

I. MDPH Response to Public Comments

Listed below are comments received from the public regarding the June 1997 Health Consultation: Assessment of Cancer Incidence in Wayland, Massachusetts. The public comment period originally ended on July 25, 1997. However, in response to requests by the Wayland community, the public comment period was extended by four months, ending in December 1997.

The majority of comments address overall or general issues in the Health Consultation. Many similar comments were received by different individuals seeking clarification of a given issue or topic. Where possible, these comments were listed together and a single response has been provided.

Comment # 1: “Section B (page 4) refers to Tables 4 through 6. There are no Tables 4 through 6 in the document. The correct tables appear to be Tables 1A through 3B.”

Response: The correct Table numbers 1A through 3B have been included in the report.

Comment # 2: “On page 9, the first paragraph under the heading, “A. Site Description” misrepresents the size of the Dow site. All four lots (A, B, C, and D) total about 30 acres, not 23.6.”

Response: According to the Phase II Comprehensive Site Assessment, the Dow site covers approximately 16 acres and consists of a former small scale research facility located in the Western portion of a 35.71 acre property located along Commonwealth Road (Ransom 1999b). The MDPH has clarified the description of the site in the final report.

Comment # 3: “On page 10, the first paragraph in “B. Site History” incorrectly states the intent of NED regarding the use of the Dow site. The plans called for the construction of three office buildings containing up to 150,000 square feet of office space with parking lots to accommodate about 400 cars.”

Response: The MDPH has changed the wording in this paragraph to indicate that NED intended to build office buildings on the site.

Comment # 4 “Did you choose the neighborhoods of investigation before the cancer incidences were mapped or after? How were these neighborhoods chosen?”

Comment # 5 “How do you determine the actual geographic area around the site?”

Response: Our investigation involved the analysis of existing cancer incidence data on both a town-wide basis and census tracts in the town focussing on areas of concern as identified and requested by the community. In their original request for an investigation of cancer incidence in Wayland, the Wayland Board of Health identified the area of concern as the Dow Chemical site and surrounding neighborhoods. The Dow site is located in census tract 3661 (Refer to Figure 1 in the report, *Health Consultation, Assessment of Cancer Incidence in Wayland, MA 1982-1994*). However, because the Dow site borders another census tract, 3662, the MDPH expanded its analysis to analyze cancer incidence rates in this area as well. All cancer cases were then mapped to their place of residence at time of diagnosis, and standardized incidence ratios (SIRs) were analyzed by census tract.

The MDPH evaluated the incidence of cancer by census tract in Wayland in order to determine whether any pattern existed at a smaller geographic level in the town. The census tract is the smallest unit of geographic area for which reliable age and sex-specific population data, necessary for calculating incidence rates, is available. The United States Census office defines census tract boundaries. These data were used to calculate incidence rates for both census tracts in Wayland for a number of different cancer types, which were then compared to the statewide incidence rates. Our evaluation included both a quantitative and qualitative analysis of cancer incidence within the town and within each census tract, particularly focussing on the area near the Dow site.

Comment # 6: “We request that you conduct a follow-up study centralized within a five mile radius of Dow Chemical.”

Comment # 7: “It may make sense to evaluate cancer incidence within a one half mile radius of the Dow site. If this area is associated with an increased cancer incidence it’s location near the border between two census tracts may dilute the data.”

Comment # 8: “By dividing the data for the Dow neighborhood by census tract, you may be diluting the data because Dow's property line lies almost along both census tracts. We request your agency analyze and compare the cancer data in both a half-mile and full mile radius of the Dow site with several standards.”

Response: As stated previously, our investigation involved analyzing existing cancer incidence data on both a town-wide basis and within each Wayland census tract. Cancer incidence data were evaluated within both census tract 3661 (the location of the Dow site) and census tract 3662. Therefore, the fact that the Dow property line lies along the border of both census tracts does not present analytical problems because both census tracts were evaluated in this investigation, both quantitatively and qualitatively.

The census tract is the smallest unit of geographic area for which reliable population data exists. The reason that our analysis focused on cases by census tract (and not on cases within a half mile, full mile, or five mile radius of the site) is because of the necessity for accurate age and sex-specific population data. Age and sex-specific population data were obtained from the U.S. Bureau of the Census and used to calculate incidence rates in Wayland and thus compare to the statewide incidence rates. It is not possible to accurately calculate incidence rates without reliable age and sex-specific population data.

Based on our evaluation of cancer incidence data by census tract and within census tracts, including in the area of the Dow site, most cancer types either occurred less than or about as often as expected, and no geographical concentrations of any particular cancer site were evident near the site or within census tracts. In addition, there were no temporal or geographic patterns observed that would suggest that an environmental factor was generally affecting the incidence of cancer in Wayland.

Lastly, evaluation of environmental data and exposure pathway analyses do not indicate that completed off-site exposure pathways are likely to have existed within a half-mile, full mile, or five mile radius of the

Dow site. If an environmental factor was responsible for the incidence of cancer in a community, one would see cancer patterns consistent with patterns of exposure. The only completed exposure pathways were surface soil and subsurface soil. The exposure pattern did not occur within a half-mile, full mile, or five-mile radius of the site. As a result, there is no reason to believe that residents living within a half-mile, full mile and five-mile radius of the Dow site were significantly exposed to contaminants likely to produce health effects across the general population. Therefore, there is no reason to suggest that a cancer pattern would be occurring within a half-mile, full mile, or five-mile radius of the Dow site.

Comment # 9: “Is the state as a whole the right comparison for a community like Wayland? Is it possible that a different interpretation could arise if cancer incidence in Wayland were compared to incidence in surrounding communities?”

Response: The incidences of cancer could be greater, less, or equal depending on the underlying risk factors, differences in population structure, and other characteristics of the population and surrounding community. The state of Massachusetts is the most appropriate comparison base because it represents a large population and therefore a stable population base to derive statistics to be used for comparison. In addition, because the Massachusetts Cancer Registry collects statewide data, using the state as a comparison to Wayland maintains the greatest degree of reliability and validity.

Comment # 10: “Can you change the ratio of how you determine cancer cases to high, average or low, in a community such as Wayland? I believe it is based on one case per 100,000 people. Wayland would never have 100,000 people living in the community.”

Response: Incidence rates are population based. Our analysis of cancer incidence in Wayland was based on the actual Wayland population as reported by the U.S. Census Bureau.

In addition, the commentor is referring to a crude rate, which is not adjusted for age and sex. Rates must be age-adjusted and sex-adjusted to correct for differences in the age and sex distributions of different populations. Comparisons between two rates are valid only if there are no differences in the age and sex distributions of the two populations. Our calculation of SIRs was adjusted by age and sex, and was not based on a crude rate, which can obscure the actual distribution of disease in a community.

The MDPH does not label SIRs as being high, average, or low because this type of ranking scheme may mislead the public. However, the MDPH does calculate 95% confidence intervals (95% CIs) as a means of evaluating how high or low the SIR is and if the results are “significant”. For example, an SIR greater than 100 indicates that more cancer cases occurred than expected; an SIR less than 100 indicates that fewer cancer cases occurred than expected; and an SIR equal to 100 indicates that the number of cancer cases in the population under study is equal to the number expected in the comparison population.

Comment # 11: “Because CT 3661 is more densely populated than CT 3662, could a cluster of cases in a more densely populated neighborhood be overlooked?”

Comment # 12: “In the Cancer Incidence Analysis portion of the study, it states that cancer cases in neighborhoods of the Dow Chemical site did not reveal any unusual geographic pattern or clustering of any one cancer type. How many cases are necessary to classify them as a cluster? How many cases are necessary to determine a geographical pattern?”

