Massachusetts
Department
Of
Public Health

# INFORMATION BOOKLET

## Assessment of Cancer Incidence in Weymouth, Abington, Hingham, and Rockland, Massachusetts 1982-1998

**Public Comment Release**
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Bureau of Environmental Health Assessment, Community Assessment Unit

**Assessment of Cancer Incidence in Weymouth, Abington, Hingham and Rockland, Massachusetts 1982-1998**

**Questions and Answers**

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**1. Q. Why was a study of cancer incidence rates conducted in the four towns of Weymouth, Abington, Hingham and Rockland?**

A. In response to requests by concerned residents, Senator Michael Morrissey, and the local boards of health, the Community Assessment Unit (CAU) of the Massachusetts Department of Public Health, Bureau of Environmental Health Assessment (MDPH/BEHA) conducted this investigation. The primary concern was suspected increases in cancer incidence in areas of Weymouth, Abington, Hingham and Rockland and the possible relationship to environmental contamination, specifically the South Weymouth Naval Air Station (SWNAS).

**2. Q. How was the study conducted?**

A. The MDPH/BEHA followed a standard peer-reviewed protocol for conducting descriptive epidemiologic investigations. This Massachusetts protocol was approved for use in 1992.

**3. Q. What cancer data were used in the study?**

A. Cancer incidence data for the years 1982-1998 were obtained for the four towns from the MDPH, Massachusetts Cancer Registry (MCR). Cancer incidence data consists of reports of newly diagnosed cases of cancer not reports of cancer deaths. The MCR has been monitoring cancer incidence in Massachusetts since 1982. The 17-year period 1982-1998 is the period for which the most recent and complete data were available at the time of this analysis. This report provides updated analyses from a previous investigation of cancer incidence in Rockland for the years 1982-1994.

**4. Q. What types of cancer were studied and why?**

A. Eight cancer types were evaluated in this investigation and included cancers of the bladder, brain, kidney, leukemia, liver, lung, non-Hodgkin's lymphoma, and pancreas. These cancer types were selected based on elevations noted in a preliminary review of town level cancer rates in the four communities and/or to address concerns raised by residents over suspected elevations in certain cancer types in neighborhoods surrounding the SWNAS.

**5. Q. Did the study review cancer rates in smaller geographic areas in the four towns?**

A. Yes. Cancer incidence rates were calculated and reviewed for each of the four towns as a whole and for each of the census tracts that geographically subdivide the towns. A census tract (CT) is a smaller geographic area of the town designated by the U.S. Census Bureau based on population characteristics. Analysis at the census tract level allows for a better evaluation of trends in cancer incidence in neighborhoods. See the attached Figure 1 for a map of the four towns and their census tracts.

**6. Q. What environmental data were evaluated?**

A. The CAU reviewed the pattern of cancer in relation to possible sources of environmental contamination in the four towns, particularly the South Weymouth Naval Air Station (SWNAS). Factors considered included available information from state and federal agencies related to contamination areas identified on the SWNAS property, potential migration of contamination to off-base locations, private well locations, surface water bodies, and base flight track information. The CAU also reviewed available information from the Massachusetts Department of Environmental Protection (MDEP) regarding potentially hazardous waste sites (21E sites) in the four towns including the Weymouth Neck Landfill, and Suburban Auto, Inc. located in Rockland. Under Chapter 21E of the Massachusetts General Laws enacted in 1983, the MDEP investigates potentially hazardous sites in the state and oversees the cleanup of these sites.

**7. Q. What did the study find about cancer incidence in the four town area?**

A. The study found that during the period 1982-1998 most of the eight cancer types evaluated occurred at or near the expected rates in the four towns of Weymouth, Abington, Hingham and Rockland. Analysis by smaller geographic area within the four towns also showed that, with the exception of lung cancer, most cancer types occurred at or below the expected rates. Some elevations occurred in certain cancer types in some census tracts, however none of the cancer types were elevated in a consistent pattern over time or in any one area within the 4 towns.

