United States Environmental Protection Agency | Office of Research and Development Washington, DC 20460 | Office of Regional Operations and State/Local Relations Washington, DC 20460 | EPA/625/R-94/009 September 1994

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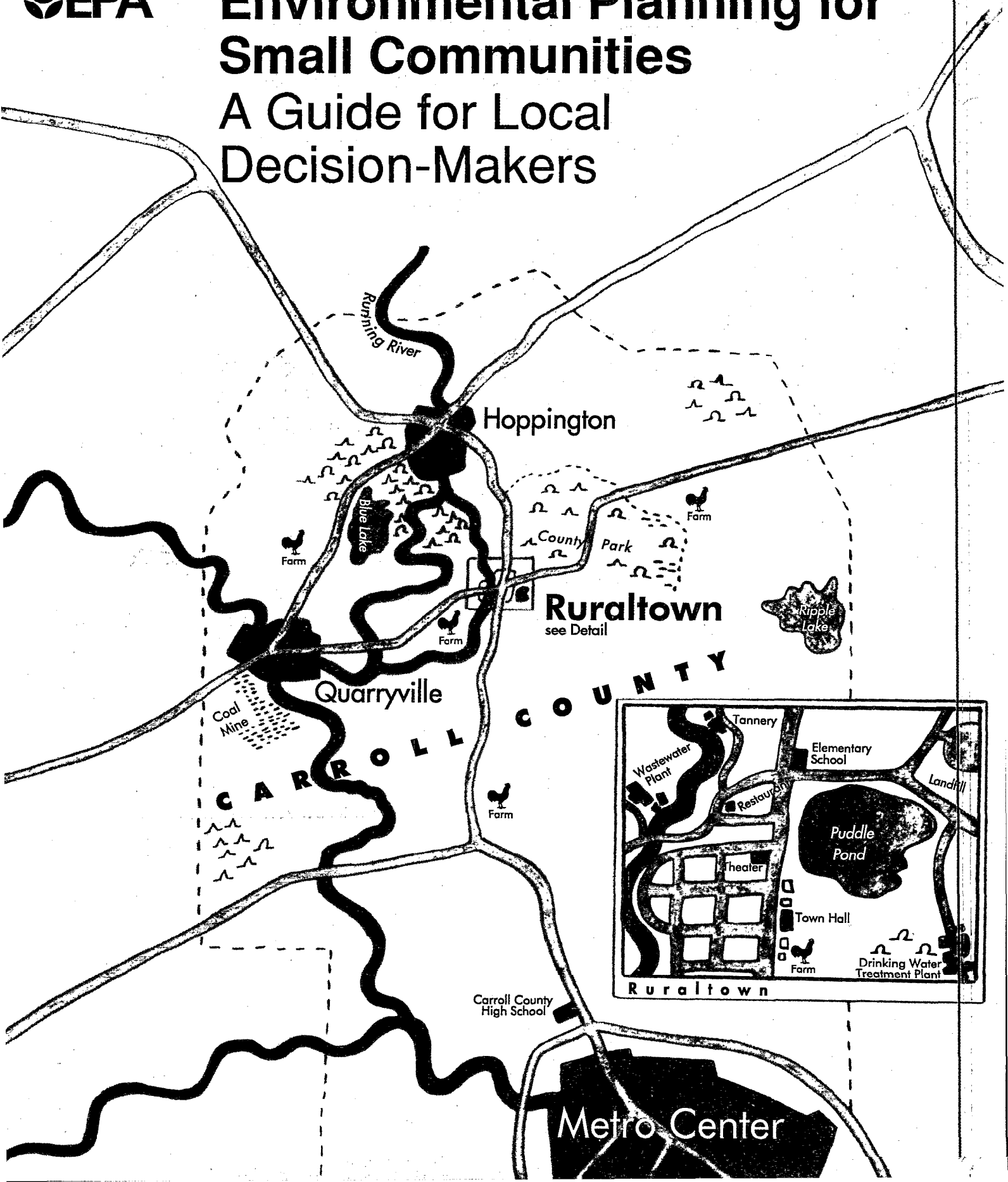
Environmental Planning for Small Communities

A Guide for Local Decision-Makers



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Environmental Planning for Small Communities

A Guide for Local Decision-Makers

United States Environmental Protection Agency

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Printed on Recycled Paper

Disclaimer

This document has been reviewed by the U.S. Environmental Protection Agency (EPA) and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation of their use.

Acknowledgments

Many people contributed their expertise to the preparation and review of this publication. Overall technical guidance was provided by Randy Revetta and James Kreissl of U.S. EPA's Center for Environmental Research Information. The document was prepared by Eastern Research Group, Inc. The following people provided guidance and review:

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Keith Jones	National Rural Water Association
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Acknowledgments (continued)

Alfred Krause	EPA Region 5
Jan Lambert	EPA Region 7
Vanessa Leiby	Association of State Drinking Water Administrators
Lawrence Martin	EPA Office of Research and Development
Patricia Miller	National Small Flows Clearinghouse
Wade Miller	Wade Miller Associates, Inc.
Richard Minard	Northeast Center for Comparative Risk
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Contents

1 Introducing Environmental Planning for Small Communities: An Open Letter

Dear Small Community Decision-Maker:

As a leader in a small community, you face many difficult challenges in managing environmental issues. You must juggle many issues at once, including how to provide safe drinking water, how to manage wastewater from homes and businesses, and how to manage the community's solid waste. The list seems endless, and the resources available are all too limited and continue to dwindle. Not only that, but you have many other responsibilities besides environmental protection, such as schools, roads, and public safety. How do you do it all?

This book offers a tool to help you meet these challenges—a process for developing a **community environmental plan.** The goals of creating this plan and putting it into action are to:

- Provide a sensible way for your community to **set priorities** and **decide how to make the best use of your resources** to protect people's health and the environment.
- Help your community **save money**—by dealing with issues before they become big problems, by making sure that environmental services are provided in the most efficient way possible, by planning to use the right combination of environmental programs and services, by working with other communities where possible, and by making use of local talent and resources. A plan also will help you take advantage of opportunities to **prevent pollution**, the cheapest and most effective solution of all.
- Provide a **blueprint for compliance** with the environmental regulations that affect your community, to help you avoid the need to react to enforcement actions by state, county, or federal agencies.
- Empower your community to **take charge of its own destiny** by charting its best course.

- **Build community awareness and support** for actions (such as possible rate increases) that you, the decision-maker, must take to protect public health and the quality of the environment.
- Help **promote the economic health and well-being of your community** by providing the environment, infrastructure, and quality of life that make your community a good place to live and to do business.

In the past, people tended to look at the environment in pieces: how to protect the air, how to protect the water, how to protect the land. Today we know that environmental protection won't really work unless we treat the environment as an integrated whole. We also know that local governments can't carry out their environmental protection responsibilities without considering the community as a whole: its resources, its economy, public opinion, and all its other needs. With a comprehensive environmental plan, you can create an integrated approach to protecting the environment and meeting your community's needs. (Keep in mind that this guidebook focuses on the environmental issues and problems addressed by the U.S. Environmental Protection Agency; your community must take into account other issues, such as public safety and agriculture, that are important in your community.)

The environmental plan described in this book is like a road map that shows you where you are and where you are going, and provides some ideas of how to get there. Without a plan for your community's environment, you are likely to waste a lot of time and money. You also might lose valuable natural resources, as well as community support, that can never be replaced.

Developing a plan and putting it into action, on the other hand, can help put you "in the driver's seat." Planning ahead to solve environmental problems can especially help small communities that do not have the resources to meet all of the regulatory requirements at once. Your environmental plan will help the community prioritize solutions to environmental problems and develop a strategy for regulatory compliance. This approach lets the community decide how best to use its resources, rather than simply react to regulatory deadlines set by distant government offices. It gives you the time and opportunity to develop the best approach for complying with important regulations, well before any enforcement actions are taken.

Federal and state regulatory agencies are aware of the problems that face small communities in meeting environmental regulations. It will take time, however, to modify the existing laws and regulations to allow for the community-based approach discussed throughout this guidebook. Some state regulators have already been flexible regarding enforcement (fines) when a community can show that it has a schedule for meeting regulatory requirements and intends to address the worst environmental problems first. Your community can use its environmental plan to begin a discussion with regulators. You might need to negotiate which problems to solve first, but the regulatory agencies will probably accept a well-planned schedule of environmental actions if you show that you are doing the best you can with the resources you have.

This guidebook presents some ideas and approaches to creating and implementing a community environmental plan. Adapt them to your local needs as you see fit:

- Chapter 2 helps you build a **planning team** that can lead your community in creating its environmental plan.
- Chapter 3 helps you develop a shared **vision** for your community's future—that is, decide what you want your community to be like in 10 or 20 years.
- Chapter 4 shows you how to define your community's **needs** by determining the greatest problems facing your community's public health, environment, and quality of life; by determining which environmental regulations apply to your community; and by evaluating the effectiveness of your environmental facilities.
- Chapter 5 explains how to figure out which **technologies and strategies** can work in your community.
- Chapter 6 discusses how to weigh your community's needs and possible ways of meeting those needs to set **priorities** for action. Here, you will put all your work together into your plan.
- Chapter 7 helps you **implement** your plan.

Throughout the planning process, you will discover many people outside your community—such as people from government agencies, colleges and universities, and organizations that specialize in helping small communities—who can give you assistance and advice. Ultimately, however, the residents of your community are responsible for making decisions that reflect your community's history, values, resources, and vision for the future. **It's up to you and your community to decide how best to handle your environmental challenges.** No other community faces exactly the same environmental issues, with the same constraints and the same resources. No one outside your community knows what is best for you. Local talent and energy are needed to develop the plan that's right for **your** community. The tools in this guidebook, adapted for your situation, can help your community turn its environmental challenges into a positive force for the future.

Major Environmental Responsibilities of Small Communities

Part of creating a comprehensive environmental plan is identifying the environmental issues facing your community. If you don't recognize the problems, you can't figure out the solutions.

Although each small community is unique, nearly all have responsibilities in the following areas:

- Drinking water quality.
- Wastewater management.
- Solid waste management.
- Leaking underground storage tanks.
- Household hazardous waste management.
- Emergency response to hazardous waste spills.
- Ground-water protection.

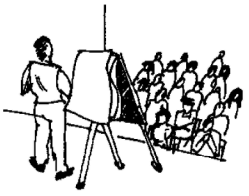
Some environmental issues affect some communities more than other communities, including:

- Wetlands protection.
- Air pollution.
- Industrial wastewater management.
- Nonpoint source pollution (pollution carried by stormwater runoff, etc.).
- Floodplain zoning.
- Asbestos in public buildings.

Comprehensive Environmental Planning

1. Put together a planning team.

2. Develop a vision for the future.



3. Define your community's needs.

4. Identify feasible solutions.

5. Set priorities for action (with schedule).

6. Implement your plan.

Meet Ruraltown, USA

Ruraltown, population 1,500, could be in any region of the United States. About half of the families in the community own and run farms. Another 100 people work in a coal mine in Quarryville, 15 miles away. Employers in Ruraltown include a tannery, several small stores, one restaurant, and a movie theater. The nearby county park provides many summer jobs. The average household income is about $25,000 a year. The average home is worth $70,000. The average farm is worth $500,000. The 300 children in Ruraltown go to Ruraltown Elementary and to Carroll County High School, which is 20 miles away. There are no buses, taxis, or subways in Ruraltown.

The nearest town, Hoppington, is 10 miles away and has 2,500 residents. The nearest city, Metro Center, is 45 miles away and has a population of 300,000 people. Ruraltown, Hoppington, and Metro Center are all part of Carroll County.

Ruraltown has no full-time mayor, no town attorney, and no environmental planner. Ruraltown does have two full-time paid government employees. One is the town clerk, who writes all birth and death certificates, keeps track of all state and federal requirements (and does all the accompanying paperwork), collects all town taxes, and is part of the volunteer fire department. The town also employs a full-time public works director to operate the drinking water and wastewater treatment plants and coordinate the municipal solid waste program.

Decisions in Ruraltown are made at a twice-yearly town meeting. The town meeting is run by the part-time mayor, who has served as Ruraltown's mayor for more than 30 years. Ruraltown also has a part-time town council. The town council presents information at the town meeting and gives advice on what the town should do. The council also meets every month to take care of business that needs attending to between town meetings.

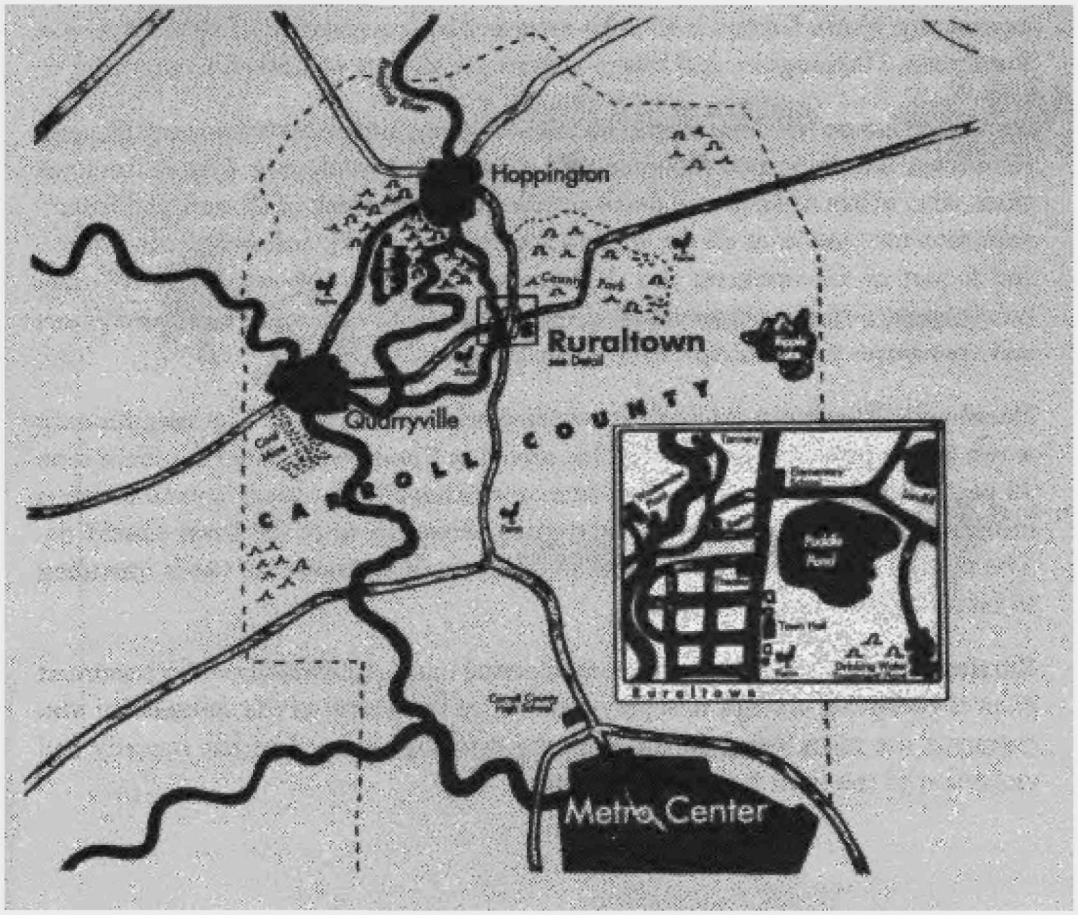
Ruraltown is facing some serious environmental issues. Its drinking water treatment plant is barely big enough to supply water to all the people in the community who currently use town water. In addition, the drinking water plant has recently had violations of the limit for coliform bacteria.

About 200 residents get their drinking water from private wells instead of the public water supply. Some private wells have been contaminated by nearby septic tank systems; others could be contaminated in the future by sources such as underground storage tanks, improperly disposed of used oil and household hazardous waste, runoff from farms, and contaminants leached from the landfill. The solid waste landfill poses other problems: It does not meet all state design requirements, and it's running out of space.

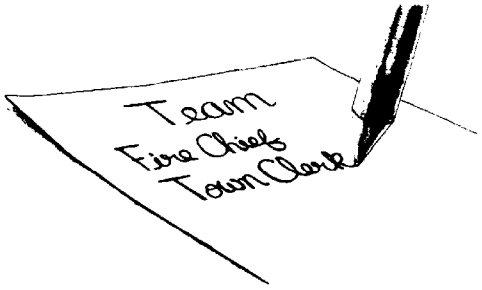
Ruraltown also has problems in the area of wastewater treatment. Only 20 percent of the homes and businesses in the town have sewer hookups, and the wastewater treatment facility is old and sometimes violates permit levels. The rest of the homes and a few businesses use septic systems. In the areas of town with shallow ground water, septic systems have been failing during the wet seasons (spring and fall).

To help meet its environmental challenges, Ruraltown leaders have decided they need a community environmental plan.

Throughout this guidebook, we will check in with Ruraltown and see how it's doing with its community environmental plan. This will give you a better idea about how the planning process works and what it might look like in one small community.



