Figure 10-1. Glenn's management plan seems to be missing something.

Chapter 10
Putting a Management Plan Together

At this point, you may be somewhat confused about all these different formulations and chemical classes. How do you decide what to use and where?

First, you should make every effort to reduce water, food, and shelter available to the cockroaches. These efforts will make other control tactics more effective.

Next, you will need to determine which of the previous formulations or compounds will work for you. The control program you select should be based on factors unique to your own personal situation. For instance, if a less toxic approach is important to you, then only consider those tactics that are less hazardous to you, your family, and pets. If the less toxic approach is not as important, and you feel able to mix and apply pesticides, your control program may include wettable powder and emulsifiable concentrate formulations.

Your management plan should consider activities of other people and pets in the environment. For example, if you want to treat a duplex that is vacant, you may choose a different strategy than if you are treating an occupied duplex. If you are treating your own home, you may also want to time the treatment so you can be gone for a period of time afterwards.

Less Toxic Control Tactics

1. Continually reduce the availability of water, food, and harborage. This is true when using less toxic controls and is true when other control options are used. Any control will be more effective when cockroach resources are eliminated or reduced. Refer to Chapter 5.

2. Reduce humidity with dehumidifiers, if high humidity is a problem. But, to prevent the cockroaches from using the dehumidifier water, empty frequently.

3. Consider using heat or freezing treatments for infested small appliances (Chapter 6).

4. Use baited sticky traps or traps containing cockroach pheromone in infested areas. You may need to get these from a pest control company that will sell pest control supplies, or search on the Internet to find them.

5. Use insect growth regulators containing hydroprene.

6. Use baits. Gel formulations containing hydramethylnon, fipronil, imidacloprid, boric acid, indoxacarb, and abamectin will work for all cockroach species. Use tamper-proof bait stations if you prefer. (Remember, the baits will work better when sanitation is good.)

7. Use desiccants (silica aerogel and diatomaceous earth) or boric acid dust in dry areas, such as under appliances or in wall voids. Dust formulations can be used in wall voids and other places where people and pets cannot disturb them. Once in place, the chance of exposure is small and hazard is reduced.

8. Use of crack and crevice treatments with aerosols are also relatively safe and easy to use. These aerosols can be purchased from pest control companies that sell pest control supplies, on the Internet, and sometimes locally at hardware or grocery stores.

9. If you have the equipment, use a liquid insecticide in cracks and crevices where cockroaches live. This will reduce exposure to people and pets.

10. Consider a ready-to-use (RTU) home pest control liquid formulation. Try a product that comes with a spray nozzle attachment which is safer than concentrated liquid formulations because you do not need to mix chemicals into a sprayer. The total-release foggers (*not recommended!*) or aerosols not designed for crack and crevice application are contact insecticides and have little long term activity. This means you will have to apply them much more frequently than residual liquid insecticides. When using any insecticides, be sure to read and follow all label directions for use.

11. Continue to monitor your progress with sticky traps.

Note: It is possible for cockroach populations to become resistant to insecticides. If control is poor, you may want to periodically change the class of insecticide you are using, this is called *rotation*.

Rental Management

If you are an apartment manager or rental owner, your approach may be a little different than that of using less toxic controls. You may be more concerned about the effectiveness of specific chemicals than their toxicity. At the same time, you should be concerned about the safety of your tenants and safety to the insecticide applicator.

Between tenants, you will have an opportunity to do a thorough cleaning and treatment of the dwelling. Dripping faucets and leaky plumbing will need to be fixed. Clean under appliances. Cracks greater than 1/16" (1.6 millimeter) will need to be caulked. You may want to dust wall voids with desiccants or boric acid dusts. You may also want to do a full-scale crack and crevice treatment while the apartment or house is vacant.

After new tenants move in, encourage the tenants to be as clean as possible and continue to limit the availability of water and food to cockroaches. You may wish to give them a photocopy of our sanitation suggestions in Chapter 5.