**8. Q. Did the study find statistically significantly elevated rates of cancer in any of the four towns?**

A. The study found that lung cancer was elevated at a statistically significant level in three of the four towns during the 17 years evaluated. Lung cancer rates in Hingham were statistically significantly lower than expected over time. In both Weymouth and Rockland lung cancer incidence has increased over time relative to the state rate. In Abington, lung cancer was elevated at a statistically significant level during 1982-1986 but has decreased since that time. Elevations in pancreatic cancer and leukemia also occurred in Weymouth during certain smaller time periods evaluated.

**9. Q. Why is lung cancer elevated in Weymouth, Abington and Rockland?**

A. Review of available risk factor information for individuals diagnosed with lung cancer showed that smoking likely played an important role in elevated rates of lung cancer in these towns as a whole. Although information was limited, review of occupational information suggests that for some individuals occupation also likely played a role in lung cancer incidence.

**10. Q. Did the study suggest that the South Weymouth Naval Air Station (SWNAS) played a role in cancer incidence in the four towns?**

A. With the exception census tracts near the SWNAS where lung cancer was elevated, no unusual geographic concentrations of individuals with cancer were observed in neighborhoods in proximity to the SWNAS property. Specifically, no atypical

concentrations of cancer were observed in areas where possible contact with base contamination could occur including, private drinking water wells, surface water bodies (Old Swamp River, French's Stream, and the Mill Pond Tributary), and historical flight paths.

**11. Q. If most cancers do not show a pattern related to the South Weymouth Naval Air Station, does that mean that there are no environmental concerns associated with the site?**

A. Not necessarily. Environmental contaminants have been detected on the SWNAS property and some studies are underway to better determine the likelihood of off-site migration. Cancer is one type of health outcome. Through follow-up studies related to environmental investigations and through the town Needs Assessment, more complete answers relative to non-cancer health risks in relation to the SWNAS will be gained.

**12. Q. Is the pattern of cancer incidence in the four towns related to an environmental source other than the South Weymouth Naval Air Station?**

A. Based on the available information reviewed to date, no spatial or geographic pattern of cancer observed in any areas of the four towns indicates a pattern related to a potential environmental exposure source. In certain census tracts where cancer was elevated, the geographic pattern of these individuals did not suggest a concentration of cases in relation to each other or in proximity to potentially hazardous waste sites in the area.

**13. Q. Does the MDPH plan to conduct further study in the towns of Weymouth, Abington, Hingham and Rockland?**

A. Yes. The MDPH plans to further investigate lung cancer in these communities in relation to individual length of residence, particularly among non-smokers, to determine whether a clearer pattern related to environmental or other risks for this cancer may emerge.

**Q. Is the MDPH conducting other health and environmental investigations in the communities of Weymouth, Abington, Hingham and Rockland?**

A. Yes. The MDPH is involved in several health and environmental investigation efforts in these South Shore communities. These include: further investigation of the pattern of lung cancer in areas surrounding the SWNAS and evaluation of non-cancer health effects (e.g., multiple sclerosis and lupus) in areas near the SWNAS through collaboration with researchers conducting the Weymouth Health Needs Assessment. The MDPH also plans to conduct water column and sediment testing for arsenic in the Great Pond Reservoir as well as further evaluation of arsenic exposure in several South Weymouth families through independent and uniform medical evaluations by occupational and environmental physicians. Further, the MDPH is conducting Public Health Assessments of the Suburban Auto Site in Rockland and the Weymouth Neck Landfill site in Weymouth.

**14. Q. Is the report *Assessment of Cancer Incidence in Weymouth, Abington, Hingham and Rockland, Massachusetts 1982-1998*, considered a final document?**

A. The report *Assessment of Cancer Incidence in Weymouth, Abington, Hingham and Rockland, Massachusetts 1982-1998* is a Public Comment Release document. The

MDPH invites written public comments on the document for a period of 30 days through March 14, 2002. The report will not be considered final until public comments are received and any necessary modifications to the report are made.

