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City of Alexandria, Virginia

MEMORANDUM

DATE: JANUARY 5, 2001

TO: THE HONORABLE MAYOR AND MEMBERS OF CITY COUNCIL

FROM: PHILIP SUNDERLAND, CITY MANAGER ^{PS}

SUBJECT: PROPOSED SPRING 2001 GYPSY MOTH SUPPRESSION PROGRAM FOR TWO AREAS IN THE WEST END OF THE CITY.

ISSUE: City Council consideration of the Spring 2001 gypsy moth suppression program for two areas in the West End of the City.

RECOMMENDATION: That City Council schedule the proposed 2001 gypsy moth suppression program for public hearing on Saturday, January 13, and following the public hearing, approve the program as recommended by staff, with the following components:

1. ~~Aerial application of *Bacillus thuringiensis* (B.t.) over two spray blocks totaling 96 acres, which includes 50 acres in the area surrounding the Virginia Theological Seminary, a small portion of Episcopal High School, Temple Beth El and adjacent residential properties south of Seminary Road (27 properties or dwellings) and 46 acres in Seminary Hill (107 properties) (Attachment 1). (The term "block" is used in the gypsy moth program to describe certain prescribed areas to be sprayed, and a block often extends over a number of acres.) This program will be carried out in cooperation with the Virginia Department of Agriculture and Consumer Services (VDACS);~~
2. Declaration that the aerial and ground spray programs are to be voluntary, that a 200-foot buffer zone will be maintained around the property of any objector, and that ground spraying will be provided for those desiring their properties to be treated within the buffer areas surrounding objectors and in other locations specified by the City Arborist; and
3. Implementation of other gypsy moth suppression measures to include the distribution of burlap for banding trees and educational materials in cooperation with the Virginia Department of Agriculture and Consumer Services.

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BACKGROUND: Based upon the annual gypsy moth egg mass survey conducted by the Department of Recreation, Parks and Cultural Activities, we have determined that two areas in the City, totaling 96 acres, qualify to participate in the Virginia Department of Agriculture Consumer Services (VDACS) Gypsy Moth Suppression Program in the spring of 2001. This program includes the aerial application of insecticide to control the gypsy moth population, and is partially funded by the United States Department of Agriculture. The qualifying areas consist of 50 acres in the area surrounding the Virginia Theological Seminary, a small portion of Episcopal High School, Temple Beth El and the adjacent residential properties south of Seminary Road (27 properties or dwellings) and 46 acres in Seminary Hill (107 properties).

In the past gypsy moths have been very destructive and have caused serious damage by defoliating and weakening mature hardwood trees such as oaks in areas of the City. Alexandria's gypsy moth suppression program began in 1988 with the spraying of 1,200 acres throughout the City. The suppression program was most intensive in 1989 when 1,800 acres were sprayed. The spray areas varied from 400 acres in 1990 to 200 acres in 1991, 100 acres in 1992, 96 acres in 1993, 57 acres in 1994 and 44 acres in 1995. In 1998, two trees on the public right-of-way were treated by ground application of pesticides. No pesticides were applied by the City to control the gypsy moth in 1996, 1997 or 1999. In 2000, it was necessary to spray 86 acres in North Ridge.

The City plans to use the biological insecticide B.t., a naturally occurring bacterium which will eliminate gypsy moths and other leaf-eating caterpillars. B.t. is applied in spring before most harmless species of butterflies have hatched, and it is often used by organic gardeners to control leaf eating caterpillars on vegetables. It is biodegradable and leaves no long lasting residue on trees or in the ground.

The decline in the gypsy moth population through the nineties has been attributed in part to timely applications of pesticides. However, it has been the artificial introduction of a fungus (*Entomophaga maimaiga*) of the gypsy moth larvae which has kept the population in check. The mild and dry spring weather in 1999 and 2000 was not favorable for the development of this fungus. We believe that the modest increase in the City's gypsy moth population expected in 2001 may be a result of this decline in the fungus of the gypsy moth larvae.

As required by VDACS and following procedures established in previous years, we have initiated a request for assistance in gypsy moth suppression in the upcoming year. This request has included preliminary identification of spray blocks for review by VDACS to determine that they meet program qualifications.

In the years prior to 1994, the Gypsy Moth Advisory Committee representing eight community groups and the Alexandria Environmental Policy Commission was convened to discuss and advise staff in the development of the spray program. In March 1994, the City Council suspended the Committee because the gypsy moth population had declined to a point where it was no longer a City wide problem (affecting only a few neighborhoods within the City). Because the expected increase in the gypsy moth population is in isolated areas, we do not recommend that the Gypsy Moth

Advisory Committee be reconvened at this time. However, we are meeting with the leaders of the affected neighborhoods to improve public awareness in these areas and address any concerns which may arise. Jerry Dieruf, the City's Gypsy Moth Coordinator, has met with the Executive Board of the North Ridge Citizens Association, an area that has had problems with gypsy moths in the past. We have contacted representatives of the neighborhood most immediately effected area in Seminary Hill about this spraying proposal, and we will make certain that the neighborhood associations, the Seminary, Temple Beth El and Episcopal High School are aware of the upcoming public hearing.

DISCUSSION: The proposed suppression program is based on the results of a gypsy moth egg mass survey completed in the fall of 2000. Staff surveyed approximately 150 sites in areas which historically were most affected by gypsy moths, and used these results to determine the limits of the proposed spray blocks. The following options have been considered:

1. Application of no pesticides and the distribution of burlap banding and educational materials to the public.
2. Aerial application of B.t. in two spray blocks, 50 acres surrounding the Virginia Theological Seminary and adjacent areas and 46 acres in Seminary Hill, and the ground spray application of B.t. to properties within the buffer areas surrounding objectors and in locations specified by the City Arborist; in combination with the distribution of burlap banding and educational materials to the public.
3. Aerial application of B.t. in two spray blocks, 50 acres surrounding the Virginia Theological Seminary and adjacent area and 46 acres in Seminary Hill, and the ground spray application of B.t. to properties within the buffer areas surrounding objectors, only if there are oak trees present, one or more gypsy moth egg masses are visible upon inspection of the site, and only upon request of the property owner or resident; in combination with the distribution of burlap banding and educational materials to the public.

Staff recommends that option two be approved for the 2001 suppression program: the application of B.t. in two spray blocks (50 acres surrounding the Virginia Theological Seminary and 46 acres in Seminary Hill), and the ground spray application of B.t. to properties within the buffer areas surrounding objectors and in locations specified by the City Arborist, in combination with the distribution of burlap banding and educational materials to the public. The proposed suppression program is consistent with programs which have been recommended to City Council by the Gypsy Moth Advisory Committee in prior years.

The additional conditions for ground spray applications in option 3 were implemented in the 2000 suppression program at the request of interested citizens. Staff believes that these conditions were too restrictive and prohibited ground spray applications on properties which were proposed for treatment. As a result, trees in the Seminary Hill spray block proposed in the 2000 suppression

program suffered defoliation in two locations, the number of egg masses counted at survey points for this area is nearly double the previous year's counts, and the size of the spray block proposed for this area in this year's program is 17 acres larger than last year. Because last year's suppression program failed to adequately control the gypsy moth population in Seminary Hill, staff does not recommend option three.

Burlap for banding trees and educational materials will be available to the public in May and June at the Lee Center, located at 1108 Jefferson Street; the Jerome "Buddie" Ford Nature Center, located at 5700 Sanger Avenue; and Fire Station No. 53, located at 2801 Cameron Mills Road and one of the other Fire Stations near Seminary Hill. Banding trees with burlap helps monitor gypsy moth larvae and determine levels of infestation. Residents who band their trees will be reminded that they must inspect the bands and remove larvae on a regular basis for this program to be effective.

In November 2000, City staff submitted a proposal to VDACS to participate in the 2001 Virginia Cooperative Gypsy Moth Suppression Program. The State requires that spray blocks have a minimum of 250 egg masses per acre, the presence of primary and secondary host tree species, and the potential for additional infestation from adjacent communities (i.e. caterpillars being wind borne into the City from Arlington and Fairfax Counties). The City's proposed suppression program meets these requirements, qualifying the City to participate in the program and to receive federal funding for a portion of the program.

The estimated cost of the 2001 Gypsy Moth Suppression Program is \$40,880 (Attachment 2). The City's share is \$22,640. The estimated federal share of the program is \$18,240, which will cover one half of the aerial application and one half of the personnel costs. The State no longer shares in any of the direct costs of the program. However, the State will administer the program, contract with an applicator, and supervise the aerial application.

