Health Consultation

HOLTSVILLE RESIDENTIAL AREA
HOLTSVILLE, FARMINGVILLE, HOLBROOK AND LAKE RONKONKOMA COMMUNITIES

SUFFOLK COUNTY, NEW YORK

EPA FACILITY ID: NYXCRA270000

DECEMBER 13, 2005

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

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SUFFOLK COUNTY, NEW YORK

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Prepared by:

New York State Department of Health
Center for Environmental Health
Under Cooperative Agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Superfund and Program Assessment Branch

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BACKGROUND AND STATEMENT OF ISSUE

A. Site Description and History

In March 1997, the New York State Department of Health (NYS DOH), through a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), completed a Health Consultation for Holtsville, Farmingville, Holbrook and Lake Ronkonkoma residential communities, Suffolk County (Figure 1, Appendix A), New York. The Health Consultation reviewed air quality information for these communities (NYS DOH, 1997). Residents of these communities expressed health concerns about odors and air pollution from nearby industrial facilities (Figure 1, Appendix A). The 1997 health consultation categorized the site as an indeterminate public health hazard, the category used by ATSDR when data are insufficient to determine whether humans are, or have been, exposed to contaminants that would be expected to cause adverse health effects. The health consultation made a recommendation and outlined a Public Health Action Plan to define a pattern of reported odors in relation to meteorology and facility operations and traffic status, and at the same time, to conduct air monitoring. That plan was adopted (without collection of information about traffic and industrial operating conditions) and odor complaint logging and air monitoring are ongoing. This health consultation summarizes the complaint triggered one-hour air sampling data collected through June 2003. It also describes general air quality in the area from 1997 to 2002.

As outlined in the 1997 health consultation, the Suffolk County Division of Environmental Quality developed a cooperative air monitoring plan to characterize ambient air quality in this area (Suffolk County, 1994). The plan includes continuous air monitoring (CAM), 24-hour, every sixth day, volatile organic compound (VOC) sampling and one-hour odor incident VOC sampling. A single CAM station was set up at the Sagamore Junior High School in Holtsville to collect data and to provide hourly summaries for a number of air pollutants and meteorological parameters. The measured pollutants include: sulfur dioxide (SO_2), carbon monoxide (CO), nitric oxide (NO), nitrogen dioxide (NO_2), methane (CH_4), non-methane hydrocarbons (NMHC) and ozone (O_3). Monitoring for fine particulate matter ($PM_{2.5}$) began in July of 1998. These pollutants can be used as indicators of ambient air quality. The meteorological parameters include solar radiation, wind speed, wind direction, barometric pressure, relative humidity, precipitation and air temperature. The CAM data collection began in August 1996 and is ongoing.

The monitoring plan also includes an odor reporting/air sampling system, which consists of telephone-activated air monitoring stations (TAAMS) which collect air samples that are analyzed for VOCs. Residents in surrounding communities were given a telephone number to page Suffolk County staff to report an odor incident. In response to these calls, a written log of the complaint is generated and a network of computer controlled sampling stations can be activated to collect one-hour air samples. The stations (Table 1, Appendix B) are in the residential communities surrounding the central industrial area, (See Figure 1, Appendix A). Stations at the Sagamore Jr. High School, Tamarac Elementary School, Seneca Jr. High School and the Nokomis School went on line in April 1997. A fifth station at a private residence at "The Colony" in Holbrook was added in December 1997. This station was added in response to complaints from residents of “The

Colony" (a newly developed gated community) concerning strong odors and black soot believed to be from the PAVCO asphalt plant in the central industrial area. Also in response to increased community concerns, in June of 2000, the operation of the monitoring station at the Nokomis School was stopped and the monitor was re-deployed to provide additional monitoring coverage at "The Colony."

B. Site Visit and Physical Hazards

NYS DOH staff initially visited the site in 1995 and has worked with the staff of Suffolk County Department of Health Services (SCDHS) in conducting the air monitoring study. The area of interest is roughly rectangular, 1 3/8 miles east to west by 1 3/4 miles north to south (Figure 1, Appendix A), with the four school-based monitoring sites at the corners. An east-west railway line crosses the area, about one half mile above the south base, and a major highway runs parallel to and about one half mile north of the railway. The perimeter of the area is suburban, containing residences and schools; the center of the area contains several large industrial facilities. The industrial facilities are located to the south of the expressway, both north and south of the railway line. Additional monitoring sites are located roughly midway on the east-west axis in "The Colony," a residential area south of the industrial area.

