FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR THE CROTON WATER TREATMENT PLANT
PUBLIC HEALTH

5.19. PUBLIC HEALTH

5.19.1. Introduction

This section assesses the public health related impacts associated with the proposed Croton Water Treatment Plant at the Eastview Site and offsite facilities. Of particular concern are the potential health effects from particulate matter emissions from fuel-burning sources at the proposed plant, as well as diesel emissions from construction-related activities, especially in relation to their effects on asthma rates within New York City and Westchester County. As described in Section 5.11, Air Quality, during construction of the proposed project, construction equipment would generate particulate matter emissions from the combustion of fuel and construction-related activities. These emissions would potentially be of greatest concern in 2008, the peak year of construction, when construction-related on-street truck traffic related to the project would need to traverse the truck routes through the local communities. The planned operation year for the proposed plant is 2010. Section 5.11, Air Quality, assessed the potential particulate matter emissions from the boilers and emergency generators associated with the proposed project. This chapter presents an overview of the issues related to particulate matter emissions, a discussion of asthma, its prevalence in New York City and Westchester County and its possible causes and triggers, and then presents an assessment of the potential public health effects from the project-related emissions.

5.19.2. Health Effects Related to Emissions of Particulate Matter

5.19.2.1. Overview[1]

Particulate matter (or PM) is a broad class of air pollutants that exist as liquid droplets or solids, with a wide range of sizes and chemical composition. Particulate matter is emitted by a variety of sources, both natural and man-made. Natural sources include the condensed and reacted forms of natural organic vapors, salt particles resulting from the evaporation of sea spray, wind-borne pollen, fungi, molds, algae, yeasts, rusts, bacteria, and debris from live and decaying plant and animal life, particles eroded from beaches, desert, soil and rock, particles from volcanic and geothermal eruptions and forest fires. Major man-made sources of particulate include the combustion of fossil fuels, such as vehicular exhaust, power generation and home heating, chemical and manufacturing processes, all types of construction, agricultural activities and wood-burning fireplaces. Since the chemical and physical properties of particulate matter vary widely, the assessment of the public health effects of the airborne pollutants in ambient air is extremely complicated. The principal health effects of airborne particulate matter are on the respiratory system.

[1] Portions of the text contained in this section are derived from the October 2, 2001 Final Environmental Impact Statement for the Fulton Fish Market at Hunts Point prepared by Urbitran Associates, Inc. and the April 27, 2001 Draft Environmental Impact Statement for the St. Lawrence Cement Greenport Project prepared by AKRF, Inc.

5.19.2.2. $PM_{2.5}$ Issues

Fine particulate matter, such as $PM_{2.5}$[2], is mainly derived from combustion material that has volatilized and then condensed to form primary particulate matter (often after release from a stack or exhaust pipes) or from precursor gases reacting in the atmosphere to form secondary particulate matter. It is also derived from mechanical breakdown of coarse particulate matter such as pollen fragments.

$PM_{2.5}$ refers to not a single pollutant, but instead to an array of fine inhalable materials. There are, for example, thousands of forms of natural ambient $PM_{2.5}$ and perhaps as many forms of man-made $PM_{2.5}$, which include fossil fuel combustion (such as diesel fuel) chemical/industrial processing and burning of vegetation. While all the disparate forms of $PM_{2.5}$ can be inhaled, their toxicological properties can differ dramatically. Some particulate matter (PM) is emitted directly to the atmosphere (i.e., primary PM), while other types of particulate matter are formed in the atmosphere through various chemical reactions and physical transformations (i.e., secondary PM). The secondary formation of $PM_{2.5}$ is one determinant of ambient air quality and is, thus far, extremely difficult to model.

The major constituents of $PM_{2.5}$ are typically sulfates, nitrates, organic carbon, elemental carbon (soot), ammonium, and metallic elements (not including sulfur). Secondary sulfates and nitrates are formed from their precursor gaseous pollutants, SO_2 and NO_x at some distance from the source due to the time needed for the chemical conversion within the atmosphere. Elemental carbon and metallic elements are primary components, while organic carbon can be either emitted directly from a source or formed as a secondary pollutant in the atmosphere. Due to the influence of these “secondary” pollutants from distant or regional sources, regional ambient levels of $PM_{2.5}$ are typically more evenly distributed than their related class of pollutants—PM_{10}, which is more highly influenced by local sources.

Data from the Botanical Gardens in the Bronx, NY, and Queens College in Queens, NY, indicate that the greatest contributors to ambient $PM_{2.5}$ concentrations are sulfates and organic carbon (approximately two thirds of the total $PM_{2.5}$ mass). Data from the Mamaroneck station in Westchester County, NY show that measured $PM_{2.5}$ levels are less than the ambient standards. Additional studies confirming the contribution of long-range transport to ambient $PM_{2.5}$ levels compare the data from City monitors to monitors from a remote site within the state, downwind from other states. These data show that high levels of sulfate and other pollutants come into New York State from areas to the west and south of New York. The data also indicate that urban sites are more likely to experience increased nitrate and carbon levels than rural sites.[3]

An important issue with respect to the health risk associated with $PM_{2.5}$ concentrations is that they have a direct causal effect on human health. Since particulate matter in the ambient air is comprised of a combination of discrete compounds or elements, its possible public health effects would vary depending on the specific components of the particulate matter in a region. Acid

[2] Particulates smaller than 2.5 microns.

[3] NYSDEC, Report to the Examiners on Consolidated Edison’s East River Article X Project, Case No. 99-F-1314, February, 2002.

aerosols like sulfuric acid may trigger reactions in pulmonary lung function, while bioaerosols, such as mold spores, may result in allergic reactions related to increased incidences of asthma, for example. The United States Environmental Protection Agency's (USEPA) 1996 Criteria Document acknowledged this uncertainty:

> "There remains uncertainty regarding the shapes of particulate matter exposure-response relationships; magnitude and variability of risk assessments for particulate matter; the ability to attribute observed health effects to specific particulate matter constituents; the time intervals over which particulate matter health effects are manifested; the extent to which findings in one location can be generalized to other locations and the nature and magnitude of the overall public health risk imposed by ambient particulate matter exposure."

5.19.2.2.1. The National Ambient Air Quality Standard for $PM_{2.5}$

Section 108 of the Clean Air Act (CAA) directs the USEPA to identify criteria pollutants that may reasonably be anticipated to endanger public health and welfare. Section 109 of the CAA requires the USEPA to establish National Ambient Air Quality Standards (NAAQS) and periodically revise them for such criteria pollutants. Primary NAAQS are mandated to protect public health with an adequate margin of safety. In setting the NAAQS, USEPA must account for uncertainties associated with inconclusive scientific and technical information and potential hazards not yet identified, and the standard must be adequate to protect the health of any sensitive group of the population. Secondary NAAQS are defined as standards that are necessary to prevent adverse impacts on public welfare, such as impacts to crops, soils, water, vegetation, wildlife, weather, visibility, and climate.