If the cockroach infestation re-occurs, share with your tenants a list of the less toxic control methods on the previous page. They might be willing to use some of these tactics, such as desiccants and boric acid, if they know how. They may also be willing to use baits as an additional control measure.

Communication to the tenant about pesticide use is the responsibility of the rental manager. Labels and MSDS information about any insecticide used in a cockroach treatment should be given to tenants.

If you are using an insecticide treatment, let the tenants know what to expect after treatment. If you use a pyrethroid, tell the tenants that they might see more cockroach activity for a few days. This means that the insecticide is working.

Insecticide Tips: What to Use?

There are problems with trying to recommend specific insecticides. One problem is that an insecticide that kills cockroaches effectively in toxicity tests in the laboratory may not be as effective in field tests. Under most conditions, *most* tank-mixed insecticides will reduce cockroach populations. But, regardless of the product, sometimes an insecticide fails to control cockroaches in an apartment, home, or duplex. The reasons for the failure of a specific product are not always known. The bottom line is that if you use a product and it does not control the cockroach population like you expected, *try something else*. It could be that you have a resistant population of cockroaches. Or, maybe the level of sanitation needs improvement or additional caulking of cracks and crevices should be done. The important thing is that you don't give up. If you take all the steps suggested in this manual, you can significantly reduce any cockroach population.

Working with a Pest Control Company

After all you've learned about controlling cockroaches, maybe you've decided you would rather let somebody else handle the insecticides. What do you look for when you want to find a reputable pest control company? Here are some suggestions to consider:

1. Regardless of how bad the infestation is, take your time in hiring a pest control company. Spend a week or two gathering information.

2. Arrange to have four or five professional pest management companies inspect your home and estimate the cost of the treatment. Request that all bids be put in writing.

3. Ask each company to describe in detail the precise procedures that they will use to treat the infestation. By now, you know the basics of cockroach biology and treatment. Let them know that you know something about cockroach control by asking lots of questions to find out what they know.

Some questions you might ask the pest control professional:

- What kind of cockroaches are these?
- Where is the infestation located?
- Will you monitor the infestation with sticky traps?
- What insecticides will be used and why are you going to use it?

- Will the insecticide provide long-term residual control?
- What methods will be used to insure my family's safety?
- What non-toxic or less-toxic types of controls will be used?
- Will IGRs and low-toxic baits be used as part of the treatment?
- How often do you recommend treatment, and how will you know if it is needed?
- Will IPM principles be followed?

Request label and MSDS information for each insecticide that they propose to use. There are no special or secret insecticides available to only select pest control companies. All companies can use any of the insecticides currently registered for use in Nebraska.

4. Be sure to discuss any health concerns that you might have. Some concerns might be family members with allergies, a pregnancy, or pets. How will the pest control company deal with these sensitive problems?

5. How long has the pest control company been in business? This is not definitive, but companies that have been in business for many years often have built a credible reputation with their clients. Request to be furnished with a list of recent references on cockroach control in your area. Be sure to call the references and ask them to comment on the service that they received.

6. Before you hire a company, be sure to check with the Better Business Bureau.

What Doesn't Work: The Fallacy of Home Remedies

So far, all the chemical and non-chemical control tactics that have been discussed have some adverse action against cockroaches when used properly. There are home remedies and other gizmos that some people believe will work against cockroaches. These approaches may even have a scientific basis, but for various reasons, are not effective against cockroaches.