Response: Disease clusters have been defined as an “Aggregation of relatively uncommon events or diseases in space and/or time in amounts that are believed or perceived to be greater than could be expected by chance” (Last 1995). However, epidemiology does not offer a single definition with defining parameters for cluster investigations. Census tracts within a town often differ in their population densities. For this reason, the MDPH did not restrict our evaluation to quantitative analysis of incidence rates by census tract to determine whether cases of cancer may or may not be clustered. Our evaluation also involved a qualitative review of incidence rates, based on experience with hundreds of similar investigations over many years in Massachusetts.

The MDPH evaluated the data in their entirety and in terms of both temporal and geographic patterns. Based on our review of all cancer types evaluated, throughout the entire town of Wayland, in both CT 3661 and 3662, no geographic patterns or clusters were observed. Furthermore, in both CT 3661 and 3662, most cancer types either occurred less than or about as equal as expected. This does not mean that individuals who lived in close proximity to the Dow site did not develop cancer, but rather that the

pattern of these individuals does not indicate the presence of a cluster or pattern of one type geographically or temporally.

Comment # 13: “How are cancers classified into primary site cancers? What are the different primary site cancers used in this study?”

Response: Cancers are classified according to the original location in the body where the cancer developed. This location is called the primary site. Ten different types of primary site cancer were evaluated in this investigation. Different primary site cancers investigated in this study include bladder, breast, Hodgkin’s disease, kidney, leukemia, liver, lung, non-Hodgkin’s lymphoma, pancreas and stomach.

Comment # 14: “On page 7, paragraph 3 under “Geographic Distribution”, the MDPH reports no unusual pattern or clustering of any one-cancer type. The Neighbors request that such an evaluation be conducted for all cancer types combined.”

Comment # 15: “In addition to evaluating clustering of different cancer types, it may be useful to look at possible concentrations of cases of all types of cancer.”

Comment # 16: “The public questions what kind of a picture would we be looking at if the agency considered all cancer incidences together. While there may not be a cluster of any one particular type of cancer, the cancers are all mixed.”

Response: For purposes of understanding the possible role of environmental factors, it is not appropriate to group different cancer types together because doing so obscures variability among individual cancer types, which may have different etiologies (causes), and risk factors. It is important to recognize that cancer is not one disease, but many different diseases. Cancer is actually a diverse group of diseases classified by primary site (original location in the body). Epidemiological studies have revealed that different types of cancer are individual diseases with separate causes, risks, characteristics, and patterns of survival. Since different cancers have different causes and risks, it is often difficult to determine if certain types of cancer have occurred due to a common environmental exposure or some

other factor(s). Although some cancers have been associated with adverse chemical exposures in the workplace or environment, many cancers are thought to be related largely to behavioral factors such as cigarette smoking, a diet high in animal fats and proteins, and alcohol consumption.

It is not unusual to observe a number of different cancer types among individuals in any neighborhood. This does not indicate a cluster, but rather a typical pattern of cancer occurrence. According to the American Cancer Society, one out of every three Americans will develop some form of cancer during his or her lifetime. Our evaluations focus on determining whether the patterns or trends observed are not typical and whether it is possible that they may be related to environmental factors. In general, if a specific factor (environmental or non-environmental) were related to cancer incidence in the town, one would not expect to observe a diverse pattern of different cancer types. Instead, one would expect to see significant increases in cancer incidence, as well as clusters of a specific cancer type(s) based on a pattern of environmental exposure. None of which were observed in the town of Wayland.

Comment # 17: “If you looked at all cancers around the site without factoring in different primary site cancers were these numbers significant? If not, how is this determined?”

Response: As explained in Response to Comment # 16, The BEHA does not group different cancer types together because different cancer types are different diseases. Therefore, an evaluation of all cancer types as a group obscures the variability that exists among different cancer types, which may have different etiologies (causes) and risk factors. However, the MCR does collect cancer incidence data for all cancer types combined for each Massachusetts city and town. The MCR reports this information for the town of Wayland for three different time periods: 1982-1992, 1987-1994, and 1990-1995.

Review of this information for the years 1982-1992 indicates that in the town of Wayland, all cancer types combined occurred about as often as expected. Approximately 578 cases were expected and 587 were observed (SIR=102). During the time period 1987-1994, all cancer types combined occurred slightly more often than expected (487 cases observed vs. 464 cases expected; SIR=105). This increase is based on an excess of 23 cases town-wide. Review of more recent cancer incidence data for the years 1990-1995 indicates that in the town of Wayland all cancer types combined occurred

less often than expected. Approximately 383 cases were expected and 357 cases were observed (SIR=93). None of these incidence rates were statistically significant. For information regarding how statistical significance is determined, please refer to the publication entitled, *Cancer Incidence in Massachusetts 1990-1995* (MDPH 1999).

Comment # 18: “There is no mention of the issue of latency in the report. The latency period mentioned at the public forum must be applied to any consideration of the potential health effects of immune toxins on our health.”

Response: The MDPH was requested by the Wayland Board of Health to investigate cancer incidence in the town of Wayland, specifically focusing on the area around the Dow Chemical site (Halko 1992). The MDPH Health Consultation was conducted to evaluate concerns specific to cancer incidence. It was not intended to be a comprehensive evaluation of “potential health effects of immune toxins”.

As requested, a discussion of latency as related to cancer incidence in Wayland has been incorporated in the final report. Cancer in general is known to have a long period of development or latency period that can range from 10 to 30 years and in some cases may be more than 40 years (Bang 1996, Frumkin 1995). According to the Final Preliminary Assessment Report, the Dow Chemical Company operated at the Wayland site between the years 1964 and 1988 (CDM 1995). Given that the latency period for most cancer types is between 12 and 25 years, cancer incidence data between the years 1970 to 2001 are more relevant when examining past opportunities for exposures which may have occurred while the facility was in operation. The time period evaluated in this investigation, 1982 to 1995, is well within this time frame.

It is also important to understand that review of environmental data and exposure pathways analysis do not indicate that Wayland residents in general were significantly exposed to contaminants from the Dow site.

Comment # 19: “We accept the original report by the Community Assessment Unit with information available from 1982 through 1992, with the expectation that it will be amended to include data available

through 1995 as soon as practical. We would hope that this will be a continuing study that will incorporate new data as it becomes available.”

Comment # 20: “We request that you continue to track cancer incidence in the town.”

Comment # 21: “Will cancer data for 1993 and 1994 be included in a Wayland study update?”

Comment # 22: “No cancer cases first diagnosed after 1992 are included in this study. I believe that there have been many more incidents of cancer reported after 1992.”

Response: Cancer incidence data for the years 1993, 1994 and 1995 have been evaluated and included in our final report. Therefore, our investigation includes cancer incidence data for the years 1982-1995. Evaluation of these additional years of data indicate that cancer incidence in Wayland generally occurred at or near the expected rates, and most cancer types evaluated occurred at approximately the same rates observed during 1987-1992. As is noted in the *Recommendations* section of our Health Consultation, the MDPH will continue to monitor cancer incidence rates in Wayland through the MCR.

Comment # 23: “Your study is inconclusive because there may be more anecdotal evidence, which probably was not included in this study.”

Response: The MDPH believes that our investigation of cancer incidence in the town of Wayland and its relationship to the Dow site is conclusive and is based on all available existing information. The MDPH did receive anecdotal information from the community, and this information was included in our evaluation. We realized that additional information might have existed, which is the reason the June 1997 Health Consultation was issued as a public comment release.