Beginning in 1994, USEPA conducted its five-year review of the NAAQS for particulate matter, which included an in-depth examination of epidemiologic and toxicological studies. USEPA also held public meetings across the nation and received over 50,000 oral and written comments regarding these studies, particularly as to whether $PM_{2.5}$ is correlated with adverse health effects, and at what ambient air concentrations of $PM_{2.5}$ these correlations hold. The studies are summarized in USEPA's Criteria Document for Particulates, Chapters 10-13 (1996); USEPA's Staff Papers on Particulates, particularly Chapter V;[4] and USEPA's proposed NAAQS for particulates, found in the December 13, 1996 Federal Register at page 65638. Based on this extensive analysis, in June of 1997, USEPA revised its NAAQS for particulate matter and proposed a new standard for $PM_{2.5}$ consisting of both a long-term (annual) limit of 15 micrograms per cubic meter ($\mu g/m^3$) and a short-term (24-hour) limit of 65 $\mu g/m^3$.[5] In establishing the NAAQS for $PM_{2.5}$ in 1997, USEPA conservatively assumed that moderate levels of airborne PM of any chemical, physical, or biological form might harm health, and so additional regulation was required. In setting the NAAQS, USEPA was required to account for uncertainties associated with inconclusive scientific and technical information and for potential hazards not yet identified. In setting the value of the annual average NAAQS for $PM_{2.5}$, USEPA

[4] Many of the studies are found on USEPA's web page at http://www.epa.gov/ttn/oarpg/t1sp.html. USEPA's second and third external review draft of the PM criteria document are available on USEPA's website as well.
[5] 62 Federal Register 38652 (July 18, 1997).

found that an annual average $PM_{2.5}$ concentration of 15 µg/m^3 is below the range of data most strongly associated with both short- and long-term exposure effects. The USEPA Administrator concluded that an annual NAAQS of 15 µg/m^3 "would provide an adequate margin of safety against the effects observed in the (se) epidemiological studies."[6] The annual standard is supplemented by a 24-hour standard of 65 µg/m^3 to protect against short-term exposures in areas with strong local or seasonal sources.[7]

5.19.2.2.2. Current Status of $PM_{2.5}$ Regulations

New York State formally recommended that USEPA designate the five counties of the New York City metropolitan area as non–attainment for $PM_{2.5}$. Based on this recommendation, Westchester County is considered to be in attainment of the applicable $PM_{2.5}$ NAAQS. USEPA will finalize the designations by 2005. Once non–attainment designations take effect, the state and local governments will have three years to develop implementation plans designed to meet the standards.

5.19.2.2.3. Public Health Issues Related to Particulate Matter

The potential for $PM_{2.5}$ to affect public health is dependent on the amount of particulate material in the atmosphere (i.e., the higher the ambient $PM_{2.5}$ concentration, the more likely that it would have an impact), and the composition of the material. The evidence cited by USEPA in establishing the NAAQS for $PM_{2.5}$ is derived from observational epidemiologic studies that found, at typical ambient levels, PM concentrations are statistically correlated with increased levels of morbidity and mortality.[8] It is also unclear what forms of PM and what physiological mechanisms are responsible for the observed health effects. However, the extent of any adverse public health effect related to an increase in PM concentrations is anticipated to be proportional in some way to the concentration increase—a small increase in PM concentrations can, at most, lead to a small increase in PM related public health effects.

Although the NAAQS for $PM_{2.5}$ is based on the measurement of simple particle mass concentrations (i.e., total µg/m^3), the USEPA recognized the need for further research into the relationships between PM composition and PM related health effects. Indeed, a major requirement of 40 CFR Part 58, (Ambient Air Quality Surveillance for Particulate Matter, Final

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[6] 62 Federal Register 28652, 38676 (July 18, 1997).

[7] Although some advocates for a new $PM_{2.5}$ standard identified $PM_{2.5}$ as a "non-threshold" pollutant, and the Appellate Division in its NYPA vs. UPROSE decision agreed with this position, the USEPA Administrator rejected this view when promulgating the $PM_{2.5}$ NAAQS, finding that up to 15 µg/m^3 of $PM_{2.5}$ could be present in ambient air without causing adverse health effects.

[8] Some analysts doubt that PM concentrations and these health effects are causal. Compare *Air Quality Criteria for Particulate Matter, Second External Review Draft*, USEPA 600/P-99/002aB (2001). Pope, III, C. A. (2000), "Epidemiology of fine particulate air pollution and human health: Biologic mechanisms and who's at risk?" *Environ Health Perspect*, 108(4), 713-23; and Samet, J. M., Dominici, F., Curriero, F., C., Coursac, I., & Zeger. S. L. (2000), "Fine particulate air pollution and mortality in 20 U.S. cities, 1987-1994," *N Engl J Med*, 343(24), 1742-1749; with Lipfert, F.W., Perry, Jr., H. M., Miller, J. P., Baty, J. D. Wyzga, R. E., & Carmody, S. E. (2000), The Washington University-EPRI Veteran's "Cohort Mortality Study: Preliminary Results," *Inhalation Toxicology*, 12(4), 41-73; and Gamble, J. F. (1998). " $PM_{2.5}$ and mortality in long-term prospective cohort studies: Cause-effect or statistical associations?" *Environ. Health Perspect.* 106, 535-549.

Rule), is the chemical speciation of $PM_{2.5}$ at 50 monitoring sites across the country. A great deal of current PM research, including studies conducted under the USEPA's Office of Research and Development,[9] is focused on attempting to better understand the biological, chemical, and physical characteristics of PM underlying its potentially toxic effects. A basic finding among these studies is that different forms of $PM_{2.5}$ differ substantially in their toxicologic significance.

As noted above, unlike the other ambient air pollutants regulated at the national level— carbon monoxide, nitrogen dioxide, ozone, lead, and sulfur dioxide—PM (PM_{10} or $PM_{2.5}$) is hardly a single molecule or small set of molecules, but is instead a sundry collection of complex aerosols and microscopic solids with widely varying physical, chemical, and biological properties. The vast differences among various chemical and biological forms of $PM_{2.5}$ mean that these forms also differ significantly in their toxicologic effects.