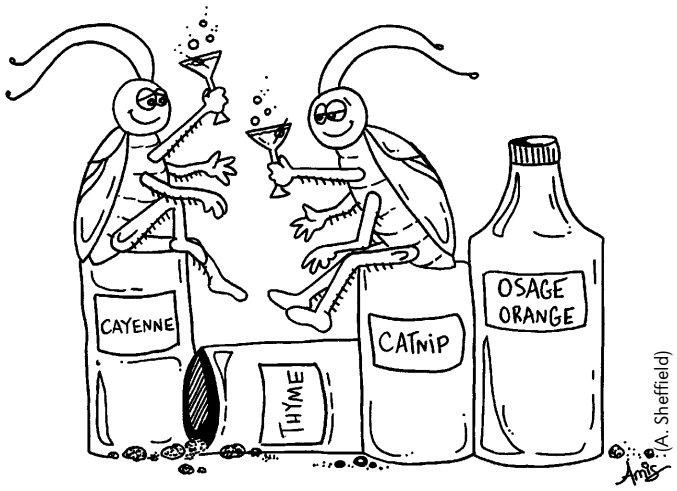

Figure 10-2. Using home remedies for cockroaches wastes valuable time that could be used to reduce the population with products that really work.

Home Remedies

Home remedies are common household substances that are used for another purpose. It has been shown that some aromatic herbs and spices have repellent properties against insects, especially when the repellent compound is very concentrated. Unfortunately, using repellents against cockroaches is not a very effective strategy. Instead of controlling the infestation, the best you can expect is to move cockroaches to different locations within the same household. Repellents only repel; they may not have any insecticidal properties.

Osage orange, citrus, cucumber, and onions. Insecticidal and repellent chemicals have been extracted from Osage orange, citrus peels, cucumber peels, and onions, but none of these extracted chemicals have been shown to effectively control cockroaches. If the concentrated chemicals are not effective, it follows that the Osage orange, citrus, cucumber peels, and onions themselves will also be ineffective.

Spices and herbs. Certain spices and herbs are said to repel/control insects. Cinnamon, catnip, and thyme are some examples; others include bay leaves, cloves, fennel, garlic, lavender, peppermint, rosemary, spearmint, and tansy. These herbs all contain chemicals that if extracted and concentrated enough, will repel/control some insects, including

cockroaches. But none have been shown to produce practical results under real life situations such as in homes, businesses, and institutions. You may see recipes for garlic pesticide solutions that contain garlic, onions, and hot pepper. These solutions are more repellent to the person making them than they are to cockroaches.

Salt, red pepper, chalk, talcum powder, and bone meal. Some people claim that other household items, like salt, red pepper, chalk, talcum powder, and bone meal, have repellent or insecticidal properties. Unfortunately, these materials will not kill or change the behavior of cockroaches. In fact, the cockroaches may actually eat the red pepper powder.

Soapy water. Soapy water solutions can be used to control certain insects on plants. Liquid dish washing soap mixed with water will kill cockroaches when sprayed directly on the insect. But, as with other contact sprays, dish soap offers no long term control.

Bacillus thuringiensis (B.t.). *Bacillus thuringiensis* is a bacteria that produces a lethal toxin that will control some mosquitoes, black flies, beetles, grasshoppers, crickets, and moth and butterfly larvae. At the present time, no strains of B.t. have been identified that are effective against cockroaches.

Bran, baking soda, and baking powder. An old wives' tale says that if you feed bran to insects, the bran will swell up inside the insect and it will die. There are similar claims made about baking soda and baking powder, common leavening agents used in baking. Bran, baking powder, and baking soda will not cause cockroaches to die

Devices, Gadgets, and Gizmos

Ultrasonic devices. There are some so-called "ultrasonic devices" that claim to repel insects, rodents, birds, and other vermin. There is no scientific evidence to suggest that cockroaches (or any other insects) respond in any way to ultrasonic sound waves.

In the early 1980's, researchers at the University of Nebraska–Lincoln studied the effect of ultrasonic sound waves on cockroach behavior. Results were reported in *Pest Control* magazine (June, 1982, page 24). In this report, the authors stated, "...it appears that sonic and ultrasonic sound is ineffective to control or repel German cockroaches". Another issue of *Pest Control* (February 1984, page 26) reports on a panel discussion that occurred at the Entomological Society of America meetings. The author says, "the bottom line on ultrasonics is this: none of the researchers who spoke...felt that ultrasonic devices control insects". One panel member summarized the entire issue, "Let's get those devices that don't work off the market...".