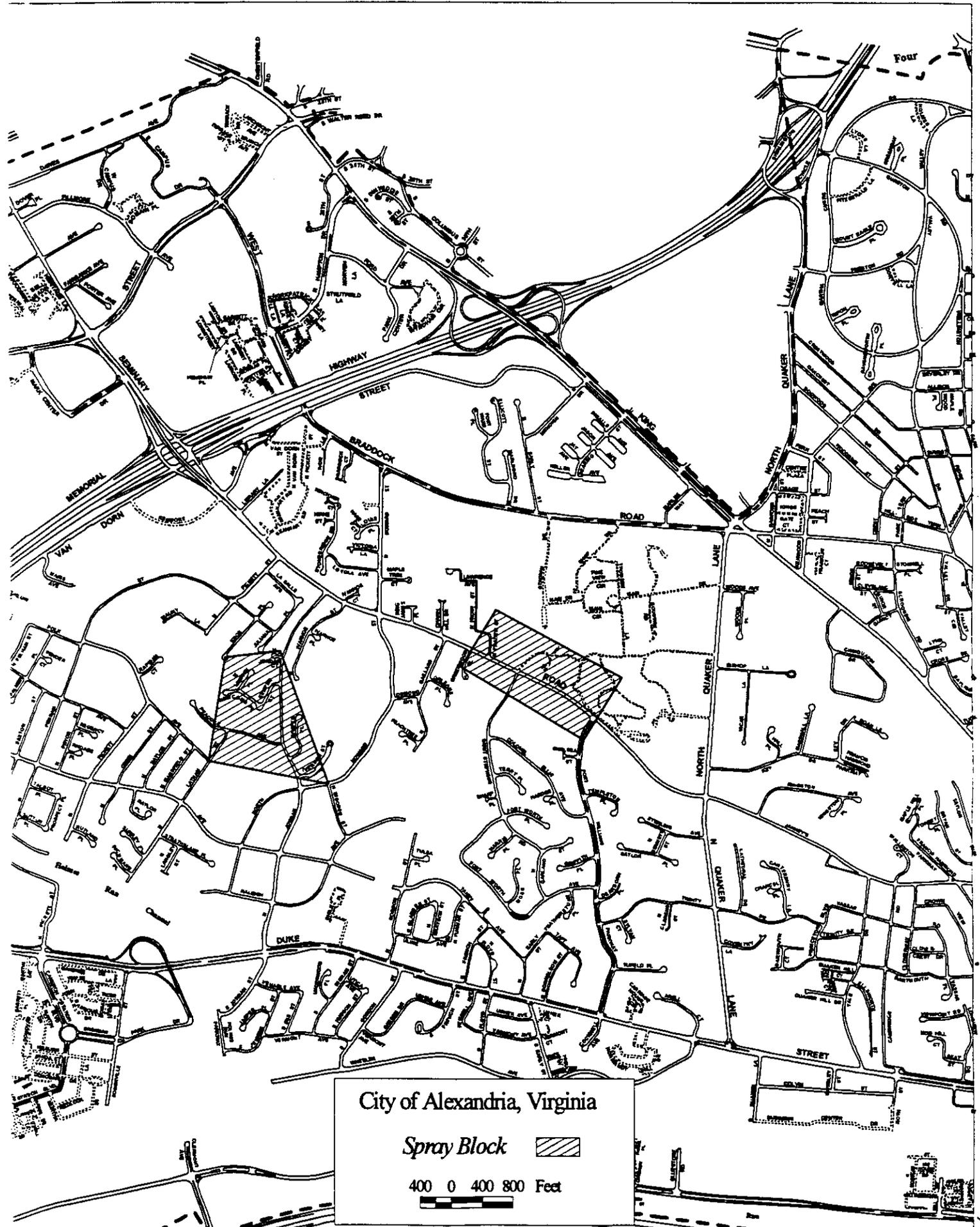
FISCAL IMPACT: The estimated cost of the suppression program is \$40,880. Federal funding is projected to account for \$18,240 of the total cost, reducing the City's cost to \$22,640. The FY 2001 Budget includes \$24,957 for gypsy moth suppression.

- ATTACHMENTS:**
1. 2001 Gypsy Moth Suppression Program Spray Block Map
 2. 2001 Gypsy Moth Suppression Program Estimated Costs

STAFF:

- Sandra Whitmore, Director,
Department of Recreation, Parks and Cultural Activities
- Kirk Kincannon, Deputy Director,
Department of Recreation, Parks and Cultural Activities
- John Noelle, City Arborist,
Department of Recreation, Parks and Cultural Activities
- Jerry Dieruf, Arborist/Gypsy Moth Coordinator,
Department of Recreation, Parks and Cultural Activities

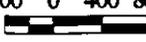
Attachment 1
2001 GYPSY MOTH SUPPRESSION PROGRAM



City of Alexandria, Virginia

Spray Block 

400 0 400 800 Feet



2001 GYPSY MOTH SUPPRESSION PROGRAM

ESTIMATED COSTS

	FEDERAL SHARE	CITY SHARE
AERIAL SPRAY SUPPRESSION PROGRAM		
Aerial spray application (96 acres @ \$67.50/acre)	\$ 3,240.00	\$ 3,240.00
Helicopter rental for defoliation survey and spray observation		\$ 1,200.00
GROUND SPRAY SUPPRESSION PROGRAM		
Ground spray applications (10 acres @ \$100.00/acre)		\$ 1,000.00
INTEGRATED SUPPRESSION PROGRAM		
Burlap bands		\$ 300.00
MAILINGS, NOTIFICATIONS, AND SUPPLIES		
Printing costs (1,000 pieces)		\$ 300.00
Postal costs (1,000 pieces)		\$ 300.00
Advertisement		\$ 300.00
PERSONNEL COSTS		
Egg mass survey and suppression program	\$15,000.00	\$ 15,000.00
CONFERENCE AND BOOKS		
Conferences and meetings		\$ 1,000.00
TOTALS	\$18,240.00	\$22,640.00

From-

*Julie Brenshaw
handed out*

EXHIBIT NO. 2

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1-13-01

151 REASONS NOT TO SPRAY: Aerial Spraying of Btk for Gypsy Moth in Ballard/Magnolia The Asian Gypsy Moth, Bt and Foray 48B. - 151 Reasons To Consider The Public Health Implications Before Any Aerial Pesticide Use in Ballard / Magnolia. Originally prepared by Dianne Wharton. and the Society Targeting Overuse of Pesticides (STOP), a citizens group in British Columbia, Canada.

This treatise is the fruit of exhaustive research by citizens wronged by their government. It contains quotations, and citations to scientific and agency data that is crucial for grasping a complex issue, and is adopted in its entirety. Prepared by Benjamin S. Schroeter April 2000

THE EFFECT OF MOTHS SPRAYING ON HUMAN HEALTH

15) "Bacillus thuringiensis - A species that is an insect pathogen and that has been implicated in human and mammalian infections." Stedman's Medical Dictionary (latest edition)

16) "Bacillus thuringiensis toxin (Btk) can be fatal to people using anti-ulcer drugs." Dr. Joseph E. Cummins, Assoc. Professor University of Western Ontario

17) "Foray 48B contains compounds additional to B.t. that are potentially harmful to man and animals, such as sodium hydroxide which is on an EPA hazards list." Dr. Bryan P. Beirne, Professor Emeritus Simon Fraser University

18) A nine-year old boy suffered a life-threatening reaction when his yard was sprayed with Foray 48B. He had a rash over his entire body, including his face, and a temperature of 103 degrees F. He was vomiting and had diarrhea and his skin was non-peeling. A blood test confirmed that B.t. had cultured in his system. The B.t. culture was resistant to Penicillin and several other antibiotics. The boy was hospitalized for 5 days then released. A week later he suffered a relapse, and was readmitted to hospital for an additional 2 days. The symptoms listed in the New Jersey Department of Health report include a "temperature of 103 degrees F lasting for 5 days, bilateral conjunctiva-injected, red, dark papillae tongue, skin peeling on palms and soles of feet, scaly and erythematous, rash on entire body." From an EPA access to information request Re an "Unreasonable Adverse Effect Incident" involving Foray 48B.

19) "The reported case is of a woman of unspecified age, apparently well and without significant past illness, who was accidentally sprayed with Thuricide (a B.t. formulation) on 25 April 1988. She immediately experienced burning, itching, and swelling of her face and upper chest. Over the next four days, she developed a febrile illness, became delirious, and the day of admission to hospital apparently had a generalized seizure." From Dr. Andrew Jin's report: "Btk as a Human Pathogen" prepared for the Vancouver Health Department, September 20, 1988

20) "When bacterial (B.t.) spores are inhaled or rubbed into the skin, they become "foreign proteins" and can cause serious allergic reactions in certain susceptible individuals." Dr. William Olkowski, Pest Management Consultant Common-Sense Pest Control, The Taunton Press 1991

21) "The three reported cases in the Oregon Study have clearly isolated and identified the organism Btk from these patients. The one immuno-compromised patient who subsequently died because of the infection was found to be septicemic and suffered pneumonitis." "...Btk may be pathogenic to sheep fed corn with the formulation." "Under American F.D.A. rules these "inerts" (the non-active ingredients in pesticides) may in fact be hazardous chemical wastes. (Hazardous Waste News #258, November 6, 1991, page 8)" Dr. Donald Cameron, Neurologist North Vancouver B.C.