**15. Q. Where can I obtain a copy of the report *Assessment of Cancer Incidence in Weymouth, Abington, Hingham and Rockland, Massachusetts 1982-1998?***

A. The full report is available on the MDPH, Bureau of Environmental Health Assessment website at www.state.ma.us/dph/beha. In addition, a copy of the report is available in the public library of each of the four towns, Weymouth, Abington, Hingham and Rockland.

**16. Q. Who should I contact for more information?**

A. For more information or to submit written comments on the report *Assessment of Cancer Incidence in Weymouth, Abington, Hingham and Rockland, Massachusetts 1982-1998* please contact:

**The Massachusetts Department of Public Health**
**Bureau of Environmental Health Assessment**
**Attn: Community Assessment Unit**
**250 Washington Street**
**Boston, MA 02108**

**Phone: (617) 624-5757**
**Fax: (617) 624-5777**

**www.state.ma.us/dph/beha**

# I. EXECUTIVE SUMMARY

## A. Background

At the request of Senator Michael Morrissey, the Weymouth Board of Health, and concerned residents of Weymouth, Abington, Hingham, and Rockland, MA, the Community Assessment Unit (CAU), a division of the Bureau of Environmental Heath Assessment within the Massachusetts Department of Public Health (MDPH), evaluated cancer incidence in the four towns that abut the South Weymouth Naval Air Station (SWNAS). This evaluation was initiated based on concerns over possible exposures from environmental contamination present at the SWNAS. The SWNAS is a federal facility that was operated by the U.S. Navy from 1941 to 1997 (ATSDR 1999a). The SWNAS property abuts four communities and extends into the town of Weymouth to the north, Abington to the southwest, Rockland to the southeast and borders Hingham to the west.

The report on this evaluation provides a descriptive analysis of the occurrence of cancer in the towns of Weymouth, Abington, Hingham, and Rockland as well as in the census tracts that geographically subdivide the towns for the years 1982 through 1998. Eight cancer types were included in this evaluation: cancers of the bladder, brain, kidney, liver, lung, and pancreas, leukemia, and non-Hodgkin's lymphoma (NHL). The report provides a comparison of the incidence of the selected cancer types in these communities with the incidence of cancer in the state of Massachusetts as a whole. The state of Massachusetts is used as a comparison to provide a stable, standard population to calculate and compare cancer incidence rates. Additionally, available information about risk factors related to the development of these cancers, including possible exposures from the SWNAS and other environmental factors, was evaluated.

To determine whether elevated rates of cancer occurred in the four towns or their census tracts, 17 years of cancer incidence data were obtained from the Massachusetts Cancer Registry and evaluated by age group and gender. The observed number of cancer cases was compared to the number of cases that would be expected based on statewide cancer rates. Standardized incidence ratios (SIRs) were calculated for three smaller time periods within the years 1982-1998 (e.g., 1982-1986, 1987-1994, and 1995-1998) for each of the eight primary cancer types for each town as a whole and the census tracts within each town.

## B. Summary of Results

In general, the results of this analysis indicate that the majority of cancer types evaluated in Weymouth, Abington, Hingham, and Rockland during the 17 years 1982-1998 occurred at or near the expected rates in the four towns and their census tracts. Moreover, with the exception of lung cancer, review of the geographic distribution of cancer in Weymouth, Abington, Hingham, and Rockland revealed no apparent spatial patterns at the census tract level that are not likely attributed to factors such as areas of higher population density (e.g., the presence of multiunit complexes or nursing homes). In general, the distribution of cases seemed to coincide closely with the pattern of population in these towns.

However, statistically significant elevations in the incidence of some cancer types were noted in some towns during certain time periods. In the town of Weymouth as a whole, the incidence of lung cancer was statistically significantly elevated during the 1987-1994 and 1995-1998 time periods. Although a statistically significant elevation in the incidence of leukemia was observed town-wide during the 1987-1994 time period, this cancer occurred at approximately the rates expected during both the earlier time period 1982-1986 and the more recent time period 1995-1998. Finally, despite a statistically significant elevation of pancreatic cancer during the earliest time period 1982-1986, this cancer occurred statistically significantly less often than expected between 1987-1994 and was about as expected in Weymouth during 1995-1998.