Comment # 24: “If the correct application of computer technology would provide more accurate data i.e., cohort study, perhaps your agency could access such pertinent information in a more scientific fashion rather than relying on the public to report on their anecdotal awareness of such cases.”

Response: The MDPH did not rely on anecdotal reports of cases from the public. Conducting a cohort study to obtain this type of information is not necessary in the state of Massachusetts. As explained in the Methods section of the Health Consultation, cancer incidence data were obtained from the MCR. By Massachusetts law, all newly diagnosed cases of cancer must be reported to the MCR. This reporting began in 1982, resulting in a comprehensive database of individuals diagnosed with cancer throughout the Commonwealth. The MCR files are currently estimated to contain data on 93% of all reportable cases (MDPH 1999). Furthermore, the MDPH is not aware of any computer technology that may be accessed to produce a cohort study.

Comment # 25: “We are concerned about Wayland residents who may have lived here for many years but were ultimately diagnosed with cancer after moving out of town or out of state.”

Comment # 26: “I disagree with the findings and wish an extension for further study. I am aware of four other cases of cancer on my street and next one over which were not included in the study because they either got sick before 1982 or after 1992 and also moved from the area.”

Response: The MCR began collecting information on Massachusetts residents diagnosed with cancer in the state in 1982. As a result, for years prior to 1982, statewide data for cancer incidence are not available. The MCR collects information on all newly diagnosed cancer patients from Massachusetts acute care hospitals. The information is provided for individuals according to their address at the time of diagnosis. Therefore, individuals who were residents of Wayland at the time of their diagnosis were included in the cancer incidence analysis. The MCR has reciprocal agreements to share data with other states, including New York, Connecticut, New Hampshire, Rhode Island, Maine and Florida. Thus, if Wayland residents used hospitals in these other states, their cancer diagnosis would be reflected in the MCR data included in our evaluation. With respect to individuals being diagnosed after assuming a residence in another area, this is an unfortunate limitation in descriptive epidemiologic research. It is important to note however that if an environmental factor had played a major role in cancer incidence in a community, it would likely still be evident based on review of available data.

Cancer incidence data for the years 1993, 1994 and 1995 have been included in the final report. In addition, as part of a separate follow-up investigation, the MDPH is conducting a medical records

review for current and former Wayland residents who live or lived in the neighborhood adjacent to the Dow site diagnosed with non-Hodgkin's Lymphoma and Hodgkin's Disease.

Comment # 27: "On page 16, under "Cancer Incidence Data", the Neighbors are not satisfied that the MDPH has accessed all available data to make the conclusions stated in this paragraph."

Response: The MDPH stands by its conclusion that the available data do not suggest that residents of Wayland experienced excessive rates of cancer incidence during the period 1982 to 1992.

By Massachusetts law, all newly diagnosed cancer cases must be reported to the MCR. This reporting started in January 1982, resulting in a comprehensive database of individuals diagnosed with cancer throughout the state. The MCR maintains a high quality database for the purpose of cancer surveillance and investigation. Intensive data evaluation is required to ensure data quality including complete registration of cases, prevention of duplicate reports, collection of uniform data and confirmation of diagnosis.

At the time of the June 1997 public comment release, the most complete cancer incidence data available were for the eleven-year period 1982 to 1992. Since that time, three additional years of cancer incidence data have become available (1993, 1994 and 1995). Cancer incidence data for the years 1993, 1994 and 1995 have been evaluated and included in the final report. Evaluation of these additional years of data indicate that cancer incidence in Wayland generally occurred at or near the expected rates and most cancer types evaluated occurred at approximately the same rates observed during 1987-1994. Analysis of this new data does not affect our conclusions and in fact, should provide reassurance to Wayland residents that they are not experiencing excessive rates or unusual patterns of cancer.

Comment # 28: "The limited number of cancer types reviewed by your agency, the limited number of years for which such data is available through the MCR and the small numbers considered here in Wayland result in rather unstable data."

Comment # 29: “Wayland is a small community and your methodology does not include calculating Standardized Incidence Ratio’s and Confidence Intervals for cases fewer than five. However, we observe that certain cancer types are indeed increasing more than expected.”

Response: The MDPH does not agree that cancer types are increasing more than expected. In the town of Wayland as a whole, seven out of the ten cancer types evaluated occurred less often than expected. Three cancer types (breast, liver and pancreas) occurred more often than expected. The elevations observed in these three cancer types were based on a small number of cases (i.e., one to three additional cases) and almost all SIRs were below 100. Furthermore, no statistical significant elevations were observed in the town of Wayland for any cancer type during the entire 1982-1994 time period evaluated.

Ten different types of cancer were evaluated in this investigation. These include cancer of the bladder, breast, Hodgkin’s disease, kidney, leukemia, liver, lung, non-Hodgkin’s lymphoma, pancreas and stomach. These cancer types were selected to address concerns raised by Wayland residents regarding suspected elevations in the incidence of these cancer types near the Dow site. Given that different types of cancer are in fact, different types of diseases, each having separate causes, risks, characteristics and survival rates, our investigations encompassed a wide range of diseases (ten) as requested by the Wayland community. In fact, had we chosen cancer types based on the types of contaminants detected at the Dow site, our evaluation would have included cancers of the breast, leukemia, and non-Hodgkin’s Lymphoma only.

Although some cancer types did occur more often than expected, this is not indicative of an increasing trend. The Community Assessment Unit has evaluated the incidence of cancer in hundreds of communities throughout Massachusetts. When we examine cancer incidence in any Massachusetts town, we will frequently see situations in which the observed number of cases is greater than expected. We will also see situations in which the observed number of cases is less than expected. Such variations are not unusual. These fluctuations or changes in the incidence of cancer can often reflect changes in the diagnosis and reporting of a particular cancer type or natural variation in the incidence of cancer. For this reason, statistical tests (e.g., 95% CI) are conducted to see whether the observed differences may be due to chance or are not likely to be due to chance.

As is correctly pointed out, for a small community such as Wayland, for many cancer types the number of cases is small. The smaller the number of cases, the more unstable incidence rates are and thus the more difficult it becomes to show that observed versus expected differences may be statistically significant. However, the BEHA evaluates the data in their entirety and in terms of temporal and geographic patterns. Statistical significance is not the sole criteria we are concerned about when conducting an investigation of cancer incidence in a community. For all data, regardless of significance, the MDPH evaluates factors that may influence disease occurrence such as smoking, occupation, and other information that may be available. In addition, the MDPH does provide information on the observed and expected numbers regardless of whether an SIR or statistical significance (95% CI) is calculated.

Based on our review of all ten cancer types evaluated within the town and within each census tract, the MDPH believes that overall, residents in Wayland did not experience excessive rates of cancer during 1982-1994, and 1995. In fact, few cancer types occurred more often than what would be expected based on statewide incidence.

Comment # 30: “In the next paragraph, the Neighbors believe the last two lines of page 7 are incorrect. If we understand the documents correctly, Natick's CT 3821 was precisely where the unusual pattern and clustering of pancreatic cancer occurred in the Wethersfield neighborhood, just south of Wayland

Response: In May 1997, the MDPH released the results of a report entitled, *Health Consultation: Assessment of Cancer Incidence in Natick Massachusetts 1982-1992* (MDPH 1997). One conclusion of this report was that pancreatic cancer in CT 3821 appeared geographically concentrated in the Wethersfield neighborhood of Natick. This area is located approximately one half mile from the Wayland border. However, no geographical distributions were observed that related to Wayland or the Dow site. In addition, there were no significant elevations in pancreatic cancer in the town of Wayland, nor was the geographical distribution of pancreatic cancer in Wayland similar to Natick. Furthermore, and perhaps more importantly, there are no known pathways of exposure between the Dow site and the Wethersfield neighborhood.