- 22) "The Oregon Health Division received a report from a health care provider about a patient who apparently had an allergic reaction to Foray 48B used during the Asian gypsy moth spray program in north Portland." (1992) "The individual's initial symptoms included difficulty breathing, chest tightness, itching in the mouth and throat, nasal congestion and plugging of the ears, and hoarseness. These symptoms were followed within 45 minutes by upper body joint pain and a variety of neurologic symptoms. According to the individual's physician, the reported symptoms were typical of previous allergic reactions." Dr. Michael Heumann, Epidemiologist, Oregon Health Division to Novo Nordisk
- 23) "In New Brunswick, a poorly documented incident of an aerial over spray of two elderly people by a B.t. formulation raised concerns about post exposure, nonspecific health effects including dermal rash, hive-like wheals, increased incidence of respiratory infections and general malaise." Dr. D.J. Ecobichon, Professor of Toxicology, McGill University [New Brunswick designates buffer zones to protect homes from aerial spraying. The buffer zone for Bt is 500 feet from the nearest human habitation.]
- 24) "After reviewing the literature, I believe there is a statistically significant risk of serious health consequences to a minority of the population." "Do we have to wait for an autopsy before we have proof?" Dr. Art Edamura, Preventive Medicine Centre, Vancouver, B.C.
- 25a) "In the product monolog, there is a precaution to avoid inhalation or contact with eyes or open wounds." "Another product monolog ... states that if someone has already developed an allergy to one of the components of Foray 48B or has asthma of a type that could be initiated by irritants such as tobacco smoke or pollens, then this patient could be affected by exposure to even small quantities of Foray 48B." Dr. Jeremy Road, Respiriologist, University of British Columbia
- 25b) B.t. can cause irritation or inflammation. U.S. Department of Agriculture 1995 citing U.S. Environmental Protection Agency (EPA) 1986
- 26) "Until the scientific community agrees unanimously that aerial spraying is harmless to respiratory health, the Lung Association will continue to say "NO" to the practice." The British Columbia Lung Association.
- 27) "The British Columbia Society of Allergists and Immunologists has gone on record opposing the use of the bacterial insecticide (B.t.) in the use against the gypsy moth. I would like to align myself with that position." Dr. R.M. Schaffrin, Asthma & Allergy Specialist, Vancouver B.C.
- 28) "The concern of the Association is that there is inadequate research into the short and long term health effects of this product. (Btk.)" The Association of Naturopathic Physicians of British Columbia
- 29) "Foray 48B, the bacterial insecticide, is causing weakness in the pancreas, lungs, and liver. This noxious substance is producing symptoms that are related to the above organs." "The most common symptoms that I have seen are a pressure feeling on the chest or chest pain, headaches, nausea, sore throat, coughing, chilliness, diarrhea, and drowsiness. Long term effects are, of course, unknown but when major organs and glands are thrown into disarray and malfunction for months or years, life threatening illness could result." Grant Smith, Certified Acupuncturist State of California #530
- 30) "However, I am now in way over my head. As the attached letter from Dr. Cameron, a neurologist, shows, while there is nothing in the medical literature, there may be individual sensitivities. This would make an aerial spray in a populated area a problem. Since I cannot review this on my own, I would like if you would refer this to the Provincial Medical Advisory Committee or contact with somebody to do a complete evaluation. This is a plea for help as I told Dr. Cameron I am more concerned with airplanes

spraying in a built-up area than I am with the Bacillus. However, Dr. Cameron is using a scattergun approach to his letter - if he is right, we should be more concerned, and, if he is wrong, the facts should be set out. Can you help - please? Dr. F.J. Blatherwick, Vancouver Health Officer to the Provincial Health Officer, March 9, 1992 (One month later half-a-million people were subjected to the first in a series of 4 aerial sprayings, and in many cases 4 ground sprayings as well) 31) "In this current case the Board believes that the communications team should have included medical expertise provided by Agriculture Canada to support their claims of safety." And, referring to the Health Study which was funded by Agriculture Canada; . . . there was no planned surveillance program and one had to be hastily put together." Metropolitan Board of Health of Greater Vancouver, June 25, 1992

32) "Pesticides should be banned. There is nowhere to hide from those who have the power to control and to kill nature. Aerial spraying of chemicals, insecticides or herbicides is a terrorism." Dr. June Irwin, Medical Specialist Pointe-Claire, Quebec

33) "Spreading of pesticides from aircraft is forbidden." Swedish Code of Statutes, Ordinance on Pesticides, Section 13, 21 November 1985

34) A healthy 18-year-old agriculture worker accidentally splashed Dipel (a B.t. formulation) into his right eye. He immediately developed conjunctivitis. Three days of treatment with an antibiotic ointment was not effective. He then began treatment with a corticosteroid ointment and after 7 days of this he developed a corneal ulcer. Cultures of the corneal ulcer produced Btk. cells, the same as those in the Dipel. Corneal ulcer caused by a biological insecticide J.R. Samples & H. Buettner, American Journal of Ophthalmology, 95 (2) February 1983

35) A healthy 24-year-old laboratory worker accidentally stuck a needle contaminated with B.t. and Acinetobacter into the webs pace between his third and fourth fingers. Within 2 hours the finger became painful and 4 hours after the accident he admitted himself to an emergency department. The finger was discoloured and the hand was swollen. Despite antibiotic therapy lymphangitis developed, reaching the shoulder and the patient remained toxic. Over a finger joint about 5 cm from the inoculation site, B.t. cells were grown. He recovered after 5 days. R.E. Warren, D. Rubenstein et al The Lancet, March 24, 1984

The following (36-38) are from studies in support of EPA Registration of Foray 48B, 1990:

36) "Gross pathological examination revealed mottled lungs, sometimes dark, the number of animals affected was greater in Group 2 where the majority of animals showed this finding. Results obtained from the analyses showed that Btk. could be isolated from lung samples, which indicated that the formulation was respirable. The results also showed that Btk. was poorly eliminated from the rat lung over a period of 28 days." (at which time the animals were sacrificed.) Acute Inhalation Toxicity Study in Rats, Oshodi, R.O. et al, Inveresk Research Internat.

37) "A group of 10 mice, 5 males and 5 females was treated with inactivated (autoclaved) test material in an amount which would be comparable to 10⁸ CFU per animal. The observation period was 7 days following treatment. Mortality was seen on day 2 at the 10⁸ CFU per animal dose." (4 out of 5 males and 3 out of 5 females died) Screen for Pathogenicity and Toxicity of Strain by Injection of Mice, Novo Nordisk, Denmark ***Editor's note: Novo Nordisk was the company that used to own the rights to the Foray series of Bt pesticide formulations. Abbott Laboratories purchased the formula rights in the early 1990s. Valent BioSciences then purchased Abbott.

38a) Four of five rats died within 23 hours. Edema and hemorrhages were seen in the pyloric part of the stomach in all rats; two rats had enlarged spleens; the rat that was killed had a necrotic tail and extensive

edema and hemorrhages on the hindquarters stretching down on the hind legs. Acute Intravenous Toxicity/Pathogenicity Study on 5 rats, Berg, N., Novo Nordisk A/S, Denmark

38b) "Up to 3 weeks after the injection of the test organism a treatment related unspecific reactive hepatitis was seen in the treated rats." Acute Intravenous Toxicity/Pathogenicity Study on 32 rats, Berg, N., Novo Nordisk A/S, Denmark

39) Eye irritation studies 91504 and 91505 showed that Foray 48B may be considered a "moderate" irritant. Study 90135 showed it to be a "substantial" eye irritant. Eye Irritation Study in Rabbits with the End Product Foray 48B, 1991, Berg, N., Novo Nordisk

40) "Prominent in-life observations included activity decrease, alopecia, piloerection and polyuria." (in other words - the rat's hair was standing on end, as in a state of shock, and falling out either completely or partially. The increased frequency in urination indicates the body's way of eliminating toxins). Acute Inhalation Toxicity Study in Rats (1991) with Foray 76B, Holbert, M.S., Stillmeadow, Inc.

41) "Subcutaneous injection of B.t. led to alteration in the immunological reactivity of the test animals of both the specific and nonspecific type, manifested by increased sensitization of peritoneal macrophages." Changes in Cell Mediated Reactivity of Guinea Pigs during Sensitization with B.t., V.P. Padalkin et al, Moscow Journal of Microbiology #6 (1985)

42) A study of 1,043 vineyard workers who were exposed to 16 pesticides over a period of 294 days found that in 10 of the 25 cases of skin rash, B.t. had been sprayed on the vineyard within 14 days of the rash occurrence. No other chemical was found to have been applied to the vineyards within 14 days of the rash occurrence on more than five occasions. Winter, C.K. and P.H. Kurtz, September 1985 Bulletin of Environmental Contamination & Toxicity, Vol.35, No.3

43) "Bacterial preparations such as Entobakterin (a B.t. preparation) are being increasingly used in agriculture in the USSR.." "Continued inhalation of the material by white rats had unfavourable lung effects, which are described. This suggests that workers applying such materials should be protected." "There were also allergic effects on laboratory animals in contact with the material." The Use of Bacterial Insecticides Needs Care, V.I. Murza et al, Zashchita Rastenii #5

44) B.t. due to its mutagenic potential may be hazardous to humans and other mammals. Chromosomes were found to be the primary target and in some cases the DNA system became inhibited. B.t. has an action which breaks the cell membrane and research continues on its possible use in studies on cancer cells. Thus, it has the potential to damage all cells. The authors end the study with the following warning: "The data conclusively indicate the need for caution against large scale use of microbial insecticides in crop fields." Cytogenetic Hazards from Agricultural Chemicals C.B.S.R. Sharma et al, Mutation Research #46

45) On August 14, 1992 a laboratory reported that a group of workers who were out in a forest when it was sprayed with Foray 48B experienced burning throats and skin irritations. (HI Log #26521) The National Pesticide Telecommunications Network, Health Sciences Center, Texas Tech Univ.