Considerable research would be required to identify, quantify, and rank the myriad components of $PM_{2.5}$ in terms of their potential importance for public health. The National $PM_{2.5}$ Speciation Program,[10] established under 40 CFR Part 58 as mentioned above, would serve as only a modest, first-cut analysis, as it would provide no information on the biologic content of ambient air PM, and only limited information on some metallic, ionic, and organic constituents of ambient PM. Although chemical and toxicologic knowledge of ambient $PM_{2.5}$ is limited, current evidence, as outlined below, suggests that $PM_{2.5}$ that is rich in either biologically-active material or in various metals is significantly more harmful than $PM_{2.5}$ that has little to no biologic or metallic content.

Biologically Active $PM_{2.5}$. Particulate matter rich in pollen and other aero-allergens is well known to exacerbate respiratory problems, especially among people with allergic asthma and sufferers of hay fever (also called seasonal allergic rhinitis).[11] Other common forms of PM, present year-round, may aggravate respiratory problems because of their biologic content. Fine particulate matter from "ordinary" resuspended dust, for example, is a complex mixture of biologically and immunologically active materials, such as macromolecules, derived from molds, grasses, trees, cat and dog dander-epithelium, and latex rubber.[12]

$PM_{2.5}$ Rich in Metals. Inhalation of metals of various types may harm the upper respiratory tract, lungs, and other organs.[13] Although such problems have long plagued various occupational settings, environmental scientists at USEPA and elsewhere are now focusing on whether the heavy metal content of some forms of respirable PM may be responsible for correlations between ambient air PM and morbidity and mortality in studied populations. For example, USEPA scientists have demonstrated that extracts of metal-rich PM cause lung

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[9] USEPA Office of Research and Development, Research and Development, Fiscal Years 1997-1998 Research Accomplishments, USEPA 60-R-99-106.
[10] id.
[11] American Lung Association, 2001, http://www.lungusa.org/air/envhayfever.html.
[12] Miguel, A.G., Cass, G.R., Glovsky, M.M., and Weiss, J. 1999. Allergens in Paved Road Dust and Airborne Particles. *Environ. Sci. Technol.*, 33:4159-4168.
[13] Kelleher, P.T., Pacheco, K., and Newman, L.S. (2000), Inorganic Dust Pneumonia: The Metal-Related Parenchymal Disorders, Environ. Health Perspect. 108, Supplement 4, 685-696.

inflammation in human volunteers.[14] In particular, they evaluated ambient PM collected in the late 1980s from the Utah Valley, where PM was rich in copper, zinc, lead, and nickel because of the dominance of a major steel mill in that valley. Compared with extracts of "ordinary" ambient PM (obtained when the mill was closed), the metal-rich extracts induced several signs of inflammatory injury. The investigators conclude that "metal content, and consequent oxidative stress that paralleled metal concentrations" caused the injury they observed, so that "mass may not be the most appropriate metric to use in assessing health effects after PM exposure, but rather specific components must be identified and assessed." Similar studies have been carried out in laboratory rats, with similar results reported.[15]

5.19.2.3. Asthma[16]

High density populations, such as those in the City and southern Westchester County, are generally considered to have higher asthma rates than non-urban populations.[17] Given concern that exposure to particulate matter, in particular, $PM_{2.5}$, emissions from activities associated with the proposed project could either aggravate pre-existing asthma or induce asthma in an individual with no prior history of the disease, the potential for emissions of $PM_{2.5}$ to precipitate onset of an exacerbation is examined in the following discussion. This discussion would include a review of the risk factors for asthma development and exacerbation; current prevalence, morbidity and mortality estimates of asthma; and whether the scientific literature indicates a causal relationship between truck traffic and the occurrence of asthma.

5.19.2.3.1. Background

Asthma is a complex disease with multiple causes and substantial inter-individual variation in the severity of symptoms. Asthma is a chronic inflammatory disorder of the airways characterized by variable airflow obstruction and airway hyperresponsiveness in which prominent clinical manifestations include wheezing and shortness of breath.[18] During an asthma "attack," an individual experiences difficulty breathing which, if severe enough, and treatment is not rendered, may be fatal in rare instances.[19] Asthmatic episodes may be triggered by specific substances, environmental conditions, and stress, as discussed below.

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[14] Ghio, A. J. and Devlin, R.B. (2001), Inflammatory Lung Injury after Bronchial Instillation of Air Pollution Particles, Am J Respir Crit Care Med 164: 704-708.

[15] Dye, J. A., Lehmann, J. R., McGee, J. K., Winsett, D. W., Ledbetter, A. D., Everitt, J. I., Ghio, A. J., & Costa, D.L. (2001), Acute pulmonary toxicity of particulate matter filter extracts in rats: Coherence with epidemiologic studies in Utah Valley Residents. EHP Supplement, 109(3), 395 - 404.

[16] Portions of the text contained in this section are derived from the October 2, 2001 Final Environmental Impact Statement for the Fulton Fish Market at Hunts Point prepared by Urbitran Associates, Inc. and the April 27, 2001 Draft Environmental Impact Statement for the St. Lawrence Cement Greenport Project prepared by AKRF, Inc.

[17] Andrew, Aligne C., et al. Strong Children's Research Center, Rochester General Hospital, and American Academy of Pediatrics Center for Child Health Research, Rochester, New York, USA.

[18] Sheffer, A.L., and V.S. Taggart. 1993. The National Asthma Education Program: expert panel report guidelines for the diagnosis and management of asthma. Med Care 1993:31 (suppl):MS20-MS28.

[19] McFadden, Jr., E.R. 1987. Asthma. In *Harrison's Principles of Internal Medicine*. (Eds: E. Braunwald, K.J. Isselbacher, R.G. Petersdorf, J.D. Wilson, J.B. Martin, and A.S. Fauchi), McGraw-Hill Book Company, New York, NY, pp. 1060-1065.

Although somewhat of a simplification, asthma can be categorized as having either an allergic or a non-allergic basis.[20,21,22] Allergic asthma is usually associated with a family history of allergic disease, increased levels of certain immune system proteins, and/or positive responses to specific diagnostic tests. Although exercise, cold air, and respiratory infections may also exacerbate asthma for allergic asthmatics, allergen exposure may be most important for eliciting airway inflammation and hyper-responsiveness. About 75 percent of people suffering from asthma have allergic asthma.[23] In contrast, people suffering from non-allergic asthma experience symptoms in their airways when confronted with such conditions as exercise, breathing cold air, or respiratory infections.[24]

Studies have demonstrated an increase in daily mortality, hospitalizations, and emergency department utilization for asthma attributable to air quality diminution from increased levels of sulfur dioxide, ozone and particulate matter. Recently published research found a 0.5 percent increase in death rates for every increase in the PM_{10} concentration level of 10 $\mu g/m^3$, even where ambient levels were well below the NAAQS standards.