2 Getting the Right People Involved



Who are the "right" people to get involved in creating your environmental plan? Anyone who is concerned enough about the quality of life in the community to invest some time and energy. You will also need people with some expertise on environmental and health issues. You will probably find that people welcome the chance to work together to find solutions to challenging issues that will shape the community's future as well as save tax dollars.

Forming a Planning Team

Someone needs to oversee the community's environmental plan. That "someone" can be a planning team made up of people who represent the different views and constituencies in your community. The planning team will guide the community through each step of the planning process, including developing a community vision, identifying needs and possible solutions, setting priorities for action, and carrying out the plan.

There are many possible approaches to forming a planning team. For example, many communities already have land use planning commissions. This commission has demonstrated an interest and commitment to community environmental issues, and might be willing to oversee the environmental planning process. This approach will ensure that the environmental planning process is well integrated with your community's comprehensive land use plan, and vice versa.

No matter what approach you use, your team should include some of the following types of people:

- **Managers or operators of environmental facilities** (such as water and wastewater systems), who are knowledgeable about environmental issues and the condition of existing facilities.
- **Elected officials or board members,** who already are involved in managing local communities and are familiar with issues that affect the area's environment.

- **Local physicians, engineers, and scientists,** who can provide technical information about environmental and health issues, links between pollution and health, and other key data.
- **County and state health agencies,** which can provide local, state, and national health statistics so that local conditions can be compared with state and national averages.
- **Emergency response personnel,** usually the community's fire department, who often know about environmental accidents, the location of underground storage tanks, and potential sites and types of community exposure or risk.
- **Community residents,** who represent specific interests or the "general public."
- **Business owners and farmers,** who represent important views in the community and can help determine future trends. (Getting a local industry or agriculture enterprise involved is especially important if the industry or enterprise is a current or potential source of pollution.)

Make an open invitation to the members of your community to join the planning team and see who is interested. Try to assemble a planning team of a workable size. A team of 20 people would probably be unwieldy, but only one or two people probably would be unable to handle all the work involved, and probably could not represent the diverse interests of the community. If too many people volunteer, divide up into different teams to handle specific problems or to seek out different types of information. Never turn anyone away—you can always find some productive way to use someone's time and energy. If too few people volunteer, keep spreading the word. No matter how large or small the team, however, the team **must** include effective leaders who can produce agreement on solutions and get results for your community.

Finding Local Experts

Right in your community, you probably have some of the expertise you need to develop a sound environmental plan. For example, managers or operators of systems that can directly affect the environment and people's health—drinking water, wastewater treatment, and solid waste management systems—have the most detailed knowledge of the operation of these systems. Scientists or engineers from local businesses and schools might be able to answer technical and scientific questions that arise. Long-time residents often are a gold mine of information about your community, past and present, and they might also have financial, management, or other experience to contribute. Physicians or environmental health professionals can provide public health statistics that might identify problems that need to be solved immediately.

Every knowledgeable person in the community does not need to serve on the planning team. Some people can give advice to the team when needed, even if they don't have time to attend regular meetings. Some ways local experts can assist the committee include answering questions by phone, providing written materials, reviewing technical documents that deal with relevant information, and speaking at public meetings. Your team should seek advice from local experts early on. In this way, experts can help shape the plan from

the beginning, knowing their ideas are valued and will be considered throughout the process.

Working With Local, County, State, and Federal Personnel

As your team develops its environmental plan, you should consult with people in local, county, state, and federal agencies. Most of these people will do their best to be a valuable source of information and assistance for the environmental concerns your community faces. In fact, your state environmental agency is generally the best place to start to obtain assistance for dealing with environmental issues. (One model for state assistance is shown in Appendix A, which presents a cooperative environmental community agreement between state government and a borough in Alaska.) In addition, if regulatory agencies understand your efforts to address environmental problems in your community, they might be able to exercise some flexibility in dealing with the community on enforcement of regulations.

The planning team might want to offer certain government agency personnel an open invitation to attend the planning team meetings. The main role of government agency employees, however, will be to provide information that the planning team has determined to be important to its efforts. Local resource providers, such as Rural Community Assistance Programs, the National Rural Water Association, and the Cooperative Extension Service, can also be a valuable source of information and assistance for small communities. See Appendix D for a list of these useful organizations.

Encouraging Public Participation

The public includes everyone in the community. Members of conservation and environmental groups, long-time residents, and people who are active in the community are good candidates to become involved in creating the environmental plan. Including the public in local environmental planning is essential for the following reasons:

- The residents of your community are the ones who will end up paying for most new environmental programs.
- Residents will benefit from good environmental planning and management.
- The public knows the community and has ideas about the kind of place in which they want to live.
- If concerned, responsible community leaders are involved in the process, they are more likely to generate broader support for the environmental plan and for the work needed to carry it out.

With their knowledge and ideas, community residents can help the planning team define environmental needs and priorities.

Once you have your planning team set up, local experts committed, and key residents identified, you are ready for the next step: creating a vision of what residents want their community to be like in the future.

Ways Your Planning Team Can Encourage Public Participation

- **Distribute flyers and other information,** such as one-page fact sheets on local environmental issues written by local experts, minutes of planning team meetings, or information about important team decisions. You can give out these materials at public meetings, through mailings (such as with utility bills), and at local stores, and publish them as notices or articles in the local newspaper. The planning team should develop a mailing list of interested groups and individuals.
- **Talk to local groups, such as volunteer organizations, PTAs, service clubs, and business associations.** Tell them about the issues your planning team will address, how the community will be affected, and why it would be valuable for them to participate at this stage of the planning process.
- **Publicize the meetings of your planning team, or hold special meetings to get community input,** so that residents, experts, and team members can express their concerns, exchange views, and explore possible solutions. These meetings can be large (in the school auditorium) or small (in someone's living room). If they are held as part of a town meeting, you may have the benefit of more people attending, but the agenda will probably be quite full and the evening a long one. Be sure to advertise the meetings well in advance—in local newspapers, on local radio and television stations, through public notices in the town hall and in local businesses, and in mailings to interested parties.
- **Ask for volunteers** for tasks such as conducting surveys, taking minutes at team meetings, organizing public meetings, and reviewing information.
- **Invite the public to attend planning team meetings.** If elected officials serve on the team, allowing the public to attend your meetings may be required by local or state law. In any case, having at least some of your team meetings open to interested members of the public is a good idea.
- **Do a survey.** Ask people how they feel about local environmental issues. The survey can include questions such as: "Which of the following do you think is the most important environmental issue in our community, and why?" List areas of particular concern in your community. Also, use the survey to find out whether and how much people would be willing to pay for improvements in the areas about which they are most concerned. The survey can be done in several ways, such as mailing the survey to all or a percentage of town residents (perhaps with a utility bill) or interviewing people about their concerns. Make sure that survey respondents explain their views (such as why drinking water quality is an important concern to them).
- **Organize school activities on local environmental issues.** You can hold a workshop, classroom program, or festival on water conservation, recycling, or other environmental issues. These events can be for children only, or can be set up so that the activities are fun for both adults and children. Children often communicate ideas from school projects to their parents.
- **Talk to your friends and neighbors.** Don't forget how much news is spread by word of mouth. Talk with and listen to your neighbors about the community environmental plan at the barber shop, grocery store, gas station, and post office. Let them know that the planning team wants their help.

How Ruraltown Got the Right People Involved

A Ruraltown town council member, a county health officer (Ruraltown doesn't have one of its own), and the Ruraltown public works director got together to form the planning team. First, they made an announcement at the next council meeting inviting all interested citizens to contact them about becoming members of the planning team. They also asked the local paper to carry the same announcement. Then, they made a list of people with particular expertise in environmental issues, including local, county, and state government officials, facility managers and operators, local businesses, scientists and engineers, environmental and civic groups, long-time residents, members of the fire department, farmers, and school staff. They got some of these names by looking at a local business directory and the phone book, and by asking people in town for suggestions. They came up with a long list:

- Drinking water and wastewater treatment plant manager.
- Town council member.
- County health officer.
- Landfill manager.
- Fire chief.
- Soil scientist from County Community College.
- Engineer from Tech, Inc..
- Manager of the Quarryville coal mine.
- Manager of the local tannery.
- Three farmers.
- Town clerk.
- Three retired members of the community.
- Member of PROTECT, a county-wide conservation group.
- League of Women Voters member.
- Rotary Club member.
- Owner of Construction, Inc..
- County Extension Service agent.
- Staff person from State Department of the Environment regional office.
- Staff person from State Department of Health regional office.
- Restaurant owner.

Along with this list, they had a list of 12 people who responded to the town council and local paper announcements about the planning team. The town council member, county health officer, and public works director thought that if all of these people agreed to be on the planning team, the team might be too large. So they reviewed the list and decided to ask only one farmer, one high school teacher, and one retired resident. They also decided to ask the staff from the state environmental and health departments, the engineer from Tech, Inc., and the school principal to serve as advisors instead of serving on the planning team.

They then divided up the lists and spent a busy week talking to these people about the community environmental plan. While some were too busy or declined for other reasons, 10 agreed to serve on the planning team and several others agreed to serve as advisors.

Two planning team members (a retired resident and the PROTECT member) agreed to find ways to get the public involved in the community's environmental plan. They decided to:

- Set up a *public meeting* to introduce the idea of the environmental plan, get input and direction from the community, and ask for volunteers. The meeting was scheduled for one month later to allow the planning team time to prepare and to reserve the school auditorium.
- Write and send *public service announcements* (PSAs) to local radio and television stations and a *press release* to the local newspaper. These were run free of charge. The PSAs and press release announced that the community would be creating an environmental plan and invited people to the first public meeting.
- Develop a *one-page flyer* describing the purpose of the community environmental plan, announcing the public meeting, and asking for volunteers to work with the team on specific projects. This flyer was posted in local stores and the town hall. In addition, the flyer was mailed out with water and sewer bills and, with the help of the gas and electric cooperative, with electric bills to all local businesses and residences. The team also offered to speak about the planning process and what it would mean for the community at meetings of PROTECT, the League of Women Voters, the Rotary Club, and other groups.
- Organize *an environmental poster contest* in the elementary school. The theme would be "How We Can Make a Difference in Ruraltown." The team would present awards to the winners, and the best poster would be printed in the local newspaper.

3 Developing a Community Vision

What do you want your community to be like in 10 or 20 years? This is one of the first questions that planning team members should ask themselves and other people in the community. The picture you come up with is your community vision. This vision should address not only environmental issues but all the issues you consider central to your community's future, such as economic development, education, government services, and quality of life. You will be creating a framework to help you make choices about environmental goals and solutions as you develop your comprehensive environmental plan.

To create your community vision, let your imagination go. Forget about what needs to get done by tomorrow at noon, and instead picture what you would like to see when you look at your town some time in the future.

Involving the Community

Because the community vision will shape important decisions, it needs to represent a broad consensus. Your team needs to make residents aware of what is at stake for the community and invite them to participate in creating the vision. If you have done this well, you are much more likely to have support for the work you do later in the planning process.

A community meeting is a good place to develop a vision for the future. (See page 10 for some ideas about how to interest people in attending such a meeting.) Explain to those attending what comprehensive environmental planning is all about, and ask them to guide the planning team by defining what they want for their community.

Asking the Right Questions

You can ask questions to help people focus on what they would like the community to be like in the future. Questions that can help the process along include:

- **What makes our community what it is today?** Who makes up our population (average age, income, and other characteristics)? What is unique and important about our community socially, culturally, and historically? What are the strengths and weaknesses of the local economy? What are important characteristics of the community's natural environment?

- **What are our community's values with respect to the environment, economic growth, and lifestyle?** For example, different communities have different attitudes toward growth: some prize stability and traditional ways of life, while others view economic growth as much more important. Some communities place great value on preserving their surroundings in a natural state; others are more interested in promoting population growth or industrial development.
- **What changes or improvements would we like to see?** Changes or improvements in the following areas might be appropriate:
  - *Our community's natural environment.* Do we see any trends, such as loss of natural resources or increasing pollution, that should be reversed?
  - *Land use.* Is the current mix of land used for industrial, commercial, residential, and recreational purposes a good balance? Should some areas be used differently in the future? What is happening in surrounding areas? Could a major manufacturing plant be built in the town next door? Should the planning area be enlarged to include such possibilities? What does the county comprehensive plan call for?
  - *Infrastructure (roads, environmental facilities, parks, schools, libraries, police and fire departments, etc.).* What level of services do we think the community should provide? Do we need to correct problems with our current infrastructure? How old are components of the infrastructure, and how long will they last? If we expect the population to grow, what new services or facilities will we need? How can these best be integrated with existing services and facilities within the community and neighboring communities?
  - *Demographics (population size, number of school-aged children, retired persons, etc.).* Do we want our population to grow or remain about the same? How much could the population grow without seriously straining our infrastructure, resources, and the environment?
  - *Economic growth.* Do we want to attract new businesses to our community? What kinds? What resources should be developed to attract new businesses? How will this affect our quality of life?
  - *Community health.* Does our community need to address health problems such as infant mortality, childhood lead poisoning, nutrition, or access to health care? How does public health in our community compare with national, state, and rural norms?
  - *Quality of life.* What is our vision for our community in areas such as economic well-being of residents, safety, recreational activities, aesthetics, and our sense of community?
  - *Local government.* Would we like to change the size, role, or structure of local government? Should it take on or drop any areas of responsibility? Will it be adequate given how we see our community changing in the future?
  - *Pollution prevention.* What can be done to prevent pollution from occurring in the first place?

Pulling the Vision Together

List all the suggestions for elements of a community vision on a flip chart or blackboard in your meeting room. After you have discussed the questions above (and any others you decide are important), you are likely to have a fairly long "wish list" for the future—as well as a list of problems that residents are concerned about. You might want to take a straw poll to let participants choose the five or six elements of the community vision that are most important to them. Ask for more discussion of items that seem controversial, and take another straw poll. (Expect some extreme positions to come up—such as "no growth" or "growth at any cost"—and encourage open, frank discussion of these views.) Alternatively, use a technique like that described in the box on the following page.

When you've reached some consensus, ask participants to discuss how the different parts of the vision fit together. Do any of the goals for the future seem to conflict with each other (such as preserving the natural environment and attracting certain businesses)? If so, ask the participants to come up with some ideas for solving the conflict. (You might decide to change your ideas about what types of industry you favor; or you might try to find out whether a historically "dirty" industry has adopted cleaner manufacturing methods.)

A strong, unbiased chairperson or facilitator for this meeting is crucial to make sure that everyone has a chance to participate and to keep the discussion on track. But don't worry about dotting every "i" and crossing every "t" in your vision statement. The important thing is to get direction from the community as a whole about where the community should be going. Think of the meeting as a group of artists creating a picture in broad, bold strokes; you and the rest of the planning team can fill in missing details later.

To tap the creativity and energy that people will bring to the meeting, be flexible and make the meeting fun. Don't burden people with speeches that are too long or too technical. Make sure everyone understands that they have something to contribute, even if they have no training in planning or environmental issues.

After you've created your initial community vision, it's time for the next step: developing a plan to make that vision a reality. This will be a dynamic process—you will need to revise your vision as your team gathers new information and your community makes new decisions.

Techniques for Your Community Meeting

Many different techniques are available for helping a group define problems and agree on solutions. One of these is the Nominal Group Technique, developed by Dr. Andre Delbecq of the University of Wisconsin/Madison. It is designed to help a group of people from different backgrounds and experiences to clarify issues, achieve insights into complex problems, and come to a shared judgment. The technique allows the group to reach conclusions in just a few hours, and it ensures equal participation by preventing more outspoken participants from having too much influence in group decisions.

No special training is necessary to lead a group through the Nominal Group Technique. Materials for the method include paper, pencils, and 3x5 index cards for the participants, and a blackboard or flip chart for each group leader. The seven steps in the process are described below.

Step 1: Introduction and Statement of Task (5 to 10 minutes). On a flip chart, the coordinator writes the question that the participants are to respond to and briefly explains what is going to happen. Participants are then divided into groups of five to seven people with a leader assigned to each group. The coordinator can lead a group, or float between groups to ensure they are keeping on roughly the same schedule.

Step 2: Silent Generation of Ideas (10 to 20 minutes). Each person works silently and independently using paper supplied to list his or her own items in response to the statement of the task. The group leader can also participate.

Step 3: Round-Robin Listing of Items on Flip Chart (10 to 25 minutes). Each group member concisely states one item from his or her list. The group leader writes the item (*without* rewording) on the flip chart and assigns it a number. There is no discussion at this time. Do not be concerned if items appear to duplicate or overlap. Continue in round-robin fashion until all items have been covered.

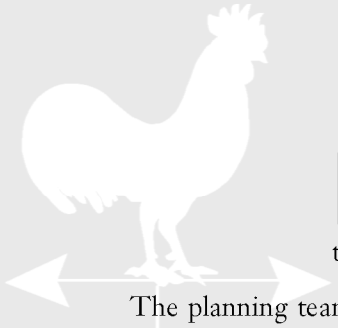
Step 4: Discussion of Items (15 to 30 minutes). Each group member, in turn, clarifies one of the items he or she has listed on the sheet. Other members may ask questions about the item to be sure of its meaning. Do *not* combine items. This continues until each item has been discussed.

