CHAPTER 4.A

FRAMEWORK OF THE ANALYSIS

A. INTRODUCTION

The impact issues of concern for the *Mosquito Population Control Program in the Rockaways* are those associated with application of adulticides to control adult mosquitoes due to concerns about the health and well being of citizens in the Rockaways. Many of the issues related to potential exposure, fate of products in the environment with respect to adulticides are similar to the issues discussed for the *Mosquito-Borne Disease Control Program* in Chapter 3.A., "Framework of the Analysis." This chapter discusses the overall methodologies for assessing the risk and consequences of exposure to adulticides, and the impact assessment approach for the *Mosquito Population Control Program in the Rockaways*. Since the procedures follow the overall approach described in detail for the assessment of the *Mosquito-Borne Disease Control Program* in Chapter 3.A., "Framework of the Analysis" only where there are appreciable differences to the specifics of the analysis are described here. These differences in analysis approach are largely due either to the lesser number of exposure scenarios for the environment types on Rockaway Peninsula (when compared to the whole City) or specific program elements that are directly associated with the *Mosquito Population Control Program in the Rockaways*.

B. PROGRAM LIMITATIONS

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 would be via backpack, truck, or all-terrain vehicle (ATV) methods. No aerial applications of adulticides are included in the *Mosquito Population Control Program in the Rockaways*. Buffer zones within 100 feet of waterbodies will be observed.

The label application limits for the products will be adhered to for the *Mosquito Population Control Program in the Rockaways*. No additives or additional carriers (besides the minimum that may be required for a product) will be added to the ULV applications.

C. DRIFT/DEPOSITION MODELING OF ADULTICIDES

Based on the sensitivity analysis of the airborne concentration and deposition from USEPA models described in Chapter 3.A, "Framework of the Analysis," the results from the ISCST3 model were selected to provide reasonably conservative estimates of adulticide airborne concentrations and deposition values for technical analyses in this study. Except where described below, the modeling assumptions described in Chapter 3.A for the *Mosquito-Borne Disease Control Program* were also applied in the assessment of potential impacts under the *Mosquito Population Control Program in the Rockaways*.

SOURCE PARAMETERS

Simulations of ground applications (i.e., truck) were performed at a release height of 12 feet above ground. Since there would be no aerial applications of adulticides, only the results from truck applications were considered.

MODELING RESULTS

Based on the procedures described in Chapter 3.A, "Framework of the Analysis," the ISCST3 model was employed to estimate conservatively the maximum predicted concentrations and deposition levels of the adulticide products being analyzed. The modeling was based on the assumption that the area to be treated was within the 300-foot swath adjacent to the source. The results indicated much higher deposition levels at the various receptors when simulated at truck-level source heights (12 feet above grade) as opposed to aerial level source heights. Therefore, to provide conservative estimates of likely spraying activities in New York City, the ground application results of the modeling were used as inputs to the technical analyses for the *Mosquito Population Control Program in the Rockaways*.

Table 4.A-1 (which is the equivalent of Table 3.A-5) presents the results of the maximum predicted airborne concentrations from ground applications of the active ingredients for each of the six products with the highest concentration of active ingredients. The results represent a "peak" maximum concentration value at the 25-foot receptor distance from the source.

Table 4.A-1: Adulticide Concentration Modeling Results

Adulticide	Active Ingredient	1-hour Average Concentration ($\mu g/m^3$) Peak Value at 25 ft Receptor Distance	
		Maximum Value	@ 6ft Receptor Height
Organophosphates			
Fyfanon ULV Concentrate Insecticide	Malathion (95%)	57.085	48.031
Dibrom Concentrate Insecticide	Naled (87.4%)	18.427	15.505
Pyrethroids			
Permethrin 57% OS	Permethrin (57%)	22.138	18.627
Scourge Insecticide with SBP-1382/ Piperonyl Butoxide 18% + 54% MF Formula II	Resmethrin (18%)	7.379	6.209
	Piperonyl Butoxide (54%)	22.138	18.627
Anvil 10+10	Sumithrin (10%)	3.795	3.193
	Piperonyl Butoxide (10%)	3.795	3.193
Source: ISCST3 modeling runs with maximum label application rates			

The results are given for the concentration estimated at pedestrian level receptors (6 feet above grade) and the maximum from all other modeled receptor heights.