5.19.2.3.2. Prevalence of Asthma

In 1998, the Centers for Disease Control and Prevention (CDC) reported that the estimated self-reported prevalence among children was between 7 and 10 percent among children.[25] According to the CDC report, over the last two decades the self-reported prevalence of asthma increased 75 percent among all persons of all ages and 160 percent in children between 0 and 4 years of age. The rate of asthma is increasing most rapidly in children under age 5. New York is thought to be the state with the second-largest number of affected children. Another report estimated that asthma prevalence in Western countries doubled between 1977 and 1997.[26] Other parts of the world besides the West, have also reported an increase in asthma prevalence in urban areas.

Though changes in infectious disease patterns,[27] decreased physical activity, increasing prevalence of obesity,[28] and increased time spent indoors are hypothesized to be contributing factors to the increase in the prevalence of asthma, the subject is one of continuing research.

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[20] Scadding, J.G. 1985. "Chapter 1: Definition and clinical categorization." In *Bronchial Asthma: Mechanisms and Therapeutics*. Second Edition (Eds: Weiss, E.B, M.S. Segal, and M. Stein), Little, Brown, and Company, Boston, MA, pp. 3-13.

[21] McFadden, 1987.

[22] Sears, M.R. 1997. "Epidemiology of childhood asthma." *Lancet* 350:1015-1020.

[23] Centers for Disease Control (CDC). 1998. "Surveillance for Asthma – United States, 1960-1995." *Morbidity and Mortality Weekly Report* 48(4): 1015-1028.

[24] McFadden, 1987.

[25] CDC, 1998.

[26] Cookson, W.O.C.M., and M.F. Moffatt. 1997. "Asthma: an epidemic in the absence of infection?" *Science* 275:41-42.

[27] *Ibid*.

[28] Platts-Mills, T.A.E., R.B. Sporik, M.D. Chapman, and P.W. Heymann. 1997. "The role of domestic allergens." In: *The Rising Trends in Asthma.* Ciba Foundation Symposium 206. John Wiley and Sons, New York, NY, pp. 173-189.

5.19.2.3.3. Asthma Morbidity and Mortality

While asthma morbidity and mortality rates have been rising throughout the United States over the last few decades,[29] New York City has experienced a disproportionate increase. For instance, from 1982 to 1985, the number of deaths from asthma in the City among individuals between 5 and 34 years of age was three times the anticipated number of deaths based on national rates.[30] The comparable rates for Westchester County are greater than the national rate, but less than New York City.

In addition, asthma is the leading cause of hospitalization for children ages between 0 and 14 and ranks among the leading causes of hospitalization for all age groups.[31] Asthma exacerbations resulting in hospitalizations appear to be particularly frequent and severe among minority, inner-city children, but the disproportionality among affected groups is likely to be due to factors other than genetic differences. A recent study by investigators at the Mount Sinai School of Medicine found an enormous difference in the rate at which children living in poor New York City neighborhoods were hospitalized for asthma, compared to children in wealthy neighborhoods. This difference reflects some combination of variations in asthma prevalence, triggers for asthma exacerbations, access to health care, and hospitalization practices. Between 1988 and 1997, the overall asthma hospitalization rate in New York City increased by 22 percent.[32] This increase was most pronounced in children and in low-income populations.[33] For example, the asthma hospitalization rate for preschool children from low-income areas rose by 63 percent during the 10 year period from 1988 to 1997.[34] In 1997, the hospitalization rate for asthma among children aged 0 to 4 was 16.0 per 1,000 children in New York City, compared to 6.1 per 1,000 in the United States, an almost three-fold difference.[35] In 1998, however, asthma hospitalizations among children decreased approximately 27 percent in New York City compared with 1997 (New York City Department of Health & Mental Hygiene (NYCDOHMH)).

Furthermore, there are striking differences in the number of hospitalizations among the City‘s boroughs. Compared with the other boroughs, hospitalization and death rates are highest in the Bronx.[36,37] Neighborhood pockets of asthma are also apparent, with East Harlem reporting the highest rate of asthma hospitalizations – approximately 3,000 hospitalizations per 100,000

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29 CDC, 1998.

30 Weiss, K.B., and D.K. Wagener. 1990. “Changing patterns of asthma mortality: identifying target populations at high risk.” *Journal of the American Medical Association (JAMA)* 264:1683-1687.

31 Stevenson, L., Garg, R., and Kaminsky, M., Bijur, P. 1999. *Asthma Facts*. New York City Department of Health, New York City Childhood Asthma Initiative.

32 *Ibid.*

33 *Ibid.*

34 *Ibid.*

35 United States Department of Health & Human Services. *Healthy People 2010: Understanding and Improving Health.* Washington D.C.: U.S. Government Printing Office, 2000.

36 Carr, W., L. Zeitel, and K. Weiss. 1992. “Variations in asthma hospitalization and deaths in New York City.” *American Journal of Public Health* 82:59-65.

37 De Palo, V.A., P.H. Mayo, P. Friedman, and M.J. Rosen. 1994. “Demographic influences on asthma hospital admission rates in New York City.” *Chest* 106:447-451.

persons.[38] The reasons for borough and local disparities in asthma are not known, but may be due to differences in economic status and ethnicity; exposure to different asthma triggers; or access to medical care.[39,40]

The number of deaths from asthma in Westchester County between 1998 and 2000 was 37, or 1.3 deaths per 100,000 residents.[41] In terms of morbidity, 1,076 hospital discharges in Westchester County were due to asthma attacks. Among females, asthma-related hospital stays occurred most frequently in the 45- to 49-year-old range, while males seemed to suffer from asthma-related hospitalization more frequently in the 1- to 2-year-old age group. Over one-quarter (26.4 percent) of asthma-related hospital discharges occurred among children ages 10 years or younger. In terms of race and ethnicity, the largest percentage of asthma-related hospitalizations occurred among whites (with 498 of the 1,076 total hospital discharges), followed by African Americans (with 312 discharges), "Other" (including Native Americans, Asian and Pacific Islanders, and other, with 240 discharges), and Unknown (with 26 discharges).[42,43]

5.19.2.3.4. Causes and Triggers

The dramatic increase in asthma among children has spurred scientists and clinicians to search for causes and risk factors for the disease. The rapidity of the increase points away from a significant change in population genetics, which would evolve over a much longer time scale, and towards some characteristic(s) of modern life. Factors that have been investigated epidemiologically (and sometimes experimentally) include indoor air pollution, outdoor air pollution, behaviors, food and food additives, medical practices, and illness in infancy. The reasons for the dramatic increase in asthma prevalence are currently unknown, although a number of hypotheses have been developed and investigated. Current hypotheses tend to focus on three areas: (1) increases in individual sensitivity (possibly due to reduced respiratory infections); (2) increases in exposures to allergens (due to change in ambient air pollution and/or indoor air quality); and (3) increases in airway inflammation of sensitized individuals (due to factors such as viral infections). No single factor is likely to explain the increase rates of asthma, however, and various factors would dominate in specific areas, homes, and individuals.