Step 5: Silent Listing and Ranking by Priority (5 to 10 minutes). On separate 3x5 cards, each group member lists, by name and number, 10 of the items that he or she considers most important from the total list. Group members then rank the items according to their personal priorities and write a large number 10 (for 10 points) on the corner of the card that has the highest priority; 9 (for 9 points) on the next, and so forth for all 10 cards. The group leader collects the cards and has someone help record directly on the flip chart the number of votes each item received. The number of votes received for each item is tabulated.

Step 6: Discussion of Vote (10 to 15 minutes). The group discusses the results of the vote. If necessary, the group members can get additional clarification about the meaning of individual items.

Step 7: Silent Re-Ranking of Items (5 to 10 minutes). Using the same procedure as in Step 5, re-rank those 10 items which received the highest total scores. *Remember,* use the number 10 for the highest priority item and the number 1 for the lowest priority item. The group leader and his or her assistant collect the cards, record the number of votes each item received, and tabulate them. If there is more than one group, each group leader turns in the completed flip chart and the 3x5 cards to the coordinator.

Many other methods exist for reaching agreement in a group. (See *Effective Meeting Skills: A Guide for More Productive Meeting,* by Marion E. Haynes, Crisp Publications, Inc., 95 First Street, Los Altos, CA 94022.) Choose or design a discussion or voting technique that fits your particular meeting goals and needs.



Ruraltown Creates a Vision for the Future

Nearly 50 people attended the public meeting that the planning team held to kick off the planning process. The mayor of Ruraltown chaired the meeting.

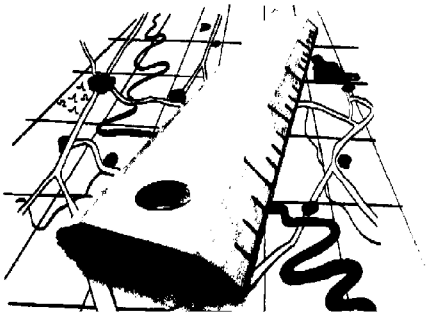
The planning team leaders devoted part of this meeting to discussing a vision for the future. The people at the meeting listed some of the values and characteristics that defined the community. The people of Ruraltown strongly value their self-reliance and independent spirit. They don't like to be told how to run their town. At the same time, the community is proud that it is close knit, and that people look out for each other. The residents want to preserve their rural lifestyle but are concerned about the slow economy and the slight decline in population throughout Carroll County. Every year, a number of family farms go under, either because they are in financial crisis or because the young people decide to live and work elsewhere. Few new businesses have come to Ruraltown in recent years. The community is also concerned about a growing number of residents living near the poverty line.

With respect to its natural environment, Ruraltown residents feel fortunate to have lakes, streams, and woods in and near the town that have been popular for fishing and other recreational activities. They have noticed a decline in fish catches in recent years, however, and wonder if that problem might be linked to local industries, construction, or farmland around Running River and lakes in the area. Many community residents expressed a desire to strengthen the environmental awareness of Ruraltown, both to protect people's health and to preserve the natural resources of the area.

At the town meeting, residents agreed on a list of goals for the future. In 20 years, Ruraltown should have:

- A clean environment that supports fishing, hunting, swimming, and other recreational activities. These activities and surroundings would attract vacationers as well as people wishing to retire to a rural setting.
- A substantial number of new small businesses, although farming would remain the mainstay of Ruraltown's economy. These businesses would include those catering to vacationers (stores, restaurants, motels) and a small to medium-size manufacturing firm.
- Environmental facilities (drinking water, wastewater, solid waste) to support a moderate and sustainable economic and population growth.
- New residential housing for about 50 families.
- A family physician to practice in Ruraltown.
- A new community center to house recreation facilities for children and cultural activities, such as a library. This, along with the new jobs created by small businesses, would help keep young families in Ruraltown.

4 Defining Your Community's Needs



Once you have established your planning team and defined your vision for the future, it is time to turn to your community's current environmental needs. The planning team should clearly identify the environmental needs within the community and collect information on these issues. Answering the following questions can help the planning team identify the community's needs:

- What are the boundaries of your environmental planning area?
- What environmental regulations affect your community?
- Do any environmental problems threaten public health, the environment, or the quality of life in your community?
- How effective are your community's environmental facilities?

This chapter helps you answer these questions.

What Are the Boundaries of Your Environmental Planning Area?

Defining the boundaries of your community's environmental planning area will help you determine your community's environmental needs. Your community's environmental planning area should include:

- "Problem" areas that might have actual or potential public health and ecological impacts, such as waste disposal sites and industrial areas.
- Areas and resources that you want to preserve and protect, such as drinking water supplies and rivers.
- Facilities and resources that are used to protect public health or environmental quality, such as solid waste and wastewater facilities.

You can define the boundaries of your community's environmental planning area in different ways. Choose the approach that makes sense for your community.

Advantages of Beginning Small

Begin with a geographic area small enough to ensure that your community has the resources and authority to carry out the plan it develops. For example, you could define your environmental planning area as the **area within your town or village boundaries,** if your community is incorporated. You might also wish to add nearby areas that are not within the town or village boundaries but that might influence or be affected by your town's environmental planning, for example, **areas served by your drinking water, wastewater, solid waste,** fire department**, or other facilities.**

The Regional Advantage

Alternatively, you might wish to use **county boundaries** (or boundaries of other political units) to define the environmental planning area. And, if an important natural resource, such as an underground drinking water source, crosses county lines, consider including the larger area served by this resource in your environmental planning area. County or other regional boundaries offer the opportunity for several localities to work cooperatively on common environmental and infrastructure issues and to share costs. If you are considering a regional approach, consult with the neighboring communities to see whether they are interested in collaborating with your community. Check with county agencies, too; without county support, a lack of authority will limit the value of a regional approach. Where permitted, special purpose districts may solve this problem.

Physical Characteristics and Natural Conditions

You could also limit your planning area by using **physical characteristics** rather than town or county boundaries. This approach is appropriate for regions where a mountain ridge, for example, tends to separate the towns on one side from towns on the other. If this is the case in your community, consider limiting your community's environmental responsibility (facilities) to the area on your side of the mountain or other natural feature that separates the two regions.

To prepare for the planning process, be sure to examine the natural conditions within your planning area to identify locations that might be more or less vulnerable to environmental damage. For example, if you overlay a map showing onsite septic system failures onto a soil map, you might be able to see clearly the areas of good soil where onsite wastewater treatment systems will work well and the areas where wastewater collection and cluster or centralized treatment and disposal are needed. An additional overlay of ground-water quality might further refine this analysis.

Adjusting the Area as Appropriate

In general, you should begin with your community boundaries. These boundaries can be adjusted if needed, for example, if new data on projected growth becomes available, or if one or more issues suggest that you should consider a combined (regional) approach. Once you have defined the boundaries of your environmental planning area, you can identify the environmental concerns within this area.

What Environmental Regulations Affect Your Community?

As you develop a community environmental plan, keep in mind that you are not operating in a vacuum. Federal, state, and county governments have many regulations covering almost every environmental issue that could concern local governments. These regulations are meant to protect everyone from the potential hazards associated with pollution. Unfortunately, this goal cannot be achieved in the same way in all types of communities. Local governments have justifiable concerns that these regulations cannot be implemented without outside funding, but remember that pollution does not respect boundaries. If a town upriver from your town dumps untreated sewage into the river, this sewage could pollute your water supply. Even if your community is environmentally responsible, you can't be sure that other communities will be the same. Protecting the environment and preventing pollution has to be a collective effort.

You should be aware of environmental regulations when you develop your environmental plan for several reasons:

- The regulations might help you identify some of the environmental issues that you face.
- Complying with regulations will help you protect people's health and the environment.
- Complying with regulations will help you avoid the direct financial costs of pollution. (Pollution of natural resources costs money and jobs.)
- You might incur fines and legal fees if you don't comply with environmental regulations, even if your reason for noncompliance was being unaware of the regulation's existence. Understanding what regulations apply to your community will help you avoid these costs.

Environmental regulations might themselves present major problems for small communities. These are some common complaints heard from small community decision-makers:

- There are too many different regulations. (Actually almost 800 regulations exist, of which half require the town to do something and the other half require the town to oversee other people, places, or things.)
- Finding out about new regulations that affect my community is difficult.
- The regulations are written in complicated, technical language.
- The regulation deadlines don't give my community enough time to comply.
- The regulations require my community to do something that it can't afford and don't help pay for it.
- The regulations require costly actions to prevent or stop problems that do not exist in my community.

These are important concerns, addressed in part by Appendix B of this guidebook. The appendix describes the major federal regulations that affect most small communities and gives information on the steps your community is expected to take to meet these requirements. In addition, the assistance providers listed in Appendix D can help you understand exactly which regulations apply to you and how.

Regulatory Compliance Needs in Ruraltown

Ruraltown planning team members consulted with state regulatory officials to review the regulations that applied to the town. The team then made a list of the regulations that the town was not meeting:

- Drinking water samples at the community treatment plant recently exceeded the maximum contaminant level (MCL) for coliform bacteria.
- The drinking water system cannot meet firefighting requirements in certain parts of town due to low pressure.
- The drinking water plant is not meeting all the applicable monitoring requirements for chemical contaminants.
- Discharges from the wastewater treatment plant exceed permit limits for suspended solids and organic matter during some periods.
- The landfill does not meet state design requirements.
- The elementary school has not been inspected for materials containing asbestos.

The information in Appendix B can help you determine which regulations apply to your community and what the deadlines for compliance are. You will probably need to consult with staff from your state agency to develop a complete and accurate list of the regulatory requirements you must meet. This list can be important when you set priorities for action (Chapter 6).

The descriptions in Appendix B are based on information available in 1994. Some of this information is likely to change in the future. In addition, state and local requirements might differ from federal regulations. Be sure to contact someone at your state regulatory agency to find out if your state's rules are different in any way. Also, find out whether there are county regulations in addition to your state's requirements.

Do Any Environmental Problems Threaten Public Health, Ecosystems, or the Quality of Life in Your Community?

A key step in defining your community's needs is determining whether any environmental problems pose a serious threat to your residents and surrounding ecosystems. Your team can develop a list of environmental problems by thinking about possible threats to the health of residents (such as unsafe drinking water), specific pollutants or pollutant sources in the community (such as pesticides used near drinking water wells or leaking petroleum storage tanks), and natural resources being affected by pollution (such as a river with degraded aesthetic qualities and a declining fish population). Also think about threats to residents' quality of life, such as loss of recreation areas or higher taxes to pay for replacing a polluted drinking water well.

Your list of environmental problems should include not only concerns that exist today but also possible future problems. For example, a town's drinking water well might not be contaminated now, but possible releases of pollutants from particular sources (such as gas stations or a landfill) near the well might contaminate the well in the future. Such *potential* risks should be included in your list of environmental concerns. To help determine potential risks, ask "what if" questions, such as "If pollutants leaked from the landfill, what effects might this have on people's health or the environment?"

It's a good idea to involve the broader community in this step. People outside your planning team might have concerns that you haven't considered. If these concerns are never heard by the team, public support for the comprehensive environmental plan might suffer. If you held a communitywide meeting to define a community vision, you probably came up with a list of residents' concerns at that time. If not, consider conducting a special open meeting of the planning team to involve interested members of the public.

After you've developed a comprehensive list of environmental problems, your team should determine which are the "high-risk" problems: which pose a serious threat to health, the environment, or quality of life. This will help you target your resources wisely when putting your environmental plan together. To help you figure out which problems are high-risk, Appendix C presents a more detailed discussion about risks along with some questions to help you assess risks. You might also want to consult with experts to help you determine the high-risk problems in your community. Start with any scientists who have been

Potential Sources of Information About Risks in Your Community

Topic	Potential Source (see key)
Air quality	1, 8, 14
Asbestos in public buildings	1, 8, 16
Business and industry information	7, 8, 17, 19
Chemical hazards	1, 6, 8, 14, 15, 19
Chemical releases/spills	1, 7, 8, 19
Climate	5, 14
Disease rates in the community	6, 8, 13, 14, 15, 16
Drinking water quality	1, 8, 13, 16
Ecosystem/habitat quality	1, 8, 9, 10, 14, 20
Fish and wildlife	1, 8, 9, 10, 14, 20
Flood hazard areas	2, 18
Forest quality	1, 8, 9, 10, 14, 20
Ground water	1, 2, 8, 14, 21
Hazardous waste sites	1, 8, 19
Land use/topography	2, 4, 8, 14, 18
Lead paint hazards	1, 8, 13, 15, 16
Nonpoint source pollution	1, 8
Parks and other recreation areas	9, 10, 20
Pesticides	1, 3, 4, 6, 8, 11, 12, 14
Population figures	8, 16, 18, 22
Regulatory information	1, 8, 12, 13, 16, 18
Radon	1, 8, 13, 14, 15, 16
Soils	2, 4, 8, 12, 14
Solid waste	1, 8
Surface water	1, 2, 8, 13, 14, 16, 20, 21
Underground storage tanks	1, 8, 19
Wastewater system performance (onsite)	1, 8, 12, 16
Wellhead/watershed protection	1, 2, 8, 12, 14, 21
Wetlands	1, 2, 4, 8, 14

Key

1. U.S. Environmental Protection Agency (EPA) regional office
2. U.S. Geological Survey (USGS)
3. U.S. Department of Agriculture (USDA)
4. USDA Soil Conservation Service
5. National Weather Service
6. Agency for Toxic Substances and Disease Registry (ATSDR)
7. Toxic Release Inventory (TRI)
8. State regulatory agency (e.g., department of health, department of environment, department of natural resources)
9. State department of fish and wildlife
10. State department of forestry; U.S. Forest Service
11. State farm bureau
12. County agricultural extension service
13. Local or county board of health
14. Local university or college
15. Local physician
16. County health officer
17. Local chamber of commerce
18. Local/Regional planning board
19. Local emergency response team (usually the fire department)
20. State, county, or local parks and recreation department
21. Local water department
22. State data center

working with or advising your planning team. If they can't provide the help you need, ask them who might be able to, or get in touch with one or more of the following:

- Representatives of the state department of health, natural resources, or environmental protection, or of the EPA regional field office.
- Scientists at a nearby college or university.
- The county health officer or local physicians.

The box on page 24 contains a more detailed list of information that might be available from agencies and organizations. These experts will not have any magic formulas to help you understand the risks you face. Scientific information about environmental risks often does not exist, is incomplete, or is hard to interpret. Experts should, however, help you get a clearer picture of what the most serious risks are, and perhaps help you uncover some problems you otherwise would not have addressed.

Of course, identifying certain problems as "high-risk" is only one of the tools to help you put together your environmental plan—it does not mean you can forget about the rest of the problems. You might need to address lower risk problems for regulatory reasons. Community residents might consider lower risk problems of great importance. You might be able to implement some simple, low-cost solutions to lower risk problems, while still giving adequate attention to the highest risks. Chapter 6 discusses in more detail how you can take all these factors into account and set priorities for action.

A number of states and cities have carried out complex "comparative risk" projects to evaluate risks to people and ecosystems and to help them make the best use of their environmental protection resources. These projects usually involve teams of scientists and other experts who spend months analyzing data and discussing their relevance. Appendix C includes a list of the states, cities, and tribes that have comparative risk projects completed, under way, or in the planning stages. If such a project exists in your state, you might be able to obtain valuable information or insight from the project to help you identify high-risk problems in your community.

The box on pages 26 through 28 describes how Ruraltown went about defining the boundaries of its environmental planning area, listing its environmental problems, and identifying which problems were potentially serious threats to its residents and the environment.

Ruraltown's Environmental Problems: Defining Boundaries and Identifying High-Risk Problems

The planning team discussed what locations to include in the community's environmental planning area. Everyone on the team agreed that at least everything within the town boundaries should be included, since the town had its own landfill and drinking water and wastewater plants. Using town boundaries would also include private wells and septic systems. A staff person from the State Department of Natural Resources suggested that the team consider including a larger area than the town boundaries, because some areas near the town's drinking water wells but outside of the town boundaries (including some farms and onsite septic systems) could affect drinking water quality in the future. The team discussed this with county officials, who agreed to help the team implement necessary programs in these areas where they had the authority to do so.

The planning team held a meeting to develop a list of environmental concerns in the community. The team opened the meeting up to interested members of the public, placing a notice in the local newspaper several weeks in advance. At the meeting, team members listed the following environmental concerns:

- The drinking water treatment plant had recent violations of the coliform maximum contaminant level (MCL).
- The drinking water treatment plant's monitoring program for chemical contaminants had been cited as inadequate by the state.
- The drinking water system is undersized; pressure is too low to meet firefighting requirements in some parts of town.
- There are high fecal coliform counts in private well supplies near septic tank systems in areas with high ground water.
- Pesticides are used near drinking water wells.
- Underground fuel storage tanks at the school and fire station are aging and might leak.
- Discharges from the wastewater treatment plant occasionally exceed permit limits for suspended solids and organic matter, especially after severe storms.

