1. We are concerned about the use of Permethrin/Biomist if used too often can be toxic to our health. Have their been studies on this?

There are a lot of studies on permethrin and the EPA uses those studies as part of their basis for registering or re-registering pesticides. The information provided here is taken from the EPA factsheet posted at: http://www.epa.gov/oppsrrd1/REDs/factsheets/permethrin_fs.htm#health.
For the EPA review, "LOC" means level of concern (cancer and non-cancer). You can see that risks associated with dietary and residential exposures as well as aggregate risks were below their LOC, except for people who apply permethrin to horses using a sponge, toddlers exposed to indoor carpets treated with permethrin, and adults exposed to indoor surfaces treated with permethrin (i.e., bug bombs used to fog inside your home for cockroaches and other pests). Most of their concerns come from exposure INDOORS from treated surfaces/carpets.

Health Effects: Permethrin is a member of the pyrethroid class of pesticides. Similar to other pyrethroids, permethrin alters nerve function by modifying the normal biochemistry and physiology of nerve membrane sodium channels. However, EPA is not currently following a cumulative risk approach based on a common mechanism of toxicity for the pyrethroids. Although all pyrethroids interact with sodium channels, there are multiple types of sodium channels and it is currently unknown whether the pyrethroids have similar effects on all channels. Nor do we have a clear understanding of effects on key downstream neuronal function e.g., nerve excitability, nor do we understand how these key events interact to produce their compound specific patterns of neurotoxicity. There is ongoing research by the EPA's Office of Research and Development and pyrethroid registrants to evaluate the differential biochemical and physiological actions of pyrethroids in mammals. This research is expected to be completed by 2007. When available, the Agency will consider this research and make a determination of common mechanism as a basis for assessing cumulative risk. Therefore, the human health risk assessment and RED document only considered the effects of permethrin. Additionally, the Agency classified permethrin as "Likely to be Carcinogenic to Humans" by the oral route. This classification was based on two reproducible benign tumor types (lung and liver) in the mouse, equivocal evidence of carcinogenicity in Long- Evans rats, and supporting structural activity relationship information.

Risks

Dietary : Acute, chronic non-cancer, and cancer dietary (food and drinking water) risks from permethrin were below the Agency's level of concern (LOC).

Residential: All non-cancer (dermal and inhalation) risks for individuals handling permethrin products in a residential setting were below the Agency's LOC. All cancer risk estimates were also below the Agency's LOC, except for the following scenario: mixing/loading/applying the EC formulation via sponge to horses.

The non-cancer post-application risk estimates for adults and youth aged children exposed to an environment treated with permethrin were below the Agency's LOC; however, the risk estimate for toddlers exposed to permethrin treated indoor surfaces (carpets) were above the Agency's LOC. The cancer risk estimates for adults exposed to indoor surfaces treated with permethrin from directed surface sprays or total release foggers were also above the Agency's LOC.

The Agency considered post-application exposure to both outdoor residential misting systems and permethrin treated clothing. All scenarios were below the Agency's non-cancer and cancer LOCs.

Aggregate Risks: The acute aggregate risk non-cancer and cancer estimate from food and drinking water does not exceed the Agency's LOC.

Aggregate short-term (1-30 days) non-cancer risk estimates, which include the contribution of risk from chronic dietary sources (food + drinking water) and short-term residential sources, exceeded the Agency's LOC for toddlers exposed to permethrin through food and drinking water, and through post-application exposure during high contact activities on lawns and indoor surfaces. The risk driver for the aggregate non-cancer risk estimate was post-application exposure to permethrin on treated indoor surfaces (carpets).

The aggregate cancer risk estimate exceeded the Agency's LOC for adults exposed to permethrin through food and drinking water, and through postapplication exposure during high contact activity on lawns and indoor surfaces. Similar to the non-cancer aggregate risk assessment, post-application exposure to treated indoor carpets was the risk driver.

All residential/recreational exposures are expected to be short-term in duration. Therefore, no intermediate-term (1-6 months) or long-term (>6 months) aggregate risk was assessed.

