

New York State Department of Health
Center for Environmental Health

**HUDSON RIVER PCB SITE:
Health Statistics Review
Town of Waterford
Saratoga County, New York**

March 2000

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**Prepared for the U.S. Agency for Toxic
Substances and Disease Registry**

Public Comment Release

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**HUDSON RIVER PCB SITE:
HEALTH STATISTICS REVIEW 1985-1992
TOWN OF WATERFORD
SARATOGA COUNTY, NEW YORK
Public Comment Release**

**Bureau of Environmental and Occupational Epidemiology
Division of Occupational Health and Environmental Epidemiology
New York State Department of Health
547 River Street, Room 200
Troy, New York 12180**

March 2000

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HUDSON RIVER PCB SITE: HEALTH STATISTICS REVIEW EXECUTIVE SUMMARY

Residents of the Town of Waterford were potentially exposed to polychlorinated biphenyls (PCBs) in the past from the town's drinking water supply, which is drawn from the Hudson River. The source of the PCB contamination was two capacitor plants located at Fort Edward and Hudson Falls, NY. The municipal water supply intake for the Town of Waterford is the first municipal water supply intake downstream of the two plants. Since testing began in 1974, levels of PCBs in treated drinking water have never been found to exceed state drinking water guidance values.

Several studies have linked exposure to PCBs to increased incidence of cancer and adverse birth outcomes. New York State Department of Health (NYSDOH) has conducted previous analyses of Waterford cancer data for the years 1970–1984. ATSDR recommended a review of more recent cancer incidence data. It was also recommended that birth outcomes in the community be evaluated.

The primary benefit of this health statistics review is to provide citizens with more recent information on cancer rates and to provide birth outcome data for their town. If cancer and adverse birth outcome rates are similar to those expected, some reassurance is provided. If unusual patterns of these adverse health outcomes are seen, the health statistics review provides information for the development of preventative strategies or future investigations.

Incidence of cancer by type of cancer and gender was reviewed for the period 1985–1992. This review included all cases of cancer in residents living in the Town of Waterford. Expected numbers of cases were calculated from standard rates for areas of similar population density in New York. The total number of cancer cases observed in males, females, and males and females combined was similar to the number of cases expected in the Town of Waterford.

When data for individual types of cancer were reviewed, two statistically significant results were observed. The number of thyroid cancer cases was significantly elevated in males and females combined, with 6 cases observed and only 2 cases expected. A further review confirmed a familial link between several of the thyroid cancer cases that indicates this excess incidence was likely due to genetic factors rather than the environment. There was also a significantly lower number of lymphoma cases in Waterford that may be explained by chance. No other sites of cancer showed significant excesses or deficits from the expected.

The observed numbers of low birth weight births, very low birth weight births, preterm deliveries and intrauterine growth retardation (IUGR) births were tabulated for the years 1973–1992. IUGR is defined as births at full-term gestation (≥ 37 weeks) in which the baby weighs less than 2500 grams. The expected numbers of these birth outcomes were calculated for Waterford using standard rates for New York State excluding New York

City. Major congenital malformation data were obtained for the years 1983–1992 for the Town of Waterford from the NYSDOH Congenital Malformations Registry and compared to the expected number of major malformations derived from the Registry for New York State excluding New York City.

Prevalence of all types of adverse birth outcomes studied in the Town of Waterford was within the expected range. In addition, mean birth weights in Waterford were within the normal range. Further analysis did not show any temporal clustering of any of these birth outcomes. A review of the major congenital malformation data by individual organ system did not reveal any unusual patterns.

The results of the current study are not consistent with the results of the two previous cancer incidence reviews in Waterford. The first cancer incidence review in Waterford (1970–1980) found a statistically significant increase of pancreatic cancer in males and cervical cancer in females. A statistically significant decrease of ovarian cancer was also found. The second cancer incidence review (1981–1984) found a statistically significant increase of oral cancer in males. Consistent findings across the three studies would provide greater support of a causal association between the possible exposure to PCBs and adverse health outcomes.

Limitations of this study include a population that may not have been large enough to detect increases in some of the rare health outcomes that were studied, multiple statistical testing of health outcomes and migration into and out of the study area. In addition, factors such as medical history, occupational exposures to chemicals, dietary, lifestyle, and other environmental exposures to contaminants were not examined. Other sources of PCB exposure such as the consumption of contaminated fish were also not examined. Although these may limit the interpretation of the results, this study, in conjunction with the previous two studies conducted, does give some reassurance that rates of adverse health outcomes studied in the Town of Waterford are similar to statewide averages.

HUDSON RIVER PCB SITE: HEALTH STATISTICS REVIEW

1.0 INTRODUCTION

The Agency for Toxic Substances and Disease Registry (ATSDR), in cooperation with the New York State Department of Health (NYSDOH), reviewed environmental health data for the Hudson River PCB Site in 1989 and again in 1994 (1,2). One result of these reviews was the determination that the residents of the Town of Waterford were potentially exposed to polychlorinated biphenyls (PCBs) from the town's drinking water supply that is drawn from the Hudson River. Because of this and concerns raised by the residents, two cancer incidence reviews were performed for the periods 1970-1980 and 1981-1984 (3,4). Subsequently, the ATSDR Health Activities Recommendation Panel (HARP) recommended a review of more recent cancer incidence and adverse birth outcome data for the town. This report updates the analysis of cancer data by including cancer data for the years 1985-1992, and evaluates birth outcomes which include the prevalence of low birth weight, preterm births and intrauterine growth retardation. Congenital malformation prevalence data for the years 1983-1992 were also reviewed.

1.1 Contamination of the Hudson River

The source of the PCB contamination was two General Electric (GE) plants located at Fort Edward and Hudson Falls, NY (2). PCBs were used in the manufacture of electrical capacitors at these facilities from approximately 1948 to 1977. During this period it has been estimated that GE discharged from 209,000 to over one million pounds of PCBs into the river (5). Much of the PCBs that were not dredged or washed out to sea were deposited in river sediments. As a result, the United States Environmental Protection Agency (USEPA) classified a 200 mile section of the Hudson River from Fort Edward to the Battery in New York City as a National Priorities List site in 1983, making it one of the largest Superfund sites in the country. The Upper Hudson River between Hudson Falls and the Troy Dam is the most heavily contaminated section of the river. The New York State Department of Environmental Conservation (NYSDEC) has identified 40 hot spots in this section of the river where PCB contamination in the sediments exceeds 50 parts per million (ppm) (5). In addition, there continues to be PCB seepage into the Hudson River from the GE Hudson Falls site.

In 1976, all fishing was banned on the Upper Hudson River from Hudson Falls to the Troy Dam due to high levels of PCBs in fish. Levels of PCBs were measured at over 500 ppm in some species of fish. In addition, NYSDOH issued a health advisory for consumption of fish taken below the Troy Dam (Figure 1). Although PCB levels have decreased since the 1970s, most fish species in the Hudson River between Hudson Falls and the Troy Dam still have PCB levels greater than the US Food and Drug Administration marketplace standard for PCBs in fish of 2 ppm. The health advisory for the Hudson River is continually updated based on size, species, and location of the fish.

In 1995, the state lifted the ban on fishing between the Troy Dam and Hudson Falls; however, anglers are not permitted to keep their catch (6).

Several community water systems south of Hudson Falls use the Hudson River as the primary source of drinking water. The municipal water supply intake for the Town of Waterford, however, is the only municipal water supply intake below Hudson Falls and above the Troy Dam (Figure 1).