- The landfill is almost full and doesn't meet the new state guidelines.
- Land-applied fertilizers in rainfall runoff are polluting lakes and streams.
- Leaf burning by residents is blamed for some health problems in the town.
- Improper disposal of used oil on the ground and to septic systems by "do-it-yourself" oil changers could cause contamination of drinking water wells.
- Improper disposal of household hazardous waste to the landfill could result in contamination of drinking water wells.
- The custodian suspects that there is deteriorating asbestos insulation in Ruraltown Elementary School, which has not been tested for asbestos.

Several community residents attending the meeting added concerns to the list:

- There is deteriorating lead paint in many homes.
- Runoff from construction sites upriver from the town might be causing a reduced fish catch in Running River; tannery wastes also might be polluting the river.

The planning team then spent time over the next several weeks talking to local and state experts about each topic. They asked the experts to help them figure out the risks posed by each problem. These advisors provided much of the information the team needed.

For example, the team had the drinking water from two private wells tested for pesticides used on nearby farms. The wells chosen for testing were those located closest to and "downstream" from the farms. The team asked a scientist from the state environmental agency to explain the potential health effects from consuming water containing the small quantities of pesticides that were detected. This scientist advised the team that the current risks were small but could increase in the future if pesticide contamination continued. She confirmed the town's concern that the aging underground storage tanks and surface water pollution from fertilizer were serious threats to natural resources. Several other scientists suggested that the team consider radon in homes a potential concern, since a number of homes in nearby communities had been found to have elevated levels of radon.

Armed with the information they had obtained, the team met again, discussed Ruraltown's environmental problems, and hammered out a list of the high-risk problems. They were:

- Drinking water samples that exceed coliform MCL (high risk to health).
- Drinking water system that is undersized (high risk to quality of life).
- High coliform counts in drinking water well supplies near septic systems in areas with high ground water (high risk to health).

- Aging underground storage tanks (high risk to health and quality of life).
- Wastewater treatment plant effluent that exceeds organic matter and suspended solids limits (high risk to natural resources and quality of life).
- Septic systems failing during wet seasons (high risk to health and quality of life).
- Landfill that doesn't meet design requirements and is almost full (high risk to quality of life).
- Surface water pollution by fertilizers (high risk to natural resources and quality of life).
- Lead paint in homes (high risk to health and quality of life).

How Effective Are Your Community's Environmental Facilities?

The most basic step in identifying your community's needs is the evaluation of your community's environmental facilities, such as solid waste (some combination of landfills, incinerators, transfer stations, and recycling centers), drinking water (some combination of a centralized source and treatment plant, distribution system, and private wells), and wastewater (either a centralized collection and treatment plant, smaller plants serving several buildings with sewers, or individual home systems). Your environmental facilities might also include structures involving little or no capital or equipment, such as buffer strips, wet ponds, and swales for runoff management.

Your planning team should work with the people who manage and operate your environmental facilities to identify problems. A facility might perform ineffectively if it is too small to serve the number of people in the community or if it is operated improperly or inefficiently. Some problems might even pose a risk to health, ecosystems, or quality of life. For example, a landfill could leach chemicals into ground water that constitutes the town's drinking water, or a wastewater treatment plant could generate odors in the surrounding area.

Ineffective performance of environmental facilities is also a constant drain on a community's finances. Inadequate performance might indicate that operations at the existing facility could be improved or that a community needs a new or upgraded facility. Often, minor modifications of an existing facility greatly improve performance and lower costs. Evaluating facility performance also helps the community identify potential risks to people's health and the environment and helps determine whether the community is complying with regulatory requirements.

To find out whether your community's environmental facilities are performing adequately, the planning team, along with each facility's manager, should consider several factors, including the design, administration, operation, and maintenance of each facility, as discussed below. This step might require assistance from outside experts. Many states can assist in this process, as can independent resource providers such as the National Rural Water Association and the Rural Community Assistance Program (see Appendix D).

Does the Facility's Design Meet the Community's Needs?

Each facility, including its equipment and processes, was designed with certain goals in mind. Determine whether your community has the same goals today. Your community might or might not have changed since the facility was designed. Asking the following questions will help the planning team determine whether the facility's design is still adequate:

- Is the plant design adequate for the community's current requirements (such as the number of people now receiving public drinking water)? Can it meet needs (such as new people or businesses moving into the community)?
- Does the facility meet the requirements of current regulations? Will it meet the requirements of regulations that have been issued but are not yet in effect?
- Are maintenance problems increasing as the plant ages? For example, do staff often "jury-rig" solutions to operating problems?
- Will the facility meet your future needs? (Refer to your community's vision for the future.)

Is the Facility Run Effectively?

Administration of a facility involves managing, staffing, training, and funding. You can assess how well the facility is run by asking the questions below.

Management

- Are facility managers clear about what the system is supposed to accomplish and whether these goals are currently being achieved?
- Have managers evaluated whether services, equipment, and facilities will need expansion to meet future needs?
- Have alternatives (such as another water source, transfer of solid waste to another facility, alternate wastewater treatment options, or intergovernmental agreement to share equipment, personnel, or services) been identified if needed in an emergency or for future increased use?

Staffing

- Are there enough employees to handle the job?
- Do employees understand their specific responsibilities?
- Are staff encouraged to make recommendations for improved performance?

- Are employees capable of handling future needs if services change or increase (for example, if recycling is added to solid waste facilities)?
- If the state requires certified (licensed) operators to perform certain tasks, does your staff meet these requirements, or have you made other arrangements with neighboring certified operators?

Training

- Do any employees need specific training to perform tasks properly?
- Do employees periodically receive additional training from universities or other sources to update their knowledge and skills?
- Do they receive proper training whenever they are required to perform new tasks or procedures?
- Is the staff encouraged to seek certification training (if a certification program exists)?

Funding

- Are the revenues generated adequate to meet operation, maintenance, and all other costs, including unanticipated emergencies? Do customer rates include all costs of providing the service?
- Are enough funds available to replace equipment at the end of its nominal or estimated service life?
- Are funds being set aside for improvements and expansions?
- Has the community considered using qualified local people, rather than more expensive outside personnel, to perform necessary tasks? Has the community considered recruiting qualified volunteers (individuals or service/professional organizations)?

Efficient Operations Are Key to Good Performance

The following operational factors should be evaluated for each of the environmental facilities in a community:

- *Capacity*. Are the drinking water and wastewater facilities operating close to the limits of their design? Is the landfill almost full? If the answer is "yes" to either of these questions and you expect the population to increase significantly in the near future, increased capacity will probably be needed in the near future. Consider alternative approaches to such costly expansion as soon as possible, while they are still viable.
- *Flexibility*. Can the facility cope with potential changes in the quality of raw water supply, changes in wastewater flow during storms, or changes in the flow of solid waste?
- *Equipment*. Is old equipment breaking down often? Should it be rebuilt or replaced? Is equipment performing as efficiently as possible? Does it meet design performance specifications?
- *Processes*. Are mechanisms that control each process operating well? Have adjustments been made to make the process more efficient or effective?

- *Operational Hazards.* Have potential hazards been identified, and are they controllable? Ways to prevent operational hazards include employee training, building a secondary containment structure to store and contain chemicals, and installing safeguards and interlocks on equipment.
- *Procedures.* Have operating procedures been developed and incorporated into an up-to-date operations and maintenance manual? Are employees familiar with correct procedures? Are easily understandable, written operating procedures readily available to employees at all times, and are they used? Are notices prominently displayed listing procedures that should **not** be used (such as mixing incompatible chemicals)?
- *Emergency Response.* Is emergency equipment readily available and regularly checked? Have emergency procedures been established? Are all employees aware of emergency procedures? Are telephone numbers and addresses of important officials and emergency response team members readily available?
- *Recordkeeping.* Are good records kept? (For example, for drinking water systems, this should include records of the amounts of water treated; chemicals used and amounts; results of water quality tests; and maps showing the entire distribution system, including locations of mains, service connections, valves, pipes, pressure vessels, instrumentation, and shutoffs.)
- *Chemical Use.* Are chemicals being used efficiently in drinking water and wastewater treatment plants? Is more of a chemical being used than was anticipated? If so, why? Can a chemical be used that is less expensive, is less harmful, or requires less operation and maintenance?
- *Corrective Actions.* If operating problems were identified in the past, have they been corrected?
- *Training.* Are programs in place to train new employees and keep current employees up to date?
- *Preventive Maintenance.* Does the facility staff perform preventive maintenance on a regular basis to minimize equipment failures? Are noncapital facilities, such as wet ponds and buffer strips, adequately maintained?

If problems exist at a facility, the planning team has identified another potential environmental need: improving the environmental facility. The community might need to define the problems further, for example, by undertaking a Composite Correction Program with the help of a state or local assistance provider (see Appendix D). Once the problems have been defined, the community needs to determine the possible costs of resolving the problem (for example, the costs of buying new equipment, using supplemental processes, or constructing a new facility). Make sure to consider the possibility of partnerships with other units of government (towns, counties, special districts) to perform maintenance tasks (see Chapter 7).

The boxes on pages 32 and 33 include additional information specifically for drinking water, wastewater, and solid waste facilities. The box on page 35 describes how Ruraltown evaluated its environmental facilities.

How Effective Is Your Drinking Water Facility?

- Are water samples taken regularly and properly as required by the state?
- Has drinking water failed to meet regulatory limits? How many violation notices has the facility received?
- Have residents complained often about the odor, appearance, or taste of the water?
- Are operators knowledgeable about the facility's treatment processes (such as flocculation, sedimentation, filtration, and disinfection)? Are these processes performing effectively, and are corrections made when they are not functioning at their best?
- Does the facility use water meters to charge its customers for water use? Meters can provide an incentive to conserve water, since the less a customer uses, the less he or she pays. Is the accuracy of meters checked periodically?
- Does the facility manager know how much "water loss" is occurring? Water loss is the amount of water being produced that is not being received by or billed to customers.
- Do charges cover the cost of operation and maintenance and planned replacement costs?

How Effective Is Your Wastewater Facility?

- Are your wastewater treatment plant operators knowledgeable about the treatment facility's processes, such as aeration, clarification, and sludge (biosolids) handling? Do they regularly monitor and adjust processes to improve performance?
- Is your sludge management system capable of properly processing all the sludge produced?
- Does excessive infiltration/inflow of stormwater occur in the collection sewer line? Does the flow bypass the treatment system during peak flow conditions?
- Is your system in compliance with all National Pollutant Discharge Elimination System (NPDES) permit limits or conditions?
- Has the facility received complaints from residents regarding odors, appearance, receiving water quality, overflows, or high user charges?

How Effective Are Your Community's Septic Systems?

- Is the water draining slowly from or backing up into sinks or toilets? If so, the pipes might be clogged (with disposable diapers, sanitary napkins, etc.), a pipe might be broken (from heavy machinery traveling over the ground above the pipe), or tree roots might have entered a pipe.
- Is smelly or dark liquid present on the ground surface above the drainfield? If so, the drainfield or soil may be inadequate to soak up the liquid during wet periods of the year.
- How often has the tank been pumped? If more often than every 3 years, the reason should be determined. The problem is usually in the soil, not the tank, and pumping only provides temporary relief.

How Effectively Does Your Community Manage Solid Waste?

Even if your community's handling of solid waste is not an immediate concern, it most likely will be in the very near future. Think about the following questions:

Landfill Concerns

- Is the community's landfill almost full? Will you need a new place to dispose of solid waste within the next few years? Has the community identified an alternative disposal method or area?
- Does the landfill meet state/federal ground-water monitoring requirements? (Check with your state agency.)

Waste Reduction

- Does your community have a waste reduction program? Is one required by the state?

Recycling Efforts

- Does the community have a recycling program (including collecting the materials, finding markets, and getting and keeping residents involved)? Many states have passed regulations requiring increased recycling of various materials, such as paper, glass, metals, yard wastes, and plastics. Check with your state agency to find out about your current and future compliance with the regulations and the markets for these materials in your area.

Costs

- How much does solid waste disposal cost your community? Is the cost rising significantly? If so, think about alternatives to disposal (recycling, composting, or regional incineration programs).
- Do fees charged to community residents reflect all costs of solid waste management (such as costs to collect the trash, run the disposal facility, and administer the program)?
- Can the community's landfill meet state requirements for financial assurance, liability, and postclosure care? Check with your state agency about these requirements.

Management

- Has the community conducted an analysis of its solid waste to determine its content and amounts produced? Most small communities have not done such an analysis, but it could help the community decide the best ways to manage wastes (such as what percentages could be recycled, composted, incinerated, and disposed of in a landfill). This information can also help the community decide what services or equipment are needed (such as trucks, bins, landfill/incinerator capacity, types of markets for recyclables). This analysis should include anticipated future changes in disposal and recycling patterns. (Refer to your community's vision for the future.) Since local data are not likely to be available, national average data can be used for planning purposes.

Regional Approaches

- For many small communities, a regional approach to solid waste management is the best solution. If several communities join together, they can:
  - Share the task of looking for markets for recyclables and offer these markets larger quantities of materials (a big plus in the recycling business).
  - Combine the wastes that each community sends to landfills or incinerators and pay lower user fees for these higher volumes.
  - Jointly use collection trucks.

Is Your List of Needs Adequate To Meet Your Community's Vision for the Future?

After you have done the work suggested in this chapter, you will have defined your community's environmental needs using three approaches: what problems pose the greatest threat to your community's residents and natural resources, how well your environmental facilities are serving your community, and what regulations you must meet. You will probably see a lot of overlap among these three lists. Combine all three into a "master list" of needs that eliminates duplication and is easier to work with. Then revisit the community vision to make sure that the goals expressed there are addressed by your list of current needs. If an important item is missing, you might want to add it to your list of current needs. For example, if you envision economic or population growth in the coming years, as Ruraltown does, make sure that you evaluate whether expanded capacity of your drinking water, wastewater, and solid waste facilities is needed.

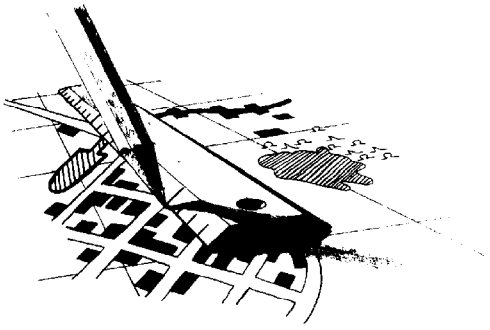
Ruraltown Evaluates Its Environmental Facilities

Ruraltown's planning team talked with the people who manage and operate the town's environmental facilities, and summarized the facility needs in the following list:

- Landfill does not meet state requirements and is almost full; need to expand or find alternatives.
- Need to increase capacity of drinking water treatment system; already unable to attain firefighting pressures at certain locations, and some people with private wells want to be connected to public water supply. Also need to meet coliform MCL and monitoring requirements for chemical contaminants in drinking water.
- Need to improve performance of wastewater treatment plant with respect to suspended solids and organic matter removal, because town wants to reduce reliance on septic systems, especially in areas with shallow ground water. Improving the wastewater treatment system will encourage growth and development in the town center and help prevent further loss of rural landscape and farms.

Before making any final decisions about the drinking water and wastewater facilities, the planning team asked for help from state and local assistance providers. The state performed a comprehensive performance evaluation on the wastewater treatment plant. This evaluation showed that the plant could be brought into compliance, except during rainstorms and snow melting periods. (The town would need to make long-term improvements in the collection system and the treatment plant, however, to realize its vision for the future.) A coalition of resource providers analyzed the drinking water plant. This analysis verified earlier findings that distribution system and disinfection system upgrades were needed.

5 Finding Feasible Solutions for Your Community



Once you've defined your community's needs and refined your community vision for the future, it's time to look for possible solutions. You've pinpointed a destination on the road map and convinced many people in the community to make the journey. Now it's time to look at the vehicles you can use to get there. There are many factors to consider: You probably can't afford a Porsche, but you don't want an old car that breaks down in the middle of a trip. To get adequate transportation, you might need to car pool with neighbors. And you have to consider whether your vehicle will need frequent maintenance.

This chapter helps you begin to figure out which solutions will work for your community. Although most small communities do not have every problem discussed in this chapter, and many will have problems that are not discussed, some of the best solutions for the typical problems faced by small communities are presented. This chapter shows you how to evaluate available options, taking into account such factors as cost and local environmental constraints. Some of the possible "vehicles" for reaching your destination are technological (structural), such as new treatment technologies. Others are management (nonstructural) solutions—setting up a water conservation program or an educational program about household hazardous waste, for example. A solution to one problem might affect (positively or negatively) another problem. At this step, you should determine all solutions that are feasible for your community and estimate what they might cost and what they might achieve. This information will be critical when you set priorities for action.