Comment # 31: “We request that your agency consider the products of the efforts of the Natick Cancer Study Task Force as they pertain to the Dow neighborhood.”

Response: The MDPH is unaware of any completed research products generated by the Natick Cancer Study group, which are applicable to the MDPH evaluation conducted in Wayland.

Comment # 32: “While you are able to present cancer data, you have not answered the questions, which caused the concern generating this study.”

Response: In their request, the Wayland Board of Health asked the MDPH to evaluate cancer incidence in the town of Wayland, specifically focusing on the area around the Dow Chemical site (Halko 1992). The focus of the Health Consultation was to address resident concerns about increased cancer incidence in Wayland and the possible relationship to the Dow Chemical site. It is beyond the scope of this investigation to determine what specific factors (environmental or non-environmental) caused an individual's cancer. In addition, the MDPH Health Consultation was not intended to be a comprehensive review of all health outcomes and their potential relationship to the environment in the town of Wayland. Rather, it was intended to evaluate pathways of exposure and answer concerns specific to cancer incidence in Wayland.

The MDPH has addressed these concerns. Review of available cancer incidence data does not suggest that Wayland residents experienced excessive rates of cancer during the years 1982-1994. In addition, review of environmental exposure pathway information for the Dow site indicates that significant exposures to site related contaminants were not likely to have occurred to area residents.

Comment # 33: “Will a study ever go beyond cancer related issues?”

Comment # 34: “As immune systems break down during the protracted latency period, would you not find a variety of health issues, including cancer?”

Comment # 35: “If residents’ health had been affected by exposure to chemicals from the site when it was operated by Dow, cancer may not be the only adverse health outcome. There are other illnesses that area associated with exposure to chemicals that may be present in the environment.”

Comment # 36: “MDPH must be willing to acknowledge that while it only looked at cancer data, the more likely health effect of such substances may not be the development of cancer.

Response: It is important to understand that environmental exposure pathway information must be taken into consideration. Exposure pathways analysis did not indicate that exposure to site related contaminants likely resulted in adverse health outcomes (cancer or otherwise). In addition, it is also important to note that MDPH was asked to evaluate cancer.

Nonetheless, the NED/DOW Neighbors, Inc. have repeatedly expressed concerns about the occurrence of non-cancer outcomes. However, as explained to the NED/DOW Neighbors in May 1997, this type of descriptive investigation is not possible because these outcomes are not reported (Barry 1997). Unfortunately, medical reporting is required only for a limited number of illnesses such as cancer and some infectious diseases (e.g. tuberculosis). Therefore, no coordinated reporting system exists by which one could monitor these types of health outcomes for the state or any individual town. In addition, the limitations of this type of information do not always allow for specific conclusions to be made about the causes of disease. It is necessary to have a systematic assessment of cases so that no cases of a particular outcome are excluded from evaluation and that all cases included in an evaluation have a confirmed and accurate diagnosis. In order to compare the number of cases of a particular outcome observed in an area to the number that would be expected to occur, one must have detailed information regarding risk factors for these illnesses and the expected rates of the illness in a larger population.

The focus of the Health Consultation was to review pathways of exposure and answer specific questions regarding citizen reported increased cancer incidence in Wayland based on concerns related to the Dow site. The MDPH Health Consultation was not intended to be a comprehensive review of health and the environment in Wayland, rather it was intended to evaluate concerns specific to cancer in Wayland, with the primary concern being the Dow site.

Comment # 37: “NED/DOW Neighbors, Inc do NOT consider some of the site work data derived by consultants in the employ of interim owner NED acceptable. Prior to DEPs direct involvement, some of the site work conducted by ESS was not performed according to industry standards or the work was inadequate to produce credible, verifiable data.”

Comment # 38: “All of the old environmental studies performed at and for the Dow site were used in preparation of the MDPH report. Much of the data and methodologies in these older studies has been refuted and shown if not proven to be flawed by various professionals involved in the data as it has been reviewed over time.”

Comment # 39: “The Neighbors are not pleased to see MDPH’s heavy reliance on one source of information the “1995 CDM Final Preliminary Assessment Report”. Certain soil and groundwater data generated at the site before full DEP Tier IA oversight are not considered credible by the Neighbors.”

Comment # 40: “The report cited in Section III is a review of all data collected for the site, and may not be the best source of information about the site. The Phase 1 and Phase 2 studies may be better sources of valid data and information.”

Response: The MDPH reviewed all available environmental information and sampling data for the Dow site, including the Phase I and Phase II Site Assessment Reports. In addition, the MDPH contacted the MDEP regarding the adequacy of the environmental data reviewed and included in this report. According to the MDEP, the majority of the work conducted prior to MDEP Tier 1A oversight is credible (MDEP 1998). The reader was referenced to the CDM Final Preliminary Assessment Report in the text because at the time the original Health Consultation was released, it provided site history information and summarized the environmental investigations that occurred at the Dow site prior to 1995 (CDM 1995). Numerous reports were reviewed and analyzed in order to evaluate the nature and extent of contamination as well as the potential for exposure. These reports are listed and referenced in the Final Health Consultation.

Comment # 41: “We ask that you and your agency apply the essential components of a risk assessment to your health study of the Dow neighborhood.”

Response: Although risk assessments and health assessments are similar in that exposure scenarios are developed in both, they have very different purposes. A risk assessment is a procedure developed for assessing potential risks and numerically establishing the probability that exposure to environmental contaminants may result in adverse health effects. The product of a risk assessment is a numeric estimate of the public health consequences of exposure to an agent (ATSDR 1992). Quantitative risk assessments, which are conducted by MDEP, are used to determine the need for cleanup at a disposal site and to evaluate alternatives and measure cleanup effectiveness at disposal sites.

In contrast, health assessments are based on environmental characterization information, community health concerns, and health outcome data (ATSDR 1992). Health assessments conducted by the MDPH use both quantitative and qualitative data, focusing on medical public health and toxicological perspectives associated with exposure to a site. From this information we are able to develop health advisories, issue recommendations, identify public health actions or studies needed to evaluate and prevent human health effects. Because risk assessments are used as a tool to support the selection of a cleanup remedy at a site and not to provide information regarding the public health implications of a site, components of a risk assessment are not used to conduct health consultations or health assessments.

Information regarding the results of risk assessments for the Dow site may be obtained by contacting Scott Greene, of the MDEP at 978-661-7600. Information regarding results of the health consultation for the Dow site may be obtained by contacting Kimberly Russo, of the MDPH at 617-624-5757.

Comment # 42: “In paragraph 3, the justification for the Tier 1A classification for the Dow site was understated.”

Response: The MDEP classified the site as a Tier 1A site in November, 1994 due to (1) potential existence of specialty chemicals on the site which are not detected using standard analyses and (2) the lack of information of past chemical usage at the former research facility (MDEP 1999). The MDPH has clarified this information in our final report.

Comment # 43: “Under the heading “C. Site Remedial Activities,” (page 10) the description of the major activities occurring as part of the first RAM should also include the installation of the groundwater wells that provided the first successful groundwater samples.”

Response: The MDPH has included this activity in our final report.

Comment # 44: “In the paragraph describing the second RAM (page 11), the removal of UST’s was not part of the second RAM. They were leftover activities of the first RAM, which had not yet been performed.”

Response: Although the removal of UST’s was scheduled to be conducted during the initial RAM, fieldwork did not begin until November 1996, when the activities associated with the follow-up RAM were to begin. The MDPH has clarified this point in our final document.