In theory, one can distinguish between "causes" and "triggers" of asthma. Causes are those factors that make a person susceptible to asthmatic attacks in the first place, while triggers are those factors that elicit asthmatic symptoms at a particular time. Triggers are more easily studied, but may not be the underlying causes of the disease. For example, although a genetic

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[38] Stevenson et al., 1999.

[39] Weiss, K.B., P.J. Gergen, and E.F. Crain. 1992. Inner-city asthma: the epidemiology of an emerging U.S. public health concern. *Chest* 101:362S-367S.

[40] Platts-Mills, 1997.

[41] Data obtained from the New York State Department of Health—Center for Community Health website on May 5, 2004: http://www.health.state.ny.us/nysdoh/chac/cha00/ast0.htm

[42] Data obtained from the Westchester County Department of Health Annual Data Book, 2003, on May 5, 2004: http://www.westchestergov.com/health/2002AnnualDataBook/Annual%20Data%20Book%202002.pdf

[43] Hispanic is an ethnic group and may be of any race. Therefore, Hispanics are also reported in the race categories. 198 Hispanics were hospitalized due to asthma.

predisposition to allergy is an important risk factor for developing asthma, there may have been no real increase in the number of genetically susceptible children, but rather a growth in the prevalence of factors that promote asthma development or trigger an attack. For a child suffering from asthma, however, identification and elimination of triggering factors is of greatest practical importance.

Allergens in the indoor environment are definitely important triggers of asthma in the U.S. Organic material that cause the immune system to overreact, such as cockroach antigens, dust mite antigens, molds, pet and rodent dander and urine, are the principal indoor air quality triggers of asthma attacks in children. Some of these antigens are probably more common in poor quality housing, which could explain, in part, why poor children suffer high rates of asthma. Other indoor pollutants, such as tobacco smoke and natural gas combustion products, can also exacerbate asthma symptoms. “Improvements” in housing, such as increased insulation and reduced ventilation to save on energy costs, and increased amounts of wall-to-wall carpeting and stuffed furniture, may have the unintended affects of promoting growth of dust mites and molds, and of concentrating antigens, irritants, and particulate matter indoors. These changes in housing over recent decades could help explain the widespread increases in asthma rates. In addition, the effect of indoor pollutants may be increased by the growing amount of time that children spend indoors, which increases a child’s exposure to antigens, and by lack of exercise, which might increase the respiratory system’s sensitivity to allergens.

Some aspects of outdoor pollution are capable of triggering asthma attacks, such as pollens. However, some researchers have suggested that outdoor air pollution is not likely to contribute significantly to the asthma epidemic because air pollution has decreased on the whole while asthma rates have increased. Yet, on a local scale, air pollution may be important, and on a larger scale, it is possible that specific pollutants, such as ozone or diesel exhaust, enhance the effects of other factors, such as allergens, even if the pollutants themselves are not triggers of asthma. Though some epidemiologic studies have found an association between 24-hour average PM_{10} (particulate matter less than 10 microns in diameter) levels and asthma hospitalizations and emergency department visits, others have not. (Norris et al., 1999; Schwartz et al., 1993; Sheppard et al., 1999; Tolbert et al., 2000; Henry et al., 1991; Hiltermann et al., 1997; Roemer et al., 1998; Roemer et al., 1999; Roemer et al., 2000). In addition, weather conditions, and cold air in particular, can elicit asthmatic symptoms independent of air pollution.

An additional hypothesis described by Cookson and Moffatt suggests a link between the increase in asthma and the decline of respiratory infections in modern society, which could shift the balance of the immune system in favor of factors that predispose persons to asthma and allergy. Infectious disease has been dramatically reduced in our society by the use of antibiotics and immunization programs.

5.19.2.4. *Potential Public Health Impacts*

5.19.2.4.1. Without Cat/Del UV Facility at Eastview Site

Mobile Sources.

Potential Public Health Effects. As mentioned above, during the peak construction year of the proposed project, construction-related truck traffic is anticipated to increase, potentially contributing to increases in particulate matter levels in the area. Therefore, it is important to determine the relationship between these emissions and asthma. This issue has been addressed, to a limited degree, experimentally and epidemiologically.

Experimentally, exposure to diesel exhaust particles has been shown to increase airways resistance in mice, while other studies of mice and humans have shown that diesel exhaust particles can enhance responses to allergens. Experiments in which non-asthmatic adults were exposed for an hour to diesel exhaust (containing particles and gases) found increased airways resistance and some cellular indicators of inflammatory response; however, these subjects did not experience asthma.

Epidemiologically, a few studies have addressed childhood asthma in relation to distance from roads and hence, from vehicle exhaust. For example, young children in Birmingham, England admitted to hospitals with a diagnosis of asthma were more likely to live close to busy roads than children admitted for other reasons. The apparent risk of admission for asthma was increased by almost two-fold for children who live close to busy roads. Undercutting the significance of these findings was the lack of information about socioeconomic status, family history of asthma, and the indoor environment. Other epidemiological studies have demonstrated an increase in daily mortality, hospitalizations and emergency department utilization attributable to air quality diminution from increased levels of sulfur dioxide, ozone and particulate matter.

In a study conducted in the Netherlands, researchers found that residence near busy streets was associated (in children, but not adults) with a one and a half fold increase in wheezing symptoms over the past year, and with a 4.8 fold higher use of asthma medications among children after controlling for various socioeconomic and indoor environmental exposures. Other studies have not found an association between asthma symptoms or hospitalizations and residence near heavy traffic.

As mentioned above, asthma among children is a major public and individual health problem in the region. However, the causes of asthma and its increase over the last two decades are not known, and the triggers for its exacerbation are only partially understood. The potential relationship between vehicular exhaust resulting from increased truck traffic and asthma, especially in communities with high rates of asthma, requires further study.