EPA believes that the appropriate way to consider the pharmaceutical use of permethrin in its risk assessment is to examine the impact that the additional nonoccupational pesticide exposures would have to a pharmaceutical patient exposed to a related (or, in some cases, the same) compound. Based on a worse case scenario assessment, EPA estimates that the permethrin exposure a patient is expected to receive from a typical single application of a 1% and 5% permethrin pharmaceutical cream, respectively, is 450 to 2300 times greater than the combined exposure from the dietary and other non-occupational sources of permethrin. FDA has reviewed these estimates and determined that pesticide exposure in patients receiving treatment with a pharmaceutical permethrin drug product would fall within the expected range of exposure following treatment with permethrin drug product alone, and would not present an increased safety risk.

2. We fear that Clark sprays more then needed in Celebration and doesn't do enough preventative measures like larvaciding enough or using mosquito larvae eating fish, bats and other safer, healthier and greener methods of mosquito control. We'd love to have you look at what they are doing and how often they are doing it and come back with a possibly "healthier" and more preventative approach if possible so the spraying is minimized.

There are two issues that we are concerned with: 1) What is the tolerance of the residents for mosquito bites? (i.e., how bad are the mosquitoes and how bad to you want to be rid of them); and 2) What is the law concerning when and how often spraying can legally be conducted?

First, I would ask what the level of tolerance is among the residents of Celebration concerning mosquito bites. Because most people have differing responses concerning tolerance, it is difficult to make everyone happy all of the time when you live amidst a mosquito-producing haven. Celebration is surrounded by water and the climate of Florida may allow for mosquitoes to reproduce throughout the year. So, is the general feeling of the residents that they don't want ANY mosquito bites? Can they tolerate a few bites? Maybe some people aren't bothered at all? Clarke may be responding to those who scream the loudest - those who don't want any mosquitoes around.

Secondly, the spraying is based on surveillance, but we are not privy to their surveillance records. I asked about their criteria and triggers for spraying, and they stated that it is based on surveillance. There were no specifics provided. The label (which is the law) for permethrin states that applicators cannot apply more than .007 pounds per acre in a given 24 hour period and that no more than 0.18 pounds of permethrin per year can be applied unless there is documented evidence of disease causing agents in vector mosquitoes or the occurrence of mosquito-borne diseases in animals or humans, or if approved by the state during recovery from a natural disaster. If you are concerned that they are spraying more than what is allowed on the label, then that is an issue for the FL Dept. of Agriculture (Bureau of Entomology, Mosquito Control section) to resolve.

In response to your requests, Clarke provided a general plan for their operations at Celebration, and not specific daily records. We cannot comment specifically on any of the methods used because only a "plan' was provided. A close examination of their program would require a much closer look at what is done daily, what their criteria are for various techniques, etc. This is something that, if you are still concerned, might be accomplished through a paid contractor (such as Dr. Janousek). Clarke does include larvaciding in their plan, but again, we cannot tell from the information provided when, where, or why they have used larvaciding.

Concerning the other methods mentioned: The University of Florida does not recommend using bats for mosquito control and mosquito control agencies do not raise or use bats for control; while they will eat mosquitoes, their diet is varied and bats cannot keep up with the mosquitoes that are continually generated around the Celebration area. Some mosquito control agencies provide fish to the public so that they can use them in ponds to eat the mosquito larvae. However, most agencies are not in the business of stocking fish. And there are some concerns with introducing fish that

may displace local fish populations. Another issue to consider is the source of the water surrounding Celebration – there may be areas that are considered "protected" or conservation areas where you cannot introduce fish. Typically, these types of biological control methods are utilized through a county extension office (Master Naturalists, etc.), through generating interest in the community by someone (a resident) who will lead the effort.

3. We fear that Clark has sprayed more on a schedule then an "as needed" basis. Is there anyway you can determine this from past records?

See response to #2 above, but yes, with raw data from light trap and spray data, this can be determined. Again, this data was not provided and would be best handled by a paid contractor. In IPM, spraying on a schedule means that the pesticide is being applying on a pre-determined day and time without surveillance data. Now, they may have a schedule where they know what area they will be in on a given day and time, but it should be supported with mosquito surveillance data.

4. Residents have complained that Clark sprays there houses numerous times in one night, in front, back in ally ways and

We do know from experience that when spraying is done by truck, it is difficult to get the product to reach the back yard (that is, go around and behind the house). Getting good coverage has always been a problem, so it is understandable that this is what they are doing when they pass by more than once. However, what we don't know is the output of each machine. What is the dosage rate set at when they are doing this? This goes back to the explanation in #2 above, are they applying more than the label allows? If so, they can be overdosing. This would have to be determined from a closer look at each machine and what the output is.