C. 2000 Demographics For The Holtsville, Farmingville, Holbrook and Lake Ronkonkoma Area, Suffolk County, NY.

NYS DOH estimated, from the 2000 Census (United States Bureau of the Census 2001a), that 80,677 people live within the communities of Holtsville, Farmingville, Holbrook and Lake Ronkonkoma, which make up a 23.2 square mile area in central Suffolk County (Table 2, Appendix A). The age distribution of the area was similar to that of the rest of Suffolk County as well as New York State, excluding New York City (NYC). There were 18,089 females of reproductive age (ages 15-44) within the four communities. The area has a lower percentage of minorities than the rest of the County or State. Based on the 2000 Census (United States Bureau of the Census 2001b), the percentage of the population living below the poverty level and the median household income are similar to the rest of Suffolk County. These comparisons are provided in Table 2, Appendix A. In addition, there are 17 schools and one nursing home within the four communities.

D. Environmental Contamination and Exposure Pathways

This health consultation is based on the results from the telephone-activated air monitoring from May 1997 through June 2003, and to a lesser extent on the routine, 24-hour VOC and CAM monitoring through December 2002. Inhalation is the only exposure pathway considered in this assessment because it is based on odor complaints; and inhalation is the primary exposure route for the gaseous contaminants measured.

The continuous air monitoring station is at the Sagamore Junior High School, at the northeast corner of the study area. Five Criteria Pollutants are monitored continuously (SO_2, CO, NO_2, O_3

and $PM_{2.5}$) at this station. This monitoring station also collects 24-hour samples for the same set of VOCs measured by the one-hour complaint triggered samples. The full day samples are collected year round on an every sixth day protocol ensuring that each day of the week is represented in the overall sampling data.

The specific compounds measured from the 24-hour and odor incident sampling sites (initially the four school-based monitors and later the additional "The Colony" based monitors) were selected by Suffolk County. The list included a subset of compounds from the U.S. Environmental Protection Agency's listing of hazardous air pollutants, or HAPS as well as compounds associated with petroleum. Although extensive, the list of compounds does not include every possible odor-causing chemical. It includes many of the predominant compounds emitted from vehicles and facilities that process or burn petroleum-based chemicals. This includes the fossil fuels used in the facilities identified in the previous health consultation (NYS DOH, 1997a). The samplers collect air for one-hour after being activated by Suffolk County staff on the basis of an odor notification via their special telephone hotline (Suffolk County, 1994).

Criteria Pollutants and National Ambient Air Standards

The US Environmental Protection Agency (US EPA) establishes National Ambient Air Quality Standards (NAAQS) for the Criteria Pollutants. These standards are established to be protective of public health with an adequate margin of safety. Of the criteria pollutants, only ozone concentrations exceeded an established NAAQS. This is not unexpected as Suffolk County and the larger Metropolitan NYC Region are designated as moderate non-attainment areas for ozone. Ozone is produced by photochemical reactions of nitrogen oxides and organic compounds in the air, as these chemicals are carried from emission sources. The reaction depends on high temperature, sunlight, and the availability of the precursor compounds. High concentrations of ozone in the study area are comparable to levels throughout the New York Metropolitan region. The ozone concentrations reflect ozone formed from emissions of nitrogen oxides and hydrocarbons from motor vehicles and other sources throughout and upwind from this densely populated area, as well as ozone that forms upwind and is carried into the region. Ozone can irritate the respiratory tract and the eyes. The NAAQS for ozone is set at a level intended to protect people from these effects. As ozone concentrations in air increase, the risk of adverse effects is greater, with those who have existing respiratory problems and those who are active outdoors at greater risk for adverse effects.