Air Quality Modeling Results. As described in Section 5.11, Air Quality, the proposed project involves substantial construction activities for a period of nearly 4 years. The projected period of greatest on- and off-site air quality emissions from construction-related activity would occur in 2008, when an average of up to 652 workers could be on-site. The emissions of airborne particulate matter related to construction would decrease after this year as the project nears completion in 2010.

During construction of the proposed project, construction equipment would generate particulate matter emissions from the combustion of fuel and construction related activities. With respect to $PM_{2.5}$, fuel combustion sources are the primary components of this pollutant. Particulate matter generated by construction-related transfer of materials and other fugitive dust sources tend to be larger size particulate matter that settles to the ground within a relatively short distance from the source. However, fuel combustion, especially from diesel combustion sources generate particulate matter that mostly consists of $PM_{2.5}$. Heavy construction equipment operating on the site would be dispersed at various locations throughout the 83-acre site for the various phases of construction, and much of the time these sources would be located within the site, far from the proposed plant boundaries. However, the construction-related on-street truck traffic related to the project would need to traverse the truck routes through the local communities.

The anticipated construction-related $PM_{2.5}$ impacts associated with the proposed project were predicted in Section 5.11, Air Quality. Analyses were performed for the peak air quality construction analysis year for both on- and off-site emissions. Since future truck trips would be substantially reduced after construction when the proposed project begins operations in 2010, potential $PM_{2.5}$ increments from mobile sources that are related to the operation of the proposed plant are anticipated to be less than those anticipated in the worst-case construction year.

The analysis showed that the maximum predicted incremental daily and annual average $PM_{2.5}$ concentration increments from both off-site construction vehicles and operations of the proposed project were below the interim guidelines used as a threshold for determining significant adverse impacts. In addition, all predicted incremental $PM_{2.5}$ concentrations from on-site construction activities were less than air quality significance thresholds at the nearest sensitive receptors. The total maximum predicted daily (24-hour) concentration of $PM_{2.5}$ at all off-site locations are anticipated to be within the applicable NAAQS. Therefore, since there were no predicted significant adverse air quality impacts, the potential effects of diesel emissions from construction-related on-site activities and off-site truck traffic and operational mobile sources are unlikely to result in a significant adverse impact on public health and local asthma incidents.

Stationary Sources.

Potential Public Health Effects. Airborne emissions from combustion of distillate fuel oil and natural gas consist primarily of water vapor and carbon dioxide. Also emitted are low levels of particulate matter, nitric oxide (NO) and carbon monoxide (CO), small amounts of NO_2, N_2O, and SO_2, and trace amounts of volatile organic compounds (VOCs), methane, and metals (*AP42*, External Combustion Sources, Section 1.3, September, 1998, and Stationary Internal Combustion Sources Section 3.1, April, 2000). Emissions of sulfur-based compounds (e.g., SO_2, sulfur trioxide) are a direct function of the quantity of sulfur in the fuel.

Particulate matter emitted from natural gas boilers consists primarily of organic products of incomplete combustion, and is very low in metal content (*AP42*, Section 1.3, September, 1998 and Section 3.1, April, 2000). Further, this particulate matter contains no biological material. Small amounts of nitrates and sulfates may be present in this particulate matter (given the gas-phase presence of nitrogen oxides and sulfur dioxide), and NO_x, SO_2 and ammonia emissions may lead to further (but much more diffuse) formation of secondary particulate matter, but these constituents, when present at less than 1 $\mu g/m^3$ levels in air—even at the maximally affected locations—do not appear to harm health.[44] Many toxicological studies have shown that concentrations of hundreds of micrograms of sulfate or nitrate per cubic meter of air are required before even minimal changes in respiratory or other function can be observed, even in asthmatic subjects or in sensitive laboratory rodents.[45]

Air Quality Modeling Results.

The air quality modeling analysis in Section 5.11, Air Quality, determined that maximum predicted incremental daily and annual average $PM_{2.5}$ concentration increments from the proposed plant are anticipated to be below the interim guidelines used as a threshold for determining significant adverse air quality impacts. Also, the total maximum predicted daily (24-hour) concentrations of $PM_{2.5}$ at off-site locations are anticipated to be within the applicable NAAQS. Therefore, since there were no predicted significant adverse air quality impacts, the potential effects of airborne emissions from the proposed project are unlikely to result in a significant adverse impact on public health and local asthma incidents.

5.19.2.4.2. With Cat/Del UV Facility at Eastview Site

Mobile Sources.

Air Quality Modeling Results. The analysis for this scenario also showed that the maximum predicted incremental daily and annual average $PM_{2.5}$ concentration increments from both off-site construction vehicles and operations of the proposed Croton project would be below the interim guidelines used as a threshold for determining significant adverse impacts. In addition, all predicted incremental $PM_{2.5}$ concentrations from on-site construction activities were less than air quality significance thresholds at the nearest sensitive receptors. The total maximum predicted daily (24-hour) concentrations of $PM_{2.5}$ at all off-site locations are anticipated to be within the applicable NAAQS. Therefore, since there were no predicted significant adverse air quality impacts, the potential effects of diesel emissions from construction-related on-site activities and off-site truck traffic and operational traffic are unlikely to result in a significant adverse impact on public health and local asthma incidents.

[44]Concentrations of at least 100 micrograms of sulfate or nitrate per cubic meter of air are required before even minimal changes in respiratory function can be observed, even in asthmatic subjects or in sensitive laboratory rodents. See U.S. USEPA 2001 (PM Criteria Document Draft) for extended discussion and references.

[45]See U.S. USEPA 2001 (PM Criteria Document Draft) for extended discussion and references.

Stationary Sources.

Potential Public Health Effects. There would be no additional increases in the airborne emissions from the operational boilers and generators for the proposed Croton project if the Cat/Del UV Facility is also constructed and operated at the Eastview Site. However, the potential effect of the dispersion of the air pollutants discharged by the proposed Croton project by the structure of the Cat/Del UV Facility (i.e., structures may affect local wind fields, resulting in different localized air flows) was assessed in Section 5.11, Air Quality.

Air Quality Modeling Results.

The air quality modeling analysis presented in Section 5.11, Air Quality, also determined under this scenario that maximum predicted incremental daily and annual average $PM_{2.5}$ concentration increments from operations of boilers and generators at the proposed Croton project were below the interim guidelines used as a threshold for determining significant adverse air quality impacts. Therefore, since there were no predicted significant adverse air quality impacts, the potential effects of airborne emissions from the proposed Croton project's boilers and generators are unlikely to result in a significant adverse impact on public health and local asthma incidents.