1.2 Description of Waterford

The Town of Waterford, which includes the Village of Waterford, is located in southern Saratoga County. The town is bordered on the east by the Hudson River, on the south and west by the Mohawk River, and on the north by the Town of Halfmoon (Figures 1 and 2). The 1990 US Census estimated that the town had a population of 8,695 persons (7). Waterford is a middle-class community with 98% of the population being of white, non-Hispanic origin compared to the New York State average of 74%. The median household income in 1989 was \$33,590, slightly higher than the state median of \$32,965 (8). The town consists of the more densely populated Village of Waterford, in which 83% of the housing units were built prior to 1950, and the less densely populated surrounding town, in which only 33% of the housing units were built prior to 1950. The median price of owner-occupied homes in 1990 was \$101,300, and the median rent was \$372 per month for rental housing units.

The largest employer in Waterford in 1994 was the GE Silicone Products Division, which employed approximately 1,500 workers (9). The next largest employer was the Grand Union Company, a grocery warehouse, which employed approximately 600 workers. There were no other private employers in the town with more than 150 employees.

The Waterford Water Works supplies drinking water to the Town and Village of Waterford. The water supply of the Town of Waterford currently meets all New York State drinking water standards and is monitored regularly for contaminants. The municipal water supply system was constructed in the late 1800s and draws water from the Hudson River. The water intake is located on the north side of the village (Figure 2). Measurement of chemical contamination in the public water supply was begun in the mid-1970s; it is not known to what extent the drinking water was contaminated with PCBs or other compounds in the Waterford area before that time. Since testing began in 1974, trace levels of PCBs have been found in both the raw and treated water. In 51 samples of treated drinking water taken between 1974 and 1981, the average PCB concentration was 0.06 micrograms per liter ($\mu\text{g/L}$), with the highest value being 0.6 $\mu\text{g/L}$ (3). Numerous samples taken since then have shown the PCB levels to be slowly declining. Levels of PCBs in treated drinking water were never found to exceed the state drinking water guidance value of 1 $\mu\text{g/L}$. In 1993, the USEPA set the maximum concentration level for PCBs in drinking water at 0.5 $\mu\text{g/L}$.

The GE Silicone plant in Waterford is located approximately 1.5 miles upriver of the water intake for the Waterford drinking water supply. Over the past 20 years, numerous spills of volatile organic compounds (VOCs) have occurred at the plant. A procedure is in place that calls for the water treatment plant to be notified when chemical spills occur at the plant. The town is then able to temporarily switch to its alternate source of drinking water through an interconnection to the City of Troy's water supply. This interconnection has been in place since 1973. It is activated, on average, less than once a year and then only for a day or two at a time. Typically this is in spring under excessive runoff condition in the Hudson River. The City of Troy obtains its drinking water from the Tomhannock Reservoir.

A review of Waterford drinking water quality from 1974 to 1983 revealed the presence of VOCs in the drinking water (3). Some of the compounds detected included chloroform, chlorodibromomethane, carbon tetrachloride, dichloromethane, benzene, and toluene. None of the 164 compounds tested were found to exceed drinking water quality guidelines, except for chloroform. Trihalomethane compounds such as chloroform can be formed from the reaction of chlorine with existing organic material. In an 11 day period from August 3, 1981 to August 13, 1981 chloroform was found to exceed the Federal guideline of 100 µg/L for total trihalomethanes in four of nine samples taken. Average chloroform levels for this period were 90 µg/L. The highest value recorded was 120 µg/L. Between 1976 and 1983, the average chloroform level in the finished water was 66.3 µg/L.

Two facilities in the Town of Waterford reported environmental release data to the Toxic Release Inventory (TRI) program between 1988 and 1993 (10). These were the Mohawk Paper Mills and the GE Silicone Products Division. The Mohawk Paper Mills reported discharges of less than 500 pounds of copper per year into the Mohawk River. The Mohawk River enters the Hudson down river from the Waterford drinking water intake pipe and so it is not expected to impact the health of the Waterford residents. The GE Silicone plant, which is up river from the Waterford drinking water intake pipe, reported both air emissions and discharges into the Hudson River of several VOCs, metal compounds, acids, and chlorine during the same period. In addition, GE also operates an active hazardous waste disposal area on plant property and has an EPA permit to incinerate mono- and dichlorobiphenyl by-products (11). There are also several other inactive hazardous waste landfill areas on the plant property.

2.0 BACKGROUND

2.1 Cancer

There is significant evidence of PCB carcinogenicity in animals, and PCBs as a group have been classified as probable human carcinogens by the International Agency for Research on Cancer (IARC) (12) and the USEPA (13). There are 209 types or congeners of PCBs that have differing levels of toxicity. The mechanisms of PCB toxicity are not

completely known. Animal studies have shown that the liver, skin, stomach, blood and thyroid may be target organs (14).

Studies of cancer in individuals occupationally exposed to PCBs have been inconclusive. Study limitations include small numbers of cases, short exposure periods, and lack of dose response associations. Brown (15, 16) reported increased incidence and mortality among workers in capacitor factories for cancers of the liver, biliary tract, and gall bladder. Excess cancer mortality has also been seen among capacitor workers for cancers of the gastrointestinal tract and hematologic tissue (17) and malignant melanoma (18). Gustavsson (19,20) found no excess cancer mortality in a group of male workers at a Swedish capacitor manufacturing facility. Loomis (21) found that mortality due to malignant melanoma increased with exposure to PCB insulating fluids. Kimbough et al. (22) recently completed a study of 7075 workers who worked between 1946 and 1977 at the two General Electric plants in Hudson Falls and Fort Edward that manufactured capacitors. They found no significant elevations for total or site specific cancer mortality.

Halogenated organic compounds such as chloroform can be formed in drinking water from the reaction of chlorine with existing organic material. These compounds can also contaminate drinking water as a result of improper disposal of chemicals. A number of these compounds are currently classified as confirmed or suspected carcinogens. IARC reviewed the epidemiological studies of cancer related to water pollution, and to chlorinated drinking water and chlorination by-products (23). IARC evaluated findings from six correlational studies and from one time trend study and found a consistent pattern between the use of surface water or chlorinated drinking water and cancers of the stomach, bladder, lung, and rectum. However, weaknesses in study designs limit the usefulness of these findings.

A number of case-control studies have been conducted which have used both community exposure and individual exposure data. Four of these studies were evaluated by IARC as providing results which need further evaluation (23). Of these studies, one showed a significant increase in rectal cancer, another a significant increase in colon cancer and two did not show any increased risk of cancer.

2.2 Previous review of cancer incidence in Waterford

The first review of cancer incidence in Waterford for the period 1970–1980 was undertaken in response to residents who expressed concern about the number of cancer cases in the community (3). A listing from the New York State Cancer Registry of all malignant tumors diagnosed among residents of the Town of Waterford during 1970–1980 was reviewed. Cancer cases were aggregated by cancer site, gender, and age group. The expected number of cancer cases for the town was calculated using age and gender-specific cancer rates for parts of New York State with similar population density. The numbers of cancers observed and expected were then compared. The study found statistically significant excesses of cancer of the pancreas in males and cancer of the cervix in females. A statistically significant deficit of cancer of the ovary was found also.

Cancer incidence was reviewed in two age groups: 0–54 years and 55 years and over. There was a significant excess of lymphomas in males aged 0–54 and of cancer of the pancreas in males aged 55 and over.

A second review of cancer incidence in the Town of Waterford was conducted for the years 1981–1984 (4). The study methodology was similar to the first review of cancer incidence except that the comparison of observed and expected incidence of cancer was not performed separately for the two age groups (0–54, 55+). The only statistically significant increase in cancer was found for oral cancers in males (six cases observed, two expected). The risk factors for oral cancer include tobacco use, alcohol use, and nutritional deficiencies. All but one of the oral cancer cases in this study were either former or current smokers.

The previous two reviews of cancer incidence in Waterford did not produce consistent findings. The types of cancer found in excess during 1970–1980 were not found to be increased for the second study period. No type of cancer was found to be elevated in both males and females during either period. However, given the latency period for cancer, if exposures occurred during the 1970s, there may not have been sufficient time between exposure and the time the studies were conducted to detect increases in cancer related to exposure.

