(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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The U.S. Environmental Protection Agency wishes to acknowledge the cooperation and support efforts of the Pennsylvania Department of Environmental Resources(PADER), the PADER Region I Office, the Pennsylvania Department of Health, Bureau of Epidemiology, the Delaware County Commissioners, Chester City Council, Mayor Barbara Bohannon-Shepard, Chester Citizens Concerned for Quality Living, Public Interest Law Center of Philadelphia, Delaware Valley Toxics Coalition, and Pacific Environmental Services Inc.

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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(μg/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[1] 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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[1] target screening risk range: within the EPA Superfund program defines acceptable cancer risks as those which do not exceed the established range of 1E-06 to 1E-04. This range corresponds to an additional cancer risk of 1 in one million(1E-06) to 1 in 10,000(1E-04) from exposure to a given chemical. The lower, more conservative -- and more protective -- end of this range is 1E-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[2].

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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[2] 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[3] 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 1.1E-5 to 6.6E-5[4]. 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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[3] cancer causing

[4] 1.1E-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 (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

	CANCER RISK	NON–CANCER RISK
DRINKING WATER ADULT		
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–02
TOTAL RISK FROM ALL SOURCES (1991–ED– 1 YEAR)	3.12E–06	0.00E+00
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

			CANCER RISK	NON–CANCER RISK
DRINKING WATER ADULT				
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	0.00E+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
WQN0162	Manganese	0.6727	0.17	N/A
	TOTAL	0.67	0.17	N/A
MONROE 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 Mass 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	Foamex L.P.	Eddyston e	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.

CHESTER RISK PROJECT

TABLE 4-28

1992 TRI FOR REGION III
DELAWARE CO., PA

Chemical Name	Facility ID#	TRI TRANSFERS: POTW Transfers (lb/yr)	POTW Chronic Index	Offsite Transfers (lb/yr)	Offsite Chronic Index	TRI TOTALS: Total Releases and Transfers (lb/yr)	Total Chronic Index	Total Releases and Transfers Sums	Total Chronic Index Sums
TRICHLOROETHYLENE	19013BNGHLINDUS	0	0	15950	15864654	24600	24468370		
ACETONE	19013BNGHLINDUS	0	0	29000	5141683	81000	14361252		
METHYL ISOBUTYL KETONE	19013BNGHLINDUS	0	0	2550	904227	43900	15531429	261750	61820924
SULFURIC ACID	19013SCTFM1500E	0	0	0	0	0	0		
TOLUENEDIISOCYANATE (MIXED ISC	19013SCTFM1500E	0	0	750	0	806	0		
DICHLOROMETHANE	19013SCTFM1500E	0	0	0	0	33642	39795173	34448	39795173
HYDROCHLORIC ACID	19013SCTTPFRONT	0	0	0	0	53000	0		
SULFURIC ACID	19013SCTTPFRONT	0	0	770	0	110770	0		
BUTYL BENZYL PHTHALATE	19013SCTTPFRONT	10000	888497	10	896	76310	6764856		
CHLOROFORM	19013SCTTPFRONT	500	1248908	0	0	14800	36964724	254880	43729583
SULFURIC ACID	19013WTCCR3300W	4	0	0	0	4	0		
METHANOL	19013WTCCR3300W	6700	237581	0	0	263088	9328099		
2-METHOXYETHANOL	19013WTCCR3300W	20120	356726419	0	0	510779	9056091683	773869	9065410692
CHLORINE	19061SNRFNGREEN	0	0	0	0	0	0		
CRESOL (MIXED ISOMERS)	19061SNRFNGREEN	0	0	0	0	0	0		
ETHYLENE GLYCOL	19061SNRFNGREEN	0	0	0	0	0	0		
PHENOL	19061SNRFNGREEN	44000	1300196	0	0	44000	1300196		
SULFURIC ACID	19061SNRFNGREEN	0	0	0	0	0	0		
1,3-BUTADIENE	19061SNRFNGREEN	0	0	0	0	120	0		
CYCLOHEXANE	19061SNRFNGREEN	0	0	0	0	2550	0		
1,2,4-TRIMETHYLBENZENE	19061SNRFNGREEN	0	0	0	0	4996	0		
AMMONIA	19061SNRFNGREEN	320000	0	0	0	329300	0		
PROPYLENE	19061SNRFNGREEN	0	0	0	0	45000	0		
ETHYLENE	19061SNRFNGREEN	0	0	0	0	46000	0		
ZINC COMPOUNDS	19061SNRFNGREEN	7300	431429	730	43143	8300	490528		
METHANOL	19061SNRFNGREEN	76000	2694951	0	0	82800	2936079		
XYLENE (MIXED ISOMERS)	19061SNRFNGREEN	29000	257084	0	0	58700	520239		
ETHYLBENZENE	19061SNRFNGREEN	2900	496439	0	0	6020	1067342		
TOLUENE	19061SNRFNGREEN	63000	5584932	0	0	101800	9024540		
CHROMIUM COMPOUNDS	19061SNRFNGREEN	9400	33332290	490	1737534	11190	39679609		
ANTIMONY COMPOUNDS	19061SNRFNGREEN	460	20389432	10690	482697652	11750	520817025		
METHYL TERT-BUTYL ETHER	19061SNRFNGREEN	6900	24467319	0	0	21100	74820352		
BENZENE	19061SNRFNGREEN	29000	149109751	0	0	83900	431397041		
ETHYLENE OXIDE	19061SNRFNGREEN	0	0	0	0	110400	16770950232	968926	17853002183

CHESTER RISK PROJECT

TABLE 4-28

1992 TRI FOR REGION III
DELAWARE CO., PA

Chemical Name	Facility ID#	TRI TRANSFERS: POTW Transfers (lb/yr)	POTW Chronic Index	Offsite Transfers (lb/yr)	Offsite Chronic Index	TRI TOTALS: Total Releases and Transfers (lb/yr)	Total Chronic Index	Total Releases and Transfers Sums	Total Chronic Index Sums
XYLENE (MIXED ISOMERS)	19014ZNTHP200CO	0	0	500	4432	26250	232705		
TOLUENE	19014ZNTHP200CO	0	0	500	44325	20750	1839491	47000	2072197
ETHYLENE GLYCOL	19032MZRCH1830C	0	0	2000	17730	2000	17730		
DIETHANOLAMINE	19032MZRCH1830C	7	0	727	0	791	0		
DIETHYL SULFATE	19032MZRCH1830C	0	0	0	0	234	0		
GLYCOL ETHERS	19032MZRCH1830C	6779	120191272	6779	120191272	13560	240772603		
CHLOROMETHANE	19032MZRCH1830C	0	0	0	0	583	456876		
BENZYL CHLORIDE	19032MZRCH1830C	0	0	0	0	211	4261020	17399	245508229
DECABROMODIPHENYL OXIDE	19013TRSCQ800WF	6	0	3000	5318982	6000	10637965	6000	10637965
XYLENE (MIXED ISOMERS)	19050JLNBS300EB	0	0	4000	35460	26268	232847		
TOLUENE	19050JLNBS300EB	0	0	12322	1092342	98864	8764265	125130	8997112
HYDROCHLORIC ACID	19032THBLL1640D	0	0	0	0	750	0		
HYDROGEN FLUORIDE	19032THBLL1640D	0	0	0	0	750	0		
PHOSPHORIC ACID	19032THBLL1640D	0	0	0	0	750	0		
GLYCOL ETHERS	19032THBLL1640D	250	4432485	0	0	1000	17729941	3250	17729941
1,1,1-TRICHLOROETHANE	19016TLDYN4THTO	0	0	0	0	111255	21917162	111255	21917162
DIETHANOLAMINE	19061BPLCMPOSTR	0	0	0	0	0	0		
NICKEL	19061BPLCMPOSTR	0	0	0	0	0	0		
PHOSPHORIC ACID	19061BPLCMPOSTR	0	0	0	0	0	0		
SULFURIC ACID	19061BPLCMPOSTR	0	0	0	0	0	0		
1,2,4-TRIMETHYLBENZENE	19061BPLCMPOSTR	0	0	0	0	5	0		
CYCLOHEXANE	19061BPLCMPOSTR	0	0	0	0	415	0		
HYDROGEN FLUORIDE	19061BPLCMPOSTR	0	0	0	0	645	0		
ETHYLENE	19061BPLCMPOSTR	0	0	0	0	1267	0		
PROPYLENE	19061BPLCMPOSTR	0	0	0	0	4483	0		
AMMONIA	19061BPLCMPOSTR	0	0	0	0	84531	0		
METHANOL	19061BPLCMPOSTR	0	0	0	0	290	10283		
XYLENE (MIXED ISOMERS)	19061BPLCMPOSTR	0	0	0	0	4899	43341		
ETHYLBENZENE	19061BPLCMPOSTR	0	0	0	0	593	105139		
TETRACHLOROETHYLENE	19061BPLCMPOSTR	0	0	0	0	45	291374		
TOLUENE	19061BPLCMPOSTR	0	0	0	0	4889	433408		
1,2-DICHLOROETHANE	19061BPLCMPOSTR	0	0	0	0	133	1437722		
NAPHTHALENE	19061BPLCMPOSTR	0	0	0	0	668	2060900		
METHYL TERT-BUTYL ETHER	19061BPLCMPOSTR	0	0	0	0	2982	10574137		
BENZENE	19061BPLCMPOSTR	0	0	0	0	3059	15723261	108893	31579555
SULFURIC ACID	19013BNGHLINDUS	0	0	750	0	1000	0		
METHYL ETHYL KETONE	19013BNGHLINDUS	0	0	16550	489051	40600	1205636		
TOLUENE	19013BNGHLINDUS	0	0	12550	1112554	70550	6254237		