VOC Sampling

The laboratory report for each sample analyzed lists the concentrations of all the chemicals that were detected and also indicated chemicals for which the samples were analyzed, but not detected in that sample. These "less than" (<) results do not necessarily mean the chemical was not present in the air at the time the sample was taken. The chemical may have been present, but at a concentration too low to be measured. The analysis provides no information on chemicals that may be in the air but are not detected. The lowest concentration that can be measured is called the detection limit. Reported detection limits for the chemicals varied across the period of the study, and many of the chemicals that could be detected by the analysis were never seen

above their detection limit. Results reported as below the detection limit are not included in the tables. Occasionally, the laboratory encountered a sample with a concentration of a chemical higher than the level that the method can measure. These results will appear in the tables with a ">" symbol in front of a number. This is read as "greater than" the numerical value that appears with the symbol (e.g., >10, would indicate a concentration value greater than 10). All results are reported in units of parts per billion, or ppb. In some cases, samples were not analyzed because they had been contaminated by moisture from rain, the sampler malfunctioned, or because a field or laboratory accident occurred.

24-hour, Routine air monitoring for VOCs

The 1997-2003 VOC monitoring results are presented as annual summaries of the 24-hour, every sixth day samples. This format shows how the profile of the compounds detected varied over the roughly six years (five full years and two partial years) of sampling data. The results of the routine air monitoring for VOCs are summarized in Table 3 (Appendix B). The table shows the frequency with which a chemical was present (at or above the detection limit) for the sampling occurrences that year, and the range of the concentrations measured for that chemical in that calendar year. Table 4 (Appendix B) lists the subset of chemicals detected in the 24 hour samples for which we have 24-hour background concentrations from NYS data collected by NYS Department of Environmental Conservation (NYS DEC) in previous studies (not in the vicinity of known contamination sources). Background data are not available for most of the contaminants. For three chemicals, the average of the detected concentrations was above the background concentrations. Two of those, 1,2-dichloroethane and chlorobenzene were detected infrequently and in only one year of the study (1997). The third chemical, m-xylene was frequently detected in all years of the study, but the 24-hour average concentration was roughly 100 times below the long term health guidance concentration. Results from the 24-hour VOC samples can be used to characterize local background and potentially, longer-term exposures.

Odor Incident Sampling for Volatile Organic Compounds (VOCs)

In the initial study years, almost every phone call triggered a sampling event; however, as the study progressed and the number and rate of incoming calls climbed, it was not always possible or practical to activate the samplers every time a call was received. Suffolk County addressed this problem by not routinely making the decision to activate based on only one complaint call. Over the years, there were also occasions when electrical or equipment problems prevented the samplers from being activated in response to a complaint. Occasionally, sampling did not occur when the odor was reported to be intermittent or when the direction of the wind was not consistent with the direction of the reported source, and Suffolk County staff felt the monitors would not characterize the odor event. The samples were analyzed by the SCDHS Public Environmental Health Laboratory for a set of 70-80 chemical compounds (the list of compounds expanded across the period of the study).

The results for the complaint triggered one-hour samples are presented in Table 5 (Appendix B) as the number of dates on which the chemical was measured above the detection limit at any monitor by year, and the range of concentrations measured above the detection limit across the sampling events. In the interest of simplicity, Table 5 considers only those results that are at or

above the detection limit for that chemical. Table 5 (Appendix B) also lists data to help interpret the sampling results. Data for those chemicals that were detected in at least twenty-five percent of the total sampling events from all years are shaded. The last column of Table 5, contains background data, which are the range of concentrations of these chemicals found in previous studies (not in the vicinity of known contamination) from NYS DOH databases of short duration (one or two hour) air samples. Background data are not available for all the contaminants.

Table 6 lists chemicals that were detected in one-hour samples in any year, and how frequently they were detected in each year's sampling events. As in Table 5, the shaded rows in table 6 indicate compounds that were detected in at least 25% of the one-hour sampling events across all years of the study. Table 6 also gives information about odor characteristics of the chemical. An odor threshold is the reported concentration at which a person might detect the presence of a compound by smell. Odor thresholds are derived from studies that report the range of concentrations at which subjects detect or recognize an odor. These studies generally involve exposing subjects to a single chemical. Individual perception of odor varies, and a number given as an odor threshold should not be interpreted as an absolute value. As such, they provide an estimate of the concentration at which a specific chemical might produce noticeable odors. Whether or not an odor threshold would still be relevant when the chemical is part of a complex mixture of chemicals is not known.

