CHAPTER 4.F

WATER QUALITY

A. INTRODUCTION

This chapter focuses on the water quality of New York City surface waters within and surrounding the Rockaway peninsula and the potential impacts to these resources from the *Mosquito Population Control Program in the Rockaways.* This analysis conservatively assumes that up to six applications could occur in the Rockaways from the end of June through September (up to two per month). The seventeen adulticides that may be used on a community scale basis for mosquito control are also under consideration for the *Mosquito Population Control Program in the Rockaways*. The primary mechanisms for application of adulticides are by backpack, truck, or all-terrain vehicle, with a 100-foot setback from water bodies.

Jamaica Bay and the Atlantic Ocean are the major bodies of water surrounding the Rockaway peninsula. There are no bodies of water on the peninsula. Chapter 3.F, "Water Quality" provides a detailed description of the use classifications and existing water quality conditions of Jamaica Bay and will not be repeated here. Only additional information needed to address specific issues associated with the *Mosquito Population Control Program in the Rockaways* will be presented. This chapter is organized into the following sections: existing water quality of Jamaica Bay, future without the proposed action, and potential water quality impacts.

B. EXISTING WATER QUALITY CONDITIONS OF JAMAICA BAY

As presented in Chapter 3.F, "Water Quality," the open water areas of Jamaica Bay are classified as SB saline surface waters. Uses that are currently impaired by poor water quality in Jamaica Bay include shellfishing, bathing, fish consumption, wildlife habitat, and aesthetics (Ringenary 1999). Fecal coliform concentrations have improved (decreased) noticeably since 1990 due to sewage system operational improvements and decreases in illegal discharges, decreasing from 200 to 20 colonies/100 mL (NYCDEP 1999a).

In 1998, the average summer dissolved oxygen (DO) concentrations exceeded the 5.0 mg/L standard for SB saline waters at all sampling sites. Average DO concentrations in the Bay have increased over the past 29 years, with top waters sometimes reaching over 8 mg/L. DO however, is highly variable between and within years, with an increasing gap between surface and bottom waters (NYCDEP 1999).

Chlorophyll a concentrations in Jamaica Bay are high, and indicative of eutrophic conditions. Water turnover within the Bay is slow, about 35 days. This slow turnover is partially due to the construction of JFK Airport in the 1960s that led to the removal of over 70 million cubic meters of bottom material, changing the mean depth from 3 to 16 feet. In 1999, the average chlorophyll a concentration for the Bay was 41.3 µg/L, well above the 20 µg/L considered indicative of eutrophic waters.

Chlorophyll a concentrations in Jamaica Bay have increased greatly since the late 1980s—the average rate of increase is close to 10 µg/L every 2 years for the period from 1986 to 1995 (NYCDEP 1999).

Water quality on the Atlantic Ocean side, at Jacob Riis Park and Breezy Point, was considered excellent by the National Park Service in 1999. The average total coliform count for these two areas was 57 colonies/100mL (2,400 colonies/100mL standard). The average fecal coliform counts were low, 38 colonies/100mL (200 colonies/100mL standard). On the Jamaica Bay side, coliform sampling near the National Park Service's Nova Scotia Bar sampling site near Jacob Riis Park indicated that 35% of fecal and 10% of total coliform counts were higher than the federal maximum recreational criteria. The average fecal coliform count at this location in 1999 was 482 colonies/100mL and the average total coliform count was 791 colonies/100mL. The National Park Service's other sampling site near the Rockaways, Beach Channel, located just west of the Cross Bay Bridge, exceeded the total coliform standard in 15 percent of the samples, with a seasonal average of 441 colonies/100mL. Fecal coliform counts exceeded the standard 35 percent of the time in 1999, with a seasonal average of 500 colonies/100mL, an increase over 1996-1998 values (Ringenary 1999).

C. FUTURE WITHOUT THE PROPOSED ACTION

As discussed in Chapter 3.F, "Water Quality" for the *Mosquito-Borne Disease Control Program*, surface water quality in Jamaica Bay is likely to improve in the future as part of the *Mosquito-Borne Disease Control Program* to implement aggressive and innovative measures to control the input of pollutants to Jamaica Bay through developing and upgrading the sewage treatment system, identifying illegal connections to the sewer system and implementing the multi-year CSO Abatement Program. The CSO Abatement Program includes construction of CSO abatement facilities (such as the one planned for Paerdegat Basin) that hold overflow in larger sewers and tanks during storm events to prevent discharge of untreated to the Bay, then pumping the sewage to the water pollution control plants (WPCP) when plant capacity becomes available after the storm. Other improvements, such as the US Army Corps of Engineers proposed navigational channel and shoreline enhancements, will also ultimately result in improved water quality by stabilizing shorelines, and re-establishing tidal wetlands in some areas.