CHESTER RISK PROJECT

TABLE 4-28

1992 TRI FOR REGION III
DELAWARE CO., PA

Chemical Name	Facility ID#	*TRI TRANSFERS:* POTW Transfers (lb/yr)	POTW Chronic Index	Offsite Transfers (lb/yr)	Offsite Chronic Index	*TRI TOTALS:* Total Releases and Transfers (lb/yr)	Total Chronic Index	Total Releases and Transfers Sums	Total Chronic Index Sums
CHROMIUM	19013PNNSY100BE	0	0	18150	0	18150	0		
NICKEL	19013PNNSY100BE	0	0	11550	10239041	11550	10239041	29700	10239041
SULFURIC ACID	19013NRTHM1200W	0	0	0	0	0	0		
AMMONIA	19013NRTHM1200W	0	0	0	0	1700	0	1700	0
PHOSPHORIC ACID	19331CNCRDCONCH	0	0	0	0	0	0		
AMMONIA	19331CNCRDCONCH	0	0	0	0	5045	0	5045	0
ETHYLENE	19061PSLNPBLUEB	0	0	0	0	9100	0		
PROPYLENE	19061PSLNPBLUEB	0	0	0	0	61100	0	70200	0
CHROMIUM COMPOUNDS	19013THPQCFRONT	0	0	147530	523139648	147535	523157378	147535	523157378
FORMALDEHYDE	19050HYDRL520CO	0	0	0	0	619	54874	619	54874
NAPHTHALENE	19061CNGLMRIDGE	0	0	7400	32800391	7410	32844716		
BUTYL BENZYL PHTHALATE	19061CNGLMRIDGE	5	443	52100	4618650	52610	4663861	60020	37508577
FREON 113	19014MCGND9CROZ	0	0	0	0	750	443		
1,1,1-TRICHLOROETHANE	19014MCGND9CROZ	0	0	6100	1201096	7100	1398695	7850	1399139
COPPER COMPOUNDS	19013HRCST651E9	0	0	0	0	103	365237	103	365237
1,1,1-TRICHLOROETHANE	19015RBNDS2RACE	0	0	0	0	1100	216699		
ACETONE	19015RBNDS2RACE	0	0	19688	3490671	21388	3792088	22488	4008779
XYLENE (MIXED ISOMERS)	19023SNTRY237MI	0	0	16435	136631	16535	173177		
TOLUENE	19023SNTRY237MI	0	0	8597	762122	14697	1302985	34232	1476062
METHANOL	19014CSTMC8CROZ	0	0	0	0	16528	586081	16528	586081
DIBUTYL PHTHALATE	19029SSCHM48POW	0	0	600	106380	600	106380		
METHYL METHACRYLATE	19029SSCHM48POW	0	0	3209	709199	6165	1366314	6765	1472693
TOLUENE	19014NTRNT11CRO	0	0	4201	372417	15779	1398804	15779	1398804
1,1,1-TRICHLOROETHANE	19018LTTNSMARPL	0	0	8050	1585845	13900	2738291	13900	2738291
NICKEL	19018BCHNNPENNJ	5	4432	0	0	5	4432		
TOLUENE	19018BCHNNPENNJ	0	0	0	0	1002	88827		
1,1,1-TRICHLOROETHANE	19018BCHNNPENNJ	0	0	3136	617790	11400	2245793	12407	2339052
N-BUTYL ALCOHOL	19014ZNTHP200CO	0	0	0	0	0	0		

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 Sums	Onsite Total Chronic Index Sums
TRICHLOROETHYLENE	19013BNGHLINDUS	250	246662	8400	8355053	0	0	0	0	8650	8603715		
ACETONE	19013BNGHLINDUS	12000	2127593	40000	7091977	0	0	0	0	52000	9219569		
METHYL ISOBUTYL KETONE	19013BNGHLINDUS	250	69650	41000	14538552	0	0	0	0	41250	14607202	184400	38308755
SULFURIC ACID	19013SCTFM1500E	0	0	0	0	0	0	0	0	0	0		
TOLUENEDIISOCYANATE (MIXED ISC	19013SCTFM1500E	5	0	151	0	0	0	0	0	156	0		
DICHLOROMETHANE	19013SCTFM1500E	33532	39782309	10	11864	0	0	0	0	33542	39795173	33698	39795173
HYDROCHLORIC ACID	19013SCTTPFRONT	0	0	53000	0	0	0	0	0	53000	0		
SULFURIC ACID	19013SCTTPFRONT	0	0	110000	0	0	0	0	0	110000	0		
BUTYL BENZYL PHTHALATE	19013SCTTPFRONT	7300	647143	59000	5230333	0	0	0	0	66300	5877476		
CHLOROFORM	19013SCTTPFRONT	6900	16993792	7500	18732123	0	0	0	0	14300	35715915	243600	41593391
SULFURIC ACID	19013WTCCR3300W	0	0	0	0	0	0	0	0	0	0		
METHANOL	19013WTCCR3300W	207599	7361436	48787	1729981	0	0	0	0	256386	9091417		
2-METHOXYETHANOL	19013WTCCR3300W	352094	6242605849	138565	2456749315	0	0	0	0	490659	8699355264	747045	8708446682
CHLORINE	19061SNRFNGREEN	0	0	0	0	0	0	0	0	0	0		
CRESOL (MIXED ISOMERS)	19061SNRFNGREEN	0	0	0	0	0	0	0	0	0	0		
ETHYLENE GLYCOL	19061SNRFNGREEN	0	0	0	0	0	0	0	0	0	0		
PHENOL	19061SNRFNGREEN	0	0	0	0	0	0	0	0	0	0		
SULFURIC ACID	19061SNRFNGREEN	0	0	0	0	0	0	0	0	0	0		
1,3-BUTADIENE	19061SNRFNGREEN	120	0	0	0	0	0	0	0	120	0		
CYCLOHEXANE	19061SNRFNGREEN	1600	0	950	0	0	0	0	0	2550	0		
1,2,4-TRIMETHYLBENZENE	19061SNRFNGREEN	4900	0	96	0	0	0	0	0	4996	0		
AMMONIA	19061SNRFNGREEN	9300	0	0	0	0	0	0	0	9300	0		
PROPYLENE	19061SNRFNGREEN	33000	0	12000	0	0	0	0	0	45000	0		
ETHYLENE	19061SNRFNGREEN	46000	0	0	0	0	0	0	0	46000	0		
ZINC COMPOUNDS	19061SNRFNGREEN	0	0	270	15957	0	0	0	0	270	15957		
METHANOL	19061SNRFNGREEN	5700	202121	1100	39006	0	0	0	0	6900	241127		
XYLENE (MIXED ISOMERS)	19061SNRFNGREEN	29000	257084	1700	15070	0	0	0	0	30700	272155		
ETHYLBENZENE	19061SNRFNGREEN	3000	531899	220	39006	0	0	0	0	3220	570904		
TOLUENE	19061SNRFNGREEN	31000	2748141	7800	691468	0	0	0	0	38900	3439609		
CHROMIUM COMPOUNDS	19061SNRFNGREEN	0	0	1300	4609785	0	0	0	0	1300	4609785		
ANTIMONY COMPOUNDS	19061SNRFNGREEN	0	0	400	17720941	0	0	0	0	400	17720941		
METHYL TERT-BUTYL ETHER	19061SNRFNGREEN	4800	17020744	9400	33332290	0	0	0	0	14200	50353033		
BENZENE	19061SNRFNGREEN	51000	262225734	3900	20052556	0	0	0	0	54900	282278290		
ETHYLENE OXIDE	19061SNRFNGREEN	110000	16710185920	400	60764312	0	0	0	0	110400	16770950232	368956	17130461033

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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 Sums	Onsite Total Chronic Index Sums
XYLENE (MIXED ISOMERS)	19014ZNTHP200CO	250	2216	25500	226057	0	0	0	0	25750	228273		
TOLUENE	19014ZNTHP200CO	250	22162	20000	1772994	0	0	0	0	20250	1795157	46000	2023430
ETHYLENE GLYCOL	19032MZRCH1830C	0	0	0	0	0	0	0	0	0	0		
DIETHANOLAMINE	19032MZRCH1830C	57	0	0	0	0	0	0	0	57	0		
DIETHYL SULFATE	19032MZRCH1830C	234	0	0	0	0	0	0	0	234	0		
GLYCOL ETHERS	19032MZRCH1830C	22	399059	0	0	0	0	0	0	22	399059		
CHLOROMETHANE	19032MZRCH1830C	5	3918	578	452957	0	0	0	0	583	456876		
BENZYL CHLORIDE	19032MZRCH1830C	211	4261020	0	0	0	0	0	0	211	4261020	1107	5107955
DECABROMODIPHENYL OXIDE	19013TRSCQ800WF	3000	5318982	0	0	0	0	0	0	3000	5318982	3000	5318982
XYLENE (MIXED ISOMERS)	19050JLNBS300EB	16779	166475	5487	30912	0	0	0	0	22266	197387		
TOLUENE	19050JLNBS300EB	72967	6470278	13555	1201647	0	0	0	0	86542	7671923	108808	7869310
HYDROCHLORIC ACID	19032THBLL1640D	250	0	250	0	0	0	250	0	750	0		
HYDROGEN FLUORIDE	19032THBLL1640D	250	0	250	0	0	0	250	0	750	0		
PHOSPHORIC ACID	19032THBLL1640D	250	0	250	0	0	0	250	0	750	0		
GLYCOL ETHERS	19032THBLL1640D	250	4432485	250	4432485	0	0	250	4432485	750	13297456	3000	13297456
1,1,1-TRICHLOROETHANE	19016TLDYN4THTO	22251	4383432	89004	17533730	0	0	0	0	111255	21917162	111255	21917162
DIETHANOLAMINE	19061BPLCMPOSTR	0	0	0	0	0	0	0	0	0	0		
NICKEL	19061BPLCMPOSTR	0	0	0	0	0	0	0	0	0	0		
PHOSPHORIC ACID	19061BPLCMPOSTR	0	0	0	0	0	0	0	0	0	0		
SULFURIC ACID	19061BPLCMPOSTR	0	0	0	0	0	0	0	0	0	0		
1,2,4-TRIMETHYLBENZENE	19061BPLCMPOSTR	0	0	5	0	0	0	0	0	5	0		
CYCLOHEXANE	19061BPLCMPOSTR	392	0	33	0	0	0	0	0	415	0		
HYDROGEN FLUORIDE	19061BPLCMPOSTR	045	0	0	0	0	0	0	0	045	0		
ETHYLENE	19061BPLCMPOSTR	114	0	1153	0	0	0	0	0	1267	0		
PROPYLENE	19061BPLCMPOSTR	1197	0	3296	0	0	0	0	0	4493	0		
AMMONIA	19061BPLCMPOSTR	79	0	17480	0	66972	0	0	0	84531	0		
METHANOL	19061BPLCMPOSTR	0	0	290	10283	0	0	0	0	290	10283		
XYLENE (MIXED ISOMERS)	19061BPLCMPOSTR	4406	39059	483	4202	0	0	0	0	4889	43341		
ETHYLBENZENE	19061BPLCMPOSTR	581	103011	12	2128	0	0	0	0	593	105139		
TETRACHLOROETHYLENE	19061BPLCMPOSTR	45	291374	0	0	0	0	0	0	45	291374		
TOLUENE	19061BPLCMPOSTR	4406	390591	483	42818	0	0	0	0	4889	433408		
1,2-DICHLOROETHANE	19061BPLCMPOSTR	133	1437722	0	0	0	0	0	0	133	1437722		
NAPHTHALENE	19061BPLCMPOSTR	668	2960900	0	0	0	0	0	0	668	2960900		
METHYL TERT-BUTYL ETHER	19061BPLCMPOSTR	36	127656	2946	10446481	0	0	0	0	2982	10574137		
BENZENE	19061BPLCMPOSTR	2644	13594605	414	2129656	0	0	0	0	3058	15723261	108893	31579565
SULFURIC ACID	19013BNGHLINDUS	0	0	250	0	0	0	0	0	250	0		
METHYL ETHYL KETONE	19013BNGHLINDUS	250	7397	24000	709188	0	0	0	0	24250	716585		
TOLUENE	19013BNGHLINDUS	1000	68850	57000	5053033	0	0	0	0	58000	514.683		

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TRI RELEASES:

1992 TRI FOR REGION III
DELAWARE CO., PA

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 Sums	Onsite Total Chronic Index Sums
CHROMIUM	19013PNNSY100BE	0	0	0	0	0	0	0	0	0	0		
NICKEL	19013PNNSY100BE	0	0	0	0	0	0	0	0	0	0	0	0
SULFURIC ACID	19013NRTHM1200W	0	0	0	0	0	0	0	0	0	0		
AMMONIA	19013NRTHM1200W	0	0	1700	0	0	0	0	0	1700	0	1700	0
PHOSPHORIC ACID	19331CNCRDCONCH	0	0	0	0	0	0	0	0	0	0		
AMMONIA	19331CNCRDCONCH	5045	0	0	0	0	0	0	0	5045	0	5045	0
ETHYLENE	19061PSLNPBLUEB	6700	0	2400	0	0	0	0	0	9100	0		
PROPYLENE	19061PSLNPBLUEB	53000	0	8100	0	0	0	0	0	61100	0	70200	0
CHROMIUM COMPOUNDS	19013THPQCFRONT	0	0	5	17730	0	0	0	0	5	17730	5	17730
FORMALDEHYDE	19050HYDRL520CO	78	6015	541	47959	0	0	0	0	619	54974	619	54974
NAPHTHALENE	19061CNGLMRIDGE	5	22162	5	22162	0	0	0	0	10	44325		
BUTYL BENZYL PHTHALATE	19061CNGLMRIDGE	250	22162	250	22162	5	443	0	0	505	44768	515	89093
FREON 113	19014MCGND9CROZ	750	443	0	0	0	0	0	0	750	443		
1,1,1-TRICHLOROETHANE	19014MCGND9CROZ	750	147750	250	49250	0	0	0	0	1000	196999	1750	197443
COPPER COMPOUNDS	19013HRCST651E9	0	0	103	365237	0	0	0	0	103	365237	103	365237
1,1,1-TRICHLOROETHANE	19015RBNDS2RACE	1100	216699	0	0	0	0	0	0	1100	216699		
ACETONE	19015RBNDS2RACE	1700	301409	0	0	0	0	0	0	1700	301409	2800	518108
XYLENE (MIXED ISOMERS)	19023SNTRY237MI	0	0	4100	38346	0	0	0	0	4100	38346		
TOLUENE	19023SNTRY237MI	0	0	6100	540763	0	0	0	0	6100	540763	10200	577110
METHANOL	19014CSTMC8CROZ	834	29574	15694	556507	0	0	0	0	16528	586081	16528	586081
DIBUTYL PHTHALATE	19029SSCHM48POW	0	0	0	0	0	0	0	0	0	0		
METHYL METHACRYLATE	19029SSCHM48POW	2960	656008	5	1108	0	0	0	0	2965	657116	2965	657116
TOLUENE	19014NTRNT11CRO	11578	1026386	0	0	0	0	0	0	11578	1026386	11578	1026386
1,1,1-TRICHLOROETHANE	19018LTTNSMARPL	2350	462948	3500	689498	0	0	0	0	5850	1152446	5850	1152446
NICKEL	19018BCHNNPENNJ	0	0	0	0	0	0	0	0	0	0		
TOLUENE	19018BCHNNPENNJ	0	0	1002	88827	0	0	0	0	1002	88827		
1,1,1-TRICHLOROETHANE	19018BCHNNPENNJ	0	0	9264	1628003	0	0	0	0	9264	1628003	9266	1716830
N-BUTYL ALCOHOL	19014ZNTHP200CO	0	0	0	0	0	0	0	0	0	0		

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1992 TRI FOR REGION III
DELAWARE CO., PA

TOXICITY DATA:

Chemical Name	Facility ID#	Reference Dose (RfD)	Confidence Statement		Reference Dose Status	Cancer Potency (CPF)	Weight of Evidence	RfD Index Dose	CPF Index Dose
TRICHLOROETHYLENE	19013BNGHLINDUS	0				0.011	c-b2	0	1.2477725
ACETONE	19013BNGHLINDUS	0.1	low		Iris	0		7	0
METHYL ISOBUTYL KETONE	19013BNGHLINDUS	0.05			HEAST	0		3.5	0
SULFURIC ACID	19013SCTFM1500E	0				0		0	0
TOLUENEDIISOCYANATE (MIXED ISC	19013SCTFM1500E	0				0		0	0
DICHLOROMETHANE	19013SCTFM1500E	0.06	medium		Iris	0.0075	B2	4.2	1.3930355
HYDROCHLORIC ACID	19013SCTTPFRONT	0				0		0	0
SULFURIC ACID	19013SCTTPFRONT	0				0		0	0
BUTYL BENZYL PHTHALATE	19013SCTTPFRONT	0.2	low		Iris	0	C	14	0
CHLOROFORM	19013SCTTPFRONT	0.01	medium		Iris	0.0081	B2	0.7	1.7127486
SULFURIC ACID	19013WTCCR3300W	0				0		0	0
METHANOL	19013WTCCR3300W	0.5	medium		Iris	0		35	0
2-METHOXYETHANOL	19013WTCCR3300W	0.001	na		HEAST	0		0.07	0
CHLORINE	19061SNRFNGREEN	0				0		0	0
CRESOL (MIXED ISOMERS)	19061SNRFNGREEN	0				0		0	0
ETHYLENE GLYCOL	19061SNRFNGREEN	2	high		Iris	0		140	0
PHENOL	19061SNRFNGREEN	0.6	low		Iris	0		42	0
SULFURIC ACID	19061SNRFNGREEN	0				0		0	0
1,3-BUTADIENE	19061SNRFNGREEN	0				0		0	0
CYCLOHEXANE	19061SNRFNGREEN	0				0		0	0
1,2,4-TRIMETHYLBENZENE	19061SNRFNGREEN	0				0		0	0
AMMONIA	19061SNRFNGREEN	0				0		0	0
PROPYLENE	19061SNRFNGREEN	0				0		0	0
ETHYLENE	19061SNRFNGREEN	0				0		0	0
ZINC COMPOUNDS	19061SNRFNGREEN	0.3	medium		Iris	0		21	0
METHANOL	19061SNRFNGREEN	0.5	medium		Iris	0		35	0
XYLENE (MIXED ISOMERS)	19061SNRFNGREEN	2	medium		Iris	0		140	0
ETHYLBENZENE	19061SNRFNGREEN	0.1	low		Iris	0		7	0
TOLUENE	19061SNRFNGREEN	0.2	medium		Iris	0		14	0
CHROMIUM COMPOUNDS	19061SNRFNGREEN	0.005	low		Iris	0		0.35	0
ANTIMONY COMPOUNDS	19061SNRFNGREEN	0.0004	low		Iris	0		0.028	0
METHYL TERT-BUTYL ETHER	19061SNRFNGREEN	0.005	na			0		0.35	0
BENZENE	19061SNRFNGREEN	0				0.029	A	0	0.2413794
ETHYLENE OXIDE	19061SNRFNGREEN	0				1.02	B1	0	0.0081699

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1992 TRI FOR REGION III
DELAWARE CO., PA

TOXICITY DATA:

Chemical Name	Facility ID#	Reference Dose (RfD)	Confidence Statement	Reference Dose Status	Cancer Potency (CPF)	Weight of Evidence	RfD Index Dose	CPF Index Dose
XYLENE (MIXED ISOMERS)	19014ZNTHP200CO	2	medium	Iris	0		140	0
TOLUENE	19014ZNTHP200CO	0.2	medium	Iris	0		14	0
ETHYLENE GLYCOL	19032MZRCH1830C	2	high	Iris	0		140	0
DIETHANOLAMINE	19032MZRCH1830C	0			0		0	0
DIETHYL SULFATE	19032MZRCH1830C	0			0		0	0
GLYCOL ETHERS	19032MZRCH1830C	0.001	na	HEAST	0		0.07	0
CHLOROMETHANE	19032MZRCH1830C	0			0.013	C	0	1.5837112
BENZYL CHLORIDE	19032MZRCH1830C	0			0.17	B2	0	0.0614574
DECABROMODIPHENYL OXIDE	19013TRSCQ800WF	0.01	low	Iris	0		0.7	0
XYLENE (MIXED ISOMERS)	19050JLNBS300EB	2	medium	Iris	0		140	0
TOLUENE	19050JLNBS300EB	0.2	medium	Iris	0		14	0
HYDROCHLORIC ACID	19032THBLL1640D	0			0		0	0
HYDROGEN FLUORIDE	19032THBLL1640D	0			0		0	0
PHOSPHORIC ACID	19032THBLL1640D	0			0		0	0
GLYCOL ETHERS	19032THBLL1640D	0.001	na	HEAST	0		0.07	0
1,1,1-TRICHLOROETHANE	19016TLDYN4THTO	0.09	na	w/d from Iris and heast	0		6.3	0
DIETHANOLAMINE	19061BPLCMPOSTR	0			0		0	0
NICKEL	19061BPLCMPOSTR	0.02	medium	Iris	0		1.4	0
PHOSPHORIC ACID	19061BPLCMPOSTR	0			0		0	0
SULFURIC ACID	19061BPLCMPOSTR	0			0		0	0
1,2,4-TRIMETHYLBENZENE	19061BPLCMPOSTR	0			0		0	0
CYCLOHEXANE	19061BPLCMPOSTR	0			0		0	0
HYDROGEN FLUORIDE	19061BPLCMPOSTR	0			0		0	0
ETHYLENE	19061BPLCMPOSTR	0			0		0	0
PROPYLENE	19061BPLCMPOSTR	0			0		0	0
AMMONIA	19061BPLCMPOSTR	0			0		0	0
METHANOL	19061BPLCMPOSTR	0.5	medium	Iris	0		35	0
XYLENE (MIXED ISOMERS)	19061BPLCMPOSTR	2	medium	Iris	0		140	0
ETHYLBENZENE	19061BPLCMPOSTR	0.1	low	Iris	0		7	0
TETRACHLOROETHYLENE	19061BPLCMPOSTR	0.01	medium	Iris	0.052	c-b2	0.7	0.2639519
TOLUENE	19061BPLCMPOSTR	0.2	medium	Iris	0		14	0
1,2-DICHLOROETHANE	19061BPLCMPOSTR	0			0.091	B2	0	0.1148106
NAPHTHALENE	19061BPLCMPOSTR	0.004	na	ECAO: Risk Assessment 2/92	0		0.28	0
METHYL TERT-BUTYL ETHER	19061BPLCMPOSTR	0.005	na		0		0.35	0
BENZENE	19061BPLCMPOSTR	0			0.029	A	0	0.2413794
SULFURIC ACID	19013BNGHLINDUS	0			0		0	0
METHYL ETHYL KETONE	19013BNGHLINDUS	0.6	low	Iris	0		42	0
TOLUENE	19013BNGHLINDUS	0.2	medium	Iris	0		14	0

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1992 TRI FOR REGION III
DELAWARE CO., PA

TOXICITY DATA:

Chemical Name	Facility ID#	Reference Dose (RfD)	Confidence Statement	Reference Dose Status	Cancer Potency (CPF)	Weight of Evidence	RfD Index Dose	CPF Index Dose
CHROMIUM	19013PNNSY100BE	0			0		0	0
NICKEL	19013PNNSY100BE	0.02	medium	iris	0		1.4	0
SULFURIC ACID	19013NRTHM1200W	0			0		0	0
AMMONIA	19013NRTHM1200W	0			0		0	0
PHOSPHORIC ACID	19331CNCRDCONCH	0			0		0	0
AMMONIA	19331CNCRDCONCH	0			0		0	0
ETHYLENE	19061PSLNPBLUEB	0			0		0	0
PROPYLENE	19061PSLNPBLUEB	0			0		0	0
CHROMIUM COMPOUNDS	19013THPQCFRONT	0.005	low	iris	0		0.35	0
FORMALDEHYDE	19050HYDRL520CO	0.2	medium	iris	0		14	0
NAPHTHALENE	19061CNGLMRIDGE	0.004	na	ECAO: Risk Assessment 2/92	0		0.28	0
BUTYL BENZYL PHTHALATE	19061CNGLMRIDGE	0.2	low	iris	0	C	14	0
FREON 113	19014MCGND9CROZ	30	low	iris	0		2100	0
1,1,1-TRICHLOROETHANE	19014MCGND9CROZ	0.09	na	w/d from iris and heast	0		6.3	0
COPPER COMPOUNDS	19013HRCST651E9	0.005	medium	iris	0		0.35	0
1,1,1-TRICHLOROETHANE	19015RBNDS2RACE	0.09	na	w/d from iris and heast	0		6.3	0
ACETONE	19015RBNDS2RACE	0.1	low	iris	0		7	0
XYLENE (MIXED ISOMERS)	19023SNTRY237MI	2	medium	iris	0		140	0
TOLUENE	19023SNTRY237MI	0.2	medium	iris	0		14	0
METHANOL	19014CSTMC8CROZ	0.5	medium	iris	0		35	0
DIBUTYL PHTHALATE	19029SSCHM48POW	0.1	low	iris	0		7	0
METHYL METHACRYLATE	19029SSCHM48POW	0.08	na	HEAST	0		5.6	0
TOLUENE	19014NTRNT11CRO	0.2	medium	iris	0		14	0
1,1,1-TRICHLOROETHANE	19016LTTNSMARPL	0.09	na	w/d from iris and heast	0		6.3	0
NICKEL	19018BCHNNPENNJ	0.02	medium	iris	0		1.4	0
TOLUENE	19018BCHNNPENNJ	0.2	medium	iris	0		14	0
1,1,1-TRICHLOROETHANE	19018BCHNNPENNJ	0.09	na	w/d from iris and heast	0		6.3	0
N-BUTYL ALCOHOL	19014ZNTHP200CO	0.1	low	iris	0		7	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	19013BNGHLINDUS	BOEING DEFENSE & SPACE GROUP	STEWART AVE. & INDUSTRIAL HWY.	19103	RIDLEY PARK	DELAWARE	395251	-751932	3721
ACETONE	19013BNGHLINDUS	BOEING DEFENSE & SPACE GROUP	STEWART AVE. & INDUSTRIAL HWY.	19103	RIDLEY PARK	DELAWARE	395251	-751932	3721
METHYL ISOBUTYL KETONE	19013BNGHLINDUS	BOEING DEFENSE & SPACE GROUP	STEWART AVE. & INDUSTRIAL HWY.	19103	RIDLEY PARK	DELAWARE	395251	-751932	3721
SULFURIC ACID	19013SCTFM1500E	FOAMEX L.P.	1500 E. 2ND ST.	19022	EDDYSTONE	DELAWARE	395119	-717006	3086
TOLUENEDIISOCYANATE (MIXED ISC	19013SCTFM1500E	FOAMEX L.P.	1500 E. 2ND ST.	19022	EDDYSTONE	DELAWARE	395119	-717006	3086
DICHLOROMETHANE	19013SCTFM1500E	FOAMEX L.P.	1500 E. 2ND ST.	19022	EDDYSTONE	DELAWARE	395119	-717006	3086
HYDROCHLORIC ACID	19013SCTTPFRONT	SCOTT PAPER CO.	FRONT & AVE. OF THE STATES	19013	CHESTER	DELAWARE	395042	-752124	2621
SULFURIC ACID	19013SCTTPFRONT	SCOTT PAPER CO.	FRONT & AVE. OF THE STATES	19013	CHESTER	DELAWARE	395042	-752124	2621
BUTYL BENZYL PHTHALATE	19013SCTTPFRONT	SCOTT PAPER CO.	FRONT & AVE. OF THE STATES	19013	CHESTER	DELAWARE	395042	-752124	2621
CHLOROFORM	19013SCTTPFRONT	SCOTT PAPER CO.	FRONT & AVE. OF THE STATES	19013	CHESTER	DELAWARE	395042	-752124	2621
SULFURIC ACID	19013WTCCR3300W	WITCO CORP.	3300 W. 4TH ST.	19061	TRAINER	DELAWARE	394948	-752400	2843
METHANOL	19013WTCCR3300W	WITCO CORP.	3300 W. 4TH ST.	19061	TRAINER	DELAWARE	394948	-752400	2843
2-METHOXYETHANOL	19013WTCCR3300W	WITCO CORP.	3300 W. 4TH ST.	19061	TRAINER	DELAWARE	394948	-752400	2843
CHLORINE	19061SNRFNGREEN	SUN REFINING & MARKETING CO.	GREEN ST. & DELAWARE AVE.	190610426	MARCUS HOOK	DELAWARE	394800	-752600	2911
CRESOL (MIXED ISOMERS)	19061SNRFNGREEN	SUN REFINING & MARKETING CO.	GREEN ST. & DELAWARE AVE.	190610426	MARCUS HOOK	DELAWARE	394800	-752600	2911
ETHYLENE GLYCOL	19061SNRFNGREEN	SUN REFINING & MARKETING CO.	GREEN ST. & DELAWARE AVE.	190610426	MARCUS HOOK	DELAWARE	394800	-752600	2911
PHENOL	19061SNRFNGREEN	SUN REFINING & MARKETING CO.	GREEN ST. & DELAWARE AVE.	190610426	MARCUS HOOK	DELAWARE	394800	-752600	2911
SULFURIC ACID	19061SNRFNGREEN	SUN REFINING & MARKETING CO.	GREEN ST. & DELAWARE AVE.	190610426	MARCUS HOOK	DELAWARE	394800	-752600	2911
1,3-BUTADIENE	19061SNRFNGREEN	SUN REFINING & MARKETING CO.	GREEN ST. & DELAWARE AVE.	190610426	MARCUS HOOK	DELAWARE	394800	-752600	2911
CYCLOHEXANE	19061SNRFNGREEN	SUN REFINING & MARKETING CO.	GREEN ST. & DELAWARE AVE.	190610426	MARCUS HOOK	DELAWARE	394800	-752600	2911
1,2,4-TRIMETHYLBENZENE	19061SNRFNGREEN	SUN REFINING & MARKETING CO.	GREEN ST. & DELAWARE AVE.	190610426	MARCUS HOOK	DELAWARE	394800	-752600	2911
AMMONIA	19061SNRFNGREEN	SUN REFINING & MARKETING CO.	GREEN ST. & DELAWARE AVE.	190610426	MARCUS HOOK	DELAWARE	394800	-752600	2911
PROPYLENE	19061SNRFNGREEN	SUN REFINING & MARKETING CO.	GREEN ST. & DELAWARE AVE.	190610426	MARCUS HOOK	DELAWARE	394800	-752600	2911
ETHYLENE	19061SNRFNGREEN	SUN REFINING & MARKETING CO.	GREEN ST. & DELAWARE AVE.	190610426	MARCUS HOOK	DELAWARE	394800	-752600	2911
ZINC COMPOUNDS	19061SNRFNGREEN	SUN REFINING & MARKETING CO.	GREEN ST. & DELAWARE AVE.	190610426	MARCUS HOOK	DELAWARE	394800	-752600	2911
METHANOL	19061SNRFNGREEN	SUN REFINING & MARKETING CO.	GREEN ST. & DELAWARE AVE.	190610426	MARCUS HOOK	DELAWARE	394800	-752600	2911
XYLENE (MIXED ISOMERS)	19061SNRFNGREEN	SUN REFINING & MARKETING CO.	GREEN ST. & DELAWARE AVE.	190610426	MARCUS HOOK	DELAWARE	394800	-752600	2911
ETHYLBENZENE	19061SNRFNGREEN	SUN REFINING & MARKETING CO.	GREEN ST. & DELAWARE AVE.	190610426	MARCUS HOOK	DELAWARE	394800	-752600	2911
TOLUENE	19061SNRFNGREEN	SUN REFINING & MARKETING CO.	GREEN ST. & DELAWARE AVE.	190610426	MARCUS HOOK	DELAWARE	394800	-752600	2911
CHROMIUM COMPOUNDS	19061SNRFNGREEN	SUN REFINING & MARKETING CO.	GREEN ST. & DELAWARE AVE.	190610426	MARCUS HOOK	DELAWARE	394800	-752600	2911
ANTIMONY COMPOUNDS	19061SNRFNGREEN	SUN REFINING & MARKETING CO.	GREEN ST. & DELAWARE AVE.	190610426	MARCUS HOOK	DELAWARE	394800	-752600	2911
METHYL TERT-BUTYL ETHER	19061SNRFNGREEN	SUN REFINING & MARKETING CO.	GREEN ST. & DELAWARE AVE.	190610426	MARCUS HOOK	DELAWARE	394800	-752600	2911
BENZENE	19061SNRFNGREEN	SUN REFINING & MARKETING CO.	GREEN ST. & DELAWARE AVE.	190610426	MARCUS HOOK	DELAWARE	394800	-752600	2911
ETHYLENE OXIDE	19061SNRFNGREEN	SUN REFINING & MARKETING CO.	GREEN ST. & DELAWARE AVE.	190610426	MARCUS HOOK	DELAWARE	394800	-752600	2911