46) "Btk. has been used extensively as an insect biocide but has not been adequately studied in neutropenic (immunosuppressed) animals or characterized as to its risk for neutropenic patients." "Lethality in neutropenic mice receiving B.t. was 50% " "Virtually all non-neutropenic mice survived challenge." "Further studies are warranted to characterize the pathogenicity of B.t. and exclude a possible role in human disease." R.E. Bryant et al, Health Sciences University, Portland, Oregon (1993)

47) During the 1986 gypsy moth spraying of Lane County Oregon, the personal B.t. exposure monitoring results were as follows: Breathing zone (BZ) samples for personnel involved in the spraying indicated B.t. exposure ranged from 0 to 11,000 Colony Forming Units per cubic meter of air. (CFU/m³) General Public BZ samples ranged from 0 to 1600 CFU/m³. A grocery store clerk and a service station attendant, who were not in direct contact with the spray, had positive B.t. exposure of 1000, and 1600 CFU/m³ respectively. General area air monitoring results for B.t. include 50, 500, and 800 CFU/m³ at restaurant locations within the spray area, and indicate the general public exposure potential. A sample result of 4200 CFU/m³ collected at a heavily trafficked road intersection immediately following the spray also reflects public exposure potential. "Air sampling results for this project indicate that microbial insecticides of this type (Btk.) can be transmitted throughout the environment. Future sampling efforts and results should indicate the prominence and proliferation these organisms can gain in the environment after such wide scale application. Therefore, careful consideration should be given prior to the deliberate release of genetically modified microorganisms (such as Btk.). The public health, ecological and occupational health consequences must be carefully explored and evaluated before these novel organisms are used." The National Institute for Occupational Safety and Health (NIOSH) Health Hazard Evaluation Report, Gypsy moth control project.

53) The risk of developing antibodies to the spray bacteria increases not only with the degree of exposure, but the chronology of exposure. The highest level of Btk. antibodies were found in workers who had been exposed for two consecutive years. B.C. Ministry of Health 1992 citing Valero & Letarte, 1989

55a) Endotoxins are bacterial toxins which contaminate the air and make people ill. Mold can also cause a number of health reactions including respiratory problems. Health Canada & Canada Mortgage & Housing Corp., Study of Molds and other contaminants. 55b) One litre of Foray 48B contains approximately 25 grams of delta endotoxin. And, Foray 48B contains viable yeasts and molds. Novo Nordisk re Foray 48B, March 26, 1992

56) "The argument about the safety of Btk. because it occurs naturally is spurious. The organism of tetanus, as well as the pus organism *Bacillus pyocyaneus* (*pseudomonas aeruginosa*) are naturally occurring too." Dr. Kenneth Graham, Professor Emeritus, Forest Entomology, University of British Columbia.

58) "Evidence has been inadequate to show the safety of Foray 48B for spraying on human populations. In my personal and professional opinion, mass spraying programs for gypsy moth eradication cannot be justified and the potential risks to human populations and the environment do not justify an aerial spraying program of the magnitude proposed by Agriculture Canada in the Saanich/Victoria area. As a toxicologist, I would prefer to err on the side of safety where there is any doubt as to the safety of the urban spraying of Btk. Given recent studies, I have considerable doubt as to its safety and its efficacy to "eradicate" the gypsy moth." Dr. Celso E. Mendoza, Toxicologist and Entomologist

59) "There is a rich literature on the harmful effects on animal and human health of B.t. formulations." "The use of aerial spray techniques is inappropriate in urban areas where it will expose large numbers of people to a bacterial fallout." (The proponents of the spray program) "...may in mistaken belief in the harmlessness to human and environmental health of the spray materials to be used, disregarding or de-emphasizing evidence to the contrary, in future years become subject to lawsuits of the sort that now beset blood transfusion workers who in the past disregarded evidence that the blood they were transfusing might be contaminated by the AIDS virus." Dr. R.P. Finegan, Biologist, University of Victoria, B.C.

- 60) "There is always a possibility that allergic or asthmatic people may react to minute quantities of any substance. This is the reason for saying in reference to B.t. that it may not be 100% safe for a small group of people. If your family members are chemically sensitive, they may react to B.t. use around the house." Health Protection Branch, Health and Welfare Canada, April 5, 1993
- 61) "Serious infections caused by organisms of the genus *Bacillus* developed in seven patients." "At least two patients with no underlying illness and one with chronic asthma who was receiving prednisone therapy, also had fatal *Bacillus* infections develop." *Serious Infections from Bacillus sp. Carmelita U. Tuazon et al, JAMA Vol.241, #11*
- 62) "Although one cannot extrapolate directly to humans, these results indicate that Btk. is not "safe" in rats. That is there is evidence of lung injury on exposure to it. These results also indicate that Btk. is respirable. I would be surprised if any ethics committee appointed to review whether this product can be safely tested in humans, would approve it for testing in humans based on the results of this study in rats." *A Review of the Inveresk Research International, Acute Inhalation Study on Rats, Dr. Jeremy Road, Respiriologist, University of British Columbia*
- 63) In 1992, ground spray workers in Vancouver suffered from a number of health complaints including dry, itchy skin; chapped lips; red, itchy, burning, puffy eyes; headache; dry, sore throat; "runny" nose; stuffy sinuses; cough and tightness in chest; nausea and diarrhea. Twenty-four physicians in the spray area took a nasal swab sample from the first 5 patients to walk into their office. The results showed that more than 11% of the exposed people were carrying B.t. in their tissues. *Noble M. et al, 1992*
- 64) Of the 251 individuals who reported health complaints, over 40% were consistent with eye/nose/throat irritation or allergic rhinitis (hay fever). Viral gastroenteritis symptoms ("intestinal flu") were reported by 14%, 9% reported exacerbated asthma, 8% exacerbated allergies and 7% allergic skin reactions such as hives or swelling. Rashes occurred in 45 individuals (18%). Other symptoms were reported by 29%. Six individuals received treatment in emergency rooms, five for allergic skin reactions and one for asthma. "Reducing the exposure of populations to spray would be one method of eliminating any possibility of health effects ... preventing the organisms from reaching the North America mainland would eliminate the need for future spray programs. Rigorous efforts in this area should be continued." "Anecdotal reports indicate that the spray program was potentially distracting to drivers ... Sun glare from spray on the windshields caused temporary risk to motorists, who had to pull off the highway to clean their windows. Low flying helicopters were potentially distracting to drivers. These safety issues should be considered as additional public health issues." *Washington State Department of Health, Report of Health Surveillance Activities, Asian Gypsy Moth Control Program, March 1993*
- 66) "The present study demonstrated that B.t. produces a hemolysin identical with that produced by *B.cereus*, a toxigenic organism of food poisoning. Therefore spraying of living cells of B.t. as an insecticide should be re-examined with respect to its safety for humans." *T. Honda et al, FEMS Microbiology Letters 79 '91*
- 67) Three family members who ate honey on Christmas day developed an illness characterized by vomiting and diarrhea. A sample of the honey was provided to the Chief of Microbiology at the University of Missouri who identified it as *Bacillus cereus*. The Centers for Disease Control subsequently received the isolate for confirmation and determined that it was B.t. and not *B. cereus*. "B.T. is very closely related to *B. cereus*, differing mainly by the ability of B.t. to produce a crystalline toxin which acts as an insecticide." "Microbiologists at FDA have demonstrated that 9 of 11 commercially available strains of B.t. tested to date elaborated the diarrhea-producing enterotoxin associated with *B. cereus* food poisoning." "B.T. is used widely and may contaminate many food

sources. This raises the possibility that it may be an important foodborne pathogen. Since the illness is likely to resemble *B.cereus* food poisoning and have a short incubation period and short duration, few outbreaks are likely to be reported or investigated fully." New Jersey Division of Disease Control Via N.J. Beekeepers Association News