In Abington, a statistically significant elevation in the incidence of lung cancer was observed among males and females combined during the earliest time period 1982-1986. During 1987-1994 and the more recent time period 1995-1998, the rates of lung cancer remained elevated but were not statistically different from the expected rates.

During 1982-1998, residents of Hingham generally experienced cancer approximately at or below the expected rates for the eight cancer types evaluated. For example, the rate of lung cancer in this town was lower than expected during the earliest time period 1982-1986 and statistically significantly lower than expected during 1987-1994 and the most recent time period 1995-1998.

In Rockland, with the exception of lung cancer during more recent years (i.e., 1995-1998), no statistically significant elevations were observed town-wide for any of the eight cancer types evaluated in this report during 1982-1998.

When all four towns were evaluated together, the most consistent trend was observed for lung cancer. Analysis of lung cancer rates by smaller time period suggests that the incidence of lung cancer in both Weymouth and Rockland may be increasing over time relative to the state rate. In Abington, the incidence of lung cancer town-wide was significantly higher than expected during the earliest time period 1982-1986. During the later two time periods 1987-1994 and 1995-1998, lung cancer continued to be elevated in Abington, particularly among males. However neither of these elevations were statistically significant.

In contrast to trends observed in Weymouth, Abington, and Rockland, lung cancer incidence rates in Hingham were statistically significantly lower than expected during 1982-1998. Moreover, analysis of SIRs for smaller time periods suggests that the incidence of lung cancer may be continuing to decline in Hingham.

Statistically significant elevations in the incidence of lung cancer were also observed in some census tracts in certain time periods. Specifically, lung cancer occurred significantly more often than expected in Weymouth CTs 4222, 4223, 4225, 4227, and 4228; Abington CT 5202.02; and Rockland CTs 5021 and 5022 during one or more time periods evaluated. Lung cancer appears to be increasing over time in some of these census tracts particularly in areas near the SWNAS.

While leukemia occurred at about the rate expected in the town of Weymouth during the earliest time period, 1982-1986, a statistically significant elevation was noted in the incidence of leukemia during the middle time period 1987-1994. This elevation was primarily due to an increase in diagnoses among males in Weymouth, who also experienced statistically significant increases in incidence during this time period. However, analysis of more recent data (i.e., 1995-1998) shows that the incidence of leukemia was slightly lower than expected. Therefore, it appears that the rate of leukemia in Weymouth has decreased in more recent years.

During 1982-1998, some individual census tracts in Weymouth, Abington, Hingham, and Rockland also displayed statistically significant elevations in the incidence of certain cancer types during one or more time periods. However, these predominantly represented isolated elevations and analysis revealed, with the exception of lung cancer, no consistent trends of cancer incidence at the census tract level throughout the 17-year time period evaluated. For example, although kidney cancer occurred at about the expected rate for the town of Weymouth as a whole during the more recent time period (1995-1998), a statistically significant elevation was noted in the incidence of this cancer type in Weymouth CT 4221, which borders the SWNAS property. This is in contrast to trends observed for this census tract during 1982-1986 and 1987-1994, during which fewer individuals were diagnosed with kidney cancer than expected based on the state rates.

For some cancer types and census tracts, calculated rates were based on small numbers of observed cases and should be interpreted with caution. Because of the instability of rates based on small numbers of cases, it is difficult to determine whether the observed elevations reflect true trends in the pattern of these cancers (e.g., true increases) in Weymouth, Abington, Hingham, and Rockland CTs or are the result of random variation in cancer rates.