2.3 Adverse Birth Outcomes

Several studies have shown a positive association between exposure to PCBs and adverse birth outcomes (24, 25, 26, 27). Consumption of PCB-contaminated fish has been associated with low birth weight, preterm birth, and developmental defects. Fein, et. al., (24) evaluated 242 infants born to mothers who had consumed moderately high amounts of Lake Michigan fish and compared them to 71 infants born to mothers who had not consumed fish from the lake. Fish consumption as well as total levels of PCBs in the cord serum were positively correlated with low birth weight and shorter gestational age. Consumption of contaminated fish has also been positively correlated with impaired autonomic development (28). There were several limitations to these studies, however, that may have affected the results including the assessment of the exposure and the definition of exposed and control subjects. More recently Patandin (27) has reported that infants with high cord plasma PCB levels (0.80 mg/L) weighed 165 grams (g) less than infants with low cord plasma PCB levels (0.20 mg/L) weighed. This is approximately the same deficit observed in infants born to mothers who smoked during pregnancy. In a study of Lake Michigan fish consumption, Dar (29) found no excess of low birth weight, stillbirths, or congenital malformations, although PCB exposure levels were generally lower than the previous Michigan study. In addition, Lonkey (30) found no differences in the birth weight of infants born to mothers who had consumed Lake Ontario fish.

In a study of 912 children born to women with background body burden levels of PCBs, Rogan, et. al., (25) found no association between higher levels of PCBs and birth weight.

An association was found between higher levels of PCBs and decreased muscle tone and hyporeflexia, however.

Occupational exposure to PCBs has also been linked to decreased birth weight and gestational age among infants of mothers exposed to PCBs during the manufacture of capacitors (26). In both this study, as well as the Michigan study (24), the effect of PCB exposure on birth weight was greatly reduced after gestational age was taken into account. This suggests that the deficits in birth weight observed may be due to prematurity of the infant rather than intrauterine growth retardation.

Adverse birth outcomes have also been linked to exposure to VOCs and trihalomethanes. Environmental exposures to VOCs from hazardous waste sites (31) and industrial facilities (32) have been linked to an increased risk of central nervous system (CNS) defects. A recent NYSDOH study found an elevation in risk of CNS defects among children born to women living within one mile of TRI facilities emitting metals or VOCs, although no elevation in risk of birth defects was seen among women living near hazardous waste sites (33). Exposure to VOCs through drinking water has also been associated with an increase in CNS defects (34, 35). In a later study, Bove (36) found exposure to VOCs in drinking water in 75 towns in northern New Jersey to be positively associated with low birth weight, small size for gestational age, CNS defects, and oral cleft defects. In addition, the authors reported that exposure to trihalomethanes in drinking water was related to increased risk of low birth weight, small size for gestational age, CNS defects, oral cleft defects, and major cardiac defects. Shaw (37) reported an increase of congenital cardiac defects among infants of women exposed to organic solvents in the first trimester of pregnancy. Kramer, et al., (38) examined the effect of long-term exposure to low levels of chloroform in drinking water. In municipalities where chloroform levels in drinking water exceeded 10 µg/L, an increased risk of intrauterine growth retardation was observed when compared to municipalities with no detectable chloroform in the drinking water. In many of these studies, however, the accuracy of exposure assessment remains a serious limitation.

2.4 Objectives

The primary objective of this health statistics review is to provide citizens with more recent information on cancer rates and to provide birth outcome data for their town. If cancer and adverse birth outcome rates are similar to those expected, some reassurance is provided. If unusual patterns of these adverse health outcomes are seen, the health statistics review provides information for the development of preventative strategies or future investigations.

3.0 METHODS

3.1 Review of Cancer Incidence

Study Population and Calculation of Expected Numbers of Cancers. NYSDOH reviewed cancer incidence for the Town of Waterford for the years 1985–1992, which are the years subsequent to the last review of cancer incidence in Waterford. Population data for Waterford that were used to calculate the expected number of cases for the period 1985–1987 were estimated from the 1980 and 1990 US Census data using linear interpolation. The population for the 1988–1992 time period was derived from the 1990 Census, which occurred at the midpoint of this period. The population was grouped into eight age groups for both males and females. The eight age groups included in the study were: 0 to 14, 15 to 24, 25 to 34, 35 to 44, 45 to 54, 55 to 64, 65 to 74 years, and 75 years and older.

The number of expected cancer cases in the Town of Waterford was calculated using standard cancer incidence rates developed by the New York State Cancer Registry. Since the incidence of cancer varies by gender and age, the standard rates are reported by gender and by the eight age groups described above.

The incidence of some types of cancer varies between urban and rural areas in New York State (39). The Cancer Registry created standard rates for different urban/rural groups based on US census data. Group I includes the most urban ZIP code areas of the state and group II includes urban non-city ZIP codes while group IV includes the most rural ZIP Code areas. The standard rates for the Suburban-mix group (group III) were used in this study. This group includes small cities, medium to large villages and the more sparsely settled suburban areas.

The expected number of cases was calculated for two time periods for Waterford. The New York State Cancer Registry provided standard rates for the period 1983–1987 that were used to calculate the expected number of cases for the first three years (1985–1987) of the study period. Standard rates for the period 1988–1992 were used to calculate the expected number of cases for the last five years (1988–1992) of the study period. The expected numbers of cases in Waterford for the two time periods were then summed to get the total expected number of cases for each cancer site for the study period 1985–1992.

Source of observed cases of cancer in study area. Information on all cases of cancer among Waterford residents diagnosed between January 1, 1985, and December 31, 1992, was obtained from the New York State Cancer Registry. The selection of cases was based on primary cancer sites and not on sites where the cancer had spread or metastasized. By law, hospitals and physicians in New York State who treat patients diagnosed with cancer and laboratories that find evidence of cancer in tissue specimens must report these cases to the New York State Health Department. The reporting to the Registry of all cases of cancer diagnosed in New York State, excluding New York City, began on January 1, 1940. On January 1, 1973, mandatory cancer reporting was extended to include New

York City. New York State also has reciprocal interstate reporting agreements. Primary reliance for reporting is from hospitals, with nearly 300 acute care hospitals reporting to the registry. Completeness of reporting based upon a variety of special studies is estimated to be at least 95% (40). The completeness of reporting, however, may vary by tumor type. Information pertaining to the tumor is coded using the 9th revision of the International Classification of Diseases (41). An examination of the Registry for the period 1978–1981 showed that 87% of the tumors reported were microscopically confirmed (40).

The data obtained from the Cancer Registry contained up to three primary occurrences of cancer for each individual. Each of these occurrences of cancer was included only if the date of diagnosis was within the study period.

The cancer registry electronic files contain address information for each individual who is diagnosed with cancer. If the address information was collected more than 12 months after the cancer was diagnosed or if the patient's ZIP code had changed since diagnosis we obtained the address of diagnosis from the original hospital report.

Duplicate reports of the same tumor are routinely removed from the registry. However, duplicate reports of the same tumor may remain in the registry in error in the rare event that there is a misspelling of the name or an incorrect date of birth. Seven duplicate tumor reports were identified and removed from the database of cases received.

Geocoding of cases. The cancer registry records contain the ZIP code of the patient's mailing address at time of diagnosis. ZIP codes are not always specific enough to determine the town of residence. For example, ZIP code 12188 contains the Town and Village of Waterford as well as a large part of the adjacent Town of Halfmoon. Since some Halfmoon residents have Waterford mailing addresses, they may be miscoded as living in Waterford. Address information was obtained from the Cancer Registry for all cases with addresses coded as the Town of Waterford, the Village of Waterford, or the Town of Halfmoon. In addition, all cases with a ZIP Code of 12188 that were not coded in one of the three areas above were also obtained.