Table 6 shows the highest concentration measured in the one-hour samples along with the reported odor threshold for the chemical. Three compounds were measured at levels above their reported odor thresholds. Those compounds were carbon disulfide, methyl methacrylate, and ethyl acrylate. Ethyl acrylate was only detected in 1999 on one occasion and is unlikely to be responsible for the chronic odor complaints. Carbon disulfide was detected on 25 days, but on only one of those did a monitor register a concentration above the reported odor threshold. Methyl methacrylate was detected on a total of nine days during the years 1998-2001. On four of those days one or more monitors registered levels potentially above the reported odor threshold. Review of the monitoring data in relation to reported odor thresholds and characteristics does not provide useful information as to which chemical(s) might be causing the reported odors. However, we do not have information about all odor thresholds or for mixtures of these chemicals. Although the monitors were located to best characterize air quality and be responsive to community complaints, it is possible that the sampler locations and sample collection times did not always capture data at the point of peak odors.

E. Wind Data

Wind patterns strongly influence the transport, mixing and dispersion of air pollutants. Table 7 (Appendix B) illustrates from which direction winds came for the region in general, on sampling days (24-hour and 1-hour) and on complaint days during the study period. The table shows the frequency that winds were from the northeast (NE), southeast (SE), southwest (SW), northwest (NW), were variable (wind direction changed or was not determinable for the period being described), and how frequently wind data were unavailable. The general wind pattern for the region during the years of interest was characterized using wind-rose diagrams illustrating the wind direction recorded at airports in the area (Grumman Airport 1998-2002, Farmingdale Republic Airport 1997-1999). Most complaints, and therefore complaint triggered sampling,

occurred from 5 a.m. to 10 p.m.

In the first four years, sampling was performed on virtually all days when a complaint was received so the wind direction for complaints and sampling is the same. However, in years 2001-2003, when sampling was not conducted on all complaint days, nor when winds were variable, there was a greater proportion of sampling days when winds were from a northerly direction. The wind direction for the every sixth day, 24-hour sampling results were determined from hourly meteorological conditions recorded at the Sagamore site. Hourly wind directions recorded from 5 a.m. to 10 p.m. (to reflect the period of time when complaint sampling would generally occur) on the sampling days were reviewed, and a judgement was made as to the prevailing wind direction for the sampling day. The greater portion of samples assigned a condition of variable wind, for the 24-hour samples, may reflect longer sampling time, greater likelihood for wind direction to change throughout a day, or the qualitative assessment of wind direction for these samples. In comparison, the airport data summarize all hourly results for the years of interest.

F. Odor Complaint Collection

Staff of the SCDHS recorded each odor complaint call, attempting to collect information as to the time and location of the odor, type of odor, the caller's perception of the source of the odor and any health complaints. Table 8 (Appendix B) shows the number of complaints received each year, the number of addresses from which those complaints were reported, and the most common description given for the odors reported (e.g., asphalt). The odor complaints generally were reported in the southern part of the study area (See Figure 2, Appendix A). Like the types of odors reported, the types of reported health complaints were fairly limited. The complaints were of headaches, irritation (eyes, throat, respiratory), nausea and aggravation of respiratory conditions. More odor complaints were received than specific health complaints.

Table 9 (Appendix B) lists health comparison values for some of the contaminants detected in air. Overall, the list of chemicals the analysis could detect is extensive and some were detected infrequently and inconsistently across the study period. The initial review and comparison with background concentrations and health values included all compounds that were detected on at least one occasion at any monitor for the one-hour sampling events. For this review, any single occurrence of a compound above reported background resulted in that compound being regarded as present above reported background. Additionally, for a compound with no reported background concentration, its detection was considered to be above background, and it was included in the review of health comparison values. Because the number of compounds ever detected at any monitor is fairly extensive, and includes compounds for which background and or health comparison values are not available, Table 9 focuses on those compounds that met certain

screening criteria. The criteria for inclusion in this table hinged upon whether or not the compound was present in the one-hour samples:

- at concentrations that approached or exceeded available background concentrations or had no background concentration available and;

- at concentrations that exceeded a short term health comparison value in at least one sample or;
- at concentrations exceeding a long-term health comparison value in 25% or more of the sampling events.

Please see Appendix C for more information on health comparison values and how they are derived.