Technology and Management Options for Small Communities: An Overview

The list of solutions that can be applied to environmental problems is nearly endless. This chapter presents a brief description of some of the solutions to issues that nearly all small communities face. You will need to find out more about these solutions if you think they

might be suitable for your community. Your goal here is to gain information about the solutions that might be suitable for your community, including:

- What each solution can achieve.
- What factors can limit a solution's effectiveness.
- What the capital and operating costs are.
- How easy or difficult implementation is.

Pollution Prevention

Preventing pollution—rather than trying to treat it after it happens—should be a basic principle of your community's environmental plan. Pollution prevention is the process of identifying areas, processes, and activities that create excessive waste byproducts to try to minimize or eliminate the amount or toxicity of these byproducts. This approach will help you avoid the costs of cleaning up pollution. Here are just a few examples:

- **Conserve water!** A communitywide effort to conserve water can help your town in several important ways. Heavy pumping of an aquifer over time can cause changes in the amount you can pump and the chemical quality of the water you pump. High water usage also means that more wastewater is generated that needs to be managed. Some simple steps—such as starting a leak detection program and using water-saving devices in homes—can help prevent these problems and help avoid the cost of developing additional drinking water and wastewater facilities.
- **Don't dump used oil!** Used oil should be recycled or disposed of so that it won't pollute the environment. Even small amounts of used oil poured on the ground, down the drain, or into the water can contaminate the drinking water supply of an entire community. Your used oil should be taken to a collection center or service station that can handle it properly. The community is responsible for providing a market or use for this used oil for ensuring its safe disposal.
- **Safely dispose of household hazardous waste!** Many common household products (e.g., most cleaning fluids, disinfectants, pesticides, and paint thinners and removers) contain hazardous constituents. Dumping these household hazardous wastes down the drain, into the garbage can, or on the ground can contaminate ground water, surface water, and soil. Many communities have started household hazardous waste collection programs (or worked with other communities to start them) to gather these wastes and dispose of them safely.
- **Save energy!** This is something every resident can do to prevent pollution. In most areas of the country, power plants burn oil, coal, or gas to generate electricity. Burning these fuels creates air pollution. If less energy is needed, less air pollution is produced. Saving energy can also save you money. Your community should promote energy conservation through public service announcements and other means.
- **Protect the area around your drinking water wells!** Every state in the nation has had incidents of contaminated ground water. If you protect your water source before it gets contaminated, you can avoid some major costs, such as the costs of sophisticated treatment equipment, cleanup and remediation, consulting and legal fees, water rate increases, and even reduced real estate prices. Ask your state environmental agency, your state Rural Water Association, or other resource provider how to start a wellhead protection program in your community.
- **Don't be a throw-away community!** Landfill space is becoming limited, and building a new landfill that protects water, soil, and air from contamination is expensive. At the same time, people keep generating more and more trash. Try to reuse materials instead of throwing them away. Try to recycle glass, plastic, aluminum, and paper. Don't buy products with extra packaging that has to be thrown away. A community can provide leadership in such efforts by developing purchasing programs that reduce waste and maximizing the use of recycled materials.
- **Don't litter!** If everyone helps, the cost of litter collection and management can be reduced.

Your environmental plan should also include teaching community residents about pollution prevention. Pollution prevention is a "mind set"—a way of looking at the world and the way we live. If everyone reduces pollution in his or her own life, the community, its environment, and the future will benefit.

- How a solution might affect other environmental problems you face or other important community considerations.
- What opportunity costs are associated with various options. (Opportunity costs are the costs of the next best alternative—what you are giving up by choosing the option you choose.)

At the end of this chapter, some specific solutions are presented for the following issue areas:

- Drinking water.
- Wastewater.
- Solid waste.
- Hazardous waste.
- Nonpoint source pollution.
- Underground storage tanks.

For more information, you can read the publications listed in Appendix D and talk to one of your local experts, your state environmental agency, and some of the organizations listed in Appendix D.

Evaluating Costs for Technology and Management Options

To evaluate the costs of possible solutions, consider several cost factors:

- Unit costs (such as the cost per thousand gallons treated, cost per cubic yard or ton of waste disposed).
- Capital costs (the costs of constructing, purchasing, or upgrading equipment or facilities).
- Annual operating costs (the costs of running equipment and facilities on a day-to-day basis).

To make meaningful cost comparisons, the facility size must be comparable between options and must be sufficient to handle the maximum material flows (drinking water, wastewater, solid waste, recyclables) anticipated over the estimated life of the facility. For example, a low unit cost for wastewater treatment will not save money if the minimum plant size required to achieve that cost savings is four times the maximum expected wastewater flow from your community.

Even before cost comparisons, the best screening method is to identify the conditions for which the option is best suited. For example, small-diameter gravity systems are likely to be the first choice where slopes provide gravity drainage to a treatment plant. "Pockets" of homes that do not drain in this way because of their lower elevation can be fitted with septic tank effluent pumping (STEP) units and fed into the small-diameter system. Likewise, dense developments of 50 or more homes might be best served by vacuum

sewers, while pressure sewers may be more suitable for developments of fewer than 50 homes. By knowing the best uses of each technology, a preliminary screening can assist the planning group in discarding certain options that are unlikely to solve identified problems.

All cost factors—unit costs, capital costs, and operating costs—should be evaluated together. There might be a tradeoff between capital costs and operating costs. A well-designed facility with higher initial costs usually provides better performance and has lower operating and maintenance costs than a lower capital-cost, high-maintenance facility. A variety of financial factors should be considered when deciding among options, as discussed in Chapter 7.

Narrowing the Options

Once you have a list of possible generic options for the key environmental issues facing your community, you need to eliminate the options that are not feasible. First, you can eliminate any option that will not work because of factors specific to your community. These factors could include:

- Population density.
- Distance from significant population centers.
- Type of water bodies and land features.
- Water quality, chemistry, and quantity.
- Soil type and geology.

Even though the solutions described in this guide are considered appropriate for small communities, local conditions can preclude their use in certain circumstances. For example, there is little point in planning for long-term use of onsite septic tank systems if no soils in the community can support their proper functioning (because they are all impermeable clay soils).

Second, you can eliminate solutions that are clearly more expensive than your community can afford. Also consider whether the costs (economic, social, ecological, or health-related) of failing to invest in a solution are acceptable. Be careful, however, not to underestimate what your community can afford. Your community might be able to get grants and low-interest loans to pay for some options. Your community can also cooperate with other communities or form partnerships with private companies to pay for some solutions (see Chapter 7).

Third, eliminate options that require more advanced technical skills than your community has access to, or that are too complicated for your community to administer. For example, waste-to-energy facilities are an option for solid waste management. Solid waste is burned in these facilities, and the heat produced is used to generate electricity. Waste-to-energy facilities use very advanced technology, however, and are probably not feasible for most small communities. Keep in mind, though, that cooperating with other communities and forming partnerships with private companies might allow you to use technologies that are too complex for your community to use alone.

Looking at Characteristics of Soil and Ground Water in Your Community

To determine whether certain technology options are feasible, it is important to understand the characteristics of soil and ground water in your community. For example, some soil conditions, such as shallow bedrock or water table, might require the use of special onsite wastewater systems in unsewered areas. By the same token, a shallow water table is more easily contaminated than a deep water table. The vulnerability of ground water affects site selection for landfills, underground storage tanks, and a variety of potentially contaminating industrial/commercial activities.

Information about soil and ground water in many areas is available from the U.S. Geological Survey and from soil surveys produced by the Soil Conservation Service (SCS) of the U.S. Department of Agriculture. SCS has published soil surveys for most counties in the eastern and midwestern United States and many counties in western states. SCS soil maps define **map units** containing similar soil characteristics based on landscape position, slope, soil wetness, depth to bedrock, type of bedrock, and other factors. A published soil survey contains tables providing information for each map unit, including:

- The number of acres mapped.
- Ratings for corrosion risk for uncoated steel and concrete.
- Limitations for sanitary facilities, including embankments, ditches and levees, septic tank soil absorption fields, sewage lagoons, trench landfills, and area landfills.
- Suitability ratings for use as daily cover for landfill.
- Suitability for dwelling structural support.
- Potential for flooding.

These maps are a very useful planning and evaluation tool. For example, the soil map can be placed over a township map marked with sites where septic systems have been repaired or replaced. This can show whether and where a long-term strategy relying on these systems is feasible. Laying a map of the wellhead protection area for the community's water supply over the other two maps could show additional areas where the use of septic systems should be restricted.

Make sure that you understand exactly what each remaining solution can achieve and whether it will create any new problems. Reviewing this information for each solution still on your list might cause you to remove some solutions from consideration. For example, if your community has a corrosive water supply that causes the wastewater treatment plant to exceed discharge limits for lead and copper, you might consider adding phosphate to the drinking water to inhibit corrosion. This strategy, however, could cause wastewater discharges to exceed phosphate limits, and removing phosphate before discharging the treated wastewater will increase costs.

Finally, keep in mind that you might want to use a combination of solutions for some problems. Different solutions can complement each other or be used to handle different aspects of a problem. For example, a community experiencing problems with septic tank systems might develop a combination of onsite, cluster, and centralized systems for treating wastewater, along with a communitywide water conservation program to improve the performance of all of them. A central treatment plant can be built to serve residences and businesses in more densely settled areas of the community, while cluster systems can serve outlying homes for which onsite systems are not suitable.

Once you have narrowed the options, you will have a list of the solutions that are feasible for your community, along with a good idea of what they cost and what they can achieve.

Finding Solutions: Drinking Water

Your community needs an adequate supply of safe drinking water. The solutions to consider fall into two categories: quality (source protection and treatment) and quantity (conservation, leak detection, and expansion of supply).

Drinking Water Quality: Protecting the Source

About 95 percent of rural communities use ground water as a drinking water source. The best way to protect ground-water resources is a **wellhead protection program**. A wellhead protection program seeks to manage the land area through which water enters the ground water that provides your drinking water. For communities that use ground water as a drinking water source, a wellhead protection program minimizes contamination of this valuable resource.

Similarly, your community can protect its drinking water source through a **watershed protection program** if your drinking water is drawn directly from a lake, river, or other body of surface water. Your **watershed** is the area of land from which water drains into that source of surface water. Through a watershed protection program, your community can protect its surface water resources by limiting contamination in surrounding areas.

Both wellhead protection and watershed protection are forms of pollution prevention, which can directly benefit your community. Wellhead and watershed protection programs involve:

- Forming a community planning team.
- Delineating the wellhead or watershed area.
- Identifying and locating potential sources of contamination in the wellhead protection area or watershed.
- Managing the area to prevent contaminants from entering the water supply. This includes regulatory (such as zoning), nonregulatory (such as public education), and financing strategies (such as purchase of development rights).
- Reviewing the protection program every year and developing a contingency plan for alternative water supplies.

These programs are the "ounce of prevention" that can help you avoid some very expensive cures—installing treatment, cleaning up the source, or finding a new water source, all of which are far more costly than preventive measures. In most cases, your state and county

officials can help you implement simple, inexpensive preventive measures that go a long way toward protecting your drinking water source.

Drinking Water Quality: Treatment Technologies

Drinking water must be treated to protect the health of the people who drink it. Different types of treatment processes tend to be used for ground water than for surface water. The major types of drinking water treatment include disinfection, organics removal, inorganics removal, and filtration. Although filtration is sometimes used for ground-water sources, this process is primarily used with surface water. Table 5-1 describes some of the advantages and disadvantages of some treatment technologies appropriate for small communities.

Proper **disinfection** kills disease-causing microorganisms (viruses, bacteria, and some parasites). The process that small communities use most often is chlorination, in which chlorine gas or hypochlorite solutions are added to the water. **Removal of organic contaminants** (such as pesticides and solvents) **and inorganic contaminants** (such as nitrate and lead) is important if your drinking water contains any of these substances at a level that might be harmful to human health (usually equated to a level higher than the EPA maximum contaminant level [MCL]). For small communities, the most suitable technologies for removal of organic contaminants might be aeration, which strips certain organics from the water to the air, or granular activated carbon (GAC) treatment, in which water passes through specially treated carbon particles that have an extensive surface area onto which the organics can attach. In the few cases where the additional removal of inorganic contaminants is required, any one of several processes listed in Table 5-1 can be used. **Filtration** removes particles of solid matter from water, usually by passing the water through sand or other porous materials. Filtration also helps to control biological contamination. Cloudy water (cloudiness is measured as turbidity) can contain harmful microorganisms and reduces the effectiveness of disinfection.

Drinking Water Quality: Restructuring Options

Small communities may at times feel overwhelmed by the cost and complexity of owning and operating a water treatment and distribution system. Every community wants to provide its residents with the best possible service at the lowest possible cost. Many small communities have found that they can achieve this goal by restructuring their water system. Restructuring refers to changes in ownership, management, or operations that allow a system to improve service and/or lower costs.

There are many different restructuring options available to small communities. For example, a community may wish to join together with some of its neighbors to form a "mutual aid" network. Through such a network, communities can share expensive equipment and staff. Another restructuring option is contracting out the operation and maintenance of the water system. Contract service companies can be hired to handle some or all aspects of operating and managing the water system. With contract operations, the policy-making and financial decisions remain with the town council, thus preserving local control. For some adjacent communities, physical interconnection with a neighboring

system might be possible and might allow communities to share the cost of treatment facilities. See Chapter 7 for more information about restructuring options.

Table 5-1
Technologies for Drinking Water Treatment

Purpose	Technology	Advantages	Disadvantages	Costs
Disinfection	Chlorination	■ Economical. ■ Easy to operate.	■ Chlorine can combine with other compounds to create byproducts harmful to consumers exposed over long periods. ■ Safety problems with gaseous units.	Capital: Low O&M: Medium
	Ultraviolet radiation	■ Easy to operate and maintain. ■ Produces no known toxic byproducts. ■ Safer than chlorine for operations.	■ A secondary disinfectant (chlorine) must be used to prevent bacterial regrowth in the distribution system.	Capital: Medium O&M: Medium
Corrosion control	Limestone contactor	■ Easy operation. ■ Compact. ■ Best for acid waters.	■ Not for very hard, high-iron, high-CO2 waters.	Capital: Medium O&M: Low
	Aeration	■ Easy operation. ■ No chemicals. ■ Also removes other contaminant gases. ■ Best for high CO_2 waters. ■ See aeration systems on next page.	■ Energy costs higher. ■ May have high O&M with hard water. ■ See aeration systems on next page.	Capital: O&M: See aeration systems on next page
	Chemical addition	■ Economical first cost. ■ Very compact. ■ Capable of best lead and copper control.	■ High operation costs—chemicals and equipment/controls requirements.	Capital: Low O&M: Medium
Organics removal: Radon and organic chemicals, including volatile organic chemicals (such as benzene, PCBs, carbon tetrachloride, and gasoline)	Granular activated carbon	■ No gaseous emissions. ■ Low to medium O&M, labor, and power requirements. ■ Relatively low energy needs.	■ Potential waste disposal problems. ■ Very expensive.	Capital: High O&M: High

Table 5-1
Technologies for Drinking Water Treatment (continued)

Purpose	Technology	Advantages	Disadvantages	Costs
Organics removal (continued)	Packed column aeration	■ High efficiency for removing volatile contaminants. ■ Low O&M labor requirements.	■ Potential air emissions problems. ■ Might need pretreatment to remove solids and to prevent iron deposits and biological growth.	Capital: High O&M: Medium
	Diffused aeration	■ Simple construction. ■ Low O&M requirements.	■ Potential air emissions. ■ Variable removal effectiveness.	Capital: Medium O&M: Medium
	Multiple tray aeration	■ Simple construction. ■ Low O&M requirements. ■ Low energy needs.	■ Potential air emissions. ■ Variable removal effectiveness. ■ Might need pretreatment to remove iron and manganese and to prevent biological growth. ■ Might be subject to corrosion problems.	Capital: Medium O&M: Low
Inorganics removal: Cadmium, chromium, arsenic, silver, and lead	Coagulation and settling	■ Reliable process. ■ Also removes some organics, bacteria, parasites, suspended solids, and turbidity.	■ High capital and O&M costs. ■ Requires high skill level for operation. ■ Removes only small amounts of nitrogen, nitrites, radium, or barium. ■ Large amounts of sludge generated must be managed.	Capital: High O&M: High
Inorganics removal: All inorganics	Reverse osmosis and similar membrane systems	■ Very high removal efficiency. ■ Simple operation. ■ Insensitive to dissolved solids content. ■ Bacteria and colloidal particles also removed.	■ High capital and operating costs. ■ High level of pretreatment required. ■ Very large volume reject stream disposal problems.	Capital: High O&M: High
Inorganics removal: Barium, radium, cadmium, lead, silver, chromium, nitrites, nitrates, selenium, and radionuclides	Ion exchange	■ Insensitive to flow variations. ■ Usually best choice for removing radionuclides.	■ Spent regenerant waste disposal problems. ■ Might need multiple treatments to remove all contaminants. ■ Pretreatment required to protect resin.	Capital: High O&M: High

Table 5-1
Technologies for Drinking Water Treatment (continued)

Purpose	Technology	Advantages	Disadvantages	Costs
Filtration	Slow sand	■ Economical. ■ Easy to operate. ■ No chemicals required. ■ Minimal power needed. ■ High removal of disease-causing organisms.	■ Significant quantities of land needed. ■ Only particular types of sands are suitable. ■ May require more maintenance if high-solids or high-turbidity source is not pretreated.	Capital: High O&M: Low
	Dual or mixed media filters	■ Economical first cost. ■ Only used with pretreatment by coagulation and settling. ■ Land requirements less than for slow sand, but more when coagulation/settling included.	■ Operator training necessary. ■ Pretreatment with chemicals required. ■ May not be suitable for small communities.	Capital: Medium O&M: Medium

Drinking Water Quality: System Options

In some cases, when a contaminant reaches potentially harmful levels in only one part of the service area and/or interferes with only one specialized use, a community might consider **point-of-use** or **point-of-entry devices**. These devices are installed at a homeowner's tap or at the point of entry to a larger area, such as a street or trailer park. Types of treatment available with these devices include reverse osmosis, activated carbon, activated alumina, and ion exchange. The public water supplier must monitor and ensure the quality of water treated with these devices; therefore, the ability to monitor is the controlling step in allowing the use of these devices.