To preserve anonymity and to respect privacy, no contact was made with the individuals or next of kin to determine residential locations. Geographic coordinates were assigned to each case address according to standard methods developed by the NYSDOH. The process first uses automated computerized address-matching software and data files that assign latitude and longitude coordinates based on the street address (42, 43). The unmatched addresses are then checked against the 1994 US Census street files (44), US Postal Service ZIP+4 digital files, New York State Department of Motor Vehicle files, and digital phone directories (45). Names and addresses were also matched to land parcel data files from the New York State Office of Real Property Services (46). Traditional sources of geographic information are used when semi-automated methods fail. These include street maps and city directories.



STATE OF NEW YORK DEPARTMENT OF HEALTH

Flanigan Square, 547 River Street, Troy, New York 12180-2216

Antonia C. Novello, M.D., M.P.H.
Commissioner

Dennis P. Whalen
Executive Deputy Commissioner

May 5, 2000

Dear Interested Citizen:

Enclosed is the report *Hudson River PCB Site: Health Statistics Review, Town of Waterford, Saratoga County, NY*. The New York State Department of Health (NYSDOH) produced this report in cooperation with the U.S. Agency for Toxic Substances and Disease Registry (ATSDR). The objective was to examine the number of cancer cases and adverse birth outcomes occurring from 1985 to 1992 in the Town of Waterford. Residents were potentially exposed to polychlorinated biphenyls (PCBs) from the town's drinking water supply, which is drawn from the Hudson River. Previous statistical reviews had been conducted for 1970 to 1980, and for 1981 to 1984. For this review, researchers determined whether or not the incidence of certain cancers and adverse birth outcomes differs from the incidence expected, based on standard rates of cancer and adverse birth outcomes.

Citizens' questions and comments are an important part of the review process and we encourage you to read the document carefully. Please send us your comments by June 19, 2000, so that they can be considered as the review is finalized. Attached is a reply form for your use. Please return the completed form or E-mail your comments to:

Nicholas Teresi
NYSDOH
CEH Outreach Unit
Flanigan Square
547 River Street, Room 316
Troy, NY 12180-2216
Fax: 518-402-7819
E-mail: npt01@health.state.ny.us

If you have any questions or wish to obtain additional copies of the review, please contact me at the toll-free number 1-800-458-1158, extension 27530. Thank you for your time and effort.

Sincerely,

Nicholas Teresi
Outreach Coordinator
Center for Environmental Health

Enclosures (2)

800500



New York State Department of Health

Comment Reply Form Town of Waterford Health Statistics Review

Thank you for taking the time to review this health statistics review. The purpose of the comment period is to give you a chance to let us know if you have any questions related to the areas that were examined or have additional information that should be included in this document. In addition, let us know if the document is accurate, clear, readable, understandable, factual and correct.

This reply form is divided into sections that correspond to the main headings in the review. Please write any questions or comments on the review in the appropriate space below.

OPTIONAL INFORMATION

Name _____
Address _____
Home Phone _____ Work Phone _____
Best time to contact you _____

HEALTH STATISTICS REVIEW SECTIONS

Please refer to page numbers on the report when writing your questions or comments.

Background

Methods

**Comment Reply Form
Town of Waterford Health Statistics Review**

Results

Discussion

Conclusions

Other

Attach additional sheets of paper if needed. Please return by **June 19, 2000**

Mail to: Nicholas Teresi
NYSDOH
CEH Outreach Unit
Flanigan Square
547 River Street, Room 316
Troy, NY 12180-2216

Fax to: Nicholas Teresi, CEH Outreach Unit
(518) 402-7819

E-Mail to: npt01@health.state.ny.us

Once geographic coordinates were assigned to cases through address-matching, the case locations were overlaid onto a digital map of the Town of Waterford using a geographic information system (47) to determine which cases fell within the study area. Each of the types of cancer and the total cancer cases within the study area were then tabulated to obtain the observed numbers of cancer cases. Two cases with Waterford mailing addresses could not be located. Analyses were done both with and without these cases, although only the results including the cases are presented here.

Statistical Testing. Age-adjusted standardized incidence ratios (SIR) were calculated by dividing the observed number of cancer cases by the expected number of cancer cases. The Poisson probability distribution, which is used to describe the occurrence of rare events, was used to calculate 95% confidence intervals (95% CI) (48). The 95% CI is the range in which there is a 95% probability of including the true SIR. If the SIR is greater than one then there is an excess of cancer cases in the study population compared to the general population. If the SIR is less than one then there is a deficit of cancer in the study population. The 95% confidence interval is used to test the statistical significance of the SIR. If the SIR is greater than one and the lower limit of the 95% CI is greater than one then there is a statistically significant excess of cancer. Conversely, if the SIR is less than one and the upper limit of the 95% CI is less than one, then there is a statistically significant deficit of cancer. In this report the SIRs and 95% CI were calculated for each type of cancer among males, females, and both combined. Data on all cancer sites were also combined to analyze overall cancer rates.

The power of a statistical test tells you the chance that the test, in this case the SIR and its 95% CI, will be able to detect an excess or deficit risk of cancer, if it truly exists. The power of the test increases as the number of expected cases of cancer increases. Power of 80% or higher is considered acceptable. To reach power of 80% for an SIR of 2.0 (a doubling of cancer incidence in the study population) the expected number of cases must be at least 10.9 (49). To reach the same power for an SIR of 1.5 (a 50% increase of cancer incidence in the study population) the expected number of cases must be approximately 36. For a number of rare cancer sites, such as the liver, there was not enough power to detect a doubling of cancer incidence, if it exists. Therefore, in order to increase the power of detecting a difference in cancer incidence, all cancer sites were also combined.

3.2 Review of Birth Outcome Data

In order to determine whether or not Waterford had an increased number or unusual pattern of adverse birth outcomes (low birth weight, preterm births, intrauterine growth retardation, and congenital malformations), birth outcome data for single births from the NYSDOH birth certificate files and NYSDOH Congenital Malformations Registry were reviewed.

Birth certificate records

NYSDOH maintains computerized birth files which contain the data recorded from birth certificates for all children born in New York State. The birth files contain birth weights and gestational ages of infants at delivery. The files also contain variables associated with birth weight and preterm delivery. These variables include age of mother, race, and the occurrence of multiple births (50,51).

NYSDOH identified all births in the Town of Waterford during the 20-year period from 1973 through 1992 by reviewing residential address information stored on the birth files. The births were geocoded following the same procedure previously described for cancer cases. Name and address information was not sufficient to locate 2.2% of the births. The birth weight for these records was not significantly different from the geocoded records, so this small proportion of records was excluded from the analysis. Records which included improbable or impossible data were eliminated from the study. These included invalid births records and those with data errors. Records listing a birth weight of less than 500g or greater than 7,500 grams were excluded from the study. Similarly records listing a gestation of less than 13 weeks or greater than 50 weeks were excluded from the analysis. Multiple birth deliveries were also excluded from the analysis since the weights of these babies are generally low. The analysis includes 2,152 births of which 98.5% were white, 0.9% were non-white, and 0.6% were of unknown race.

Low birth weight, preterm births, and intrauterine growth retardation

Records of all live births from 1973 to 1992 were obtained from NYSDOH Bureau of Vital Records. The observed numbers of low birth weight (LBW) infants (< 2,500 grams), very low birth weight (VLBW) infants (< 1,500 grams), preterm deliveries (< 37 weeks of gestation) and intrauterine growth retardation (IUGR) births were tabulated. IUGR is defined as births at full term-gestation (≥ 37 weeks) in which the baby weighs less than 2,500 grams. The numbers of births expected in these categories in the Town of Waterford were calculated from standard rates for infants born to white mothers living in New York State, excluding New York City, during the same birth year. Because low birth weight rates vary with age of the mother, rates were age adjusted using eight age groups. The age groups were: less than 16 years, 16 to 17, 18 to 19, 20 to 21, 22 to 23, 24 to 34, 35 to 39, 40 to 44 and 45 years and older. The LBW, preterm deliveries, and IUGR results were calculated for five-year intervals, and VLBW was calculated over twenty years. SIRs and 95% Poisson confidence intervals were calculated to determine the probability that chance alone could explain the results. In addition, the mean birth weight in Waterford over the twenty-year study period was compared to that of New York State, excluding New York City, after adjusting for age of the mothers in the study population. SaTScan software was used to test for temporal clustering of the adverse birth outcomes (52).