D. POTENTIAL WATER QUALITY IMPACTS

Potential water quality impacts from the active ingredients were discussed in detail in Chapter 3.F for the *Mosquito-Borne Disease Control Program* and the empirical studies used as part of that assessment are not rediscussed in this chapter. As presented in Chapter 3.F, "Water Quality," malathion is the only active ingredient being considered in the *Mosquito Population Control Program in the Rockaways* that has a NY State water quality standard. Therefore, only the discussion of malathion will refer to a water quality standard. The estimated concentrations of active ingredients to Jamaica Bay from the *Mosquito Population Control Program in the Rockaways* were presented in Chapter 4.D, "Natural Resources" as part of the Tier II risk assessment for the *Mosquito Population Control Program in the Rockaways*. This section incorporates the results of that evaluation in assessing potential water quality impacts. Because the potential impact to water quality will depend on certain physical and chemical characteristics of the adulticide, as well as the characteristics of Jamaica Bay, this discussion is organized by active ingredients in the adulticides.

ORGANOPHOSPHATES

Malathion

Chapter 3.F, "Water Quality" provides a discussion of the physical and chemical properties of malathion and an assessment of the potential effects of its application as part of the citywide program. Malathion is an organophosphate insecticide that is soluble in water and moderately binds to soils. It therefore has the potential to leach to ground water or surface water bodies. However, it also appears to degrade rapidly in the presence of active soil microbial activity, with degradation most rapid in moist soils. This suggests that in areas of the Rockaways where surface runoff containing malathion is carried to tidal wetlands, it would have a chance to be degraded. Because malathion is water soluble and does not bind tightly to organic material, it is less likely than the pyrethroid active ingredients, discussed below, to be affected by organic material in the stormwater or CSO systems. The New York State water quality standard for malathion in surface waters is 0.1 ?g/L. The estimated exposure concentration for Jamaica Bay (if there is a rainfall after the application of malathion) calculated as part of the Tier II risk assessment for the *Mosquito Population Control in the Rockaways* (Chapter 4.D, "Natural Resources") is approximately 0.109 ?g/L (0.00010895 ppm). Although the hazard quotients calculated from this exposure concentration do not result in predicted significant adverse impacts to aquatic organisms, the calculated malathion concentration in Jamaica Bay are slightly greater than the water quality standard which suggests that the application as part of the *Mosquito Population Control in the Rockaways* has the potential to cause an exceedance of the malathion water quality standard in Jamaica Bay.

Naled

Like malathion, naled is an organophosphate adulticide that is water soluble. Chapter 3.F provides a detailed description of its chemical and physical characteristics and an assessment of the potential affects to water quality if applied as part of the *Mosquito-Borne Disease Control Program.* While it does not partition to sediment to a great extent, it and its degradation product (dichlorvos) appear to dissipate rapidly, with half-lives less than 2 days. The estimated exposure concentration for Jamaica Bay calculated as part of the Tier II risk assessment for the *Mosquito Population Control in the Rockaways* (Chapter 4.D, "Natural Resources") is approximately 0.00007630 ppm (mg/L). This concentration did not result in hazard quotients that would result in predicted significant adverse impacts on aquatic organisms. Because Jamaica Bay is a large body of water and naled appears to dissipate in a relatively short period of time, its application as part of the *Mosquito Population Control in the Rockaways* should not significantly affect water quality of the Bay.

PYRETHROIDS

Active Ingredients

Permethrin

Chapter 3.F, "Water Quality" provides a detailed description of the physical and chemical properties of permethrin and the potential effects of its application for the *Mosquito-Borne Disease Control Program.* Permethrin is a synthetic pyrethroid that is almost insoluble in water and very soluble in organic solutions. It binds strongly to soil particles and sediments. These characteristics suggest that permethrin is not likely to enter the water column and affect water quality if discharged to Jamaica Bay. The estimated exposure concentration in Jamaica Bay from the *Mosquito Population Control in the Rockaways*, presented in Chapter 4.D, "Natural Resources," is 0.00000224 ppm (mg/L), which resulted in hazard quotients that would result in predicted significant adverse impacts on crustaceans

but not to mollusks, fish, and algae. Because the estimated concentration does not assume any partitioning to the sediment or within the stormsewer or CSO the concentration available within the water column is likely to be lower and should not result in significant water quality impacts.