68) "Although it has not been specifically linked with food poisoning, the practice of applying viable preparations of *B.t.* to food crops as an insecticide by both home gardeners and commercial growers may present a special hazard. The ability of *B.t.* cultures to induce fluid accumulation in the ligated rabbit ileum (Spira and Goepfert 1972) and to produce diarrhea in monkeys (Bennett and Harmon 1986) plus the easily demonstrable presence of the diarrheal antigen in culture fluids of most *B.t.* strains with the micro slide gel diffusion test (Bennett and Harmon 1986) raise doubt about the safety of this practice. Certainly, thorough rinsing of leafy vegetables that have been treated with *B.t.* is a minimal precaution: there is no published information to suggest that *B.t.* is less capable of proliferating in foods than are the enterotoxigenic *B. cereus* strains. To the contrary, the two species behave similarly in susceptible foods at ordinary food holding temperatures." Dr. Reginald Bennett, Microbiologist, U.S. Food and Drug Administration (FDA)

69) "We suggest that isolates of *B. cereus* from cases of soft-tissue infection in countries where *B.t.* is widely used be examined for parasporal inclusions to see if natural *B.t.* infections are being overlooked." "The possibility of transfer of toxigenic plasmids from *B.t.* to *B. cereus* in the environment is raised. Indeed the species may need to be redefined." R.E. Warren et al, *The Lancet Medical Journal*, March 24, 1994

70) "*Bacillus cereus* is primarily associated with food borne gastroenteritis due to preformed toxin. Even so, its role as a pathogen responsible for various sometimes severe, local and systemic infections is being increasingly recognized. It is most commonly implicated in fulminant infections of the eye which include endophthalmitis and panophthalmitis, wound infections, septicemia, endocarditis, meningitis, osteomyelitis, septic arthritis and prosthetic joint infections, all associated with morbidity and mortality." *Bacillus Cereus Meningitis In Two Neurosurgical Patients*, D. Barrie et al, *J. of Infection* 25,192

71) "Both *B.t.* and *B. sphaericus* are entomopathogens which can cause disease in man." F.A. Drobniewski et al, *Journal of Applied Bacteriology*, Vol.76 (1994)

72) *B.t.* has been reported to be a mammalian pathogen in one case where it was identified as the causal agent in a fatal case of bovine mastitis. Gordon, R.E., *Some Taxonomic Observations on the Genus Bacillus*, 1977.

73) "Thus *B.t.* can easily take up an anthrax plasmid and create anthrax related disease in mammals. Such plasmid transfers readily take place in nature. It is grotesque and improper for people who claim expert knowledge to maintain that plasmid exchanges are out of the question. Indeed, government bureaucrats and university administrators are clearly showing a common malady, scientific imperialism. They are using their positions to promote views that are contrary to well established facts and palming off such views on poorly informed members of the public." Dr. Joseph E. Cummins, Professor (Genetics) University of Western Ontario

75) There has even been a case, described by scientists as "surprising" of successful plasmid transfer between *B.t.* and the distantly related species *E.coli*. Trieu-Cuot et al., 1987, *FEMS Microbiol.Lett.*48

87) "An additional precaution for individuals with serious immune disorders: Individuals with leukemia, AIDS, or other physician diagnosed causes of severe immune disorders may consider leaving the spray area during the actual spraying. Such individuals should consult their doctor for advice about avoiding exposure before the spray project begins." Oregon Department of Agriculture, Gypsy Moth Spray Program, 1992 (The Oregon Department of Agriculture together with the Mayor's Office and Health Division, arranged a shelter program that offered residents who had health concerns free accommodation outside the spray area).

BACILLUS THURINGIENSIS TREATMENT OVERVIEW: Symptoms if they appear, are those of bacterial food poisoning. Monitor the patient for fluid and electrolyte loss. Control vomiting and diarrhea as needed. Treatment is supportive; there is no antidote. Inhalation exposure: Decontamination: Move patient to fresh air. Monitor for respiratory distress. If cough or difficulty in breathing develops, evaluate for respiratory tract irritation, bronchitis, or pneumonitis. Administer 100% humidified supplemental oxygen with assisted ventilation as required. Eye Exposure: Decontamination: Exposed eyes should be irrigated with copious amounts of tepid water for at least 15 minutes. If irritation, pain, swelling, lacrimation, or photophobia persist, the patient should be seen in a health care facility. Dermal Exposure: Decontamination: Wash exposed area extremely thoroughly with soap and water. A physician may need to examine the area if irritation or pain persists. Animals - Show fever, appetite loss, hematological changes and electrolyte changes post *B. thuringiensis* administration via oral, intravenous, intranasal and intradermal routes. (Pivovarov et al) Case Reports: Three of four volunteers who ingested food contaminated with 1×10^5 to 1×10^9 cells per gram of *Bacillus thuringiensis* developed nausea, vomiting, diarrhea, fever, colic-like abdominal pains, and tenesmus. The incubation period was 8 hours. (Pivovarov et al) Dr. David Spoerke, Tomes Editorial Board Tomes (R) Medical Management (c) 1987-1992 Micromedex Inc. Volume 14

THE EFFECT OF THE SPRAYING TO THE ENVIRONMENT

94) Aerial spraying remains the most highly wasteful, polluting practice still being used in agriculture today. An estimated 85 to 90% of the pesticide drifts off target and less than 1% is necessary to control the target insect. Pesticides can drift for as far as 50 miles from site of application and in less significant concentrations for hundreds of miles depending on particle size, wind conditions, temperature, humidity etc. Dr. Marion Moses, Clinical Professor, University of California, Pesticide Education Center

96) Ground spraying also pollutes the environment with high-pressure hydraulic hoses that gush out torrents of pesticide with such force that birds nests can be knocked right out of trees. The drift from this type of application can range from 50 to 200 feet. Rotary mist-blowers have a jet turbine generator which rotates an aerosol with a range of 150 feet and blankets both sides of the street for blocks and blocks. Drift from mist-blowers has been measured from 160 to 740 feet. Pressure accidents caused by blown hoses, and the resulting spills are a potential hazard to the public when residential areas are sprayed. The Washington State Department of Health reports 10 such accidents involving ruptured hoses, and the subsequent injury claims in their 1993 annual report. Drift data quoted from *The Journal of Pesticide Reform*, Spring 1995, Vol.15, No. 1

97a) "...Aerially applied B.t. formulations can be detected up to 80 kilometers from the site of release." From a 1993 study by J.A. Addison, Forestry Canada citing Major, L. et al 1985 Gov't of Quebec

97b) In general, the concentration of spores present in air samples was higher following aerial treatment of a nearby area (within 20 kilometers) with B.t.k." From a 1993 report by Imre S. Otvos, Forestry Canada citing Major-, L. et al 1985 Gov't of Quebec

97c) Washington State Department of Agriculture received 400 pesticide related complaints in 1993. 29.2% of these calls involved spills, disposal and other, 21.5% direct overspray exposure and 49.3% were related to drift! (1994 Pesticide Incident Reporting & Tracking)

97d) B.t. can grow and replicate in the environment; spores remain in the air for up to 17 days after spraying, in soil for 3 years, and in water for 70 days.

98a) B.t. has the ability to germinate, survive and multiply within the soil system. Saleh, S.M. et al, 1970 J. Invertebr. Pathol. 15

98b) "After 11 months, B.t.k. was still present in the soil, and in 85% of the samples the concentration of B.t.k. exceeded pre-application levels." From a 1993 report by Imre S. Otvos, Forestry Canada citing Cardinal & Marotte 1987, Quebec Gov't

99a) After almost 3 years following treatment, B.t. could still be detected in the soil. West, A.W. et al, 1984, Journal of Invertebrate Pathology v.44

99b) In a field trial conducted in Quebec, two 40-hectare plots were aerially sprayed with B.t.k. Viable B.t.k. spores were recovered in the air in both plots up to 17 days after spraying and reached a high 8 days after spraying. Smirnoff et al, Canadian Journal of For. Res. 3

100) In a study conducted in a citrus grove, B.t. persisted in the orchard for 2 years after spraying and remained toxic to lepidoptera for 2 years. Huang, Y. et al, Academy of Agricultural Sciences Chinese Journal of Biological Control, 6, 1990

101a) "Approximately 1 year after treatment, viable B.t.k. endospores were recovered from white spruce branch samples that received either Dipel or Thuricide treatment in 1981." Reardon, R.C. et al, Can. J. Entomology, Vol. 116

101b) "After 5 days 40% of the B.t. was still in the air over 3,300 ft. from where it had been sprayed." Air Pollution from Pesticides and Agricultural Processes, R.E. Lee, Jr.