Package plants might offer a low-initial-cost alternative to permanent treatment structures. These are modular units that usually are assembled off site and shipped to the community. The plants contain a number of treatment technologies in one unit and are usually used to treat surface water supplies to remove color, turbidity, and microorganisms. Package plants that remove organic and inorganic substances, however, are also available. Because the operational requirements for package plants are quite significant, except in rare instances a small community should consider using them only if the community can transfer the responsibility to another party (such as the county or a private contractor) or restructure (e.g., combine the local system with other small systems) to improve its ability to operate such sophisticated systems.

Drinking Water Quantity: Conservation

People can do many simple things to use less water, for example, use low-flow shower heads and toilets, place a filled plastic bottle or toilet dam in the toilet tank, or shut off the tap while brushing teeth. Every gallon saved is one less gallon pumped, treated, and delivered to the consumer. A water conservation program can consist of updating building codes, conducting public education, or promoting conservation through financial incentives, such as higher water rates or scaled charging systems. For example, a powerful tool to keep water demand in check is regressive user charges, which charge customers who use more water a higher fee per gallon used. These charges penalize usage beyond basic requirements and encourage people to use less so that they can save money.

Check with your state about water conservation requirements. For example, for more than 10 years, California and other states have required communities planning expansion of water infrastructure to compare structural approaches to expansion (wells, sewers, treatment plants) with nonstructural approaches (leak repair, rate structure modification, and toilet and other water fixture retrofits).

Drinking Water Quantity: Leak Detection

Finding and preventing leaks can save a lot of water. A **water audit** compares the total quantity of water produced with metered water consumption. If the total metered water usage is less than 85 percent of the total metered water production, a systemwide leak detection survey should be conducted. Distribution pipes, treatment facilities, and water pumps all can be sources of large leaks. Finding a leak can be difficult and expensive. Fixing the leak, which often involves excavating covered pipes, can also be expensive. If the leak is severe, however, the expense can be justified.

Drinking Water Quantity: Finding a New Supply

Except for communities with large growth potential or a major new water-consuming user (such as a large subdivision), water conservation, leak correction, reuse options, and regressive user charges may be enough to keep a community from having to seek a new water supply. To justify these programs to members of the community, explain that the programs avoid major capital expenses that go along with developing new water supplies. If a major increase in the demand for drinking water is expected, however, a new water supply might be necessary. This could be an excellent long-term alternative if a relatively pure supply is close and available. Depleting a natural resource, however, always has a price. Keep in mind, too, that increasing the supply will increase the cost of drinking water and will also affect wastewater management costs.

Finding Solutions: Wastewater

Domestic wastewater must be properly managed to avoid public health problems. Three types of wastewater handling systems can be used in small communities: onsite systems, cluster systems, and centralized systems. Your community might need a combination of these systems, such as onsite systems in outlying areas, cluster systems in small residential subdivisions, and centralized systems in more populated or commercial areas.

Onsite Systems

Septic systems handle the wastewater from one residence on site. These systems are very common in small communities where homes are not close together. Septic systems consist of a tank that retains the wastewater solids and a drainage field (leachfield) where the tank effluent is distributed. In the leachfield, natural processes purify the liquid as it drains through the soil.

Conventional septic systems work best on large lots with deep, permeable soils. A variety of alternative onsite system designs are available to accommodate a range of difficult site and soil conditions. The most appropriate system depends on factors such as how permeable the soil is, how high the water table is, and how shallow the bedrock is.

Poorly sited, designed, installed, or maintained septic systems can result in surface ponding in yards. Surface ponding that continues for an extensive period is considered a health hazard and requires corrective action. Because maintenance is the only factor that can be controlled once an onsite system is installed, a program of periodic inspection and/or pumping is advisable. This approach, combined with public education to ensure that owners are putting only appropriate materials down the drain, is the easiest to implement. Repairs and replacements should always be done by professionals with the approval of local or state authorities, since exposure to inadequately treated sewage and hydrogen sulfide gas presents a health risk.

Although individuals usually own septic systems, a community can take a variety of steps to maintain effective systems, including:

- Periodically inspecting the system and requiring pumping when necessary.
- Requiring an operating permit that must be renewed periodically to ensure maintenance.
- Keeping files of all septic system locations and maintenance performed.
- Requiring prior approval by the town or county health officer of all repairs and replacements.

- Setting up a fund to help homeowners with needed repairs or replacements.

In some states, legislation permits setting up onsite wastewater management districts. Of course, one important way to improve the performance of an onsite system is to conserve water. This reduces the volume of water the system has to handle. Detecting and repairing leaky faucets and toilets, using low-flow showerheads, toilet dams, low-flush toilets, and faucet aerators, and eliminating wasteful water use habits all conserve water.

Cluster Systems

In some neighborhoods individual onsite systems are inappropriate, either because lots are too small or because other land characteristics make them impractical. In this situation, a cluster system might be appropriate. A cluster system normally uses low-cost alternative sewers to collect wastewater from homes in the area and transport it to a reliable, low-cost, easily operated treatment/disposal facility. This type of system can be suitable for developments or neighborhoods of up to 100 homes but is often used for smaller groupings.

Several types of alternative sewer systems can be used to collect and transport wastewater from residences to the treatment facility. (See Table 5-2 for a description of alternative sewer systems.) The treatment facility is usually a larger version of an individual onsite system, such as subsurface soil absorption systems or sand filters.

As with any treatment system, a maintenance program is essential to ensure proper operation of a cluster system. Compared with conventional collection and treatment systems, cluster systems require minimal maintenance. The maintenance program, however, should always be in place and clearly spelled out to homeowners who use the cluster system.

Centralized Systems

In more densely settled areas, where multiple cluster systems are needed and onsite systems are not practical, a centralized wastewater system might be necessary. Constructing conventional sewers to collect the wastewater, however, is almost never practical for small communities because of the high cost. Conventional sewers usually account for over three-quarters of the total cost of a conventional wastewater collection and treatment system. The high cost of constructing the sewer system might be acceptable on a per-household basis, however, if no lift stations are required, but alternative designs are almost always cheaper under the same circumstances. Alternative sewers—small-diameter gravity, pressure, and vacuum sewers—can save 25 to 50 percent of the capital cost of wastewater collection in small communities.

Many types of technologies are available for treating wastewater at a centralized plant. Natural treatment technologies use natural processes associated with soils, vegetation, or wetland environments to treat wastewater and include land treatment, lagoons, slow sand filters, and constructed wetlands (see Table 5-3). These systems generally require larger land areas than mechanical systems. Wastewater must be treated (usually by sedimentation or lagoons) before application to land, filters, or wetlands.

Table 5-2
Alternative Sewer Systems

Sewer Option	Description	Applications	Advantages	Disadvantages	Costs Relative to Conventional
Small-diameter gravity sewers	A septic tank at each house, usually followed by a small-diameter sewer of lightweight plastic that can be buried at shallow depths.	Suitable for areas with: ■ Topography sloping downward toward treatment site. ■ Low-density population. ■ High ground water or shallow bedrock.	■ Can be easily diverted around, above, or below obstacles. ■ Installed at shallow depth; can often follow contours of land. ■ Low infiltration of ground water and stormwater. ■ No power required.	■ Each service connection requires a septic tank. ■ Pumping and disposal of septage from each tank required. ■ Pump stations might be required in rolling terrain.	Capital: Low O&M: Low
Small-diameter pressure sewers ■ Septic tank effluent pump (STEP). ■ Grinder pump (GP).	STEP sewers pump settled septic tank liquid to a treatment facility. GP sewers grind up solids in wastewater and pump liquids and solids to treatment facility. Both use small-diameter piping buried at shallow depths.	Suitable for areas with: ■ Flat or upward-sloping topography. ■ Low-density population. ■ High ground water or shallow bedrock.	■ No infiltration of ground water or stormwater. ■ Can be built around buildings and trees. ■ No septic tank required for GP. ■ Installed at shallow depth. ■ Some manufacturer technical assistance available.	■ Power required for pumping units at each house. ■ Higher operation and maintenance costs. ■ Septic tank pumping and septage disposal required for STEP. ■ High-strength GP wastewater.	Capital: Low O&M: Medium
Vacuum sewers	Wastewater is collected in sumps and enters sewer through valve. Wastewater is drawn through small-diameter pipes to a central vacuum station, where it is then pumped to conventional sewer or treatment facility.	Suitable for areas with: ■ Flat terrain. ■ Higher density population. ■ High ground water or shallow bedrock.	■ Single central power connection. ■ No septic tanks required. ■ Least likely to have odor and corrosion problems. ■ Minimal infiltration of ground water and stormwater. ■ Installed at shallow depth. ■ Manufacturer provides technical assistance program.	■ Skilled operation and maintenance required. ■ Minimum number of connections is about 50 homes per vacuum station.	Capital: Low O&M: Medium

Table 5-3
Centralized Wastewater Treatment Technology Options

Technology	Description	Advantages/Disadvantages	Costs	
Land application: ■ Slow-rate infiltration (SRI). ■ Rapid infiltration (RI). ■ Overland flow (OF). ■ Subsurface wastewater infiltration systems (SWIS).	Treated wastewater is sprayed or flooded onto vegetated soils, sandy basins, or a grass-covered slope, or is distributed from pressurized laterals below the surface in gravel trenches. Natural processes purify the wastewater.	■ All but SWIS require buffer area for separation and require a long-term commitment of a large land area. ■ Ground water contamination by nitrates might be a concern with SWIS and RI. ■ Except for overland flow, no discharge permit required. ■ SRI and OF unsuitable for treating wastewater in cold weather, requiring holding ponds for storage during winter months.	Capital: O&M:	Medium Low
Lagoons: ■ Facultative. ■ Aerated. ■ Controlled discharge.	Wastewater is placed in a large pond and is treated by the interaction of sunlight, wind, algae, and oxygen over time. Deeper lagoons can be aerated to provide additional oxygen.	■ Odors possible. ■ Large amount of land required. ■ May not always meet effluent requirements. ■ Aerated lagoons require significant power.	Capital: O&M:	Low Low to medium
Constructed wetlands: ■ Free water surface (FWS). ■ Submerged flow (SF).	Settled wastewater is applied to a SF-constructed wetland. Lagoon-treated effluent is applied to FWS wetlands. Natural processes purify the wastewater.	■ FWS requires very large land area. ■ Present SF design removes organics and solids. ■ Low energy requirements.	Capital: O&M:	Low Low
Trickling filter	Settled wastewater trickling down through a bed of rock or plastic media is purified by the bacteria living in the medium. The bacteria slough off and separate as sludge in a final settling tank.	■ Process is vulnerable to freezing temperatures. ■ Less effective removal of toxics and metals than activated sludge (AS) systems. ■ Capable of meeting secondary effluent standards. ■ Large volume of sludge generated. ■ High power requirements.	Capital: O&M:	Medium Medium
Oxidation ditches	Screened and degritted raw wastewater is mechanically aerated in an oval ditch. After treatment, liquid and sludge are separated in a final settling tank.	■ Most stable performance of all continuous flow mechanical biological systems. ■ May be designed and operated to meet water quality limits beyond secondary effluent. ■ Skilled maintenance required. ■ Large volume of sludge generated.	Capital: O&M:	Medium High

Table 5-3
Centralized Wastewater Treatment Technology Options (continued)

Technology	Description	Advantages/Disadvantages	Costs	
Sequencing batch reactor	A tank is filled with screened and degritted wastewater. Wastewater is aerated, solids are allowed to settle, and the effluent is drawn off and discharged. One tank or multiple parallel tanks can be used.	■ Subsequent (disinfection) processes must be oversized or require equalization. ■ Most flexible mechanical biological treatment systems capable of phosphorus and/or nitrogen removal. ■ Large volume of sludge generated. ■ Can be designed and operated to meet water quality limits beyond secondary effluent.	Capital: O&M:	Medium Medium
Slow sand filters: ■ Recirculating (RSF). ■ Intermittent (ISF).	Settled wastewater is applied to the surface of a sand bed and allowed to percolate through the bed, where it receives treatment.	■ Reliable, high-quality treatment. ■ RSF capable of removing (~50%) nitrogen. ■ Required land area intermediate between natural and mechanical system.	Capital: O&M:	Medium Low

Mechanical treatment technologies use engineered facilities that treat large volumes of wastewater in a relatively small space. They require more skilled attention and energy to operate and are less sensitive to changes in climate compared with most natural systems. Mechanical systems appropriate for small communities include trickling filters, oxidation ditches, and sequencing batch reactors.

All of the above treatment systems are usually capable of meeting state standards for discharge to surface water. (All systems that discharge to surface water must obtain a National Pollutant Discharge Elimination System [NPDES] permit, which determines the amount of treatment and monitoring required.)

All treatment systems produce some amount of sludge, which must also be treated and/or properly managed. Sludge treatment systems reduce sludge volume by removing water (dewatering). They can reduce the number of disease-causing organisms in sludge and reduce its attraction for insects, rodents, and other animals through digestion, composting, or adding lime. Spreading treated sludge on the land to improve soil or placing it in a landfill are the most common disposal methods for small communities.

Depending on the wastewater discharge standards that apply to your community, a centralized wastewater treatment facility might be required to disinfect the effluent before discharging it to a water body. Your state may also restrict the use of certain natural wastewater treatment or sludge disposal techniques.

Finding Solutions: Solid Waste

The best approach to solving a community's solid waste problem is integrated solid waste management—using a **combination** of techniques and programs to manage the municipal waste stream. An integrated system is designed to address a specific set of local solid waste management problems, and its operation is based on local resources, economics, and environmental impacts.

The idea behind integrated solid waste management is that a combination of approaches can be used to handle targeted portions of waste stream. Local officials should consider a series of activities, each of which is designed to **complement** the others. For example, a recycling program can have positive impacts on the development of a waste-to-energy facility. Source reduction, recycling, combustion, and landfilling can all have positive impacts on the local municipal waste management problem.

To reduce waste management problems at the national level most effectively, states, municipalities, and the waste management industry should first consider source reduction—reducing the amount and toxicity of the solid waste generated. Recycling of useful waste materials is the next most desirable approach. Finally, composting, incineration, and landfilling complete the solid waste hierarchy. Suitable combinations of these alternatives are considered an integrated management program.

For small communities, **regional cooperation** in solid waste management offers several advantages. Communities that join forces can share the resources needed to promote reduction at the source and operate recycling and composting programs. For example, communities often can obtain better contracts for selling recyclable materials with the higher volume of materials resulting from regional cooperation. With incineration, a regional facility is probably the only economically feasible approach. With landfilling, regional cooperation can result in greater efficiency and cost savings in collecting and transferring trash and in operating the solid waste facility. Larger facilities are more attractive to private industry, which can relieve individual towns of the responsibilities of operating these facilities. Host counties and communities can also claim additional cost savings.

Pollution Prevention: Source Reduction, Recycling, and Composting

Source reduction, recycling, and composting reduce the total volume of waste that must be disposed of, thereby lowering disposal costs and extending the life of your disposal facility (landfill).

Source Reduction

Source reduction is an approach that changes the way products are manufactured, purchased, and used so that less solid waste is generated. You can ask community members to generate less waste by:

- Reusing plastic and paper shopping bags, lunch bags, and containers. For example, local merchants can cooperate by offering a reward for each bag returned.
- Eliminating unnecessary packaging.
- Using long-life and energy-efficient products (such as light bulbs).
- Avoiding disposable products if reusable items are available (such as razors and batteries).
- Using mulching mowers so that grass does not have to be bagged.

Similarly, your town government should consider leading by example, revising its purchasing practices to follow the same principles listed above. Your community could also consider using "pay-as-you-throw" rates for garbage collection to reduce the amount of garbage. Over 1,000 communities, including many small communities, have adopted this kind of system, which charges residents different disposal rates based on the amount of garbage they generate. However, charges should reflect community attitudes. At many locations where these systems were initiated without community support, illegal dumping of solid waste has increased.