Congenital Malformations

The Congenital Malformations Registry receives case reports on children born to New York State residents and diagnosed before the age of two years with a congenital malformation, chromosomal anomaly, or persistent metabolic defect (53). This information is reported to the Registry by hospitals and physicians as mandated by the New York State Sanitary Code. The concept of the Registry arose out of the recognition of the environment as a potential etiologic factor in the occurrence of birth anomalies. Reporting to the registry began in October 1982. The Registry periodically audits hospital records to encourage completeness of reporting. Incomplete or inconsistent reports are returned to the sender for clarification. Malformations are classified as either minor or major. Major malformations are considered to have an adverse effect on the individual's health, functioning, or social acceptability, while minor malformations are considered to be of limited social or medical significance. This analysis considers major malformations used in the annual New York State Congenital Malformations Registry reports, exclusive of perinatal infections (54).

Major congenital malformations in singleton births for the Town of Waterford for the years 1983–1992 were obtained from the New York State Congenital Malformations Registry. The total observed number of malformations in Waterford was compared with the number expected among white singleton births in New York State, excluding New York City, during the same time period. Any specific type of malformation with more than five cases was investigated separately by comparing the observed number of cases to the expected number. Malformations were also grouped by organ system and time to determine if there were any unusual patterns of malformations or time trends in the occurrence of the major malformations. Because of the small number of malformations in the study area, only the proportion of malformations by organ system is shown in the results.

4.0 Results

4.1 Cancer Results

Table 1 summarizes the results of the tests for different types of cancer among males, females, and males and females combined. This study identified 289 cases of cancer diagnosed in residents living in the town of Waterford during the period 1985–1992. There was no consistent pattern of elevation or deficit within the study area. The 289 cancer cases observed in both males and females combined was similar to the 295 cases expected using standard rates of cancer for areas of similar population density in New York. The total numbers of observed cases of cancer in males and females when compared separately with expected numbers were also found to be within the normal range.

When individual cancer sites were examined, there were two significant results observed, one excess and one deficit. The number of thyroid cancer cases in the Town of Waterford

was significantly elevated in males and females combined with 6 cases observed and only 2 cases expected (SIR=3.00, 95% CI 1.10–6.53). Elevated numbers of thyroid cancer were observed in both males and females, although neither was significantly elevated alone. A lower than expected number of lymphoma cases was observed in both males and females. This became significant when the numbers for males and females were combined. The New York State Cancer Registry requires suppression of data involving fewer than six observed cancer cases. Because of this the exact numbers of cancer cases observed and the accompanying SIRs and confidence intervals cannot be given.

There were two cancer cases that could not be accurately geocoded to determine if they were in or out of the study area. These included one breast cancer and one kidney cancer. The addition of these cases did not significantly alter the results of the study.

4.2 Birth Outcomes

All the birth outcomes reviewed were found to be similar to what was expected in other areas in New York State (Tables 2a – 2d). The mean birth weight in Waterford over the 20-year study period was 3,408 grams, while the mean birth weight of New York State excluding New York City was 3,411 grams after adjusting for age of the mothers in the study population. The number of low birth weight, preterm, and intrauterine growth retardation births were all found to be within the expected range for both the total study period and for individual 5-year periods. In addition, there was no statistical difference in the number of very low birth weight babies born in Waterford during the 20-year study period. Since there were too few very low birth weight children born in the study area, individual 5-year periods were not compared.

There were 51 children born with major malformations in the Town of Waterford between 1983 and 1992. The expected number of children born with major malformations during this time period was 53. Since children can be born with more than one major malformation, the total number of malformations in children born in Waterford was also compared to the expected total number of malformations. No significant difference was found (73 major malformations expected, 67 observed). There was also no significant difference in the proportion of malformations in the different organ systems (Figure 3).

Further analysis using SaTScan software (51) did not reveal any temporal clustering of low birth weights, IUGR, or congenital malformations.

5.0 DISCUSSION

Prevalence of all types of adverse birth outcomes were within the expected range and the incidence of only one site of cancer was found to be significantly elevated. The number of thyroid cancer cases in the Town of Waterford was significantly elevated in males and females combined. Birth certificate data were used to confirm that several of the affected

individuals were related. The related cases all had medullary thyroid carcinoma which is a relatively rare form of the disease. Approximately 20 percent of medullary thyroid carcinomas are of the familial form. If a child inherits that gene from a parent (there is a 50% probability of this), the child will develop medullary thyroid carcinoma nearly 100% of the time (55). Thus, the observed increase in thyroid cancer was likely caused by familial factors and not environmental risk factors.

Migration into and out of a study area is always a problem in studies of this type. Since both the length of exposure to carcinogens and the latency period necessary to develop cancer can be long, new, unexposed residents moving into a study area can dilute the effect of any exposures that may have been present. Residents may also develop cancer that is related to exposures that occurred prior to moving into the study area and thus exaggerate cancer rates. In addition, residents who have lived in Waterford for many years but move from the area and develop cancer at a later date could not be included in the study. The 1990 US Census estimated that 43.4 percent of Waterford residents over 5 years of age lived in a different house in 1985, and of these people who changed homes, 62.0 percent moved from a different county. Although we do not have actual figures for the number of people moving into and out of Waterford, the census data indicate that a significant amount of migration had occurred in the past (8).

The statistical analysis of this study included 53 individual tests of significance for cancer and 17 individual tests for significance for adverse birth outcomes. A probability limit of 0.05 was used to determine statistical significance. Thus, it would be expected that 5 percent, or 1 in 20, of the individual tests would be statistically significant due purely to chance. Since there were 70 total comparisons, it would be expected that three or four test results might appear statistically significant even though the differences between the observed and expected health outcomes were due to random fluctuations in the data. Thus, the significant findings of a deficit of lymphoma in men and women combined could be due to chance alone.

Another consideration is the power of the statistical test to detect true differences in incidence rates when they exist. The power of the test depends on the number of expected cases. There was insufficient power to detect a doubling of cancer for 32 of the 53 individual tests of significance for cancer. For this reason, an increase of some types of cancer may have gone undetected.

To address this problem of small numbers, all types of cancer or birth defects can be combined for calculations of observed and expected numbers and statistical testing. If, however, not all cancers or birth defects were sensitive to a particular environmental risk factor, combining different types of disease might dilute elevations that might be apparent in only one type of cancer. The same is true for combining many years of data. If the data are grouped together over many years and the differences are not expected to vary with time, the power to detect differences increases. Any temporal trends in the data may, however, go unnoticed.

Other factors that can affect the rates of cancer or adverse birth outcomes were not taken into account in the current study. Information about individual use of bottled water, and water filters was not available. Nor were data available to estimate drinking water contamination levels at the individual houses. Individual exposure to contaminants in drinking water would vary with the length of time the person lived in the study area before diagnosis and how much water was consumed. Other factors such as medical history, occupational exposures to chemicals, dietary, lifestyle, and other environmental exposures to contaminants were not examined. If the study population is different than the reference population with respect to these factors, then the results may be biased in either direction.

6.0 CONCLUSIONS

This review of health data was conducted because of the concern that Waterford residents may have been exposed to PCBs or other contaminants in their drinking water which may have lead to adverse health effects. This review updates two previous reviews of cancer incidence data and provides additional information on birth outcomes for the Town of Waterford.