Table 4.A-2 (the equivalent of Table 3.A-6) presents the results of the maximum predicted deposition levels from ground applications of the active ingredients for each of the six products of concern. The results from ground represent a "peak" maximum deposition value at the 25-foot receptor distance from the source and an average deposition value within the 300-foot swath adjacent to the source (which incorporates multiple passes of the truck every 300 feet upstream of the first pass). The results are given for the deposition levels estimated at ground level receptors (0 feet above grade) and surfaces at receptors located 12 feet above grade.

Table 4.A-2: Adulticide Deposition Level Modeling Results

Adulticide	Active Ingredient	1-hour Average Deposition Level (mg/m^2)			
		Average Within 300 ft		Peak Value at 25 ft Receptor Distance	
		Ground Level	Surface at 12 ft Height	Ground Level	Surface at 12 ft Height
Organophosphates					
Fyfanon ULV Concentrate Insecticide	Malathion (95%)	5.009	6.910	25.039	36.123
Dibrom Concentrate Insecticide	Naled (87.4%)	1.617	2.230	8.083	11.661
Pyrethroids					
Permethrin 57% OS	Permethrin (57%)	1.943	2.680	9.710	14.009
Scourge Insecticide with SBP-1382/ Piperonyl Butoxide 18% + 54% MF Formula II	Resmethrin (18%)	0.648	0.893	3.237	4.670
	Piperonyl Butoxide (54%)	1.943	2.680	9.710	14.009
Anvil 10+10	Sumithrin (10%)	0.333	0.459	1.665	2.402
	Piperonyl Butoxide (10%)	0.333	0.459	1.665	2.402

D. ENVIRONMENT TYPES

It is not possible to predict exactly where in the Rockaways Peninsula in a given year which it may be necessary to apply adulticides to control adult mosquitoes in the future. In large measure, these sites will be determined by surveillance and complaint data and the likely habitat for mosquitoes. However, it is possible that at one time or another most land uses in the Rockaways Peninsula and all of its natural areas could be affected by spraying. Therefore, six typical environments within the Rockaways have been identified for analysis, with emphasis on those that may be particularly vulnerable to the application of adulticides. The overall environment types are discussed in detail in Chapter 3.A, "Framework of the Analysis."

E. REPRESENTATIVE AREAS FOR EIS ANALYSIS

As discussed further in Chapter 4.B, "Land Use, Community Facilities, Public Policy and Zoning," four representative geographic areas of the Rockaway Peninsula were selected for site-specific study. One additional area, the "western Rockaways" (see Chapter 4.B) would not be subject to adult mosquito control efforts under this program. Table 4.A-3 summarizes the variety of land uses and environment types which may be found on the Rockaway Peninsula. Figures 4.A-1 and 4.A-2 depict the Rockaway Peninsula and study areas discussed further in section 4.B. As shown on Table 4.A-3, the Rockaway Peninsula includes many of the environment types found in New York City, some likely mosquito breeding grounds, and locations of vulnerable human populations and animal species. A detailed discussion of these areas can be found in Chapter 4.B.

Table 4.A-3
Rockaway Peninsula Environment Types

Environment Types	Present on Peninsula
Residential	
Low-rise	X
Mid-rise	X
High-rise	X
Parks/Open Areas	
Public open space	X
Paved open areas	X
Unpaved open areas (including residential front and rear yards)	X
Marinas/Waterfront Recreation (i.e., beach, boating)	X
Natural Resources	
Upland forest	
Upland field	X
Tidal wetland	X
Freshwater wetland	
Water Supply	X
Sensitive waterbodies (including estuaries, rivers, basins)	X
Community Facilities/ Institutional Uses	
Schools	X
Hospitals	X
Elder care centers	X
Commercial	
Retail	X
Outdoor Dining	
Open markets	
Large Vacant Parcels	X
Industrial/Transportation	
Municipal facilities (including transfer stations, WPCP, depots)	X
Manufacturing/warehouse	
Rail/Transit system	X
Major Arterials/Highways	
Source: Allee King Rosen & Fleming, Inc., November 2000.	