Comment # 45: “Your study fails to address the potential health effects of organotins and mercuries found in soils on the site.”

Response: It is important to understand that in order for a health effect to occur, an individual must actually be exposed or come into contact with the contaminant. Organotin and mercury compounds were discovered in the shallow disposal area during a release abatement activity at a depth of four feet below ground surface. In general, the public is only exposed to the top three inches of soil (i.e., surface soil) (ATSDR 1992). It is possible that human exposure to organotin and mercury compounds may have occurred via incidental ingestion or via dermal contact. Due to the nature of activities at the site and the depth of the contaminants it is unlikely that local residents were exposed to contaminants at the Dow site. Local residents primarily used the site as a walking path. Although residents have also been reported in the more developed, industrial area of the site, given the inaccessibility of these soils to the public and the reported residential use of the site, it is not likely that local residents were exposed to contaminants in the subsurface soil.

Again, the focus of the MDPH Health Consultation was to answer specific questions regarding citizen reported increased cancer incidence based on concerns related to the Dow site. It was not intended to be a comprehensive review of health effects and the environment in Wayland, rather, it was intended to evaluate concerns specific to cancer incidence. The most readily available mechanism to assess non-cancer effects is through the evaluation of environmental data. Based on this review of environmental data, the general population was not likely exposed to levels of contaminants, which would be expected to result in health effects. This includes both non-cancer and cancer outcomes.

Comment # 46: “Many substances at the site have been so exotic that neither the DEP nor EPA has established toxicity or cleanup standards for them. Likewise, ATSDR CVs also fails to include them. MDPH must admit its limitations to truly evaluate the potential health threats that such exotic material may pose.”

Comment # 47: “The 3rd paragraph on page 13 refers to the comparison values. It should be noted that there are no comparison values for mercury, tin or for any of the organotin compounds.”

Response: The “exotic” substances mentioned in this comment are organometallics. Due to the absence of cleanup standards for these compounds, the MDEP required Dow to develop cleanup standards (Harnois 1995). Although organometallics were detected in the soil samples collected from the shallow disposal area, given the reported residential use of the site and the inaccessibility of these soils to the general public, it is unlikely that local residents were exposed to these contaminants. Again, in order for a health threat to be present, an individual must actually be exposed or come into contact with the chemical.

The ATSDR comparison values are chemical and media specific concentrations that are used by health assessors to select environmental contaminants for further evaluation. Comparison values are screening values in that, any media concentrations less than a comparison value are unlikely to pose a health threat. However, as stated previously, media concentrations above a comparison value do not necessarily represent a health threat; for a health threat to be present, an individual must actually be exposed or come into contact with the chemical.

The comparison values used for the health consultation are overly conservative considering potential exposure scenarios for the Dow site. Based on former and current land use, possible exposures to site related contaminants are most likely short term. For that reason, comparison values for acute exposures were used when available. In instances where acute exposure comparison values were not available, we selected what we considered to be the most appropriate comparison value, for the exposure scenario. In some cases, comparison values for chronic exposures (i.e. daily exposure over a lifetime) were used in the screening process. Clearly, such comparison values are overly protective for short-term exposures that might be experienced by trespassers.

If an ATSDR comparison value was not available, the maximum concentration of the chemical detected was compared to area background concentrations or the relevant state and/or federal standards or guidelines. After the contaminants were screened using the relevant comparison values, the identified chemicals of concern were further evaluated using the best medical and toxicological information available to determine whether or not they were likely to pose a hazard to public health under site specific conditions of exposure.

Comment # 48: “ATSDR values expired on 6/30/97. If they were no longer valid, it would appear the MDPH should determine what differences there are with the new values now in effect.”

Response: The ATSDR publishes comparison values on a quarterly basis in the event that changes in a comparison value for a certain chemical are necessary. However, changes in a comparison value are infrequent and therefore the expiration date printed on the comparison values used for the Wayland Health Consultation do not necessarily indicate that these values are not useful or that they are out of date. If any changes in a comparison value occurred, BEHA staff reviewed these changes in relation to the cancer incidence evaluation in Wayland.

Comment # 49: “Paragraph 4 (page 9) states “Based on employee reports, the Final Preliminary Assessment Report identified several areas of possible soil contamination on the site” describing possible soil contamination on the site. In order to compile such information, Dow conducted interviews of former employees in the spring of 1994. Dow’s own attorney interviewed the Dow employees. The Neighbors requested that the questions asked in those interviews be included in the public record, but

that never occurred. Those interviewed were asked to return signed affidavits corroborating that summaries of those interviews which entered the public record did in fact represent the nature and content of the interview. A number of affidavits were not returned to the DEP. The DEPs attempts to reach those individuals by phone were not entirely successful.”

Response: Questions and concerns regarding the interviews conducted with former Dow employees and the adequacy of environmental sampling plans should be addressed to the MDEP. The MDPH was not involved in conducting the interviews with former Dow employees. However, it should be noted that the MDEP believes the interviews were successful in identifying and documenting laboratory practices, types of research conducted at the site, and potential disposal areas on the site (MDEP 1998).

Comment # 50: “On page 11, there is a statement that follow up sampling of soils did not show contaminants greater than in previous soil samples (“None of the samples collected detected contaminants at concentrations that were greater than the previous sampling rounds (MDEP, 1997)”). In these follow up remediation activities, Dow’s goal is to excavate soil from known areas of contamination until such confirmatory sampling shows the site to be clean. Follow up RAM activities have continued because these samples ARE NOT clean. They may not be any worse than the initial sampling, but some areas keep expanding without achieving clean soils AND concentrations of certain contaminants remain above S1 soil standards.”

Response: The MDPH reported the MDEPs conclusions regarding follow-up soil sampling. Our point was not that soils on the Dow site were clean, but that the concentrations of contaminants detected during the second RAM were not greater than previous sampling rounds. Initial soil sampling conducted at the site detected non-TLC compounds at concentrations below 0.05 mg/kg. Further research determined that many of the non-TLC compounds were naturally derived products related to the decomposition of plant materials (e.g., terpenes, pinenes, natural waxes, steroids, and fatty acid compounds). Metals were detected at concentrations either within typical background levels or below or equal to ATSDR comparison values. Additional soil sampling of the site conducted as part of the second RAM indicated that no contaminants were detected at concentrations greater than what was discovered during the initial RAM. For those organic compounds that were identified and for which an

ATSDR comparison value exists, none were detected at a concentration above a comparison value. Therefore, it was determined that there was no health concern related to possible exposure to these soils even though some contaminants were detected.

Comment # 51: “Given that in the years past, before a fence was installed at the main entrance, cars would frequently enter the site. Teens would party up there leaving beer bottles strewn near the concrete pad burn area. The Neighbors do not understand how the MDPH reaches the conclusions it does in the third paragraph on page 17.”

Response: Review of available environmental data for the Dow site indicated that the majority of compounds detected in the surface soil (e.g., the top 3 inches of soil) were either below ATSDR comparison values or within typical background concentrations (ATSDR 1992). Although local residents have been reported in the developed area of the site, the available evidence does not suggest that the reported use of the site would generally result in significant opportunities for actual exposure. The public is largely exposed to only the top few inches of soil. Local residents primarily used the site to access the walking path that winds through the wooded area and teenagers have reportedly used the site as a hangout area. Occasional contact with soil could have occurred while walking or hanging out at the site. However, activities that could result in significant exposures (e.g., incidental ingestion of soil) do not appear to have occurred. Based on the reported use of the site and review of available chemical specific environmental concentration data for the Dow site, it is not likely that exposures to surface soil contaminants would pose a significant health risk to local residents.