There were no excesses or deficits in any of the birth outcomes studied. This includes low birth weight, gestational age, intrauterine growth retardation, and birth defects. There was a significant elevation in thyroid cancer for males and females combined during the study period 1985–1992. A further review confirmed a familial link between several of the cases, which indicates this elevation was probably the result of genetic rather than environmental factors. There was also a significantly lower number of lymphoma cases in Waterford that may be explained by chance.

There were no other statistically significant differences in the incidence of any other types of cancers that were reviewed in either males, females or both genders combined. Limitations include the fact that the study population may not have been large enough to detect increases in some of the rare health outcomes that were studied, as well as the fact that multiple comparisons were made. Another limitation was migration into and out of the study area which can dilute or exaggerate an effect. Although these factors may limit the interpretation of the results, this study does give some reassurance that rates of adverse health outcomes studied in the Town of Waterford are similar to those statewide.

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Authors and Acknowledgements

Authors

Thomas O. Talbot, M.S.P.H.

Steven P. Forand, M.A.

Valerie B. Haley, M.S.

Bureau of Environmental and Occupational Epidemiology

New York State Department of Health

547 River Street, Room 200

Troy, NY 12180

Acknowledgements

John Olm, M.P.H.

Bureau of Environmental Exposure Investigation

New York State Department of Health

547 River Street, Room 300

Troy, NY 12180

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TABLES

Table 1: Observed and expected numbers of incident cancer cases in the Town of Waterford, NY 1985–1992

Type of Cancer (ICD9)	Males					Females					Total				
	# cases		SIR	95% C. I.		# cases		SIR	95% C. I.		# cases		SIR	95% C. I.	
	Obs. ^a	Exp. ^b		Lower	Upper	Obs. ^a	Exp. ^b		Lower	Upper	Obs. ^a	Exp. ^b		Lower	Upper
Oral (140–149)	c	4.5	c	c	c	c	2.2	c	c	c	7	6.8	1.03	0.41	2.12
Stomach (151)	c	3.8	c	c	c	c	2.2	c	c	c	c	6.0	c	c	c
Colon and Rectum (153–154)	23	22.0	1.05	0.66	1.57	19	21.2	0.90	0.54	1.40	42	43.3	0.97	0.70	1.31
Liver (155)	c	1.4	c	c	c	c	0.9	c	c	c	c	2.2	c	c	c
Pancreas (157)	c	3.9	c	c	c	c	3.9	c	c	c	9	7.8	1.15	0.53	2.19
Lung (162)	37	30.7	1.21	0.85	1.66	20	18.3	1.09	0.67	1.69	57	48.9	1.17	0.88	1.51
Melanoma (172)	c	2.9	c	c	c	c	2.0	c	c	c	7	4.9	1.43	0.57	2.94
Breast (174)	-	-	-	-	-	47	42.2	1.11	0.82	1.48	47	42.2	1.11	0.82	1.48
Cervix and Uterus (179,180,182)	-	-	-	-	-	7	12.0	0.58	0.23	1.20	7	12.0	0.58	0.23	1.20
Ovary (183)	-	-	-	-	-	7	6.4	1.09	0.44	2.25	7	6.4	1.09	0.44	2.25
Prostate and Testis (185–186)	30	34.7	0.86	0.58	1.23	-	-	-	-	-	30	34.7	0.86	0.58	1.23
Bladder (188)	10	10.9	0.92	0.44	1.69	c	4.0	c	c	c	15	14.8	1.01	0.57	1.67
Kidney (189)	c	4.5	c	c	c	c	2.8	c	c	c	8	7.4	1.08	0.47	2.13
Brain (191–192)	c	2.6	c	c	c	c	2.0	c	c	c	c	4.6	c	c	c
Thyroid (193)	c	0.7	c	c	c	c	1.3	c	c	c	6*	2.0	3.00	1.10	6.53
Lymphoma (200–202)	c	6.8	c	c	c	c	5.3	c	c	c	C**	12.1	c	c	c
Leukemia (204–208)	c	4.2	c	c	c	c	3.2	c	c	c	c	7.4	c	c	c
Other (others in 140–208)	16	17.8	0.90	0.51	1.46	11	13.5	0.81	0.41	1.46	27	31.3	0.86	0.57	1.26
TOTAL (140–208)	145	151.4	0.96	0.81	1.13	144	143.5	1.00	0.85	1.18	289	294.8	0.98	0.87	1.10

Notes: * Statistically significant excess ($p < 0.05$)
 ** Statistically significant deficit ($p < 0.05$)

^a Observed cancer cases reported to the New York State Cancer Registry through October 1996.

^b Expected numbers based on the NYSDOH Cancer Registry Cancer Incidence Standards 1983–1987 and 1988–1992, which include age and gender specific cancer rates for population density Population density Group III (urban/rural mix). Population of the study area based on the 1980 and 1990 populations of Census Block Groups included in the study area.

^c Number of cases, SIRs and 95% CI are not shown to protect privacy of individuals where the number of observed cases in one or more of the gender specific cells is < 6 .

Table 2: Birth Outcomes for 2,152 births in the Town of Waterford, 1973–1992, compared to number of expected based New York State, excluding NYC. Standard rates for white births adjusted for mother's age.

a) Low Birth weight (<2500 g)

Year	Number Observed	Number Expected	Standardized Incidence Ratio	95% CI Lower	95% CI Upper
TOTAL	95	97.4	0.98	0.79	1.19
1973–77	25	23.9	1.05	0.68	1.55
1978–82	25	22.2	1.13	0.73	1.67
1983–87	24	24.9	0.96	0.62	1.43
1988–92	21	26.5	0.79	0.49	1.21

b) Very Low Birth weight (<1500g)

Year	Number Observed	Number Expected	Standardized Incidence Ratio	95% CI Lower	95% CI Upper
TOTAL	18	14.01	1.28	0.76	2.03

c) Preterm Births (<37 weeks gestation)

Year	Number Observed	Number Expected	Standardized Incidence Ratio	95% CI Lower	95% CI Upper
TOTAL	158	152.7	1.03	0.88	1.21
1973–77	29	31.8	0.91	0.61	1.31
1978–82	41	33.2	1.24	0.89	1.68
1983–87	39	41.5	0.94	0.67	1.28
1988–92	49	46.2	1.06	0.78	1.40

d) Intrauterine Growth Retardation ($\geq$ 37 weeks gestation and <2500g)

Year	Number Observed	Number Expected	Standardized Incidence Ratio	95% CI Lower	95% CI Upper
TOTAL	34	44.7	0.76	0.53	1.06
1973–77	13	12.0	1.08	0.58	1.85
1978–82	7	10.3	0.68	0.27	1.40
1983–87	7	11.0	0.64	0.26	1.32
1988–92	7	11.4	0.61	0.25	1.26