F. EXPOSURE SCENARIOS AND PATHWAYS

As described in Chapter 3.A, "Framework of the Analysis," an exposure scenario describes the way by which a person or biota can potentially be exposed to adulticides as a result of spraying. Exposure scenarios are defined by the potential "populations" (public health) and "receptors" (natural resources) which may be exposed, and the "pathways" by which they may be exposed.

The general human populations and receptors that can potentially by exposed to adulticiding activities, and the general pathways by which they can be exposed are outlined in Chapter 3.A, "Framework of the Analysis."

EXPOSURE SCENARIOS WITHIN THE ROCKAWAYS PENINSULA

During spraying application, adulticide formulations will be dispersed in air, and may settle and leave a residue directly on an individual's skin, due to dispersion and spray drift. Adulticide residues may also settle on non-targeted outdoor surfaces (such as lawns, gardens and swimming areas) and surfaces within homes (through open windows or ventilation systems). There is also the potential for

insecticides to enter public water supply systems (for the Rockaway Peninsula, this would be underground aquifers below the peninsula). Potential impacts from inhalation, dermal contact, or ingestion of adulticides (through direct and indirect exposure) were considered in the public health analysis. Potential impacts to terrestrial and aquatic receptors (through exposure from primary and secondary sources) were considered in the natural resources impacts assessment.

Considering the potential areas for adulticide applications, vulnerable human and natural resource populations, and the environment types found within the Rockaways Peninsula, the exposure scenarios within the Rockaway Peninsula are discussed below.

Exposure Scenarios Particular to the Public Health Analysis:

Exposure through direct and indirect contact to the human population groups associated with these environment types:

- Range of residential conditions;
- Schools;
- Nursing Home;
- Hospital;
- Parks;
- Beach; and
- Paved and Unpaved Parks.

Environment Types Particular to the Natural Resources Analysis

Exposure to biota through primary and secondary sources in these environments:

- Natural areas/parks bordering Jamaica Bay (including Grass Hassock Channel);
- Open Areas bordering Rockaway Beach/Atlantic Ocean; and
- Piping Plover endangered species.

There would also be exposure pathways for the trained applicators who apply the insecticides, and these would be addressed by compliance with the Occupational Safety and Hazard Act (OSHA) regulations. All contractors involved in the *Mosquito Population Control Program in the Rockaways* will be responsible for proper transportation, storage, and disposal of potentially hazardous materials and for proper reporting and cleanup of any spills. City workers involved in the *Mosquito Population Control Program in the Rockaways,* such as police officers escorting the spraying trucks, would follow procedures recommended by NYCDOH to minimize potential exposure to adulticides and to ensure compliance with applicable U.S. Occupational Safety and Health Administration (OSHA) and NYS Public Employees Safety and Health (PESH) regulations and standards. These procedures include training of workers in the potential hazards of adulticides, use of appropriate personal protective equipment, and work practices designed to prevent exposure.

REGIONAL ISSUES

As discussed in Chapter 3.E, "Water Supply," New York City has groundwater System in southeastern Queens, which supplies less than 2 percent of the City's total use. The aquifers, which are the sources for the Groundwater System, are located beneath southern Queens, and application of adulticides in the Rockaway Peninsula could potentially affect the quality of groundwater supplies.

G. SUMMARY OF ANALYSIS ASSUMPTIONS

Several assumptions were used in the modeling to yield conservative estimates of the adulticide concentrations and deposition levels resulting from adulticiding activities. The same assumptions employed for the *Mosquito-Borne Disease Control Program* were applied for this program, with the exception that only trucks would apply products, and the estimated reapplication of adulticides in a given neighborhood would be expected to be less frequent. Given the strong tidal influence on mosquito breeding in the Rockaways Peninsula, it is expected that spraying of adulticides would occur up to two times a month (approximately two weeks apart) for up to three months per year. ☞

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