Comment # 52: “Many substances on the site have not been identified.”

Response: Subsurface soil samples collected from the shallow disposal area contained a number of compounds (SVOCs) which could not be tentatively identified. As a result, the MDEP required Dow to confirm the presence of and identify these compounds by conducting a library search for both VOCs and SVOCs and an analysis for sulfate, iodide, fluoride and 28 target analyte metals (Greene 1995, MDEP 1996). Through Dow’s research, most of the unknown compounds detected in the soil were identified as compounds related to the decomposition of plant material. The remaining unknown compounds were able to be partially identified and separated into classes of compounds (e.g., PAHs)

(MDEP 1995). The unknown compounds were discovered in the shallow disposal area at relatively low concentrations (i.e., less than 1.5 ppm) in a small isolated area of the site (Greene 1997). In addition, the area where these subsurface soil samples were collected from is heavily wooded. According to the MDEP, it is likely that these unidentified compounds would be detected even in an uncontaminated environment due to the natural decomposition of organic matter (Greene 1997). Furthermore, although local residents have historically been known to frequent the site, the public is usually only exposed to the top 3 inches of soil. Because relatively low levels of these unknown compounds were detected at depths greater than 3 inches in a heavily wooded area of the site, the data do not suggest that local residents may have been exposed to these unknown compounds.

Comment # 53: “The last sentence on page 13, 2nd paragraph, states that non-TCL compounds present at less than 0.05 mg/kg in soils are not considered contaminants of concern. However, some of these compounds may be COCs because of potential high toxicity.”

Response: A contaminant of concern (COC) is a site-specific chemical substance that is selected for further evaluation of potential health effects. In other words, the term does not imply any level of hazard. Generally, a chemical is selected as a contaminant of concern because its maximum concentration in air, water, or soil at the site exceeds one of ATSDRs comparison values. Contaminants of concern were chosen on the basis of data quality, site background concentrations, comparison value concentrations, and community health concerns.

During any site investigation it is not unusual that some non-TCL compounds are detected but not identified during laboratory analysis. According to the MDEP, all of the unknown compounds detected in the soil were able to be identified as compounds related to plant material and the natural decomposition of that material, except for some unknown detected in sampling locations TP02 and CPOE (MDEP 1995). While the unknowns detected in these two areas were not able to be completely identified, the majority were able to be separated into classes of compounds (e.g., all of the non-TCL compounds detected in CPOE-S2 were identified as PAHs).

The MDPH has modified the text to clarify that the majority of the unidentified compounds detected at the site are thought to be related to the decomposition of plant material and all were detected at very

low concentrations (i.e., less than 1.5 ppm). Therefore, these compounds were not considered contaminants of concern.

Comment # 54: “The Neighbors are concerned that the chemicals in the vials may also be in the soils. Given that the DEPs remediation regulations only address present and future threats to health and the environment, such important forensic type evidence gets removed without being identified. The removal of the vials affects MDPHs ability to access the information it needs to investigate health issues/effects, which are inherently based on the past.”

Comment # 55: “As the MDEP oversees cleanup more and more contaminated soils, groundwater, broken glassware are removed from the site...this removes all types of forensic evidence from the site and from further review as to its potential effects on the past, present and future public health.”

Comment # 56: “The vials represent forensic evidence which apparently no Massachusetts agency has control of. There seems to be a great rush to finalize issues over the Dow site prematurely before sufficient assessment and study has been performed to enable intelligent and informed conclusions.”

Comment # 57: “It appears that the regulations and activities of one agency act contrary to the interests of the other agency as well as the public interest.”

Comment # 58: “Sampling of the site is incomplete, only limited efforts have been made to evaluate some soils (i.e., the 130 vials excavated from the Shallow Disposal area).”

Response: The MDPH does not believe the vials removal affects our ability to investigate whether exposure to contaminants detected at the Dow site may be related to increased cancer incidence in the town of Wayland. Exposure pathway information must be considered.

Subsurface soil in the area where the vials were discovered has been impacted by contamination. Various compounds such as VOCs, SVOCs and metals have been detected in this area. The vials were discovered during excavation activities at the Dow site. Specifically, the vials were found buried in an area known as Test pit number 2 (TP02). TP02 was excavated to a depth of 4 feet below ground

surface. As previously mentioned, in terms of exposure pathways, generally, the public is exposed to only the top three inches of soil (i.e., surface soil). Given that the vials were discovered during excavation activities, it is highly unlikely that area residents were exposed to either the vial contents which leached into the subsurface soils or the vials themselves. In addition, although comparison values were not available for several compounds detected in TP02, the majority of compounds detected were below MDEP Method 1 soil standards.

Decisions about the removal of materials from a site as part of an enforcement action fall within the mandate of the MDEP. According to the MDEP, analyses of the vials will not provide any additional information necessary for the investigation of environmental contamination at the Dow site (MDEP 1998). Because the MDEP analyzed both soil and groundwater for all contaminants likely to be present in the shallow disposal area, they do not believe that any information pertinent to their investigation of environmental contamination at the site would be gained (MDEP 1998). Although the MDPH does not have the regulatory authority to require testing of the vials, we did recommend that, if for no other reason than to respond to the public's expressed desire to know the contents of the vials, the vials either be tested by Dow or that the vials be made available to the citizens for testing (Barry 1998).

Comment # 59: "The last paragraph describes potential future exposure to soil contaminants. As NED attempted to secure permitting from town boards for its office park project, they stated that they expected to blast in numerous locations because there is a great deal of ledge and bedrock on the site. For any party contemplating purchasing and developing this property beyond the existing building, future exposure could be a concern in areas not tested and remediated."

Response: Questions regarding the adequacy of environmental testing and sampling plans should be addressed to the MDEP. They are the agency responsible for ensuring assessment and cleanup of hazardous waste sites in Massachusetts.

When discussing public health implications, perhaps it is more important to understand that both past and more recent environmental investigations conducted at the Dow site show that soil, surface water, sediment, and groundwater have been mildly impacted by past disposal practices. Exposure pathway analyses for these media do not indicate that nearby residents or trespassers were exposed to significant

levels of contamination. Based on site history information and reported residential use of the site, it does not appear likely that Wayland residents had opportunities for significant exposure to site related contaminants.

The town of Wayland plans to purchase the Dow property for future use as conservation land (Ransom 2000c). The MDPH understands that a deed restriction preventing the property to ever be used for residential housing will be placed on the land and instituted as a condition of the sale. Since the site is not intended to be used for residential building in the future, it is unlikely that blasting will occur on the property. However, once environmental cleanup has been completed and future land use plans are clearly identified, the MDPH could provide an updated opinion relative to public health recommendations.

Comment # 60: “On page 16, the report states that one would expect health risks from pond sediments to be less than the risks from soil. With exposed, unprotected stockpiles of dredged pond soils sitting on the property for years, the real exposure and risks seem unknown.

Response: Because ATSDR comparison values do not exist for sediment, soil comparison values were used instead. Generally, the use of these values results in a more conservative evaluation because health risks from exposure to sediment would be expected to be less than soil due to a lower magnitude of exposure. The sediment sampling results discussed on page 16 refer to sediment samples obtained directly from the ponds, not samples obtained from the piles of dredged pond sediment. Therefore, the use of soil comparison values for sediment obtained directly from the ponds would result in a more conservative evaluation, due to a lower magnitude of exposure.