DISCUSSION

Several observations can be made based on the complaints, wind direction and the odor incident monitoring. North winds would be expected to cause odors in the south of the study area, if the source of the odorous compounds was in an area north of where odors were reported. That source might be in the industrial area or could be from a source to the north of the industrial area. Although the correlation of odor reports and winds from the north is consistent with a source north of the southern part of the study area, the VOC data are not consistent with the hypothesis of a predominant source or sources of these compounds within the central industrial area. Sampling results often found that when winds were from the north, the monitors north of the industrial area registered relatively higher VOC concentrations or detected a greater number of VOCs than the monitors to the south of the industrial area. The formaldehyde concentrations tend to be higher at the monitors at "The Colony". However, as this relationship was seen across sampling events, regardless of wind direction, relating the data to a specific source or even a source location is not possible. The range of formaldehyde concentrations at "The Colony" on the complaint sampling days are within the range of background reported by ATSDR. For the most part, VOC concentrations across the monitors did not vary greatly in magnitude making it difficult to attribute the source of the VOC's to a particular location. Calm winds and weather conditions that discourage air movement and transport away from the community would be expected to be associated with poor dispersion of air contaminants. This might foster higher measured pollution levels throughout the area, and might also result in relatively small variation in measured VOC concentrations across an area.

Many of the odor complaints described the odor as "asphalt". While this odor is distinctive and recognizable to the human nose, there is not a recognized "signature" VOC mixture that would be exclusive to asphalt. Many chemicals that are associated with petroleum and its combustion products are also associated with asphalt production. Throughout the years, complaints of gasoline or fuel odors were reported from time to time and certain petroleum-related compounds (e.g., benzene, toluene, m-xylene, o-xylene, and methyl *tert*- butyl ether or MTBE) were detected frequently in both complaint and routine VOC sampling. These compounds are commonly found in outdoor air owing to the widespread use of petroleum products. Freon 11, Freon 12 and

Freon 113 were also detected frequently. Freons, formerly used extensively in refrigeration and cooling operations remain in the atmosphere for many years and their presence in air samples is not unusual. As shown in the table, Freon 12 is considered to be odorless, and the odor thresholds reported for Freon 11and Freon 113 are well above any of the concentrations measured at the monitoring locations. It is unlikely that these frequently detected chemicals are

responsible for odor complaints. There are other odor producing chemicals that were not among the list of compounds for which the samples were analyzed.

NYS DOH assessed the potential risks for short-term and chronic (cancer and noncancer) health effects from exposure to contaminants detected during odor incidents in the Holtsville, Farmingville, Holbrook and Lake Ronkonkoma communities. The potential for health effects from exposure to any contaminant depends on the toxicity of the contaminant and on specific conditions of exposure including air concentration (for inhalation exposure), exposure pathway, exposure frequency and duration. The likelihood of an individual experiencing adverse health effects from exposure to a substance is dependent on factors such as age, sex, genetics, health status and lifestyle. These factors can influence how sensitive or susceptible an individual is to a particular exposure. Additional information on this assessment is in Appendix C.

Thirty-three of the sixty-three chemicals detected in some complaint samples were detected at concentrations that exceed typical background air levels (see Table 5). For some of the other chemicals we do not have data describing background concentrations. For others, no short- or long-term health comparison values are available, and in some cases, neither background data nor health comparison values are available. The review of the sampling results considered all compounds detected in relation to available background concentrations and health comparison values. However, this discussion will focus on those chemicals that were detected in one-hour samples above reported background levels or had no reported background levels, and either ever exceeded a short-term health comparison value or exceeded a long-term health comparison value for more than 25% of the sampling events.

Sampling results in relation to Short-term Health Comparison Values

Two chemicals, 2-propenal (also known as acrolein) and formaldehyde, were detected above their short-term health comparison value in at least one odor incident sample (see Table 9). Exposure to high concentrations of 2-propenal can cause irritation of the eyes, nose, throat and lungs. The short-term health comparison value for 2-propenal, based on eye irritation, was exceeded in 22% (32 dates) of the odor complaint sampling events from 1997-2003. Short-term exposure to the highest concentrations of 2-propenal measured in the odor incident sampling could pose a high risk of causing the reversible irritant effects associated with this contaminant. However, the highest one-hour concentration of 2-propenal measured in this study is about 18 times lower than the concentration of 2-propenal that caused eye irritation in humans after 40 minutes of exposure in the study on which the short-term health comparison value is based. Exposure to high concentrations of formaldehyde can cause eye and nose irritation. The short-term health comparison value for formaldehyde was exceeded on two days of sampling (1.4% of sampling dates). Short-term exposure to the highest concentrations of formaldehyde measured in the odor incident sampling could pose a low risk of reversible irritant effects associated with this chemical. However, the highest one-hour concentration of formaldehyde measured in this study is about five times lower than the concentration that caused symptoms (e.g., sneezing, runny nose) in humans after two-hours of exposure in the study on which the short-term health comparison value is based.