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
XYLENE (MIXED ISOMERS)	19014ZNTHP200CO	ZENITH PRODUCTS CORP.	200 COMMERCE DR.	19014	ASTON	DELAWARE	395215	-750015	2514
TOLUENE	19014ZNTHP200CO	ZENITH PRODUCTS CORP.	200 COMMERCE DR.	19014	ASTON	DELAWARE	395215	-750015	2514
ETHYLENE GLYCOL	19032MZRCH1830C	PPG IND. INC.	1830 COLUMBIA AVE.	19032	FOLCROFT	DELAWARE	395319	-751637	2843
DIETHANOLAMINE	19032MZRCH1830C	PPG IND. INC.	1830 COLUMBIA AVE.	19032	FOLCROFT	DELAWARE	395319	-751637	2843
DIETHYL SULFATE	19032MZRCH1830C	PPG IND. INC.	1830 COLUMBIA AVE.	19032	FOLCROFT	DELAWARE	395319	-751637	2843
GLYCOL ETHERS	19032MZRCH1830C	PPG IND. INC.	1830 COLUMBIA AVE.	19032	FOLCROFT	DELAWARE	395319	-751637	2843
CHLOROMETHANE	19032MZRCH1830C	PPG IND. INC.	1830 COLUMBIA AVE.	19032	FOLCROFT	DELAWARE	395319	-751637	2843
BENZYL CHLORIDE	19032MZRCH1830C	PPG IND. INC.	1830 COLUMBIA AVE.	19032	FOLCROFT	DELAWARE	395319	-751637	2843
DECABROMODIPHENYL OXIDE	19013TRSCQ600WF	TRS ACQUISITION CORP.	600 W. FRONT ST.	19013	CHESTER	DELAWARE	395000	-752230	2952
XYLENE (MIXED ISOMERS)	19050JLNBS300EB	JULIAN B. SLEVIN CO. INC.	300 E. BALTIMORE AVE.	19050	LANSDOWNE	DELAWARE	395600	-751900	2899
TOLUENE	19050JLNBS300EB	JULIAN B. SLEVIN CO. INC.	300 E. BALTIMORE AVE.	19050	LANSDOWNE	DELAWARE	395600	-751900	2899
HYDROCHLORIC ACID	19032THBLL1640D	BULLEN COMPANIES	1640 DELMAR DR.	19032	FOLCROFT	DELAWARE	395343	-751640	2842
HYDROGEN FLUORIDE	19032THBLL1640D	BULLEN COMPANIES	1640 DELMAR DR.	19032	FOLCROFT	DELAWARE	395343	-751640	2842
PHOSPHORIC ACID	19032THBLL1640D	BULLEN COMPANIES	1640 DELMAR DR.	19032	FOLCROFT	DELAWARE	395343	-751640	2842
GLYCOL ETHERS	19032THBLL1640D	BULLEN COMPANIES	1640 DELMAR DR.	19032	FOLCROFT	DELAWARE	395343	-751640	2842
1,1,1-TRICHLOROETHANE	19016TLDYN4THTO	TELEDYNE PACKAGING	4TH & TOWNSEND STS.	19016	CHESTER	DELAWARE	395030	-752150	3499
DIETHANOLAMINE	19061BPLCMPOSTRBP	BP EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-752400	2911
NICKEL	19061BPLCMPOSTRBP	BP EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-752400	2911
PHOSPHORIC ACID	19061BPLCMPOSTRBP	BP EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-752400	2911
SULFURIC ACID	19061BPLCMPOSTRBP	BP EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-752400	2911
1,2,4-TRIMETHYLBENZENE	19061BPLCMPOSTRBP	BP EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-752400	2911
CYCLOHEXANE	19061BPLCMPOSTRBP	BP EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-752400	2911
HYDROGEN FLUORIDE	19061BPLCMPOSTRBP	BP EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-752400	2911
ETHYLENE	19061BPLCMPOSTRBP	BP EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-752400	2911
PROPYLENE	19061BPLCMPOSTRBP	BP EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-752400	2911
AMMONIA	19061BPLCMPOSTRBP	BP EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-752400	2911
METHANOL	19061BPLCMPOSTRBP	BP EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-752400	2911
XYLENE (MIXED ISOMERS)	19061BPLCMPOSTRBP	BP EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-752400	2911
ETHYLBENZENE	19061BPLCMPOSTRBP	BP EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-752400	2911
TETRACHLOROETHYLENE	19061BPLCMPOSTRBP	BP EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-752400	2911
TOLUENE	19061BPLCMPOSTRBP	BP EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-752400	2911
1,2-DICHLOROETHANE	19061BPLCMPOSTRBP	BP EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-752400	2911
NAPHTHALENE	19061BPLCMPOSTRBP	BP EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-752400	2911
METHYL TERT-BUTYL ETHER	19061BPLCMPOSTRBP	BP EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-752400	2911
BENZENE	19061BPLCMPOSTRBP	BP EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-752400	2911
SULFURIC ACID	19013BNGHLINDUS	BOEING DEFENSE & SPACE GROUP	STEWART AVE. & INDUSTRIAL HWY.	19103	RIDLEY PARK	DELAWARE	395251	-751932	3721
METHYL ETHYL KETONE	19013BNGHLINDUS	BOEING DEFENSE & SPACE GROUP	STEWART AVE. & INDUSTRIAL HWY.	19103	RIDLEY PARK	DELAWARE	395251	-751932	3721
TOLUENE	19013BNGHLINDUS	BOEING DEFENSE & SPACE GROUP	STEWART AVE. & INDUSTRIAL HWY.	19103	RIDLEY PARK	DELAWARE	395251	-751932	3721

CHESTER RISK PROJECT

TABLE 4-32

MAXIMUM CARCINOGENIC RISKS IN AIR

CHEMICAL	MAXIMUM PREDICTED CONCENTRATION (ug/m^3)	RISK-BASED LEVEL (ug/m^3)	CARCINOGENIC RISK*
chromium VI	0.0047	0.00015	3E-05
benzene	2.8	0.22	1E-05
gasoline	0.19	5.10E-05 $(ug/m^3)^{-1}$**	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 $(ug/m^3)^{-1}$**	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^3)	RISK-BASED LEVEL (ug/m^3)	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^3)	NATIONAL AMBIENT AIR QUALITY STANDARD (ug/m^3)*	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 Sums	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	619	54874	54874
25	CONGOLEUM CORP.	MARCUS HOOK	515	89093	89093
24	MCGEE INDUSTRIES INC.	ASTON	1750	197443	197443
23	HARCAST 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	31579565	31579565
6	EPSILON PRODS. CO.	MARCUS HOOK	70200	0	35738527
5	BOEING DEFENSE & SPACE GR	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	8708446682	8708446682
1	SUN REFINING & MARKETING C	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 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 C.	Pennsylvania
MALES						
All Sites	348.0	231.0	201.6	214.0	294.0	226.8
Lung, trachea, etc	127.8	79.8	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	7.8	8.3	8.0	8.8	8.3
FEMALES						
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.
rates per 100,000 population.

Source; PA Depat. of Health.

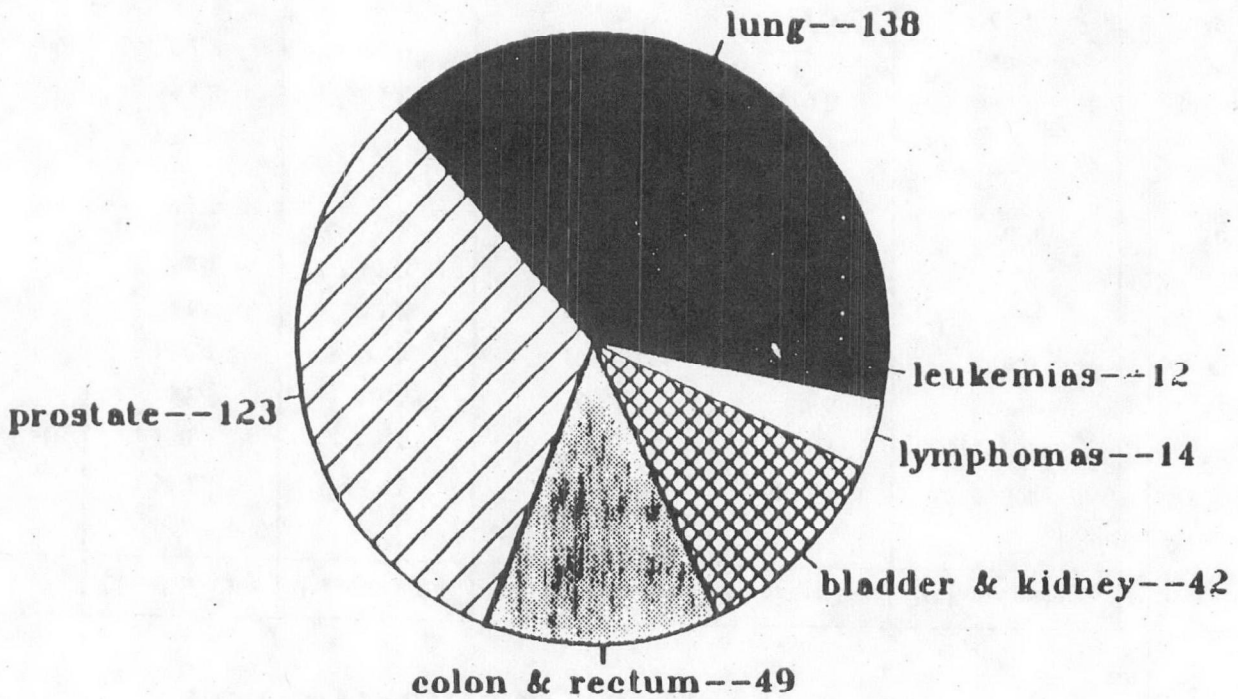
Age-adjusted cancer incidence rates for Chester City, Delaware and adjacent counties, and Pennsylvania by sex, 1987-91

	Chester City	Delaware Co.	Montgomery Co.	Chester Co.	Philadelphia C.	Pennsylvania
MALES						
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
FEMALES						
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