Although the sediment samples discussed on page 16 were not obtained from the dredged pile of pond sediments, they do provide an indication of what types of contaminants would be expected to be present in these piles. Environmental sampling data indicate that the detected concentrations of most of the chemicals found in sediment obtained directly from the ponds were either below or approximately equal to the comparison values. No VOCs, pesticides, PCBs, or dioxins were detected in any of the sediment samples

Environmental sampling data for the piles of dredged pond sediment became available after the June 1997 public comment release. In 1998 four sediment samples were obtained from two piles of pond sediments located on the Dow site. These samples were analyzed for the presence of metals, VOCs, SVOCs, pesticides, herbicides, dibenzodioxins, dibenzofurans and inorganic compounds. Results of the analyses indicated the presence of metals, SVOCs, VOCs, as well as dioxin and furan compounds. It is possible that some exposure to residents from the piles of dredged pond sediments may have occurred in the past. However, for those compounds detected for which a comparison value was available, the maximum detected concentration of the majority of compounds detected were either below ATSDR comparison values or MDEP cleanup standards.

Comment # 61: “The ponds have been sampled at different times, but never under direct DEP oversight.”

Response: Questions regarding MDEP oversight and the adequacy of environmental sampling plans should be addressed to the MDEP. They are the state agency responsible for ensuring the assessment and cleanup of hazardous waste sites.

Comment # 62: “The first paragraph (page 19) describing the fish consumption pathway needs to be modified given that the MDPHs assumption about pond use is incorrect.”

Response: The MDPH is aware that historically local residents were known to have occasionally used the ponds for fishing. However, an individual may only be exposed to site related contaminants by eating the fish that have incorporated the contaminants into their bodies. The MDPH has modified the fish consumption pathway to state that based on the review of site related historical data, as well as anecdotal reports from the community, it does not appear likely that local residents *regularly* (i.e., three or more times per week) used the ponds on the Dow property for consumption fishing. It is important to note however, that this does not change the conclusion that significant exposures to site related contaminants from fishing were not likely to have occurred to local residents.

Comment # 63: Given that children and adults have used the ponds and the site in general for more recreational uses than the MDPH was aware of, the agency should reevaluate it’s assumptions.”

Response: As stated previously, although local residents have been reported in the developed area of the site, the available evidence does not suggest that the reported use of the site would result in significant opportunities for actual exposure. The MDPH acknowledges that non-employee use of the site occurred. As reported to the MDPH and others, Wayland residents primarily used the site to access the walking path that winds through the wooded area, teenagers were known to use the site as a hangout area and children reportedly used the ponds for ice skating. Nonetheless, the available evidence does not suggest that resident use of the site would result in significant opportunities for actual exposure.

Occasional contact with soil could have occurred while walking or hanging out at the site. However, more rigorous activities that could result in significant exposures (e.g., ingestion of soil) do not appear to have occurred. Based on the reported residential use of the site and review of available environmental concentration data for specific chemicals detected at the Dow site, it is not likely that exposures to surface soil contaminants would pose a significant health risk to local residents. In addition, although local children reportedly used the ponds for skating and hockey during the wintertime, these activities would not result in an opportunity for exposure to pond surface water or sediments unless someone fell in. As noted in the Health Consultation, if an individual waded or swam in the ponds, exposure to surface water and sediment would be possible. However, according to the Wayland community, the ponds were primarily used for ice-skating and, occasionally, for fishing. Although the ponds were periodically used for fishing, information obtained from the Wayland community does not suggest that residents consumed the fish caught in these ponds on a regular basis). In addition, review of environmental sampling data for the ponds indicate that if occasional contact with surface water or pond sediment occurred, this exposure would not result in adverse health effects.

Comment # 64: “The opening statement to the section on page 18, of the Health Consultation released in 1997, describing the groundwater pathway needs to be verified.

Response: The opening statement on page 18 reads, “ Past or current exposures to the groundwater are unlikely”.

While the possibility of exposure to groundwater from the site cannot be completely ruled out, past, current, and future exposures to the groundwater are unlikely for the following reasons. The groundwater at the site is not used as a source of drinking water. The Dow site is not located within a Potentially Productive Aquifer or other active or potential drinking water source areas, and is not located in or connected to a Zone II drinking water protection area or an Interim Wellhead Protection Area (Ransom 1999). In addition, there are no public or private water supply wells located within a one mile radius of the site (Gradient 2000), and there is no evidence that suggests the groundwater at the site is impacting any surrounding sources of drinking water. It is therefore not likely that exposure to the groundwater from the site has occurred in the past or will occur in the future.

Comment # 65: “The second paragraph (page 18) identifies the potential exposure at the property south of the Dow site. Follow up attempts to access the groundwater wells at Willow Brook were unsuccessful. Neither RAM 2 nor the follow up to RAM 2 investigated the groundwater plume discovered at the Dow site during RAM 1. It is not at all clear to the Neighbors that anyone would have known to test at Willow Brook for the presence of some of the exotic substances found on the Dow site during RAM 1.”

Response: Questions regarding environmental testing and sampling plans should be addressed to the MDEP. They are the agency responsible for overseeing and ensuring timely assessment and cleanup of hazardous waste sites in Massachusetts.

Prior to the release of the June 1997 public comment release, the MDPH reviewed available groundwater sampling data for the Dow site in order to determine if any completed or potential exposure pathways to site related contaminants existed for Wayland residents. Past or current exposures to the groundwater are unlikely for the following reasons. Chlorinated solvents have been detected in groundwater monitoring wells located downgradient from the shallow disposal area. According to the MDEP, groundwater from the Dow site discharges into an undeveloped and wooded wetland area to the south (MDEP 1998). This property is owned by the Willow Brook Farm Condominium Association (Ransom 1999c). All residents living in the Willow Brook Farms condominiums obtain their drinking water from the municipal water supply. This property is not located

within a Potentially Productive Aquifer or any active or potential drinking water source areas, and is not located in or connected to a Zone II drinking water protection area or an Interim Wellhead Protection Area (Ransom 1999a). Furthermore, more recent environmental investigations have discovered no evidence to suggest that the groundwater from the site could impact surrounding sources of drinking water (Gradient 2000).

Comment # 66: “The last sentence in the third full paragraph (page 18) states that GW-3 standards are the least restrictive of DEP standards under the MCP. This is not always true. Many GW-3 standards are equal to the GW-1 (drinking water) standard, and some GW-3 standards, particularly for pesticides, are more restrictive than the GW-1 standard for the same chemical.”

Response: Under the MCP, groundwater at all disposal sites is considered to be a potential source of discharge to surface water and is categorized, at a minimum, as category GW-3. Site specific information concerning potential receptors, exposure pathways, and other criteria discussed in the MCP are used to determine if the groundwater shall also be categorized as GW-1, designed to protect groundwater that may be a potential source of vapors or hazardous materials to indoor air. The MDPH has restated the wording of this sentence to indicate that under the MCP, groundwater categorized as GW-3 represents a potential source of discharge to surface water and offers the least opportunity for human exposure (i.e., GW-3 standards are protective of aquatic life).

Comment # 67: “The MDPH has not identified or evaluated all exposure pathways. Neither Dow nor the MDEP has provided your agency with a full accounting of all the toxins the neighborhood was exposed to during 25 years of research and apparently less than standard housekeeping.”

Comment # 68: “The air exposure pathway has been omitted from your study. This is (perhaps) the most likely route of exposure if there were any from the site. This exposure is not addressed by DEPs MCP regulations. Failure to address this pathway is a major hole in your procedure and renders INVALID any definitive conclusion regarding the Dow site and the neighbor’s health.”