Recycling

Some solid wastes can be collected separately and sold to manufacturers as raw materials for making products. Town leaders can tap into the desire among community members to "do the right thing" by designing programs that make it easy to recycle. Recycling collection programs range from simple, low-technology dropoff centers to complex separation at material recovery facilities. Table 5-4 shows several recycling options.

Critical to the success of a recycling program is the availability of markets for collected materials. Without proper markets, storing, transporting, and disposing of the recyclables that have been collected can result in significant costs. You will need to identify marketable materials and the potential volume of each, and find potential buyers for the materials. In general, marketable recycling materials include:

- Aluminum cans
- Glass bottles
- High-grade office paper
- Cardboard
- Other metal cans
- Some plastic bottles
- Newspaper and magazines
- Metals
- Wet cell batteries (such as car batteries)

For the recycling process to go full circle, the recyclable materials that have been collected must actually be reused. Small communities can help "close the loop" by purchasing products with recycled content and encouraging citizens and local industries to do the same; this helps create markets that ensure collected recyclables are reused.

Table 5-4
Recycling Options for Small Communities

Collection System	Description	Advantages/Disadvantages
Recycling in conjunction with other public service	Recyclables are collected with other public services, such as solid waste collection.	■ Profits from sales of recyclable materials are internalized within the solid waste management program.
Regional facilities	Collected materials are pooled in a regional recycling center or facility.	■ Practical in areas with sparse population. ■ The recycling program has independent budgeting and money-raising power. ■ Able to handle more recyclable materials, which are more marketable for buyers.
Private recycling operations	Recycling is done through private entities, such as industry or waste management firms.	■ Reduces capital investment in collection equipment. ■ Can be selective in accepting recyclable materials (low-value materials such as mixed paper may not be accepted).
Public recycling drives with volunteers	Recycling programs are run as fundraising or public service activities. These programs are often operated in conjunction with local governments, which may supply buildings, equipment, and staff.	■ Increases public involvement and awareness.

Recycling alone will not solve a community's solid waste problems, but it can divert a significant portion of the waste stream from disposal in landfills or combustion facilities. For a community of 1,000 people, recycling the materials listed on the previous page would typically reduce the amount of waste disposed of in a landfill by about 5 percent.

Composting

Yard wastes (leaves, grass, weeds, and remains of plants) account for close to 20 percent (by volume) of the municipal solid waste stream. Yard wastes can be easily decomposed by bacteria and fungi to form a humuslike product useful as a soil amendment for gardening, landscaping, and agriculture. A centralized yard waste composting program can be relatively inexpensive and easy to operate, and can help reduce the amount of solid waste bound for disposal. You can encourage homeowners to compost yard waste on their property if a centralized system is not practical. Because home composting might attract unwanted animal life or breed insects if not done properly, a public education or assistance program is important. In addition, community programs that encourage the use of mulching mowers and low-maintenance plantings can be very effective in reducing the amount of yard waste generated.

Table 5-5
Alternative Collection Systems for Sparsely Populated Areas

Collection System	Description	Advantages	Disadvantages
Direct haul	Wastes are directly hauled by residents to a transfer or disposal facility.	■ Appropriate in sparsely populated areas, where a collection system is impractical. ■ Low costs.	■ Can be inconvenient for residents. ■ Difficult to control waste separation. ■ Higher incidence of illegal dumping.
Green box or roll-off containers	8- to 12-cubic-yard (or larger) steel containers are placed strategically throughout the community, to which residents must deliver waste. A larger collection vehicle collects the waste from the container.	■ Reduces the travel distance for residents, compared with direct haul. ■ Less traffic congestion near disposal facilities. ■ Reduces incidence of illegal dumping compared with direct haul.	■ Difficult to control waste separation. ■ Costs somewhat more than direct haul.
"Mailbox" collection	Residents leave their waste near their mailboxes for scheduled collection.	■ No community capital costs for purchasing containers and constructing pads. ■ Minimizes illegal dumping.	■ Assumes a collection vehicle can travel same routes as mail delivery vehicle. ■ More expensive due to labor and need for collection vehicle.
Green bag/blue bag collection	Residents separate their wastes for curbside pickup.	■ Allows collection of compostable and noncompostable waste.	■ Usually feasible only for a large (e.g., countywide) program.

Solid Waste Collection and Transfer

Because it is labor intensive, collection is often the most costly part of a community's solid waste management program. Efficiency in the collection system can therefore save a community a significant amount of money. Municipal workers or private collection services can operate the collection system. Table 5-5 describes the advantages and disadvantages of alternative collection systems.

Collected solid wastes are delivered either to a **transfer station** or directly to disposal facilities. Transfer stations are centralized facilities where waste is unloaded from several small collection vehicles and loaded into a large vehicle; the large vehicle then transports waste to the disposal facility. In this way, only one vehicle has to travel the last segment of the journey to the disposal facility. In addition, operation of a transfer station can be integrated with other waste management options such as recycling programs. Because of its high capital and operating costs, however, you will need to perform a careful cost-benefit analysis when evaluating the use of a transfer station. By sharing a regional transfer station, communities that use the same disposal facility can substantially reduce their individual costs.

For most rural and sparsely populated communities, green box or mailbox collection programs are the most practical approach, but in some very rural settings, direct haul might be the only option.

Solid Waste Disposal

The most common methods for solid waste disposal are landfilling and incineration. **Landfilling** involves placing wastes in a large, specially designed cavity, then covering them with soil (or approved alternative materials) each day. The daily cover prevents attraction of animals and insects. Federal law mandates many specific requirements for landfills, including that the bottom of the landfill be lined with more than one layer of impermeable materials (synthetic plastic and natural clay) to prevent the contamination of ground water by liquid leaching from the landfill.

Incineration involves burning combustible solid wastes (such as paper and plastic materials) in a large, specially designed furnace. The waste is reduced to an ash, which must then be disposed of, usually in a landfill. Incinerators can generate valuable energy as a byproduct.

Regional landfills and incineration facilities can provide practical and cost-effective regional solutions for several small communities. Capital and operating costs for these facilities are shared by a larger number of users, reducing the cost to individuals in any one community.

Finding Solutions: Hazardous Waste

Improper disposal of household hazardous waste (HHW), including used oil, can have major environmental consequences for small communities, especially for drinking water supplies. A number of small communities have begun HHW collection programs and used oil recycling programs to prevent pollution from these substances.

Household Hazardous Waste Collection Programs

Many common household products contain hazardous constituents (see Table 5-6). These products become HHW once the consumer no longer has any use for them. The average U.S. household is estimated to generate more than 20 pounds of HHW per year. As much as 100 pounds can accumulate in the home, often remaining there until the family moves or does an extensive cleanout. HHW can pose risks to people and the environment if it is not used and stored carefully and disposed of properly.

HHW programs benefit communities by reducing the risks to health and the environment resulting from improper storage and disposal of HHW. While programs vary across the

Table 5-6
Some Potentially Harmful Components of Common Household Products

Product	Typical Toxic or Hazardous Components
Antifreeze (gasoline or coolants systems)	Methanol, ethylene glycol
Automatic transmission fluid	Petroleum distillates, xylene
Automobile battery acid (electrolyte)	Sulfuric acid
Degreasers for driveways and garages	Petroleum solvents, alcohols, glycol ether
Degreasers for engines and metal	Chlorinated hydrocarbons, toluene, phenols, dichloroperchloroethylene
Engine and radiator flushes	Petroleum solvents, ketones, butanol, glycol ether
Hydraulic fluid (brake fluid)	Hydrocarbons, fluorocarbons
Motor oils, waste oils, grease and lubes, gasoline, diesel fuel, kerosene, #2 heating oil	Hydrocarbons
Rustproofers	Phenols, heavy metals
Carwash detergents	Alkyl benzene sulfonates
Car waxes and polishes; bug/tar removers	Petroleum distillates, hydrocarbons, xylene
Asphalt and roofing tar	Hydrocarbons
Paints, varnishes, stains, dyes	Heavy metals, toluene
Paint and lacquer thinner	Acetone, benzene, toluene, butyl acetate, methyl ketones
Paint and varnish removers, deglossers, strippers	Methylene chloride, toluene, acetone, methanol, xylene
Paintbrush cleaners	Hydrocarbons, toluene, acetone, methanol, glycol ethers, methyl ethyl ketones
Metal polishes	Petroleum distillates, isopropanol, petroleum naphtha
Laundry soil and stain removers	Hydrocarbons, benzene, trichloroethylene, 1,1,1-trichloromethane
Other solvents	Acetone, benzene
Refrigerants	1,1,2-trichloro-1,2,2-trifluoroethane
Household cleansers, oven cleaners	Xylenols, glycol ethers, isopropanol
Drain cleaners	1,1,1-trichloromethane
Toilet cleaners	Xylene, sulfonates, chlorinated phenols
Disinfectants	Cresol, xylenols, heavy metals
Ointments	Heavy metals
Pesticides (all types)	Naphthalene, phosphorus, xylene, chloroform, heavy metals, chlorinated hydrocarbons
Photochemicals	Phenols, sodium sulfite, cyanide, silver halide, potassium bromide
Printing ink	Heavy metals, phenol-formaldehyde
Wood preservatives (creosote)	Pentachlorophenols
Swimming pool chlorine	Sodium hypochlorite
Lye or caustic soda	Sodium hydroxide
Jewelry cleaners	Sodium cyanide
Cosmetics	Heavy metals

Source: *Adapted from University of Rhode Island. 1988. Natural resources facts: Household hazardous wastes. Fact sheet no. 88-3 (August).*

Table 5-7
Selected Household Hazardous Waste Collection Systems

System	Description	Advantages	Disadvantages
One day dropoff collection	A licensed hazardous waste contractor signs a contract with the community (or several communities) to collect HHW on site. Residents drop off the wastes at specified locations on a specified day.	■ Most HHW is accepted. ■ Costs may be reduced if more communities are involved. ■ Most widely used collection method.	■ Possible congestion or delays at collection point. ■ Public participation is limited to volunteers. ■ Some cost to community.
Mobile facility dropoff	A moveable facility allows periodic collections on a regular schedule at different sites within a county or several communities.	■ Increases public participation over dropoff method as number of sites increases.	■ Initial investment is very high (contract rental may reduce the costs).
Curbside collection	Scheduled collection conducted by contract collector (usually 1–4 times/year).	■ Efficient if well managed. ■ Maximizes public participation. ■ Most convenient for participants.	■ Expensive. ■ Types of wastes usually limited to waste oil, paint, or certain hazardous wastes such as explosives and corrosive wastes in corroded containers.
Point of purchase	Residents return HHW to retail stores where the products were originally purchased.	■ Low cost. ■ Deposit requirement on purchase may enhance public participation.	■ Types of wastes are limited (usually car batteries and waste oils).

country, most include both educational and collection components. Public education about HHW is necessary no matter what collection/disposal strategy is used. Education can focus on:

- How HHW contributes to pollution.
- Which kinds of products contain hazardous constituents.
- Which alternative products contain fewer or no hazardous constituents.
- How to reduce the amount of HHW generated in the home (such as using up household products or giving away what cannot be used).
- How to properly store, handle, and dispose of products in the home containing hazardous constituents.

Communities usually begin a HHW program by designating a specific day for residents to drop off HHW. Organizing a collection event, perhaps with neighboring communities, is an important first step in reducing and managing risks associated with HHW. Options for HHW collection are shown in Table 5-7.

Finding Solutions: Nonpoint Source Pollution

Nonpoint source (NPS) pollution comes from many different sources and affects both surface water and ground-water quality. NPS pollution can especially be a problem when it affects drinking water supplies. Even water bodies that are not used for drinking water, however, can become so degraded that they can no longer be used for desirable purposes, such as fishing and swimming.

Because of the strong relationship between drinking water and NPS issues, many of the technology and management options presented in this chapter for drinking water are also useful for NPS pollution. NPS pollution control should be part of wellhead and watershed protection programs. The most important aspects of NPS pollution control programs are:

- Identifying sources of NPS pollution.
- Developing management strategies to control NPS pollution. As with wellhead and watershed protection, this includes regulatory strategies, nonregulatory strategies, and financing strategies, as well as control methods that the local government can use directly.
- Educating the community on NPS pollution problems and strategies to reduce those problems.

Sources of NPS Pollution

Many different activities and land-use patterns create NPS pollution. Commonly, NPS pollutants are carried by rain and snowmelt that run into lakes, streams, and other water bodies. Stormwater runoff can carry soil, fertilizers, pesticides, oil and other car fluids, trash, and other materials that affect water quality. Runoff increases when natural vegetation, which captures and uses much of the rainwater, is removed. Problems also occur when natural lands are developed and covered with houses and hard surfaces such as asphalt that do not absorb water. Rainwater that falls on these surfaces quickly runs into surrounding areas. This problem is worsened when contaminants on these surfaces, such as antifreeze leaked from cars, are washed with the runoff into surrounding water bodies.

Runoff is also a major problem on surfaces that cannot absorb water quickly enough, such as exposed soil. This is a particular concern because runoff over bare soils causes erosion, which increases water quality problems and wastes valuable soil resources.

Air pollution also contributes to NPS water pollution. Contaminants that are released to the air settle or are ultimately washed out of the air by rain or snow.

Management Strategies for NPS Pollution

There are two practical ways to reduce NPS pollution:

- Reducing contaminants that are applied to the soil or released to the air.
- Keeping stormwater runoff to a minimum.

For small communities some of the most common contaminants that contribute to NPS pollution are pesticides and fertilizers. Most pesticides contain toxic substances that can contaminate drinking water and poison plant or animal life. Fertilizers can cause excessive levels of nitrate in ground water and can cause excessive algae growth in surface water bodies. Too much algae reduces the oxygen and sunlight available in the water, which harms naturally growing plants and animals. When too much of a pesticide or fertilizer is applied to plants or soils, the excess is washed away into receiving waters. When pesticides and fertilizers are used before a rainstorm, much of what has been applied can be immediately washed away. Using too much of these substances and using them at the wrong time also wastes money.

The best way to reduce NPS pollution is to reduce the amount of nonabsorbent and minimally absorbent ground cover. A good approach is to surround areas such as parking lots with plant-covered strips that can capture and soak up runoff. Finally, exposed or bare soil should be limited as much as possible. Stalks, leaves, and other plant residue can be left to cover the soil after crops are harvested, or quick-growing plants such as grasses can be planted on exposed soils. These methods protect the soil for the next growing season and help reduce pollution of nearby water bodies.

Examples of regulatory, nonregulatory, and financing strategies available to small communities for NPS pollution control are presented in Table 5-8.

Educating the Community

Because NPS pollution control strategies can help both the environment and community residents, educational programs can be extremely successful. Before people will change their actions to reduce NPS pollution, they need to be made aware of how their activities affect local water bodies. They also need to be educated on how to best reduce NPS pollution. You can make a big difference by educating community residents. Use public service announcements and press releases to spread the word about the causes of NPS pollution problems. Set up a committee that can provide advice to local residents on how best to reduce NPS pollution and save money at the same time. Send out pamphlets that outline the problems and possible solutions.

Educational programs can be both popular and powerful. Communities around the country have used educational programs to spur actions that protect their valued waterways. People are willing to help once they are armed with the knowledge they need.

Table 5-8
Reducing Nonpoint Source Pollution: Options for Small Communities

Program Type	Description	Advantages	Disadvantages
Protective zoning	Areas within the community are separated into land-use zones and districts. Sensitive areas, such as wetlands and strips along rivers, lakes, and other water bodies, are identified. Potentially damaging activities in these areas, such as excessive pesticide use and development, are restricted.	■ Water bodies susceptible to NPS pollution can be directly protected. ■ Environmentally beneficial land-use practices can be encouraged, while land-use practices that cause environmental problems can be discouraged or eliminated.	■ Does not affect current land-use practices that are causing pollution. ■ Can be controversial because it affects how residents can use their land. ■ Requires significant administration and enforcement.
Acquisition	Sensitive areas, or buffer zones around sensitive areas, are purchased by the community. The community can then directly control activities in these areas to reduce NPS pollution.	■ Offers the most direct protection for water bodies susceptible to NPS pollution. ■ Can achieve other goals, such as flood management, creation of open space for recreation, and preservation of ecologically important settings.	■ Potentially high costs.
Tax incentives	Landowners that keep their land in a state that reduces NPS pollution, such as forest land, are taxed at a lower rate than those that develop their land.	■ Promotes environmentally beneficial land-use practices while discouraging practices that cause environmental problems.	■ Limits local government intervention. ■ Might result in lost tax revenue for the community. ■ Requires significant administration, assessment, and bookkeeping. ■ Landowners might still develop their lands, despite the program.

Finding Solutions: Underground Storage Tanks

Thousands of small and rural governments own and operate underground storage tanks (USTs). Eighty percent or more of the USTs in small towns are made of unprotected steel and might leak after as few as 10 years in the ground. Leaking tanks pose a major threat to ground water. In 1992, corrective action costs for a spill or leak contaminating only soil ranged from $10,000 to $125,000. Cleanup costs involving ground water can range from $100,000 to over $1 million, depending on the extent of contamination.