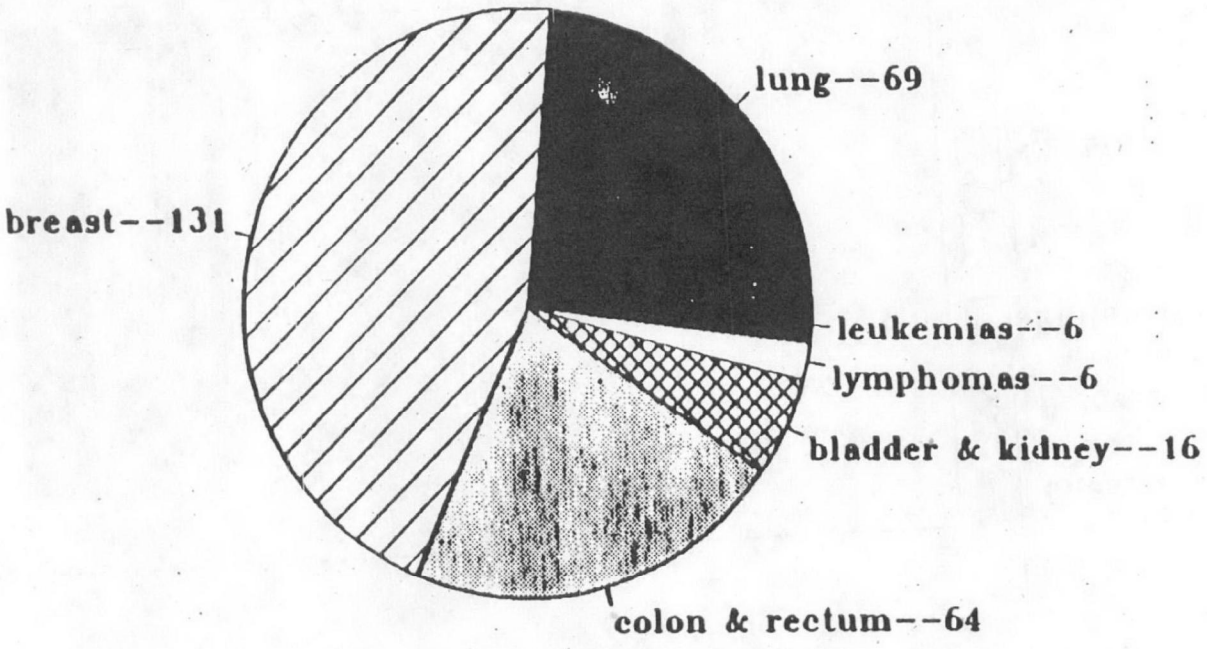


Cases = 378
72.6% of the total•

• 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

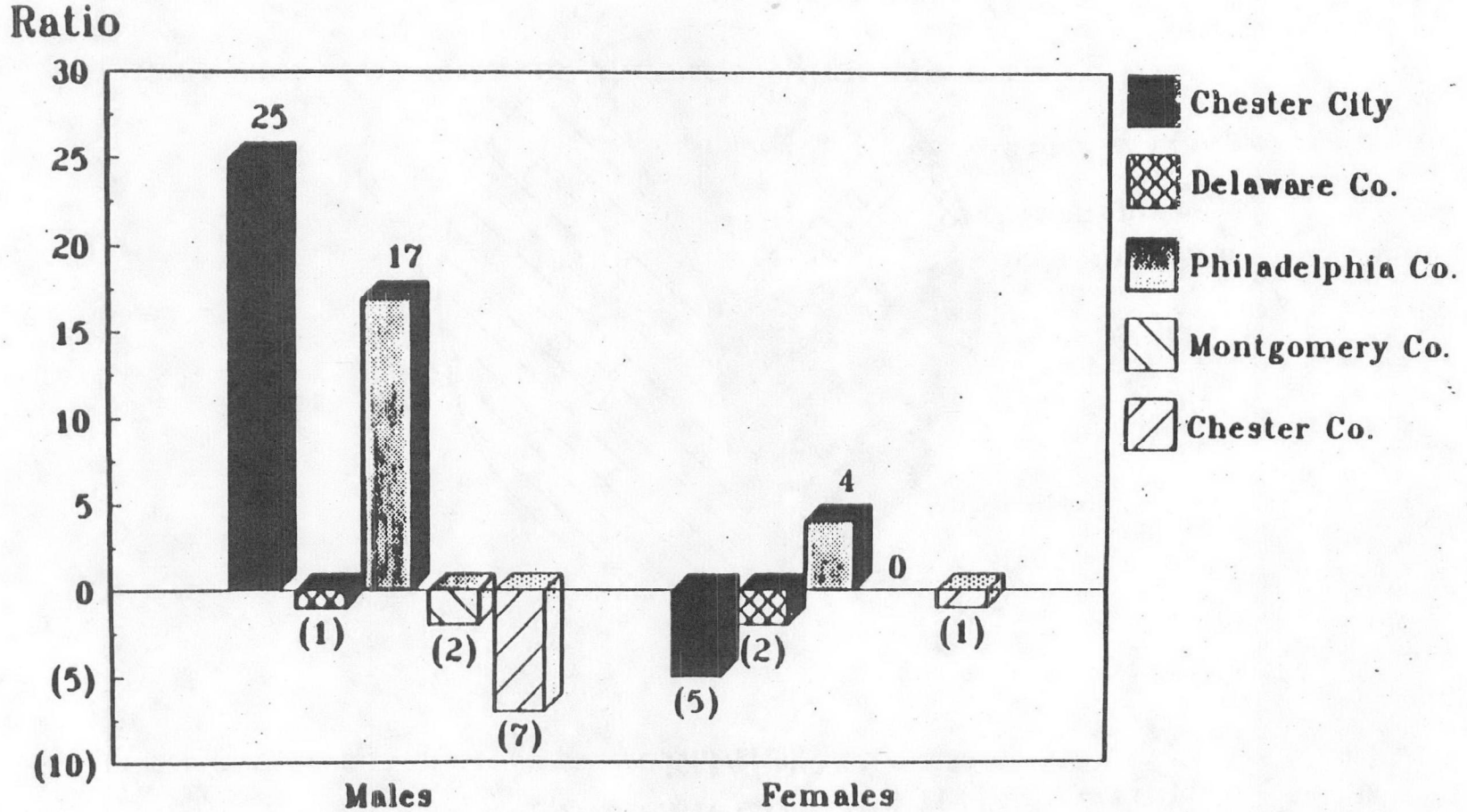


Cases = 292
60.1% of the total•

• 486 total cancers among female residents.

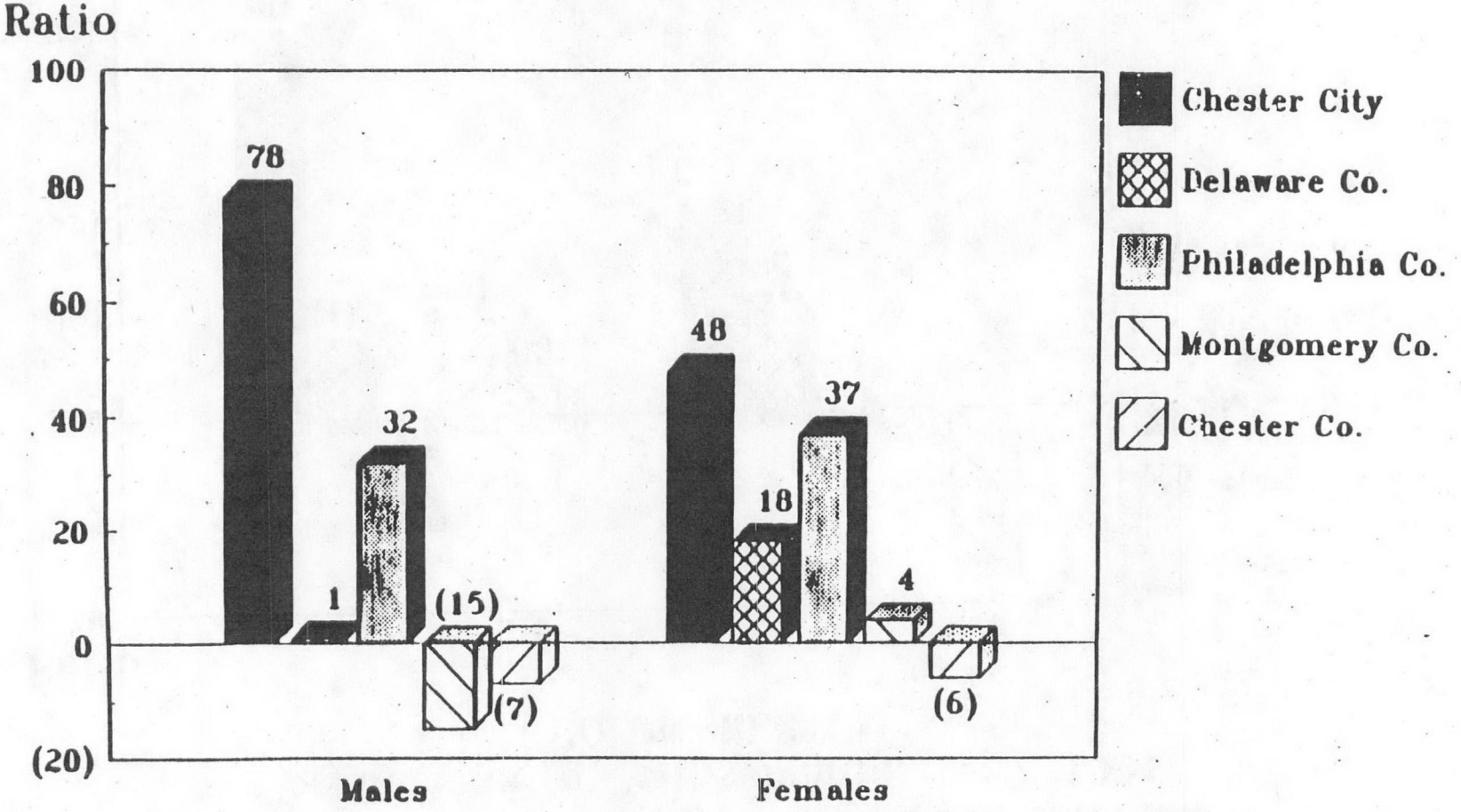
Source: PA Dep[illegible] Health

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



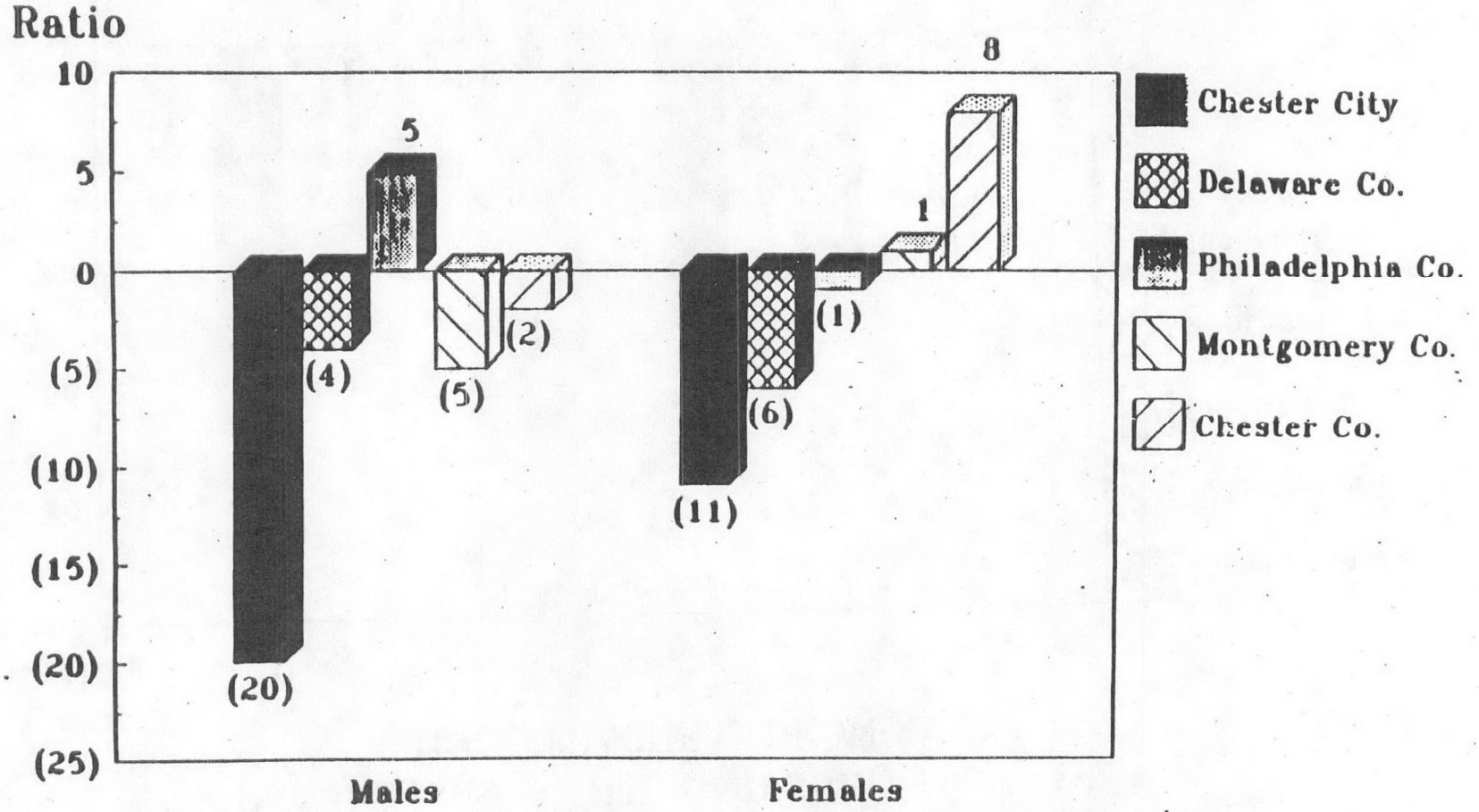
Source; PA Depat. of Health.