Comment # 69: “The Neighbors contend that the MDPHs failure to even mention or address the air pathway, which we believe is a completed exposure pathway, is a major hole in your study.”

Response: During analysis of human exposure pathways, environmental data are used to determine how human exposure may have occurred, may be occurring, or may occur (ATSDR 1994). In order to determine whether an exposure pathway is relevant to the Dow site, the MDPH must have sufficient information to link contaminated media (e.g., in this case air) to a specific population. The MDPH depends on other agencies (generally environmental regulatory agencies) or potentially responsible parties to generate the environmental data necessary in order to determine the degree of public exposure to chemicals at a specific site. Because atmospheric contaminants can travel long distances in the air, widespread deposition of atmospheric contaminants is typically considered “background” under MDEP regulations and exempt from notification requirements. As a result, there is no historic environmental sampling data for air at the Dow site. This is not unusual, as historical exposures are difficult to assess and environmental data are often not available or very limited in nature.

According to Dow, small volumes of volatile solvents, including methylene chloride, chloroform, trichloroethylene and perchloroethylene were allowed to evaporate up laboratory hoods during normal operations (Tobey 1974). There is no evidence to suggest that residents were exposed to significant quantities of these chemicals. Based on the nature of the operations conducted at the site, it is not likely that deposition of minute quantities of compounds in the fume hoods would lead to significant atmospheric deposition of contamination in the environment surrounding the site (Ransom 1999b). In 1988, the interior surfaces of the exhaust ducts connected to laboratory fume hoods were tested for the presence of TCDD; no detectable levels were discovered (MDEP 1995). In addition, surface soil samples collected near the Burn Bucket Area, where deposition would likely be the highest, only indicated the presence of low levels of PAHs, products of combustion.

The MDPH modified the exposure pathway analyses in the final report to include air as a potential exposure pathway. Given the level of community concern expressed at the June public meeting, the MDPH obtained and reviewed meteorological data from the New England Regional Climate Center. Review of cancer incidence data evaluated in relation to prevailing wind data did not suggest an unusual pattern in relation to likely areas of air exposure.

Comment # 70: “Contrary to what we were told by a DEP official in June 1995, evidence of exposure to toxics via the air pathway is NOT gone forever and unavailable for assessment. What goes up into the air is often deposited back down on earth onto soils, bodies of water, buildings, trees, etc. It is not only a matter of past exposure. Physical evidence of such deposition is very much in the realm of the present, and therefore well within the mandate of the MDEP and MDPH to protect our health and environment.”

Response: This comment assumes that contaminants, which were released into the air during the 1980s, are still present on the site. There is no evidence to suggest this is the case. According to the MDEP, the nature and extent of contamination detected at the Dow site did not warrant identifying air as an impacted medium during RAM activities (MDEP 1995).

However, as stated previously, the MDPH will modify the exposure pathway analyses in the final Health Consultation to include air as a potential exposure pathway. Review of cancer incidence data evaluated in relation to prevailing wind data did not suggest an unusual pattern in relation to likely areas of air exposure.

Comment # 71: “ Air, fish, surface water, and sediment are potential pathways based upon site history, and should be considered.”

Response: Fish, surface water and sediment are considered to be potential exposure pathways. These pathways are discussed in the June 1997 public release document. As mentioned, the MDPH will include air as a potential exposure pathway in the final Health Consultation.

Comment # 72: “I disagree with the MDPH comment at the public meeting indicating exoneration of Dow and cancer incidence because it is obvious that we still don’t know.”

Response: The MDPH did not intend to imply exoneration of Dow at the public meeting. The MDPH health consultation examined and investigated available environmental data and cancer incidence data for the town of Wayland as it related to the Dow Chemical site. It is beyond the scope of this investigation to determine what specific factors (environmental or non-environmental) caused an

individual's cancer. However, based on the available health outcome data reviewed, it is unlikely that contamination associated with the Dow site was responsible for increased rates of cancer in the town of Wayland, or census tract 3661 where the Dow site is located. This conclusion is based on the fact that there was no discernable pattern of elevated rates of cancer and there was no evidence of any geographic clustering around the Dow site. In addition, although environmental contamination is present at the site, evaluation of exposure pathways does not indicate that significant exposures were likely to have occurred to local residents. None of these conclusions exonerate Dow from any responsibility to address environmental contamination concerns expressed by residents or environmental regulatory agencies.

Comment # 73: "Accepting for the moment all of the data that went into the study and all of the limitations in the types of cancer incidence reviewed for the brief period of the study, the conclusions do not fit the data. Fairly blanket conclusions about "cancer" and "disease" due to problems at the Dow site are sweeping generalizations compared with the severely couched and limited conclusions one could make elsewhere based on the inherent study limitations already discussed and agreed upon elsewhere."

Comment # 74: "The first clause in the last recommendation states that, "Although significant exposures to residents from the Dow Chemical Site were not likely to have occurred in the past..." Neighbors feel very strongly that this recommendation be deleted. The MDPH has no scientific basis for making such a statement, which can easily mislead the public. The MDPH does NOT know what our neighborhood has been exposed to, and the MDPH does NOT know what if any health effects have occurred as a result of Dow Chemical's research and dumping in our backyard for 25 years."

Comment # 75: The MDPHs conclusions appear to be premature and unsubstantiated. You do NOT have the scientific basis necessary to support any conclusion, positive or negative, concerning any potential health impact the Dow site may have had on our neighborhoods' health. Among the many requests we have made of your agency is your return to Wayland to host another public meeting at which time you should formally announce retraction of those statements from your written report and your spoken comments. They should be EXPUNGED from the public record because they simply do NOT represent good science."

Comment # 76: “The MDPH must issue a public statement modifying their conclusions, their Q/A Fact Sheet and their overheads. The only valid conclusion your agency can draw is that you do not have adequate information to determine what, if any, health effects the Dow site may have had on our neighborhood.”

Response: The MDPH believes that the conclusions drawn are valid. This investigation analyzed descriptive health outcome data for cancer, which can provide information on patterns and trends of disease that may suggest that a common etiology is possible or that an excess of well-established risk factors exists in a certain area. Conclusions drawn from the information reviewed are entirely scientific. Our evaluations focus on evaluating pathways of exposure and determining whether or not the patterns or trends observed in disease incidence, specifically cancer, are not typical and whether it is possible that they may be related to environmental factors. Again, this Health Consultation was not intended to be a comprehensive review of health and the environment in Wayland, rather it was intended to evaluate concerns specific to cancer in Wayland, with the primary concern being the Dow site.

Our evaluation of cancer incidence data by census tract and within census tracts, including the area of the Dow site found no unusual patterns or trends of incidence. In fact, most cancer types either occurred less than or about equal to expected. No geographical concentrations were evident near the site or within census tracts and no temporal or geographical patterns that would suggest that an environmental factor might be involved were observed. The pattern of cancer incidence observed in the town of Wayland was a rather typical pattern of cancer occurrence.

Extensive environmental site investigations have occurred at the Dow site. The MDPH reviewed environmental sampling data for soil, sediment, surface water and groundwater on the Dow site. While contamination is present at the Dow site, it is important to understand that in order for a health effect to occur an individual must actually be exposed or come into contact with the contaminant(s). Based on our review of environmental sampling data and evaluation of exposure pathways, the MDPH is able to determine what types of contaminants neighboring residents may have been at risk of exposure to and how they may have been exposed (i.e., pathways). Evaluation of exposure pathways does not indicate that area residents or on-site trespassers were exposed to contaminants at concentrations high enough

to produce health effects. This conclusion is consistent with the types of operations conducted at the facility and the extent of contamination present at the Dow site.