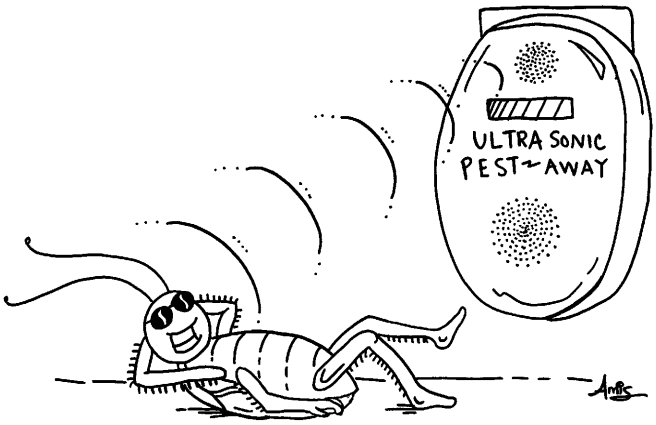

Figure 10-3. Cockroaches survive, even thrive when ultrasonic devices are placed in infested dwellings. Cockroaches and other insects don't have the ability to detect ultrasonic sound waves.

One researcher recently said, "These devices are marketed as sonic, ultrasonic, subsonic, and ionic. But they are all simply moronic!"

Electric Cat. A device that originated in Brazil is the *Vibromax*, the Electric Cat. This gadget was designed to mount directly to reinforcement bars within concrete floors and walls. The manufacturers claimed that the vibrations produced by the device would imitate those of a mild earthquake. This device was also tested at the University of Nebraska–Lincoln. Results showed that the vibrations produced by the *Vibromax* had no effect on cockroach behavior and would not repel them.

Bug Zappers. The last device that should be mentioned is the bug zapper. It is designed to kill flying insects that are attracted to the color of light produced by the device. But the bug zapper does not control cockroaches because they are not attracted to this color of light.

More Outrageous Claims

Copper, aluminum foil, and hair. *Copper foil* is said to produce an electric current that insects don't like and thus repels them. Copper foil has no effect on insects whatsoever. Some people believe that insects will not cross *aluminum foil* because they see their reflection and become confused. It is not possible for cockroaches to see their reflection in foil, let alone become confused. Aluminum foil will not control or repel cockroaches. Finally, it has been said that human or horse hair stretched out in a line will prevent insects from crossing it. It is said that if insects cross the hair, they will die of dehydration. This is the most outrageous claim of all. Human or horse hair will not dehydrate cockroaches!

Future Controls?

Researchers all over the world continue to look for more effective, safer, and cheaper methods to control cockroaches. These new agents will be inherently less toxic, designed to kill only specific target insects, and the methods used to apply them will be more precise. Many ideas are now being investigated. Probably the most basic change will not be the technology used to control cockroaches, but the attitude about *how* the control work will be done.

Impact on the environment will be considered even more in the future. Many existing formulations will be eliminated and some will be redesigned. A good example are the solvent systems in some aerosols. Products containing ozone-depleting solvents are being phased out now, forcing manufacturers to find more environmentally friendly alternatives. The new formulations will also contain active ingredients safer for the environment and less toxic to the applicator.

Because they have been so successful, cockroach baits will continue as a major area of development. Over the last few years, the list of active ingredients has grown from only one or two to more than ten. This increase in the number of products was forced by the cockroaches themselves. In some areas where baits have been used repeatedly, some cockroaches wouldn't eat the bait. Some don't like the gel bait formulation; others didn't like the ingredients. But, bait manufacturer and university researchers have found new active ingredients and bait formulations to solve these problems. New problems will almost certainly arise in the future, requiring new solutions. The result will be many more formulations and active ingredients.

Many new cockroach control tactics, along with refinements of the ones already mentioned, will certainly appear over the next decade or so. Some of them will prove to be effective and others will not. Some may work very well, but will be too dangerous or expensive. From time to time you will see or hear about a new product. Remember, ask questions, *be skeptical*, and use common sense when making decisions. If it seems to be too good to be true, it probably isn't.