5.19.3. Health Effects of Detention Basins

5.19.3.1. Detention Basin Issues

Detention basins of standing freshwater can quickly turn into a prime breeding habitat for a variety of mosquito species. One of the most populous species in Westchester County is the *Culex pipens*, a carrier of the West Nile Virus. Over the past few years the spread of the virus has raised public awareness forcing government officials to treat its spread as a legitimate public health issue. This section examines the potential for detention basins at the Eastview Site to serve as a breeding site for these mosquitoes and any mitigation needed to prevent any significant adverse public health impacts.

5.19.3.2. Background

The West Nile Virus belongs to the Flaviviridae family (genus *Flavivirus*) and is part of the Japanese Encephalitis (JE) serocomplex.[46] JE viruses are maintained in nature by a mosquito vector and bird reservoir host. Humans and other mammals (often equine) infected with West Nile Virus are considered "dead-end" hosts, as they are not anticipated to contribute to the transmission cycle. The greatest mortality due to West Nile Virus has occurred in the bird and horse population in New York. However, the chance of humans becoming seriously ill from West Nile Virus is very small. This is because most humans are able to overcome any infection from West Nile Virus by the normal response of their immune system.

[46] National Pesticide Information Center (NPIC) website, (http://ace.orst.edu/info/npic/wnv/virus.htm)

West Nile Virus was first discovered in a woman from the West Nile District of Uganda in 1937. It has a wide geographic distribution and has been involved in human disease outbreaks in Africa, southwest Asia and Europe. Although the exact origin of the West Nile Virus found in the U.S. remains unknown, the strain isolated from the 1999 outbreak is most closely related to that isolated in Israel in 1998 from a dead goose[47].

Symptoms of West Nile Virus in humans generally appear within 3-14 days of infection, following a period of incubation. Symptoms are typically flu-like, presenting with a mild fever, headache, and body ache. Skin rash and swollen lymph glands may also accompany infection. Some individuals who become infected with West Nile Virus (less than 1%) develop encephalitis, which is an inflammation of the brain. West Nile Virus encephalitis primarily affects persons over 50 years of age. Those with a compromised immune system may also be more susceptible to acquiring encephalitis. Symptoms of this disease develop rapidly and may include high fever, headache, muscle weakness, stiff neck, confusion, and coma. The rate of fatality is 3 to 15 percent among those who develop the disease. Currently no approved human vaccine is available for West Nile Virus.

5.19.3.2.1. Geographic Distribution

West Nile Virus has already spread throughout Northern Africa and portions of Western Europe. The climate changes and weather trends associated with global warming are suggested as a reason for the gradual expansion of this and other viral diseases across larger areas of the earth, including areas with large urban populations.

While West Nile Virus was first identified in the U.S. in the fall of 1999, the West Nile Virus appears to be well established in the United States and continues to spread. As of November 20, 2002, 3,698 confirmed human cases of West Nile Virus, and 212 deaths have been reported. The virus has already been detected in 44 states and the District of Columbia.

5.19.3.2.2. Causes and Aggravating Factors

Mosquitoes commonly carry the West Nile Virus. Of the 159 types of mosquito species present in New York State, only one, *Culex pipiens* or the household mosquito, is the central focus of the emergence and spread of West Nile Virus in the United States. There are five other species of mosquitoes known to carry West Nile Virus. The others are *Culex restuans, Culex salinarius, Aedes triseriatus, Aedes vexans, and Aedes japonicus.*

Any object that can hold water can become a breeding area for mosquitoes. Mosquitoes breed and lay their eggs in standing water. Standing water can be found in gutters, abandoned tires, pools, birdbaths, trashcans, window boxes, wheelbarrows, rowboats, planters, and children's toys. Weeds, tall grass, and shrubs also provide a home for mosquitoes.

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[47] Briese, T., Rambaut, A., Pathmajeyan, M., Bishara, J., Weinberger, M., Pitlik, S., and Lipkin, I. Phylogenetic Analysis of a Human Isolate from the 2000 Israel West Nile virus Epidemic, *Emerging Infectious Diseases.* 8 (5) 528-531. May 2002.

Mosquitoes are most likely to bite during evening, nighttime, and early morning hours. During these hours it is important for people to be cautious of their local mosquito population. As temperatures fluctuate viruses like West Nile Virus can survive in their host organisms, or vectors, through the winter and reemerge in the spring. The mosquito is the most commonly known vector for this virus.

5.19.3.2.3. ***Prevention & Management Plans***

The unprecedented introduction of West Nile Virus into the metropolitan area of New York City (NYC) in the late summer of 1999 and its subsequent statewide expansion in 2000 has resulted in a large-scale review of existing programs and required resources to address this threat.[48] Representatives from local health units, State and Federal agencies have been meeting on a regular basis to address each of the significant surveillance and response issues associated with this mosquito borne disease. As a result of these discussions and consultation with community groups, the New York State Department of Health (NYSDOH) has developed a set of complementary action plans designed to offer a degree of consistency in the approach taken among municipalities to minimize cases of this or other related arbovirus infections.

These management plans are based on four criteria: educating the public; destroying larval stage mosquitoes; destroying adult mosquitoes; and effective public communication. These plans include a preventative strategy to minimize the potential re-appearance of West Nile Virus. This calls for a phased response using biological pesticides first, which kills mosquito eggs and larvae, larvicides, then leading to a full-scale aerial spraying program for adult mosquitoes if West Nile Virus occurs in human populations again.

Many different pesticides are registered in New York State for mosquito control. Broadly, these products can be broken down into either adulticides (those products that control adult mosquitoes) or larvicides (those products that control immature forms of mosquitoes). While pesticides are inherently toxic, if used properly, the potential for significant human exposure to the mosquito adulticides or larvicides is low. Hence, the risk of health effects to the general public is also low.

5.19.3.2.4. West Nile Virus Status in 2002

Table 5.19-1. Shows the current numbers of dead birds, mosquito pools, and number of humans afflicted with West Nile Virus for the 2003 season.