102) "Survival of B.t.k. in the 4 types of water (deionized, tap, lake, and sea water) indicated that it was broken down more quickly in sea water than in fresh water. A 90% reduction of B.t.k. in sea water was observed in 30 days while only a 50% reduction in distilled and tap waters was evident after 20 days. In lake water a 50% reduction of B.t.k. was achieved in approximately 50 days." "The amount of residual chlorine normally applied to a standard water purification system does not appear to be sufficient to destroy Btk." Menon, A.S. et al, Water Air Soil Pollution, Vol. 25, 1985

THE IMPACT OF B.t. ON WATER

103) Further to the study mentioned above (102) another experiment recovered viable Bti cells from the water for up to 200 days, and in the sediment for up to 270 days after application. Hoil, S.L. et al, The Environ., 11(1) 1991

104) The nitrogen in B.t. robs the water of oxygen. "We would be concerned about the contribution of nitrogen in B.t. to the eutrophication of oligotrophic surface waters." (eutrophication=deficient in oxygen, oligotrophic=high in oxygen) "The information on impacts of B.t. on aquatic organisms does not include impacts on aquatic insects, including adult insects which may use riparian vegetation." R. S. Gill, Environmental Specialist, California Regional Water Quality Control Board

- 105) "A bucket of water exposed to the aerial application contained 22,800 spores per mL of water, but this number was reduced to 7,800 spores per mL 2 months later after the water had been kept refrigerated in darkness." Impact of (B.t.) aerial treatment on non-target Organisms. Buckner et al, Report CC-X-59, Ottawa
- 106a) "One species of Plecoptera, (Stoneflies) *Taeniopteryx nivalis*, showed an average of 30 percent mortality, significantly higher than the mortality in the control, at the end of the 9-day observation period." Lethal & Sublethal Effects of B.t. on aquatic Insects in Outdoor Streams, Kreutzweiser et al, Bull. Environ. Contam. Toxicol. 49 1992
- 106b) "...two species of stoneflies in the families Leuctridae and Taeniopterygidae were found to be susceptible to B.t.k. at field application rates (30 BIU/ha or 2-6 IU/ml) for gypsy moth." Final Environmental Impact Statement 1995, U.S. Dept of Agriculture, citing Eidt 1985; Kreutzweiser 1992 and 1993
- 107) "At the highest concentration of unfiltered suspension, 10 percent of the eels were dead after 96 hours." Tolerance de la Faune Marine a *B.thuringiensis* Alzieu et al. Bull. Inst. Peches Marit. 250
- 108) "The application of B.t. over large areas in the forest environment may present a potential hazard to fish in lakes and streams through effects on their food organisms, most important of which are aquatic insects." Toxicity of B.t.k. to Aquatic Insects, Eidt, D.C., Canadian Entomology 117, 1985
- 109) "Ground application is preferred when feasible because it allows thorough coverage of host foliage while minimizing drift onto non-target habitats. Small bodies of water such as fish ponds and swimming pools are easily safeguarded by covering them with tarps." Final Environmental Impact Report (Gypsy moth), California Department of Agriculture 1992
- 110) Elevated drift rates of Mayfly *Baetis* spp. (one of the many fish food organisms) was noted after a direct B.t.k. application to an in situ stream mesocosm observation apparatus located at a study site on Vancouver Island. Limnotek Research Inc. B.C. Ministry of Forests 1992
- 111) "Some juvenile coho salmon died at the high dose when they were exposed for 7 days to doses ranging from 5.2×10 to 26.4×10 spores per mL." Review of B.t.k. - With Special Emphasis on the Aquatic Environment, Surgeoner, G.A. et al, 1989
- 112) "Exposure of *Biomphalaria alexandria* snails to low concentrations of Thuricide (a B.t. formulation) caused a significant decrease in both ovipository activity and size of egg masses and reduced the percentage of egg hatchability." Osman G. et al, Anz Schaedlingskd Pflanzenschutz Umweltschutz, Volume 64 (7) 1991
- 113) During the spraying of Vancouver and area in 1992, B.t.k. spores in Capilano Lake soared to 45 percent by the end of April, and to almost 70 percent by June 4. Greater Vancouver Water District Quality Control Annual Report 1992
- 114a) Mussels exposed to high concentrations of B.t.k. spores suffered 28% mortality. B.t.k. may also be toxic to earthworms and to brine shrimp. The U.S. Environmental Protection Agency (EPA) Office of Pesticides & Toxic Substances, 1988

114b) B.t.k. adversely affected black fly *Simulium vittatum* and perhaps black fly *Prosimulium fascum/mixtum*. Eidt, D.C. 1985, Canadian Entomologist, Vol.117 The Impact of B.t. on Non-Target Lepidoptera, Beneficial Insects and Birds.

115) Non-target beneficials may be at risk to side effects of B.t.k. directly from the insecticidal spray, or indirectly due to residue contaminated foliage surfaces. The alteration of the food sources of natural enemies may also account for some of the observed detrimental effects of B.t.k. in field studies. Environmental Report & Current Status of Btk., Dr.Imre S. Otvos, Forestry Canada, March 1993

116) "As B.t. affects other species of lepidoptera, the massive spraying will affect them detrimentally and therefore the parasites and predators of the lepidoptera which (the lepidoptera) are thus liable to increase, some perhaps to outbreak proportions, as they recolonize the treated areas." Dr. Bryan P. Beirne, Professor Emeritus of Pest Management, Simon Fraser University. B.C.

117) "My primary objection to the spraying is that it uses dynamite to kill a merely alleged mosquito, killing all species of butterflies and moths in the caterpillar stage. This crazy dynamite tactic endangers every single local threatened butterfly habitat. It has obliterated in Vancouver a normally hardy and also attractive and very interesting native butterfly, Lorquin's Admiral. It may well have obliterated the Stanley Park Colony of Johnson's Hairstreak. No specimens of this butterfly have been seen in another refuge, the Lynn Valley Headwater Park, since that was sprayed in 1992. It has wiped out the Spring Azure, an attractive blue butterfly, in all except the far periphery of the attacked areas." Roger Ashton, Butterfly expert and author

118) "Further research on the impact of B.t. on non-target lepidoptera and insectivorous birds is needed considering the increasing use of the insecticide in forest management." Szuba K.J. et al, Faculty of Forestry, University of Toronto 1990

119) "Rare non-target species of lepidoptera may be ecologically at risk in large-scale pest control programs based on B.t.k. The study showed that both numbers of non-target insects over the test period and species richness were depressed for 3 years following treatment. A reduction in caterpillar abundance could negatively affect the population dynamics of some birds." Miller, J.C. American Entomol. Vol.36, 1990

120) "Use of B.t.k. should be prohibited in areas where it has the potential to drift, flow, wash or otherwise enter the habitat of any endangered / threatened species of lepidoptera or reduce the food source of any insectivorous listed species, such as the endangered least Bell's vireo (*Vireo bellii pusillus*)." United States Department of the Interior, August 7, 1991

121) B.t.k. can cause irritation and allergy-like symptoms in vertebrates and indirectly, birds and mammals that feed on lepidopteran species have a reduced number of prey items to eat. Bats feeding exclusively on lepidoptera could also be affected as strongly suggested by a study of the Virginia big-eared bat in West Virginia. U.S. Dept. of Agriculture, Gypsy moth management in the United States, 1995 Appendix G, 9-11

122) "The U.S.D.A. Forest Service will not spray for spruce budworm this spring on the Deschutes, Mt.Hood and Willamette National Forests. Studies have been started to learn more about the possible effects of B.t. spraying on the food sources of the (insectivorous) Townsend's big-eared bat." Media release from the United States Department of Agriculture Forest Service, 1993

- 123) "B.t.k. caused losses in 3 species of song birds and increased mortality and decreased growth in chicks of wild spruce grouse. B.t.k. sprayed from the air into the forest canopy, knocked down caterpillars of low shrubs and herbs up to 65% over 4 weeks." Effect of B.t.k. on Insects, Small Birds and Chicks of Spruce Grouse, Bendell, J.F. et al, Faculty of Forestry, University of Toronto 1990
- 124) "An operational spray of B.t.k. reduced the abundance of caterpillars of low vegetation and this in turn caused changes or declines in numbers, age structure, survival, growth, movements, and feeding habits of wildlife. If caterpillars are needed as food by a species it cannot replace this item with alternatives." Effect of B.t.k. on Song Birds, Chicks of Spruce Grouse, Masked Shrew, and Caterpillars of Low Vegetation. Bendell, J.F. et al, March 1992
- 125) B.t. is a potential avian toxin, in eight studies done on the effect of B.t. on birds, birds were impacted. Symptoms of effects ranged from mild to severe and included death at the 1% level. Other symptoms included emaciation, blood in gizzard, hemorrhage in gastro-intestinal tract, reduced feeding and weight gains. Reduced egg production. From an affidavit by Jorma Jyrkkanen, Terrace, B.C. Filed in Federal Court
- 126) "The toxicity data reported here show that B.t.k. had a severe impact on survival of the larvae of ladybird beetles." B.t.k. killed over 23 percent of the eggs and 91 percent of the larvae of newly hatched Ladybird beetles in a period of 3 days. Impact of Pesticides on Ladybird Beetles, 1982 Olszak R., Roczn. Nauk Roln. Ser.E. Ochr.Rosl:12
- 127) "A mortality rate of 100% was observed after a 2-month exposure period of test earthworms to the smallest dose of Btk." Smirnoff, W.A. et al, J. Insect Pathol. Vol.3
- 128) "The braconid wasp suffered mortality of 39% and 100% respectively at the two higher concentrations within 14 days of feeding, as compared with 9% in the controls." Muck, O. et al. (1981) Z. Ang. Ent. Volume 92
- 129) B.t.k. caused population declines in ground beetles, nematodes and predatory mites. Addison, J.A. (1993) Canadian Journal of Forest Research 23:2329-2342
- 130) "The spray application apparently caused a decrease in the numbers of adult males (of masked shrews) that were replaced by juveniles. Moreover, the insecticide significantly reduced the abundance of lepidopteran larvae. This suggests that the reduction in numbers of lepidopteran larvae caused increased mortality and (or) dispersal of adult males." Effects of B.t.k. on *Sorex cinereus* (masked shrew) in a Jack Pine Plantation in Ontario Bellocq, M.I. et al, Canadian Journal of Zoology. Vol.70, 1992
- 131) "A reduction in food consumption, body weight, and egg production of hens was recorded when two formulations of B.t. was incorporated into the feed." Effect of Feeding B.t. to Caged Layers for Fly Control, Burns et al, J.Econ.Ent. Volume 54 The Impact of B.t. on Bees.
- 132) "Bees were harmed or killed in feeding trials though the dosages achieved were in excess of those expected in the fields. End-points other than mortality were mainly overlooked in the bees however, so that there exists the potential to affect other parameters at lower dosages, for example, feeding, growth, or honey production, posing a potential risk to bees, and to honey and to pollination of legumes and other beneficial plants." Jorma Jyrkkanen, Environmental Consultant, 1992 Affidavit filed in the Federal Court of Canada