5. Residents have complained about not knowing when Clark will spray. We have asked them over 8 months ago to post a daily schedule, but they have not done so.

This is something that you have to address with Clarke. If it is not in their contract, then they are not required to post it. Some mosquito control agencies post this on a website, some print it in the newspaper, but then some don't do anything at all. I did ask them about how they handled people who do not want their house/yard sprayed, and this was their response:

> **"Is there a "no spray" customer list?**
> We do keep a list of "no spray" customers. When we are contacted by someone who wishes to be left out of the treatment area, they are immediately added to the list. The ULV route technicians receive this information as well so they are able to locate and execute the request. "

6. Residents have complained about getting stuck outside when the spray truck comes. Residents are fearful of going outside at night at this point during the week. Is it safe to be be outside while the truck comes by or drive behind the

As a general rule, less is better. However, it is not necessary to run from it – human health effects and exposure is considered in the process of making the pesticide label (which is the law). Refer to #1 about EPA's risk assessments. But, as a matter of common sense, it is not advised to run behind the truck (as kids did many years ago when they used to spray DDT). You could ask them to spray at a different time. The most effective time to spray is when the mosquitoes are up and flying – so that they contact the insecticide droplets. You could always ask Clarke to spray later at night, when most people are indoors.

The truck spraying uses a technology called Ultra-Low Volume, which allows them to use only a very small amount of the insecticide and still be effective. Consider this: the amount of permethrin allowed by the label to apply to the head of child with head lice (permethrin is used in "Nix" and some other head lice shampoos) is 140 milligrams per head treatment. That same amount of permethrin used by mosquito control operations would treat an area approximately

1918 square feet (a 20' x 96 ' area = a small house). This comparison is used to show you the safety factors that are built into mosquito control products and applications.

7. Residents are afraid of the spray going into their pools since they spray down back ally ways where their pools are. From what we have read the spray is not supposed to be sprayed into pools. Is it safe to swim in a pool after it was exposed to the spray? How long does it take for Biomist to degrade?

The label prohibits applications to natural water sources (see "environmental hazards" pasted below), but I have never seen anything about chlorinated swimming pools (pool water is chlorinated, filtered, and circulated).

ENVIRONMENTAL HAZARDS

This pesticide is extremely toxic to aquatic organisms, including fish and aquatic invertebrates. Runoff from treated areas or deposition of spray droplets into a body of water may be hazardous to fish and aquatic invertebrates. Do not apply over bodies of water (lakes, rivers, permanent streams, natural ponds, commercial fish ponds, swamps, marshes or estuaries), except when necessary to target areas where adult mosquitoes are present, and weather conditions will facilitate movement of applied material away from the water in order to minimize incidental deposition into the water body. Do not contaminate bodies of water when disposing of equipment rinsate or washaters.

And from the EXOTOXNET

http://pmep.cce.cornell.edu/profiles/extoxnet/metiram-propoxur/permethrin-ext.html
permethrin profile:

Breakdown of Chemical in Water

The results of one study indicate that synthetic pyrethroids can present a significant threat if they are used near estuarine areas. They tend to bioconcentrate in these environments. In this study, permethrin had a half- life of less than 2.5 days. When exposed to sunlight, the half-life was 4.6 days (15). Permethrin should be kept out of lakes, streams, or ponds. Do not contaminate water by cleaning equipment or by disposing of wastes near a body of water. Permethrin may not be applied when weather conditions favor drift from treated areas (1). Permethrin degrades rapidly in water, although it can persist in sediments (7, 21). There is a gradual loss of toxicity after permethrin ages for 48 hours in sunlight at 50 parts per billion (ppb) in water (14).

The list of "residential risks" by EPA was discussed above (#1), but here is the way they plan to reduce those risks (you will see that there is no mention of swimming pools):

Discontinue use of sponge application method for formulations applied as liquids. Ready to use (RTU) products, such as wipes and trigger pump sprays will still be available for this use pattern.

Discontinue use of all directed broadcast and crack and crevice sprays (i.e., low pressure handwand, backpack sprayer, cold fogger) on all residential indoor surfaces, except for aerosol sprays.

Limit concentration of RTU aerosol consumer sprays to 0.5% ai of permethrin. The Agency will consider products with higher concentrations if the registrants for these products are able to provide justification or data to the Agency which demonstrate that little to no exposure will occur due to the specialized use of the product.