Resmethrin

Chapter 3.F, "Water Quality" provides an assessment of the potential effects from the application of resmethrin as part of the *Mosquito-Borne Disease Control Program*, which would apply to the *Mosquito Population Control in the Rockaways* as well. Resmethrin is also a pyrethroid pesticide. Like sumithrin and permethrin, it is not very soluble in water, but is very soluble in organic solutions. These characteristics suggest resmethrin would have an affinity for soil and sediment particles, which reduces its tendancy to enter the water column. The estimated exposure concentration for resmethrin calculated for Jamaica Bay from the *Mosquito Population Control in the Rockaways*, as presented in Chapter 4.D, "Natural Resources," is 0.00000002 ppm, which did not result in hazard quotients that would result in predicted significant adverse impacts on aquatic organisms. As is the case for the other active ingredients, this estimated concentration did not take into account partitioning with organic material in the stormwater system, the CSO, or the Bay, which would result in a lower concentration than that projected.

Sumithrin

As discussed in Chapter 3.F, "Water Quality," the chemical characteristics of the active ingredient sumithrin suggest that, when applied, it should have a greater affinity for organic material in soils and sediments than water, reducing the amoungt available within the water column. Chapter 3.F provides a description of the chemical and physical characteristics of the active ingredients and the results of the post-spray monitoring conducted in 2000. The estimated exposure concentration for sumithrin presented in Chapter 4.D, "Natural Resources" is 0.00000016 ppm. This estimated exposure concentrations resulted in hazard quotients that would result in predicted significant adverse impacts on aquatic organisms. Because sumithrin binds tightly to organic material, the impacts to water quality should be small even with the discharge of rainfall runoff through the CSOs or stormwater discharge occuring after a spray event, because of binding with sediment in the sewers and in the Bay.

Synergists

Piperonyl Butoxide (PBO)

For these analyses, piperonyl butoxide (PBO) was considered to be an active ingredient. Piperonyl butoxide is not expected to volatilize or adsorb to sediment as readily as the other pyrethroid active ingredients. Because of this, it is expected to leach from soil and be released in water. In water, it has been found to be resistent to hydrolysis. Chapter 3.F, "Water Quality," provides a description of the chemical and physical characteristics of piperonly butoxide, and the results of the post-spray monitoring conducted in 2000. The estimated exposure concentration for piperonly butoxide is 0.00009875 ppm (mg/L). This exposure concentration resulted in hazard quotients that would result in predicted significant adverse impacts on aquatic organisms. The fact that the City's post-spray monitoring program collected only one sample where the concentration of piperonly butoxide was above the practical quantitation limit suggests that the methods of application and the 100-foot setback from surface waters should minimize the introduction of this adulticide to Jamaica Bay through drift.

Inerts

Chapter 3.C, "Public Health" discusses the inert ingredients contained in the adulticides evaluated in this EIS. In most cases the inerts consist of petroleum distillates or white mineral oil. Mineral oil is included in USEPA's list of minimal risk inert ingredients, which include substances that are ubiquitous in nature and not expected to present a hazard to human health or the environments. The amount that would make its way into Jamaica Bay should not affect water quality or aquatic organisms. With respect to petroleum distillates, the volume applied in these ULV formulations will be small, and some of the volume applied will volatilize in the atmosphere or on the ground surface before it reaches Jamaica Bay through stormwater runoff or CSO. Based on the application rates, the range of inerts in pyrethroids range from 3 to 118 times the application rate for sumithrin. Even without the benefit of estimating the volatilization of petroleum distillates, proportioning the sumithrin results by a factor of 118 would result in incremental water quality levels of petroleum distillates that are extremely small. Therefore, the amount of these inerts that would eventually enter the Jamaica Bay will be small and inconsequential compared to other sources of these compounds in Jamaica Bay, and should not result in significant impacts to water quality.

LITERATURE CITED

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