In general, review of the patterns of cases according to age and gender, as well as risk factor information related to smoking and occupation, did not reveal any inconsistent patterns for those cancer types that experienced statistically significant elevations within the four communities of Weymouth, Abington, Hingham, and Rockland between 1982-1998. Although an initial review of trends over time indicated an increasing rate of lung cancer in areas close to the SWNAS site, analysis of environmental and non-environmental risk factors as well as an evaluation of the geographic distribution of cases, did not reveal a clear pattern suggesting that environmental exposures from the base contributed to the incidence of this cancer type. For example, smoking is the primary risk factor for the development of lung cancer. Among those diagnosed with this cancer type, a majority reported being a current or former smoker at the time of diagnosis. This information suggests that smoking likely played a role in the incidence of lung cancer as well as in the incidence of bladder, kidney, and pancreatic cancers in these communities.

With regard to specific environmental concerns evaluated at the base, no unusual geographic concentrations of cases were observed in neighborhoods close to the SWNAS property. None of the cancer types evaluated were unusually concentrated in proximity to private drinking water wells identified by a well survey conducted by ATSDR, and no unusual geographic concentrations of cases were observed in neighborhoods along the Old Swamp River or French's Stream, downstream from the base. Although results of recent investigations at the Mill River tributary in the northwest corner of the base were unavailable at the time of this evaluation, none of the cancer types were unusually concentrated in this area of South Weymouth. No clear relationship between the distribution of cancer and historical flight paths was observed in any of the four towns surrounding the base. When cancer incidence was evaluated in relation to other specific community environmental concerns in the towns of Weymouth and Hingham, again, no unusual patterns of cases were observed. This evaluation included a review of the geographic distribution of each cancer type in relation to 21E sites (i.e., hazardous release sites reported to the Massachusetts Department of Environmental Protection) in the four towns.

## C. Conclusions and Recommendations

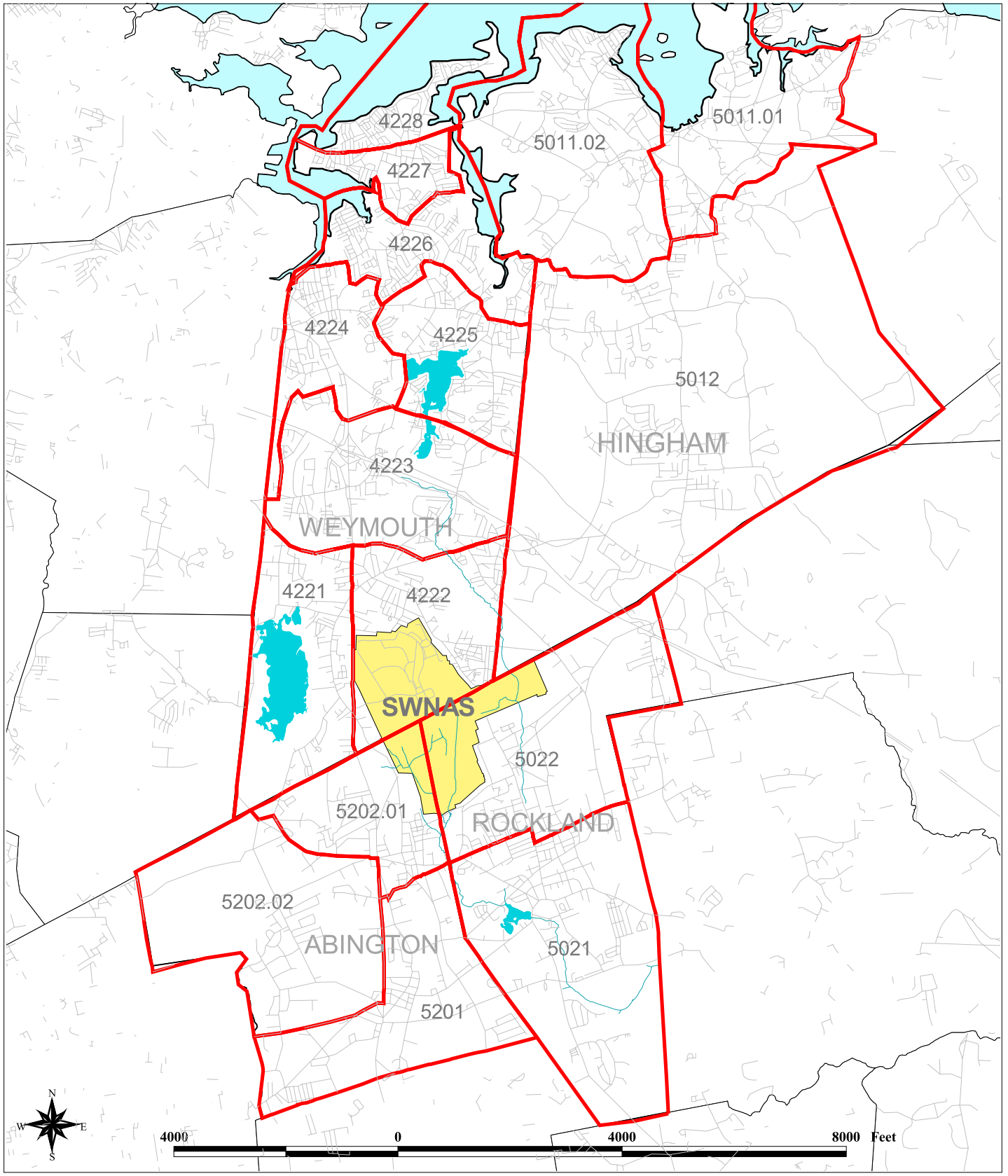
Based on the health and environmental information reviewed in this evaluation, as well as available environmental data specific to the SWNAS, it does not appear that environmental exposures related to the base are likely to have played a major role in the pattern of cancer incidence in Weymouth, Abington, Hingham, and Rockland during the 17-year time period 1982-1998. However, very little historical data on contaminant concentrations both on and off the base were available to evaluate the potential for base-related exposures in the past. In addition, data from ongoing investigations at the base were not available at the time of this analysis.