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



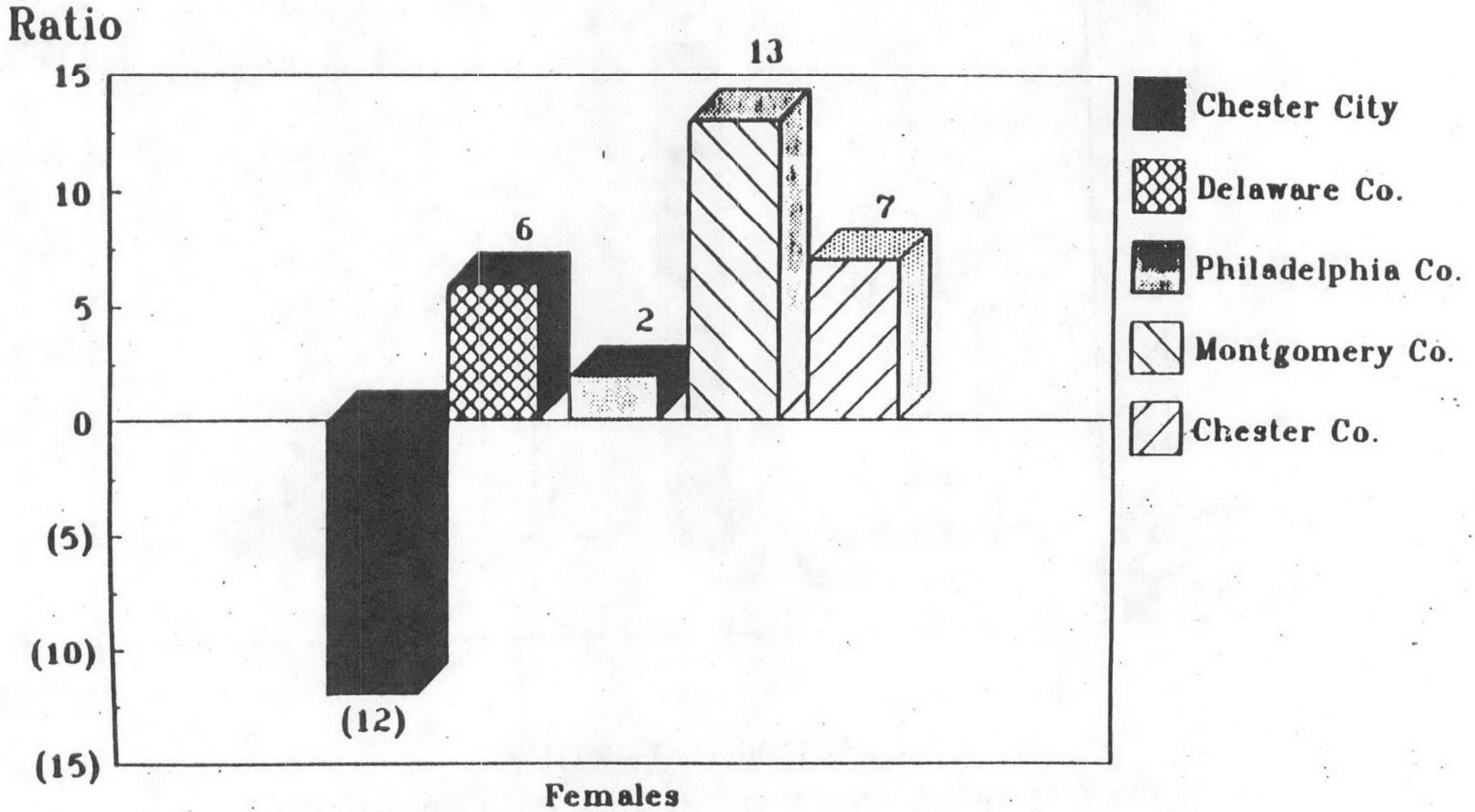
Source; PA Depat. of Health.

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



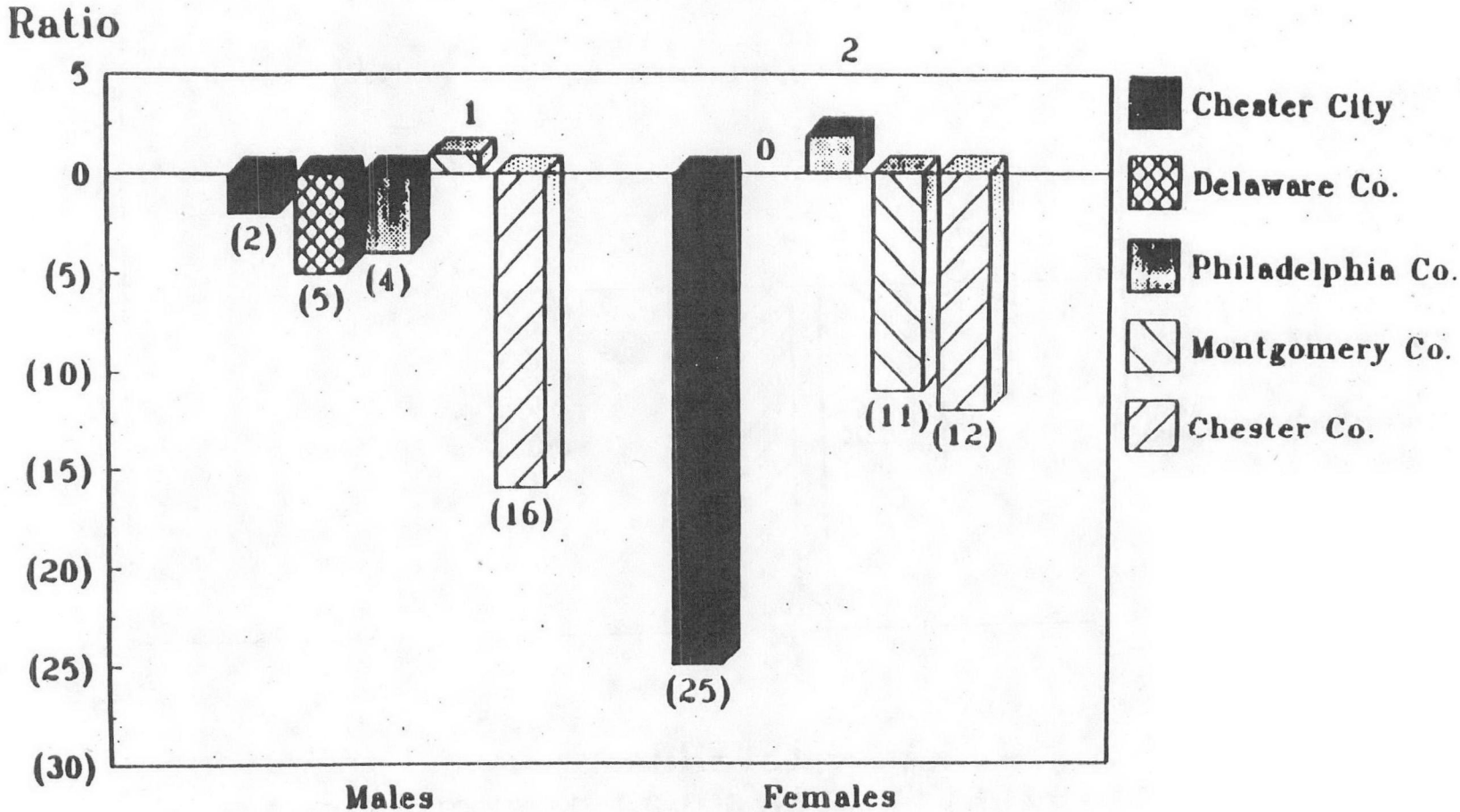
Source; PA Dept. of Health.

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



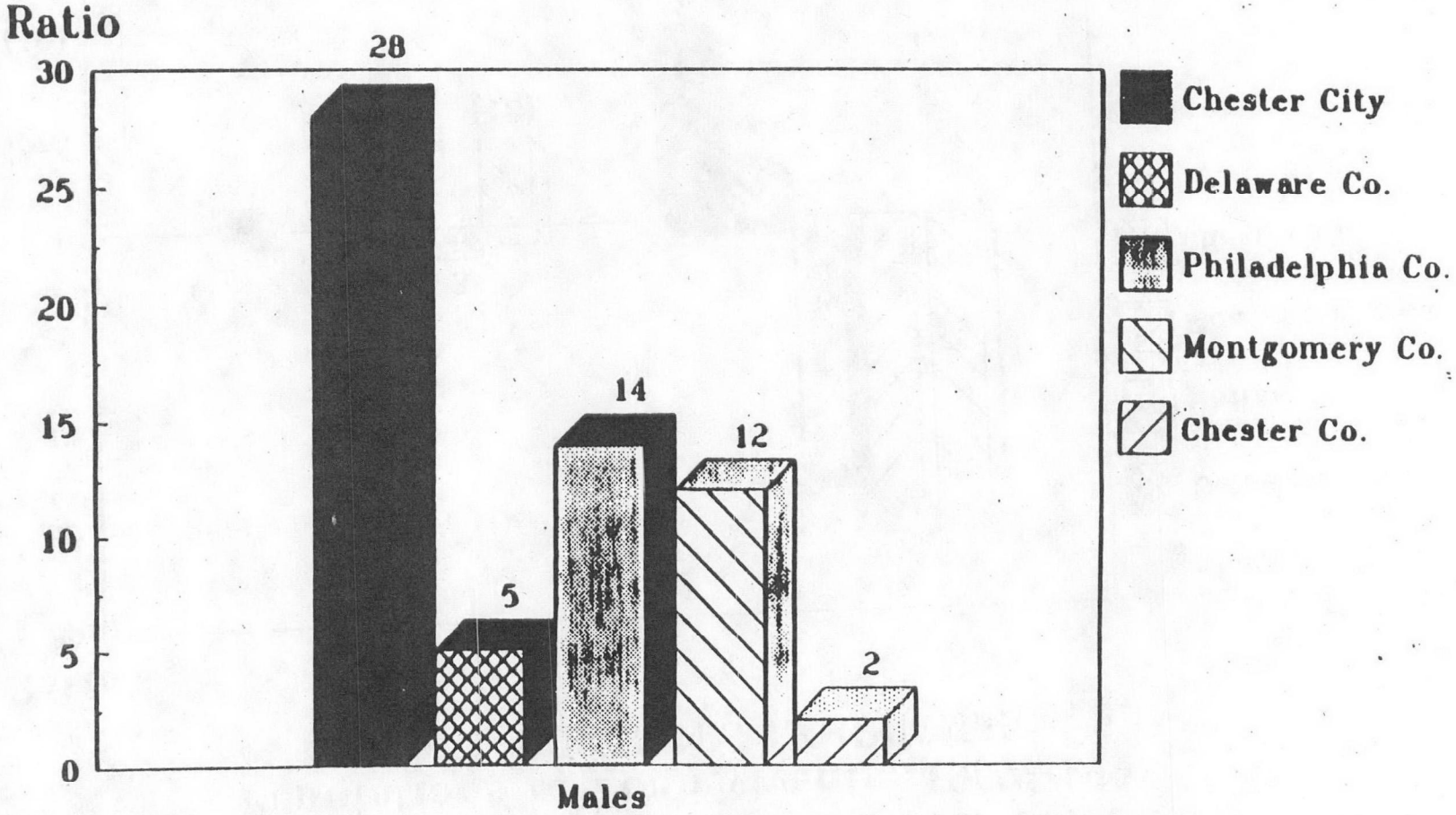
Source; PA Dept. of Health.