133a) High concentrations of B.t.k. spores can be toxic to bees. U.S. Environmental Protection Agency (EPA) Office of Pesticides & Toxic Substances, 1988

133b) Dipel (a B.t.k. formulation) caused some toxicity to honey bees in a 1981 study. Atkins, E.L. et al (1981) Leaflet 2883, University of California.

134) "During the appeals, a suggestion was made by one of the Appellants, the Richmond Beekeepers Association, that a study hive be specifically sited in one of the treatment areas and monitored during and after the spray program. The Panel recommends that Agriculture Canada consider pursuing this suggestion." Environmental Appeal Board, April 8, 1993 Vancouver, B.C. (The study on bees was not carried out in Richmond in 1993, nor to-date, has it been done in any other spray area.)

135) "The Degroffs, a Fourth Avenue family with a large collection of iguanas and snakes occupying their living room had their property officially named a no-spray area Tuesday. A Thurston County Judge ruled that the State Department of Agriculture had no data to show that the spray program's insecticide wouldn't hurt the reptiles." The Olympian News, May 19, 1993

136) A site inspection of Victoria/Saanich after the urban aerial spraying of Foray 48B found among other things, generally lower bird populations, dead fledgling birds, many bird species gone, no more house finches, and 3 dead chickens. No honey bees from the first spray to the end of July, reduction in wasp populations, reduction in bumble bee populations, ladybird populations drastically depleted all season, drastically reduced butterfly and skipper populations and population explosions of other moth/caterpillar species outside the sprayed area. Three sprayed pond fish developed tumors. The Ecological Health Alliance, November 1994

THE EFFECT OF B.T. ON PLANTS: It has been noted that B.t. has a burning effect on plants, particularly if sprayed on warm days.

137) "There is some concern that this insecticide would be a plant mutagen when sprayed on plants." Sharma, C.B.S.R. et al, Mutation Research, Volume 46:(19-26)

138) Report of a fifteen-foot, fifteen-year-old apple tree dying as a result of pesticide application using Bt. Washington State Department of Agriculture Case Report 54W-93, May 24, 1993

EFFECTIVE ALTERNATIVES TO B.T. SPRAYING: There are many proven safe and effective alternatives which can be used to control the gypsy moth without resorting to the most extreme measure of all; aerial broadcasts of pesticides over urban areas. (a) Introduction of natural predators. The gypsy moth has many natural enemies. Predators are animals which actually eat the gypsy moth and they include: Mice, Shrews, Raccoons, Skunks, Squirrels, Beetles, Spiders, Carpenter Ants and about 40-species of birds which include Chickadees, Tanagers, Steller's Jays, Robins, Vireos, Orioles, Grackles, Starlings, Blackbirds and Cuckoos. Parasites are usually insect species which consume and kill the gypsy moth by living inside it. There are over 100 known insect parasites of the egg, larval and pupal stages. Certain flies and small non-stinging wasps are examples of gypsy moth parasites. (b) Mating Disruption - High density pheromone trapping. Traps baited with a female hormone that attracts male moths are more effective than pesticides which kill only larvae. Mass trapping kills adults. Mass trapping-only projects have been carried out successfully in many areas including Appleton, Delevan, Monana, Sheboygan and Melon in Wisconsin. No further moths are reported in these areas. Wisconsin Department of Agriculture 1991 (c) Egg hunts - Destroying Egg Masses. The Environmental Appeal Board recommended that a bounty system be considered for in-tact, in-situ egg masses. (d) Sterile Insect Release Program. Large numbers of laboratory reared male gypsy moth pupae are treated with gamma

radiation, then allowed to mature into adults. These sterile moths are then released to mate with native (wild) females. Female moths that mate with sterile males lay infertile eggs. (e) Tree Banding. Sticky barrier bands intercept caterpillars on their way up the tree. The tiny caterpillars will attempt to cross the sticky material, become stuck and die. The barriers are removed from the trees at the end of the caterpillar season in late June. Burlap hiding bands installed around trees will catch gypsy moth caterpillars on their way down the trees. This method is more labour intensive than the sticky tape mentioned above as the caterpillars have to be destroyed, preferably every day, by sweeping them into a container of soapy water. (f) Fungus Routs Gypsy Moth Outbreak. "Last summer, the fungus *Entomophaga maimaiga*, which efficiently checks gypsy moths in its native Japan, unexpectedly proliferated in the northeastern United States. It slaughtered gypsy moths in droves, producing their first known massive fungus-induced die-off in North America." Experiments by Insect Pathologist Dr. Ann E. Hajek of the Boyce Thompson Institute for Plant Research in Ithaca, New York showed that scientists could deliberately use the fungus in the wild to induce gypsy moth die-offs of up to 90%. Science News, August 4, 1990

B.T. IS NOT EFFECTIVE. "Fifty-five organic vegetable growers in the U.K. were interviewed in 1987 to determine their perceptions of pest problems and how to deal with them." "Although over half the growers use some form of curative control such as debris, pyrethrum and B.t., the majority thought they were ineffective and uneconomic." L. Peacock et al, *Agric. Ecosyst. Environ.* 31, 1990. Moths Take the Field Against Bio-pesticide Science, Volume 254, November 1, 1991 The U.S. Department of Agriculture recommends high density trapping for gypsy moths when there are less than 10 egg masses per acre. And, the sterile insect release method when there are less than 10 egg masses per acre. (1995 USDA FEIS supra)

Our Case Against Moth Spraying (Canadian) Environmental Appeals Board Stops The Btk Spraying. In December 1995, Agriculture Canada applied for a pesticide use permit to ground spray 4 city blocks in Sapperton with BTK for the control of gypsy moths. The targeted area was residential and was also home to an elementary school. Public outrage was swift and relentless. Over 90% of residents signed a petition against the spraying. Their City Council was opposed to the spraying, so was their Member of Parliament. Large "No Spraying" signs appeared in front yards, and some residents even threatened to block the streets to prevent the spray tankers from entering. A dozen appeals were filed with the Environmental Appeal Board, including one from the Parent Teachers Association of the targeted school. (It costs \$25.00 to file an appeal) Fortunately, their efforts paid off and in April 1996 the Board cancelled the permit on the grounds that the pesticide posed a threat to human health, and that the spraying was unlikely to be effective. In its decision the Board noted that: 1) BTK had caused health reactions in previously sprayed areas, including: "...skin rash and other immune, allergic and sensitization responses such as dry, itchy skin; red, burning eyes; dry sore throat; cough and tightness in the chest.." 2) Children are at particular risk from the effects of BTK. "With smaller weight, and developing systems, children are likely to be more susceptible for all potential health effects." 3) BTK is respirable in mammals, therefore, there is the possibility of lung injury on exposure to it. 4) According to the manufacturer, repeated exposure via inhalation can result in sensitization and allergic response. 5) Some ground spray workers suffered health reactions and remained culture positive for prolonged periods of time. 6) There have been no long-term studies done on the effects of BTK on human health. For a copy of the Board's decision: Call (250) 387-3464. Fax (250) 356-9923. British Columbia residents may call 660-2421 to be connected toll free. Or write: Environmental Appeal Board P.O. Box 9425 Station Provincial Government Victoria, British Columbia. Canada. V8W 9V1.