Despite the environmental data gaps, other than lung cancer, there was no consistency in the types of cancers for which incidence rates were statistically significantly elevated in census tracts or neighborhoods immediately surrounding the SWNAS. An overall review of the geographic patterns of cancer in the neighborhoods and towns abutting the SWNAS, including Rockland, did not indicate concentrations of any of the cancer types evaluated. For most cancer

types, the geographic distribution of cancer cases was away from the base boundary and was consistent with the population density in these areas. Moreover, with the exception of lung cancer, no one area of any of the four towns displayed cancer incidence patterns that looked remarkably different from other areas of the towns.

When interpreting information related to patterns of cancer in the four towns, it is also important to consider the role of other risk factors that were not available for evaluation in this report. This investigation was not able to evaluate the possible role that other non-environmental risk factors (e.g., diet, exercise, and heredity) may have contributed to the pattern of cancer incidence in these communities. As a result of trends observed in the incidence of lung cancer, the MDPH plans to further investigate lung cancer in these communities in relation to individual length of residence, particularly among non-smokers, to determine whether a clearer pattern related to environmental or other risks for this cancer may emerge. The MDPH also recommends that the Boards of Health in Weymouth, Abington, Hingham, and Rockland consider the results of this analysis in the planning of prevention and intervention strategies to evaluate potential health impacts in these communities in the future. In addition, based on information regarding the incidence of lung cancer and smoking in Weymouth, Abington, and Rockland, the MDPH recommends that tobacco control efforts be focused accordingly. Through the use of the Massachusetts Cancer Registry, the MDPH will continue to monitor cancer incidence in the towns of Weymouth, Abington, Hingham, and Rockland.

Figure 1
Location of South Weymouth Naval Air Station
Massachusetts




Bureau of Environmental Health Assessment

Town Boundaries
Ocean
Census Tract Boundaries
SWNAS
Roads
Ponds
Streams & Rivers