Limit all total release fogger formulations to 0.25% ai of permethrin.

The Agency will consider products with higher concentrations if the registrants are able to provide justification or data that an equivalent indoor surface residue of 2.4 $\mu g/cm^2$, or less, will result in a room size of 2000 ft^3 or less.

Amend all liquid and wettable powder products registered for outdoor residential use to either prohibit use in outdoor residential misting systems, or provide specific use directions.

8. Residents are afraid of what the spray does to the herbs, fruit and vegetables some residents grow in their backyards. Is it safe to eat when exposed very often nightly to Permethrin/Biomist?

Keeping in mind that the label (which is the law) for permethrin states that applicators cannot apply more than .007 pounds per acre in a given 24 hour period and that no more than 0.18 pounds of permethrin per year can be applied unless there is documented evidence of disease causing agents in vector mosquitoes or the occurrence of mosquito-borne diseases in animals or humans, or if approved by the state during recovery from a natural disaster, the label for Biomist allows for its application over some crops. The crops are listed on their label and I have pasted them below:

BIOMIST® 30+30 ULV can be applied over specific growing crops and range grasses prior to harvest for the control of adult mosquitoes within or adjacent to these areas. Application can only be made where the following crops are present:

Alfalfa	Cauliflower	Garlic	Pears
Almonds	Cherries	Range Grasses	Pepper, bell
Apples	Corn, fodder	Horseradish	Pistachio
Artichoke, globe	Corn, forage	Kiwifruit	Potato
Asparagus	Corn, grain (field & pop)	Leafy Vegetables (except Brassica)	Soybeans
Avocado	Corn, stover	Lettuce, head	Spinach
Broccoli	Corn, sweet kernel & cob with husks removed	Mushrooms	Tomatoes
Brussels Sprouts	Eggplant	Onion, dry bulb	Vegetable, cucurbits
Cabbage	Filbert	Peaches	Walnuts
Celery			Watercress

In the treatment of corrals, feedlots, swine lots, poultry ranges and zoos cover any exposed drinking water, drinking fountains and animal feed before application.

9. Can dogs and cats bring the chemical inside from the grass? Is it safe for small dogs and cats?

The products used for mosquito control are meant to hit the flying mosquitoes, not to deposit on the grass. The grass does not get "treated" when making an Ultra Low Volume application of permethrin. Permethrin is used on dogs for flea and tick control, but it not used on cats. You should consult your veterinarian about safety for cats (i.e., do not use permethrin products on cats that are labeled for use on dogs).

10. Residents are concerned about a dark filmy residue that seems to be on outside lawn furniture, kids toys and outside plants. Is it toxic for children to play with these toys or play in the grass after it is sprayed? Should there be a residue?

Is the dark filmy residue coming from the mosquito control application? If you are sure that it is, ask if they dilute their product or apply it without dilution. If they dilute, then it is possible that the film is from the diluting oil used with the permethrin. But again, the human safety and risk is taken into account when EPA approves the label (and it is an extremely conservative evaluation – 10x or more of a worst-case scenario).

We do not conduct those types of analyses at our lab.

11. Do they know the effects of Biomist when mixed with other chemicals that are being sprayed on lawns in our area

I would be more concerned with exposure to what is being intentionally sprayed on your lawns every day than with any effect of mixing them with Biomist. As I stated earlier, mosquito control applications are not made directly to lawns, they are intended to hit the flying mosquitoes with very small droplets. The droplets are removed from the air when a mosquito comes into contact with them, so they are not intentionally deposited on the lawn.

12. We have read some studies about auto immune diseases that can be linked to chemicals like Permethrin/Biomist. Do you know anything about these studies?

We are not sure what studies you are referring to and would like to read them if you can provide them. The only one we have seen refers to exposure to low levels of the common household pyrethroid pesticide, bifenthrin, and that it might increase asthma. But remember that for this study, they used a "common household pyrethroid" and this is not the same application as a mosquito control product application.

13. I know that they were spraying the city of New York on a regular basis with Permethrin and it was stopped because of health concerns. Do you know anything about that or other studies that have been done when it is sprayed so often for

We are not aware of any such studies. A "passive" study would be all of the mosquito control agencies that operate in Florida where mosquito control is conducted on a regular, sometimes year round basis. Indian River County, as well as others, has been using permethrin for a long time (15 years in some cases). There have been no reported epidemiological issues for residents or for mosquito-control workers in Florida.