The detection of formaldehyde and 2-propenal at concentrations above their short-term health comparison values may indicate an increased likelihood that particularly sensitive individuals might experience symptoms of eye or nose irritation. The measured concentrations of formaldehyde and 2-propenal are below air concentrations found to cause reversible irritation in human studies. However, in those studies people were exposed only to formaldehyde or to 2-propenal and not to a mixture of chemicals containing formaldehyde or 2-propenal.

Sampling results in relation to Long-term Health Comparison Values

Two chemicals, formaldehyde and benzene were detected above public health assessment comparison values for long-term (chronic) exposure (Table 9) in more than 25% of the one-hour odor incident samples. 2-Propenal was detected in 22% of the one-hour samples at levels above the long-term health comparison value. Although this is below the 25% criteria originally set, 2-propenal sampling results will also be discussed.

Short-term (one-hour) samples, especially those that are collected in response to an event (in this case, odor complaints) may not represent long-term exposures. Comparisons with long-term health comparison values are more valuable when using longer-term sampling results. Short-term sampling results (i.e., one-hour samples) are unlikely to accurately represent long term exposure (e.g., years or decades).

For comparison with long term health comparison values, the 24-hour sampling results were reviewed, and for those dates when a compound was not measurable, a value of one half the appropriate detection limit was assigned as the compound's concentration for that day's sample. This allowed calculation of an average concentration across all the years of data collection, taking into account those days when the compound was not measurable.

The average air concentration for 24-hour sampling results for 2-propenal (0.05 ppb) indicates a low risk for non-cancer health effects from long-term exposure. There are no NYS background concentrations for 2-propenal.

The 24-hour average for benzene (0.30 ppb), is below the long-term, non-cancer health comparison value, but is above the long-term health comparison value for excess cancer risk. A lifetime of exposure to benzene at this concentration would be estimated to be associated with a low risk of increased excess lifetime cancer risk. However, benzene concentrations and associated risks in this area are similar to those found throughout New York State.

Routine, 24-hour monitoring data for formaldehyde are not available. The one-hour air samples were not analyzed for formaldehyde prior to 1999. From 1999 through June 2003, formaldehyde was detected in 86% of the complaint samples. Hourly formaldehyde concentrations showed considerable variability. The average of the one-hour samples, when one half the detection limit is used for those sample events when formaldehyde was not detected, was 9.1 ppb (averages ranged from 5.9-13 ppb for single years). The median formaldehyde concentration across the years of the study was 6.9 ppb. Using either the calculated hourly average of 9.1 ppb value, or the median value of 6.9 ppb to estimate increased risk of long-term health effects from exposure

to formaldehyde, the estimated increase in excess lifetime cancer risk would be characterized as moderate, and the risk of non-cancer health effects would be minimal.

While there are no NYS specific background concentrations for formaldehyde, the 1997 ATSDR Toxicological Profile for Formaldehyde reports that average outdoor air concentrations of formaldehyde in U.S. urban areas were in the range of 11 to 20 ppb. US EPA conducted a study from 1994 through 1998 of indoor air quality, referred to as the Building Assessment and Survey Evaluation (BASE '94-'98). The study included measurements of volatile organic compounds in indoor and outdoor air at 100 randomly selected public and private office buildings across the United States, with no known indoor air related complaints. The average outdoor air concentration reported from that study ranged from less than 0.23 ppb to 10.6 ppb with an average value of 3.1 ppb. Indoor air concentrations of formaldehyde were higher, ranging from less than 0.2 ppb to 41 ppb. The average indoor air concentration of formaldehyde in the BASE 94-98 study was 13 ppb.