FIGURES

Public Comment Release

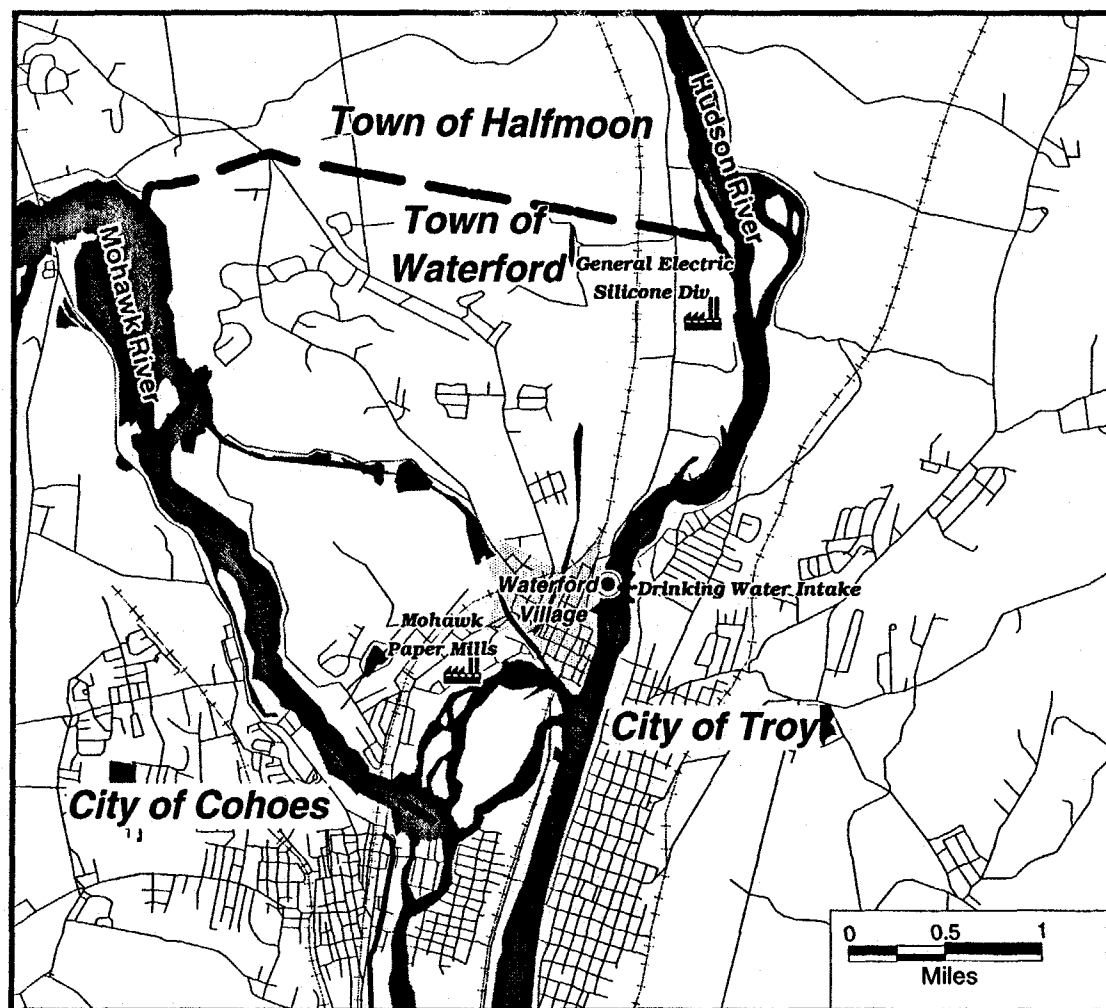
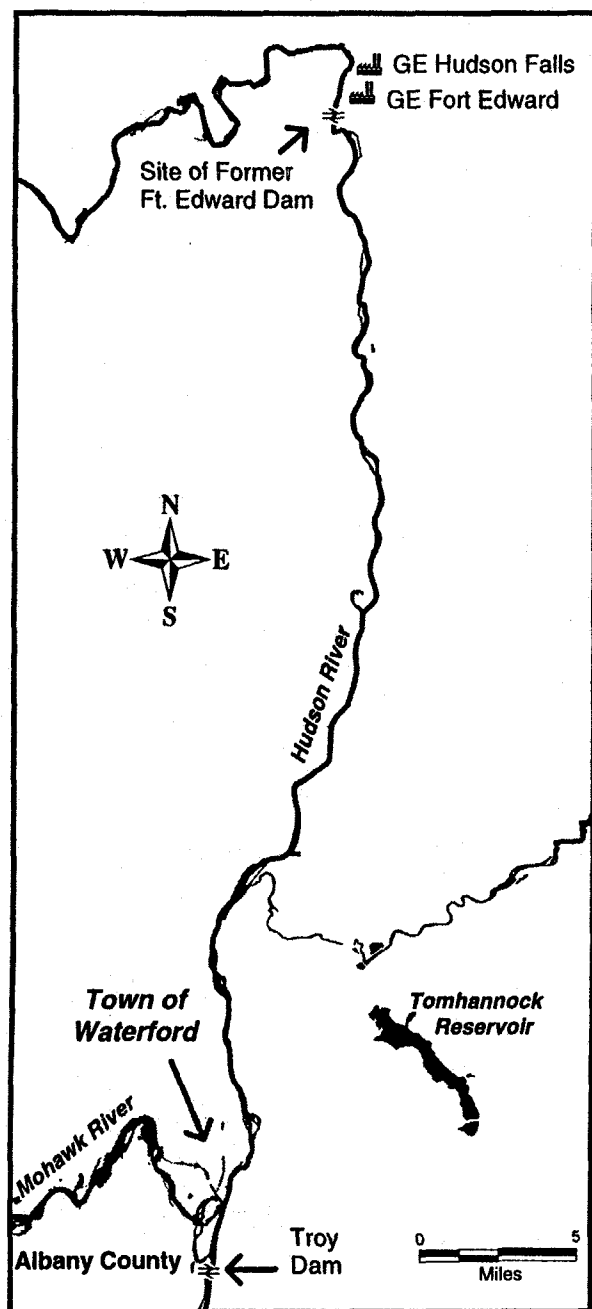
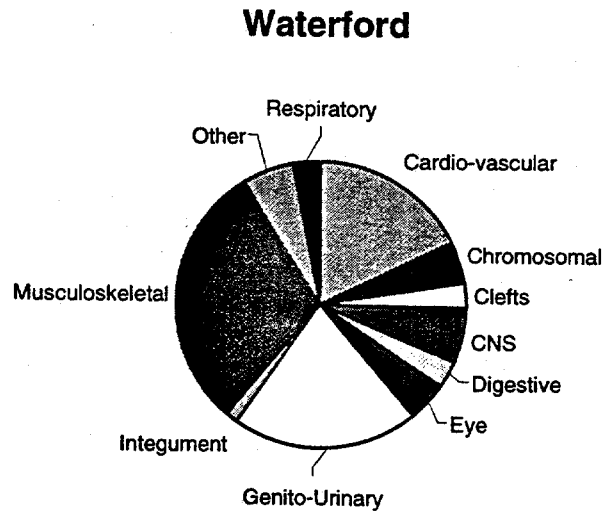


Figure 1 (left). The upper Hudson River from the Hudson Falls/ Ft. Edward area to the Troy Dam. Much of the PCBs discharged by the 2 GE facilities was deposited in the sediments in this part of the river.

Figure 2 (above). The Waterford study area consisting of the town and village of Waterford. The locations of the GE Silicones plant and the intake for the water treatment plant are also shown.

----- Town Boundary

Figure 3: Proportion of congenital malformations by organ system in Waterford and the Upstate area, 1983–1992

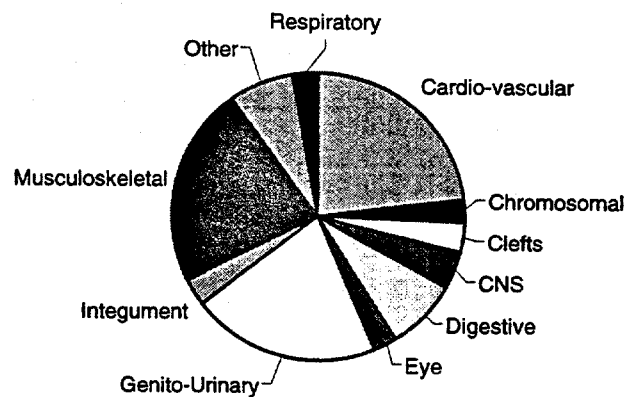


Number of malformations = 67

Number of children = 51

% of children with malformations = 4.0%

New York State Excluding NYC



Number of malformations = 75,332

Number of children = 54,676

% of children with malformations = 4.2%

APPENDIX

FACT SHEET

HUDSON RIVER PCB SITE: HEALTH STATISTICS REVIEW TOWN OF WATERFORD SARATOGA COUNTY, NY

Prepared by



STATE OF NEW YORK
DEPARTMENT OF HEALTH

Center for Environmental Health
Flanigan Square
547 River Street
Troy, NY 12180-2216