OPPOSITION FROM OTHER AREAS SPRAYED WITH BTK. BTK was aerially sprayed over forests in Nova Scotia and Newfoundland amid tremendous public protest. Although there were no residences for miles, people were afraid the pesticide would leach into their water supply. One of the

opponents of the spraying explained that when the area was sprayed with BTK in 1979, the water supply was sprayed by mistake. "Now my brother has Hodgkin's Disease and my mother has breast cancer." (Chronicle-Herald, June 15, 1996.) Middle River, Nova Scotia is a tiny community with a population of only 900 residents. Yet, 600 people signed a petition against the spraying, 150 people attended a concerned resident's meeting, and 60 residents ranging in age from 2 months to 90 years, picketed in front of the government building. Some residents even camped out in the forest to try and stop or disrupt the spraying. "Residents feel government is ignoring evidence used to stop an intended BTK spray in Vancouver." (The Inverness Oran, Volume 21, No. 14, June 1996.) Auckland, New Zealand residents armed with the Board's decision are seeking an injunction, to stop BTK spraying. The spraying is causing a myriad of health problems and a hundred angry residents packed a recent meeting demanding that it be stopped. In the words of one irate resident "It's like dropping an atomic bomb to kill a sniper." (N. Z. Herald, April 4, 1997.)

EPA PROTECTS WORKERS FROM BTK PESTICIDES. WORKERS CANNOT ENTER AN AREA SPRAYED WITH BTK FOR AT LEAST 4 HOURS. On May 3, 1995, the U.S. Environmental Protection Agency (EPA) established a Worker Protection Standard Restricted Entry Interval of 4 hours for BTK pesticides. (From EPA Pesticide Regulation (PR) NOTICE 95-3)

IT IS A VIOLATION OF FEDERAL LAW TO STATE THAT A PESTICIDE IS SAFE WHEN USED AS DIRECTED. According to the American Cancer Society, "It is a violation of federal law to state that the use of pesticides is safe when used as directed." "EPA registration is not a consumer product safety program. It is not intended to determine the safety of the pesticide, but rather to indicate it will kill a targeted pest." "No one can assure your safety when using pesticides. Most pesticides are associated with some risk to human health or the environment." "A National Cancer Institute study indicated that children are as much as six times more likely to get childhood leukemia when pesticides are used in the home and garden." "According to a report in the American Journal of Epidemiology, more children with brain tumors and other cancers were found to have had exposure to insecticides than children without cancer." The above excerpts were taken from "What you should know about pesticides.", published by the Erie County Unit of the American Cancer Society.

A SEVERE ALLERGIC REACTION FOLLOWING BTK SPRAYING When North Carolina was sprayed with Foray 48B in 1994, "an unreasonable adverse effect incident" was reported to EPA. A resident whose home was sprayed experienced burning, itching and swelling of her eyes and a red, itching rash developed on her neck and face. She took Benedryl to relieve her symptoms. The next morning when she had not improved she went to the emergency room at New Hanover Regional Medical Center. The attending physician indicated that she had had a severe allergic reaction. She was treated by I.V., given medication, and sent home. A dermatologist was consulted, and for a time she was taking steroids. Weeks later she was still taking an antihistamine every few hours. She has not been outside in her yard since her first reaction and has avoided the sun. She continues to have the rash. This individual has never experienced these symptoms before and has no known allergies. (From a Freedom of Information Request to EPA)

FIVE YEARS OF HEALTH PROBLEMS IN VANCOUVER ATTRIBUTED TO MASSIVE BTK SPRAYING OF 1992. "And the unusually high incidence of allergy-related health complaints in the Vancouver area during the past five years has been linked by some to the massive BTK spraying of 1992." ("Not just cars," T. Keswick, Burnaby Now, March 30, 1997)

NOSEBLEEDS During the aerial BTK spraying of Vancouver in 1992, a 10 per cent sample of Emergency Department visits found 1,839 patients with discharges from eyes or respiratory tract, 1,352 with respiratory problems, 100 with rashes, 60 with unexplained allergic reactions and 119 with

nosebleeds. It is important to remember, that the potential exists for 10 times these numbers - 1,190 nosebleeds. etc. (From a Health Study done on the effects of the spraying by Noble, Riben and Cook, University of British Columbia, 1992.)

THE FUTILITY OF BTK SPRAYING If the gypsy moth (or any other insect) finds conditions under which it can thrive and multiply, no amount of spraying will prevent it from doing so. The spraying will only damage the ecosystem and hurt people. "They've tried to eradicate the gypsy moth 24 times in California, what it tells us is that eradication doesn't work." (Professor Judith Myers, Entomologist, Associate Dean of Science, University of British Columbia)

WHERE HAVE ALL THE BUTTERFLIES GONE? BTK HAS A DEVASTATING EFFECT ON NON-TARGET LEPIDOPTERA Following a BTK aerial spraying of the Warm Springs Indian Reservation (Oregon) in 1993, it was found that: "...species richness was reduced by 67%, numbers of caterpillars were reduced by 72-81%, and live caterpillar mass was reduced by 86-88%." Dr. Jeffrey C. Miller, Department of Entomology, Oregon State University.

SAFE, NON PESTICIDE METHODS: THE SOLUTION TO INSECT CONTROL "The B.C. fruit industry appears to be winning the battle with the destructive codling moth infesting apple and pear orchards throughout the Okanogan. A year-end review of the sterile insect release program indicates the wild codling moth population has dropped to record lows, in the south Okanogan, where the program has been operating for three years. The program involves the release of millions of sterile moths to mate unsuccessfully with their wild counterparts, thus eliminating the need to spray insecticide against the pest. 79 percent of 600 surveyed orchards suffered no codling moth damage this year. This compares to 42 percent in the same orchards in 1995." (Fruit Industry winning moth battle, Vancouver Sun, October 25, 1996)

SOME FOOD FOR THOUGHT - In 1957, a group of Long Island, N.Y. residents went to court to try and stop an aerial spraying for gypsy moths. But unfortunately, government officials had convinced the judge that the pesticide was harmless, and the spraying went ahead on schedule. It was DDT in fuel oil! The spraying killed untold numbers of birds, beneficial insects and fish, wiped out vegetable crops, contaminated dairy milk, ruined beekeepers and killed a champion race horse. We now know, that the long term effects of exposure to DDT is cancer of the pancreas. (The American Cancer Society)

Good morning Mr. Mayor and Members of Council,

EXHIBIT NO. 3

8
1-13-01

I regret that for the second year in a row I am out of town on the day of the public hearing on the Gypsy Moth Suppression Program. Lois Hunt has been kind enough to fill in for me again and she will read my testimony.

At the behest of City Council, on March 13, 2000, Lois Hunt and I met with John Noelle, city arborist, and Jerry Dieruf, Gypsy Moth coordinator. The very productive meeting resulted in an agreement on the criteria for ground spray treatment in the area designated as a gypsy moth spray block last spring in Seminary Hill. This year the staff of the arborist's office is recommending that those criteria not be used as an eligibility standard for ground spraying within a 200-foot buffer of an objector to aerially spraying in the two spray blocks which have been designated for the 2001 program.

Let me say that I am not opposing aerial treatment with Bt, but I believe the criteria for eligibility for an insecticide treatment sprayed from the ground, requiring much more product and more expense, borne entirely by the city, makes as much sense this year as it did last.

The first criterion that the staff would like to drop is the requirement that oak trees must be present. That requirement should be a "given" since oak trees are the favored host tree of the gypsy moth. Properties with trees other than oaks are simply not threatened by the gypsy moth at the level of infestation present in the city at this time. Only in much heavier infestations than what the city is now experiencing does the gypsy moth attack other tree species. Any yard without oaks should not be considered for ground spraying.

The second criterion is equally reasonable. It merely says that at least a

single gypsy moth egg mass must be visible on the property. Counting egg masses in the fall is the tool used to predict the level of infestation for the following spring. The threshold level of infestation which qualifies for participation in the Virginia Dept. of Agriculture Consumer Services program is 250 egg masses per acre. If a person can't locate a single egg mass on his/her property, the chances that there would be significant damage from gypsy moth the following spring are extremely small. It takes a few seasons for numbers to increase to levels that threaten trees, and that is why continued monitoring is necessary.

The third criterion that the staff would like to drop is the requirement that the property owner or resident must request the ground spray. The staff is recommending that unless an owner/resident in a 200 foot buffer area responds negatively to a notification letter, that property will have its trees sprayed from the ground. Opting out may make sense with aerial spraying, but opting in should continue to be required for ground spraying. I believe it is completely unreasonable for the city to enter private property to spray insecticide in the absence of a request from that owner. A person coming home from a two-month trip to find the city spraying on his/her property, having missed the notification and the opportunity to say no, would have good reason to be irate.

I request that you choose Option 3 which maintains these three common sense criteria for determining eligibility for receiving a ground spray service for gypsy moth from the city.

Paula M. Sullivan
4300 Ivanhoe Place
Alexandria, VA
703-370-3039

Ladies & gentlemen, Mayor Donley:

Thank you for the opportunity to speak. My name is Lois Kelso Hunt, I live at 310 Park Road -

Paula Sullivan & I served on the Gypsy Moth Advisory Committee as long as it existed; we continue to take an interest.

At the behest of Council, we met last year with city staff to suggest improvements in the program.