Ratio of Cancer Incidence Rates for Selected Populations to Pennsylvania, 1987–1991
KIDNEY/BLADDER



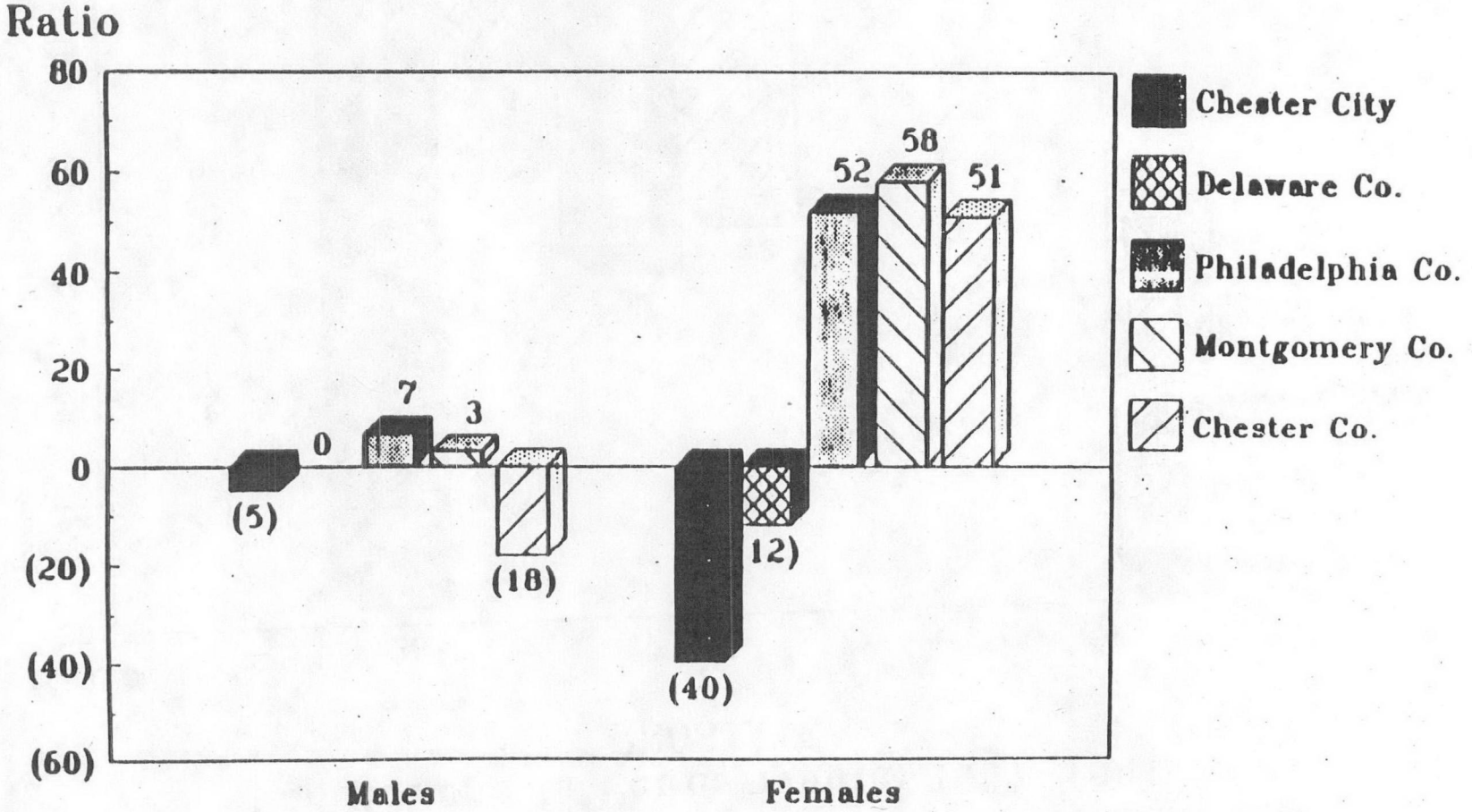
Source; PA Dept. of Health.

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



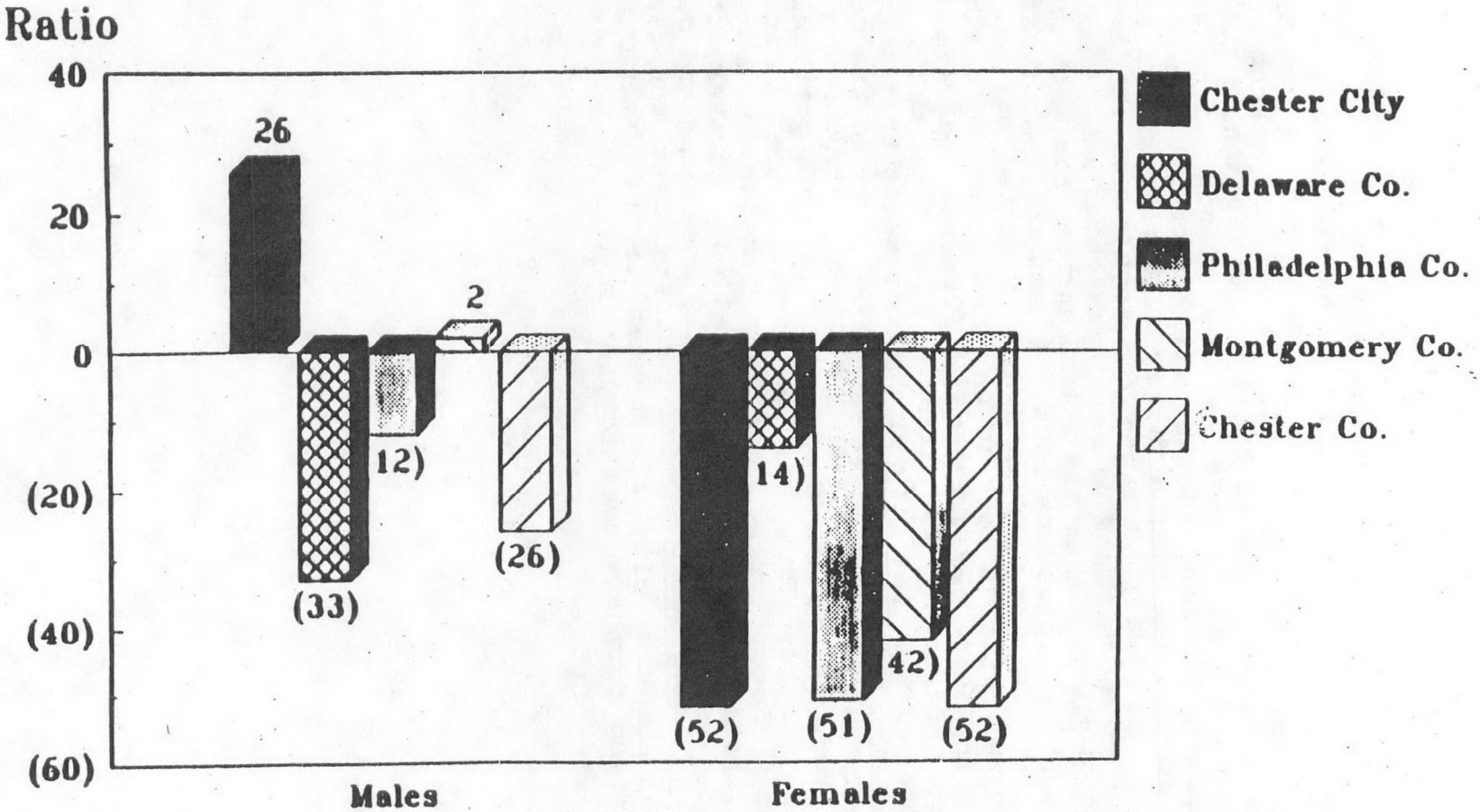
Source; PA Dept. of Health.

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



Source . Dept. of Health.

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



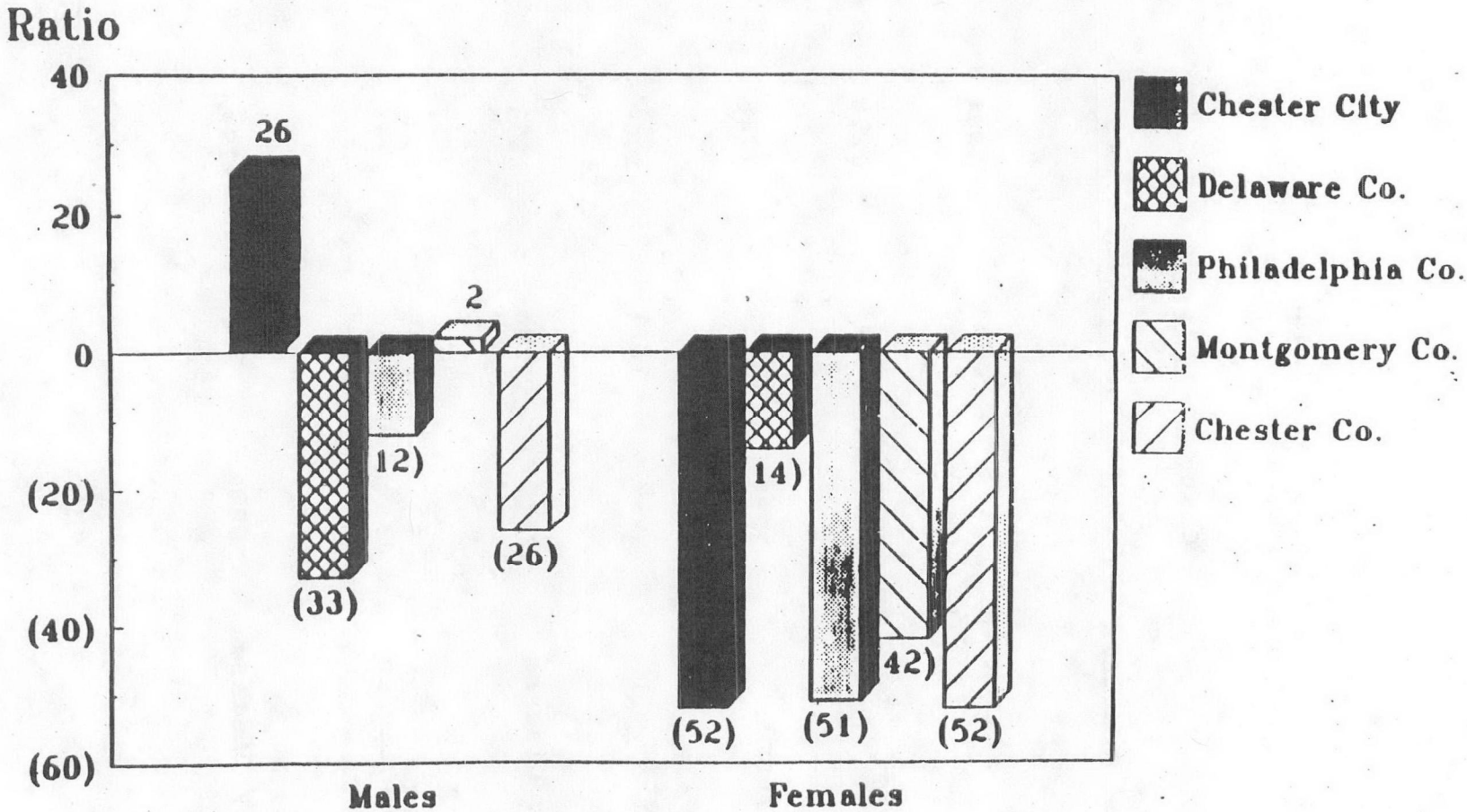
Source; PA Dept. of Health.

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 Commonweath'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 muiltitude 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%

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



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