Limitations

From 1997-2003, the study collected complaint, air monitoring and meteorological data for the Holtsville, Farmingville, Holbrook and Lake Ronkonkoma area. The volume of data collected in this study is substantial, but as with any study there are limitations in the study itself, and in the scope of the assessments that can be generated from the data collected. While the list of chemicals for which the air samples were analyzed is extensive and includes chemicals associated with processes occurring in the area, it does not include all possible odor-producing chemicals. While information about odor characteristics is available for some of the chemicals, we do not have information about odor characteristics of the mixture of chemicals found to be present in the one-hour samples. Air monitoring locations, selected to represent community exposures, may not reflect the location with the strongest odors or the highest VOC concentrations during each odor event. Additionally, for many of the compounds detected in the air samples there is incomplete information regarding odor, short and long term background concentrations, and short and long term health comparison values.

The public was invited to comment on this health consultation during the public comment period which ran from August 8th, 2005 September 5th, 2005**.** A response to public comments was prepared to answer area residents' questions on the draft Holtsville, Farmingville, Holbrook and Lake Ronkonkoma Communities Health Consultation (see Appendix E).

CONCLUSION

Based on ATSDR's present public health hazard categories (see Appendix D) and on the air monitoring data collected through June 2003, the Holtsville site has been categorized as posing no apparent public health hazard. The air sampling analysis was designed to measure a variety of volatile compounds that might have been related to odors. Some of the compounds detected by the analysis can not be characterized in relation to typical background or health importance

because there is no information available with which to compare them. In the 1997 Health Consultation, the Holtsville site was categorized as an indeterminate public health hazard because environmental data were incomplete to determine whether the site had an adverse impact on human health.

The data collected from April 1997 through June 2003 indicate:

- Odors were reported throughout the period of the study;
- Some organic compounds were found at levels higher than reported background levels;
- For the most part, VOC concentrations did not vary greatly in magnitude across the study area;
- Monitors north of the industrial area often detected higher concentrations of VOCs, even when winds were from the north;
- No chemical or group of chemicals was clearly associated with one-hour samples or a specific source;
- The compounds detected consistently in the one-hour samples were not found to approach or exceed reported individual odor thresholds, and for the most part, were not different from the chemicals detected in the routine 24-hour samples.
- The formaldehyde concentrations tend to be higher at the monitors at "The Colony". However, relating the data to a specific source or even a source location is not possible. The range of formaldehyde concentrations at "The Colony" on the complaint sampling days is within the range of background reported by ATSDR.

The sampling results when compared with short and long term health comparison values indicate:

- The presence of formaldehyde and 2-propenal in one-hour samples at concentrations above short-term health comparison values may indicate a potential for reversible eye irritation in sensitive individuals; however, the measured levels are below concentrations where eye irritation was reported in human studies;
- Benzene was found at concentrations above the long-term health comparison value for increased excess cancer risk. However, benzene concentrations and associated risks in this area are similar to those found throughout New York State.
- Formaldehyde was found in one-hour samples at concentrations above the long-term health comparison value for increased cancer risk. However, one-hour sampling results may not represent long- term exposure; and risk associated with median and

- average one-hour formaldehyde concentrations are similar to those reported by EPA and ATSDR for ambient air.

Certain study limitations present challenges in associating the reported odors with monitoring results:

- The sampling and analysis, while extensive, does not detect all potentially odor-

causing chemicals.

- While some information about odor thresholds for specific compounds is available, information about odor thresholds for the mixture of detected chemicals are not.
- There is no specific chemical signature for asphalt (the most frequently reported odor) and many chemicals used in its manufacture are also emitted from other industries and processes.

RECOMMENDATIONS

Given these results and the limitations of this type of study, it is unlikely that additional sampling would be useful in providing more definitive information about the source of odors.

PUBLIC HEALTH ACTION PLAN

Should conditions or operations in the area or at the industrial facilities change in some way resulting in a change in content or volume of emissions, NYS DOH would revisit the issue of evaluating community air quality.

NYS DOH, in conjunction with SCDHS and ATSDR, conducted an air sampling study to characterize potential health risks associated with exposure to airborne dust from a stockpile of granite aggregate at the Prima Asphalt Plant in Holbrook. The results from that study are the subject of a separate Health Consultation.

CERTIFICATION

The Health Consultation for the Holtsville Residential Area was prepared by the New York State Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was initiated. Editorial review was completed by the cooperative agreement partner.

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Technical Project Officer, CAT, SPAB, DHAC

The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this health consultation, and concurs with its findings.

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Team Leader, CAT, SPAB, DHAC, ATSDR

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