[48]New York State West Nile Virus Response Plan– Guidance Document (http://www.health.state.ny.us/nysdoh/westnile/2001/responseplan/2001wnv_responseplan.pdf)

TABLE 5.19-1. NEW YORK CITY & WESTCHESTER COUNTY WEST NILE VIRUS: 2003 POSITIVE RESULTS SUMMARY

WNV Positive Results	Westchester Totals	Citywide Totals	Bronx	Brooklyn	Manhattan	Queens	Staten Island
Dead Birds	1	170	29	44	7	56	34
Mosquito Pools	14	275	42	37	11	123	62
Human Cases	1	30	6	8	2	11	3

Notes:
New York City information obtained on May 4, 2004 from http://www.nyc.gov/ html/doh/html/wnv/wnvr1-2003.html.
Westchester County information updated on September 19, 2003. Westchester County information obtained on May 4, 2004 from http://www.westchestergov.com/health/PHU_06_26_2003(WNV)_files/PublicHealthUpdate(WNV_1stHumanCase).htm.
Dead Birds: Dead birds are tested by the New York State Department of Environmental Conservation and the New York State Department of Health.
Mosquito Pools: Mosquitoes are collected from over 90 locations Citywide and tested by the New York City Department of Health & Mental Hygiene. New York State Department of Health tests for Westchester County.
Human Cases: Healthcare providers in New York City are required to report all patients hospitalized with viral encephalitis and meningitis to the New York City Department of Health & Mental Hygiene. Blood and spinal fluid specimens are tested for West Nile Virus by the New York City Department of Health & Mental Hygiene. In New York City, the Human cases reported were hospitalized cases of West Nile Encephalitis or Meningitis.

The only pool of standing water on the site is a pool at the north end of the site where storm drains from the Grasslands Reservation discharge. The Mine Brook corridor does not provide good mosquito habitat. Mosquitoes need stagnant water to lay their eggs. Mosquitoes most commonly associated with the West Nile Virus often breed in artificial containers that hold stagnant water. They are much less frequently found in natural habitats such as salt marshes, wetlands, large bodies of water, or streams. Wildlife within such bodies of water, such as fish, frogs, turtles, or waterfowl, will feed on the mosquito larvae before the larvae are able to complete its life cycle and become an adult mosquito.[49] Therefore, the Mine Brook corridor, being a moving stream, does not provide good mosquito breeding habitat.

5.19.3.3. Potential Public Health Impacts

5.19.3.3.1. Without Cat/Del UV Facility at Eastview Site

The anticipated year of completion of the proposed work at the Eastview Site is 2010. Therefore, potential project impacts have been assessed by comparing the Future With the Project conditions against the Future Without the Project conditions for the year 2010.

[49] Information obtained on May 4, 2004, from www.westchestergov.com/health/WNV2001/WNV%20and%20your%20pond.pdf.

In the Future With the Project, the proposed water treatment plant is not anticipated to result in any significant adverse impacts to the surface water, stormwater, or groundwater. A stormwater detention basin would be installed to ensure that flows are maintained to adjacent natural resource areas at or near the existing rates and volumes. Impacts to natural resources at the project site would be minimal; therefore public health risks in the study area are anticipated.

Concern about the potential for the detention basin to provide breeding habitat for mosquitoes and a subsequent public health risk related to West Nile Virus and other mosquito-borne diseases led to changes in the design of the detention basin. Rather than a solid bottom that would allow very slow infiltration of water, and possibly standing water for long periods during high-water periods, the detention pond outfall would be fitted with a low volume drain that would completely empty the pond and prevent the pooling of standing water. The drain rate was calculated to be slow enough to avoid flooding of Mine Brook and points downstream, but fast enough to insure drying of the pond within a few days. The site would also comply with Westchester County's *Comprehensive Mosquito-Borne Disease Surveillance and Control Plan* that would be implemented by various departments of the county. No introduction or changes to this current management policy are anticipated.

The construction of the proposed plant would take place from fall 2005 to fall 2010. The anticipated year of peak construction of the proposed work at the water treatment plant site is 2008. The peak year had been selected based on the anticipated numbers of workers involved in each year of the project. During the peak year of construction, no adverse public health risks are anticipated with respect to the natural resources affecting the project site. No impacts are anticipated to the natural and surrounding structural resources from the quality and quantity of stormwater runoff due to the construction activities at the Eastview Site.

During construction artificially created detention basins would provide a breeding habitat for mosquitoes that are capable of carrying West Nile Virus. These detention basins would be designed to not accumulate standing water and be periodically drained. The contractor would be responsible for removing any containers that could temporary store water; therefore, mosquito growth would not be increased because there would be no increase in standing water.

5.19.3.3.2. With Cat/Del UV Facility at Eastview Site

The Cat/Del UV Facility is not anticipated to result in any significant adverse impacts to the surface water, stormwater, or groundwater. A pretreatment forebay, along with on-line storage, would be utilized to ensure that flows are maintained to adjacent natural resource areas and Mine Brook at or near the existing rates and volumes. These areas would be diversely vegetated in order to provide a natural habitat for known vector predators for mosquito larvae. Generally, the flow-through characteristics of on-line storage do not lead to stagnant water, which is a prime precursor for mosquito breeding habitat. The absence of stagnant water coupled with the periodic flushing associated with wet weather events and the presence of potential predators minimizes the viability of mosquito larvae survival, thereby minimizing the potential for a mosquito infestation. In addition, the advantage of utilizing the pretreatment forebay to improve the water quality would further limit the potential existence of mosquito larvae. The potential for limiting the mosquito populations within this area would aid with minimizing the spread of the West Nile Virus and other mosquito-borne diseases. In addition, the Cat/Del UV Facility site would also comply with Westchester County's *Comprehensive Mosquito-Borne Disease Surveillance and Control Plan* that would be implemented by various departments of the county. During the peak year of construction, no adverse public health risks are anticipated with respect to the natural resources affecting the Cat/Del UV Facility site. During construction of the Cat/Del UV Facility, artificially created detention basins would provide a breeding habitat for mosquitoes that are capable of carrying West Nile Virus. These detention basins would be designed to not accumulate standing water and be periodically drained. The contractor would be responsible for removing any containers that could temporary store water; therefore, mosquito growth would not be increased because there would be no increase in standing water. No impacts are anticipated to the natural and surrounding structural resources from the quality and quantity of stormwater runoff due to the construction activities at the Eastview Site.

5.19.4. Conclusion

The causes of asthma and its increase over the last two decades are not known, and the triggers for its exacerbation are only partially understood. The potential relationship between vehicular exhaust resulting from increased truck traffic and asthma, especially in communities with high rates of asthma, requires further study. Air quality modeling results show insignificant increases in the short-term and annual average concentrations of $PM_{2.5}$ from the construction or operation of the proposed project. Therefore, potential $PM_{2.5}$ emissions from mobile and stationary sources related to the construction and operation of the proposed project are not anticipated to result in adverse public health impacts.

Detention basins at the Eastview Site could provide a breeding habitat for mosquitoes that are capable of carrying West Nile Virus. These detention basins would be designed to not accumulate standing water and be periodically drained. The contractor would be responsible for removing any containers that could temporary store water; therefore, mosquito growth would not be increased because there would be no increase in standing water.