New York State Department of Health
HUDSON RIVER PCB SITE: HEALTH STATISTICS REVIEW

SUMMARY AND QUESTIONS AND ANSWERS

Introduction: The New York State Department of Health (NYSDOH) has recently completed a health statistics review for the Town of Waterford. Residents of the town were potentially exposed in the past to polychlorinated biphenyls (PCBs) from the town's drinking water supply, which is drawn from the Hudson River. The current review is a follow-up to two previous reviews that examined cancer incidence in the Town of Waterford for 1970–1980 and 1981–1984. The Agency for Toxic Substances and Disease Registry (ATSDR) Health Activities Recommendation Panel recommended a review of more recent cancer incidence and adverse birth outcome data for the town. This report updates the analysis of cancer data by including cancer data for 1985–1992, and evaluates birth outcomes, which include the prevalence of low birth weight, preterm births, and intrauterine growth retardation for 1973–1992. Birth defect prevalence data for 1973–1992 were also reviewed.

Background: The study area consisted of the Town of Waterford whose residents were potentially exposed in the past to PCBs from the town's public drinking water supply that is drawn from the Hudson River. PCBs were discharged into the river between 1948 and 1977 from two capacitor manufacturing plants located at Fort Edward and Hudson Falls, NY.

Study Methods: Cancer incidence by type of cancer and gender was reviewed for 1985–1992. This review included all cases of cancer in residents living in the Town of Waterford. The observed number of cancer cases was obtained from the New York State Cancer Registry. By law, hospitals and doctors must report all cancer diagnoses in New York State to this registry. The expected number of cases was calculated using the standard cancer rates from similar areas of the state, taking into account population density, age, and sex. The observed and expected numbers of cases were compared in order to look for increases and decreases in the number of cancer cases.

Prevalence of low birth weight, preterm births, and intrauterine growth retardation was reviewed for 1973–1992. Information on birth weight and gestational age was obtained from birth certificates maintained by the NYSDOH Bureau of Vital Records. The numbers of adverse birth outcomes expected in the Town of Waterford were calculated from standard rates for infants born to white mothers living in New York State, excluding New York City, during the same birth year. Because low birth weight rates vary with the age of the mother, rates were age adjusted using eight age groups.

Prevalence of major birth defects was reviewed for 1983–1992. Birth defects in singleton births in the Town of Waterford for 1983–1992 were obtained from the New York State Congenital Malformations Registry. The total observed number of malformations in Waterford was compared with the number expected among white singleton births in New York State, excluding New York City, during the same time period.

Results:

- As in the previous reviews, there was no consistent pattern of increases or decreases in the types of cancer that were investigated.
 - ♦ When all types of cancer were combined, there was no increase or decrease in males, in females, or in males and females combined.
 - ♦ A statistically significant excess of thyroid cancer was found in males and females combined. A further review confirmed a familial link between several of the cases, which indicates the excess incidence was likely due to genetic rather than environmental factors.
 - ♦ A significantly lower number of lymphoma cases was observed in males and females combined. This may be due to chance.
- There were no excesses or deficits in any of the birth outcomes examined.

Conclusions: Generally, cancer incidence and prevalence of adverse birth outcomes in the Town of Waterford were similar to expected rates. There was an increase in thyroid cancer among males and females, which was probably due to heredity. There was a decrease in lymphoma among males and females. This may have been due to chance. There were no excesses or deficits in any of the birth outcomes studied. Study limitations include a population that may not have been large enough to detect increases in some of the less common health outcomes that were studied, and migration into and out of the study area. In addition, factors such as medical history, occupational exposures to chemicals, dietary, lifestyle, and other environmental exposures to contaminants were not examined. Other sources of PCB exposure such as the consumption of contaminated fish were also not examined. Although these may limit the interpretation of the results, this review, in conjunction with the previous two reviews, does provide some reassurance that rates of adverse health outcomes investigated in the Town of Waterford are similar to statewide rates.

QUESTIONS and **A**NSWERS

Q. Why was this health statistics review conducted?

A. The primary purpose of this health statistics review is to provide citizens with more recent information on cancer rates and to provide birth outcome data for their town. If cancer and adverse birth outcome rates are similar to those expected, some reassurance is provided. If unusual patterns of adverse health outcomes are seen, the health statistics review provides information for the development of strategies for preventing adverse health effects or helping to plan possible future investigations.

Q. Did you contact residents in the Town of Waterford to find out if they had cancer or adverse birth outcomes?

A. No, residents were not contacted for this review; information already available to the New York State Department of Health (NYSDOH) was used. By law, hospitals and physicians in the state must report cases of cancer diagnosed among New York State residents to the New York State Cancer Registry. The Registry is more than 95% complete. Birth weight and gestational age information was obtained from birth certificates maintained by the NYSDOH Bureau of Vital Statistics. The Congenital Malformations Registry, which receives reports on children born to New York State residents and diagnosed before the age of two years with a reportable birth defect, provided the birth defect information.

Q. What were the findings of the review?

A. Generally, cancer incidence and numbers of adverse birth outcomes in the Town of Waterford were similar to expected rates. When all types of cancer were combined, there was no increase or decrease in cancer. The review found an increase in thyroid cancer among males and females, which probably resulted from heredity. A decrease in lymphoma among males and females was also found. This may have been due to chance. There were no increases or decreases in any of the birth outcomes studied. Because of the small numbers of cases, the ability to detect an actual increase in cancer rates was a problem for many of the less common sites of cancer.

Q. What is the significance of the increase in thyroid cancer in the study area?

A. Six cases of thyroid cancer were observed, and two cases were expected. Several of these cases were related, and these cancers were probably a result of genetic factors rather than environmental factors. The related cases all had a relatively rare form of the disease. If a child inherits the associated gene from a parent (there is a 50 percent probability of this), the child will develop thyroid cancer nearly 100 percent of the time.

Q. What did the previous reviews of cancer incidence find?

A. The first review of cancer incidence in Waterford for 1970–1980 was conducted in response to residents who expressed concern about the number of cancer cases in the community. The review found a statistically significant increase of pancreatic cancer in males and cervical cancer in females. A statistically significant decrease of ovarian cancer was also found. A second review of cancer incidence in the Town of Waterford was conducted for 1981–1984. The only statistically significant increase in cancer was found for oral cancer in males.

The previous two reviews of cancer incidence in Waterford did not produce consistent findings. The types of cancer found in excess during 1970–1980 were not found in excess in the second study period. No type of cancer was found to be elevated in both males and females during either period. The results of the current study are not consistent with the results of the previous two reviews in Waterford. No type of cancer that was found to be elevated in either of the two previous studies was found to be elevated in the current study. Consistent findings across the three studies would provide greater support of a causal association between the possible exposure to PCBs and adverse health outcomes. The lack of consistency alone, however, is not enough to rule out a possible causal association.

Q. What is the current status of the public drinking water quality in the Town of Waterford?

A. The public water supply for the Town of Waterford presently produces water that meets all New York State and Federal drinking water standards. Public water supplies in New York State are monitored extensively for a variety of contaminants, and New York State's strict drinking water standards are applied. When monitoring shows that drinking water standards are exceeded, the source of the water supply is switched and the water supplier is required to notify its customers.

For more information, please contact:

Nicholas Teresi
NYS Department of Health
Center for Environmental Health
Outreach Unit
1-800-458-1158 ext. 2-7530

Thomas Talbot, MSPH
NYS Department of Health
Bureau of Environmental &
Occupational Epidemiology
1-800-458-1158 ext. 2-7950