Your community should develop a list of private existing and abandoned underground storage tanks, as well as those owned and operated by the community. Contact your state regulatory agency to see if it has a list of USTs in your area.

A community has two basic options for reducing the potential risks associated with owning an UST:

- Closing existing USTs. This option eliminates potential future liabilities. The cost of removing old tanks and assessing the site ranges from $5,000 to $10,000. Table 5-9 shows a number of options that small communities can choose if they close existing USTs. More than one of these options can be used at the same time.
- Upgrading existing community-owned USTs through repair and installation of required systems that protect against leaks and spills. This may be a very expensive option —$20,000 to $30,000 for equipment and labor and $2,000 to $6,000 annual operating costs—and does not relieve the community of liability for future leaks and spills.

Table 5-9
Options for Communities That Close Existing USTs

Option	Description	Advantages	Disadvantages	Costs*	
				Category	Range
1. Using commercial supplies	Maximize use of nearby commercial petroleum product suppliers.	■ If conveniently located suppliers are available, eliminates future liability with only slightly higher costs.	■ Depends on the availability and long-term stability of the suppliers. ■ Slight increase in fuel costs.	■ Additional fuel costs.	$0.05–$0.20 more for each gallon of fuel purchased.
2. Using alternative fuels	Use alternatives to oil (such as electricity or natural gas) for heating purposes.	■ Potential added benefit of reduced pollution.	■ Fuel costs may be substantially higher. ■ O&M costs may be changed. ■ Conversion costs can be substantial.	■ Conversion and operating costs.	Determined by type of alternative.
3. Regionalization	Several communities share one large, centrally located facility with one or several USTs and close some or all their USTs.	■ Has some of the advantages of closing existing USTs. ■ Communities share the cost of compliance and liability.	■ Not practical in sparsely settled areas. ■ Possible inconvenience due to travel distance and time.	■ New tank installation and operating costs.	Determined by facility size and complexity.
4. Privatization of USTs	Community signs lease agreement with a private vendor; under agreement, the vendor constructs, operates, and owns the facility.	■ Reduces or eliminates liability. ■ Capital costs are spread out over the term of the lease. ■ Used where #1 is not feasible.	■ Higher costs per unit of storage capacity.	■ Typical annual lease payments for 5 years.	$9,000–$15,000 annually.
5. Above-ground tanks	Construct storage tanks above the ground.	■ Reduces many environmental risks associated with USTs. ■ Lower O&M and possibly capital costs. ■ Easy leak detection and remediation.	■ Subject to more dangerous explosions from vapor leaks. ■ Safety issues may result in prohibition of construction in certain areas.	■ Tank installation.	$20,000–$50,000.
6. Installation of new USTs	Install state-of-the-art UST for best performance and management.	■ Protection against leaks and spills.	■ Most expensive option. ■ Still liable for spills and leaks.	■ Typical operating costs. ■ Typical installation costs (equipment and labor) per tank.	$2,000–$6,000 (annual only). $25,000–$50,000.

* Costs are in addition to the $5,000–$10,000 cost of closing existing USTs (removing old tanks and assessing sites).

Ruraltown Narrows the Options: Septic Tank Problems

Septic systems are a serious problem in certain areas of Ruraltown, causing high coliform counts in nearby private wells. Some septic systems had been installed in areas where they could never accept the wastewater properly because the soil was too shallow or impermeable.

After discussion with the local extension agent and a state official, the planning team obtained soil maps for the area. Overlaying the septic system failures revealed that certain areas of the town were unsuitable for the use of these systems, with the areas of failures generally matching the areas with unsuitable soils. Other, outlying areas had good soils for septic systems, and the overlay revealed few problems there.

The planning team drew up a list of possible options to address this problem and eliminated some from consideration. Where conventional onsite septic systems wouldn't work, the team learned, some other types of onsite systems (such as mound systems) might be feasible for the soil conditions in the area. Conveying wastewater from a number of homes via a small diameter effluent sewer to a "cluster" treatment facility (large soil absorption system or sand filter) might also be possible on a suitable site a short distance away. The team ruled out conventional sewers and centralized wastewater treatment for the homes in question because of the large distances between homes and between these homes and the existing underused collection system, which would have resulted in prohibitive costs. Low-cost sewers, however, could be used to carry wastewater to the existing mains.

The Ruraltown team narrowed the options in this manner for each of the problems and needs it had identified. The list of feasible options is shown on the next page.

Feasible Solutions to Ruraltown's Problems

Problem	Solution
Drinking water samples exceed coliform MCL	■ Obtain outside assistance (such as a circuit rider or contract O&M) to provide on-the-job training and supervision for Ruraltown's operators/administrators. ■ Improve chlorination equipment (upgrade mixing system and contact tank). ■ Implement wellhead protection program. ■ Hire engineering firm to evaluate long-term needs.
Inadequate drinking water system capacity	■ Conduct full professional evaluation. ■ Upgrade current treatment facility. ■ Dig new wells in protected areas. ■ Replace portions of distribution system. ■ Implement water supply program (water conservation, leak detection, new rate structure, and public education).
Drinking water plant does not meet all monitoring requirements	■ Determine and conduct all required monitoring. ■ Investigate possibility of monitoring waiver for some contaminants. ■ Seek agreement with other communities to pool samples to reduce costs of commercial laboratory, or consider using an academic institution in area.
High coliform counts in private well supplies near septic systems in areas with high ground water	■ Install new onsite mound systems (for problem systems). ■ Install cluster collection and treatment facility. ■ Add point-of-use and point-of-entry disinfection units at problem locations.
Pesticide use near drinking water wells	■ Set limits on type and amount of pesticides applied in wellhead protection areas. ■ Encourage farmers and homeowners to use less hazardous chemicals with more efficient application. ■ Provide hazardous waste collection system for area.
Aging underground storage tanks owned by town	■ Close all underground petroleum tanks. ■ Get petroleum products from nearby commercial sources. ■ Replace tanks.

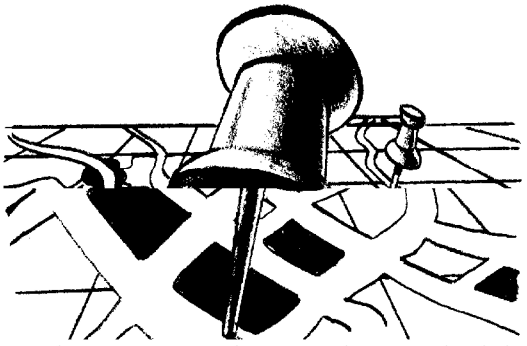
Feasible Solutions to Ruraltown's Problems (continued)

Problem	Solution
Poor wastewater treatment plant performance; effluent exceeds organic matter and suspended solids limits	■ Conduct full professional treatment plant evaluation. ■ Obtain circuit rider assistance and training. ■ Implement water supply program (water conservation, leak detection, new rate structure, and public education).
Failing septic tank systems	■ Replace with new onsite systems where soils acceptable. ■ Collect with low-cost sewers to cluster disposal system. ■ Collect with low-cost sewers to existing sewer mains.
Landfill doesn't meet state design requirements; almost full	■ Construct a new landfill with new required design. ■ Close landfill and build transfer station. ■ Implement a source reduction program with public education; charge residential customers by the bag and review results annually. ■ Enter regional agreement to build new disposal facility and materials recovery facility.
Pollution of surface water by fertilizers (nitrates and phosphates)	■ Educate farmers on use of grassy strips and other means to contain runoff pollutants. ■ Educate farmers, commercial appliers, and residents on more efficient use of fertilizers in the watershed protection area.
Leaf burning	■ Encourage yard waste composting by residents. ■ Initiate townwide yard waste collection and composting.
Household hazardous waste (including used oil) contaminating ground water near landfill	■ Start public education program about household hazardous waste and used oil. ■ Identify or provide a market/use for used oil. ■ Ask the gas station to collect used oil. ■ Start periodic household hazardous waste collection days with neighboring communities (e.g., once or twice per year).

Feasible Solutions to Ruraltown's Problems (continued)

Problem	Solution
Might be asbestos in elementary school	■ Make sure school is inspected. ■ If asbestos is found, see if containment option is feasible.
Lead paint in homes	■ Start educational program through schools about what the hazards are and how to minimize them.
Radon in homes	■ Determine if radon exists in planning area; if so, start educational program about what the hazards are and how to check for and minimize them.
Runoff from construction sites and tannery	■ Notify construction companies and tannery about NPS pollution regulations and provide information on storm-water best management practices (BMPs) alternatives. ■ Monitor their implementation of these practices and keep authorities informed of violations.

6 Putting the Plan Together



By this point, you have gathered together the information you need to put together your community environmental plan. You have defined your community's vision for the future, your community's environmental problems and needs, and feasible solutions. Now it's time to set priorities for action and produce a coherent plan—your road map and your schedule for reaching your goals.

To create your community environmental plan, three steps remain:

- Target the most important problems for your community to solve.
- Set priorities for action and choose the solutions to implement.
- Put the plan together, making sure that all the solutions fit together (including coordinating with regulatory agencies to make sure that they agree).

Targeting the Problems

At this step, the planning team needs to decide which problems to target. You have already laid much of the groundwork for this in Chapter 4, when you determined the greatest hazards to people and the environment, determined the regulatory requirements you have to meet, and evaluated how effective your environmental facilities are.

You should target the problems your planning team considers to pose the highest risk, since protecting the health and environment of your community's residents is your first priority. If your community is not in compliance with regulations covering other problems, however, it is in your community's best interest to consider these regulations as you put your plan together. Make sure that you discuss this situation with your state agency as early as possible. Explain your community's desire to solve the high-risk problems first. Let them know that, in your plan, you will address how and when your community will meet the regulatory requirements that cover the other problems. Be willing to discuss a timetable for compliance. If you have a clear plan for addressing the regulatory requirements in the

future, regulatory agencies should be able to negotiate with you to develop a long-term agreement and exercise some flexibility in their enforcement roles. The state can be a valuable ally in your efforts to "do the right thing."

If you have facilities that are not performing well, you might want to target those problems too, even if they don't yet pose a high risk or cause you to be out of compliance with regulations. Poorly working environmental facilities waste money and other resources and are likely to cause bigger problems in the future.

Finally, your community probably has other important considerations besides risks, regulations, and performance of environmental facilities. These might be social or economic goals, such as:

- Attracting businesses to the community.
- Making the community a nicer place to live.
- Promoting tourism.

Each community has its own set of considerations and priorities. For some communities, these other considerations might even be more important than reducing risk. This would be a good time to revisit your community vision to see what goals residents value the most.

At this stage in the planning process, you should rearrange the list of your community's needs and problems according to the considerations that are most important to your community. Since some will probably be equally pressing, you can arrange them in categories, such as "action is urgent," "action is necessary," and "action is desirable." The box entitled "Ruraltown's Priorities" shows how Ruraltown grouped its needs and problems.

Setting Priorities for Action

Which solutions will you implement to address your problems and needs? Which will you implement now, and which will you implement farther down the road?

You should already have a handle on which solutions are feasible for your community, how quickly or easily they can be implemented, approximately how much they cost, and what they can achieve (see Chapter 5). List these solutions, along with key information about them, next to the problems.

Ruraltown's Priorities

The Ruraltown planning team grouped its environmental problems as shown below. The "urgent" problems were those that presented the highest risks to human health. Those grouped under "action is necessary" were high or medium risks, or were regulatory violations. Those grouped under "action is desirable" were not regulatory issues and had lower or longer term risks.

In its discussions with state officials, the Ruraltown team learned that the town might be able to obtain "use waivers" from the expensive drinking water monitoring requirements for certain organic and inorganic chemicals. States can grant these waivers when it can be shown that a contaminant has not been used, manufactured, or stored in the wellhead area. The state agreed to help the team develop a plan to apply for a waiver and comply with all other monitoring requirements.

Action Is Urgent	Drinking water samples exceed coliform MCL
	High coliform counts in wells near septic systems in areas with high ground water
	Landfill doesn't meet state design requirements; almost full
Action Is Necessary	Poor wastewater treatment plant performance
	Failing septic tank systems
	Inadequate drinking water plant capacity
	Drinking water plant does not meet all monitoring requirements
	Improper disposal of used oil and household hazardous waste
	Pesticide use near private drinking water wells
	Might be asbestos in elementary school
	Pollution of surface water by fertilizers
	Aging underground storage tanks owned by town
	Lead paint in homes
Action Is Desirable	Runoff from construction sites and tannery
	Radon in homes
	Leaf burning

Setting your priorities for action requires a balancing act. You want to solve as many of the most urgent problems as you can with the resources you have. You might also want to address problems that don't necessarily pose a high risk but that have easy and inexpensive solutions. For example, littering generally does not pose a great hazard to public health or to ecosystems. The littering problem, however, might be easily solved by providing trash cans in public places, having school children make posters that can be displayed throughout town asking people not to litter, or even getting local law enforcement involved, if necessary. Activities that involve a broad spectrum of your community help generate public support for the overall environmental program.

Also, keep in mind that your resources might not be as limited as you think. Chapter 7 provides some information about obtaining resources to implement your plan, including how to draw on the resources of other communities and the private sector. Be creative when making your choices, and be open to new resource possibilities.

Give special attention to solutions that can address more than one problem. For example, you might decide that leaf burning is a low-priority problem in your community, while managing solid waste is a high priority. Yard waste composting is a solution for reducing solid waste that also helps discourage leaf burning and its associated air pollution problems.

The matrix below can help you set short-term priorities for action. Keep in mind that your community is likely to have longer term needs that might require substantial resources to solve.

Remember, this is the environmental plan for *your* community. Only the people in your community know what the priorities for action should be. So take charge, be creative, and do your best to juggle your options to solve as many of your community's environmental problems as possible while maintaining public support and using resources wisely.

	Problem Is Very Important for the Community to Solve	Problem Is Less Important for the Community to Solve
Solutions Require Few Resources	Include solutions in the plan	Probably include solutions in the plan
Solutions Require Many Resources	Include as many solutions as possible in the plan	Don't include solutions in the plan

Looking at the Big Picture

At this stage in the planning process, your community environmental plan will be pretty well hammered out. The only thing left to do is to look at the big picture. For each of the problems that are priorities for action in your environmental plan, try to predict the full outcome of using the solution (or solutions). See if any of the solutions you have chosen might cause new problems or interfere with one another. Say, for example, that your community decides to expand its ground-water supply system. This could mean that the "zone of contribution" for the well—the area of an aquifer that recharges the well—could

expand to encompass more septic tank leachfields or other potential sources of contamination. Talk to your local experts and county, state, and federal contacts. Ask them if they foresee any problems with how the solutions fit together.

Community support will be crucial to the success of your plan. As you look at each solution, ask yourselves questions about how much support it will have in the community:

- How concerned is the community about the problem that the solution addresses?
- Do you have local leadership necessary to undertake and complete the needed changes?
- Can you draw on local capabilities, equipment, and ingenuity to implement the solution?

Consider that the county, state, and federal governments have to protect the broader public interest and might find your plan too narrow. Keeping an eye on environmental problems that you might be exporting to other communities will help you anticipate and avoid conflicts with higher levels of government.

Finally, never lose sight of your community vision. Looking at each problem independently can make it difficult to see how it all fits together. Throughout the process, stop and consider what you are really trying to accomplish.

Ruraltown Puts Together Its Environmental Plan

The Ruraltown planning team, with the assistance of representatives from the state environmental agency, selected the solutions to implement based on several factors. After reviewing the list of feasible solutions, the team clearly saw that lower cost strategies emphasizing pollution prevention and public education would provide major benefits for the town. In several cases, the team selected educational strategies over more coercive methods. For example, the team decided to provide information to farmers and residents about ways to reduce pollution from pesticides and fertilizers. In its work with residents, the team found several people who were enthusiastic about developing education programs for the community.

Despite the benefits of voluntary efforts, Ruraltown still needed major improvements to its environmental facilities. To address the failing onsite septic systems in areas with unsuitable soils, the team determined that a new cluster treatment system would be the most cost effective of the feasible options. The team contacted local construction companies about using equipment to help construct such a system. A civic organization and the residents who would be served by the systems agreed to donate time to the project to help reduce costs.

For the drinking water and wastewater treatment plants, the team decided to obtain circuit rider assistance to improve operator skills in the short term (instead of hiring a trained full-time operator) and to plan for major capital improvements over the next 5 years. In the long term, the plants may have to be upgraded and expanded to accommodate growth in the area (if the growth demand exceeds water savings due to the new rate structure designed to discourage unnecessary water use.) Ruraltown would fund a professional evaluation of the long-term needs of both plants after the immediate programs have been in place long enough for the town to assess their effects.

Finally, the town would pursue a regional agreement to build a new disposal facility and materials recovery facility. The team determined that in the long run this would be less expensive than building and using a transfer station, especially since several other towns in the county were also experiencing problems managing their solid waste.

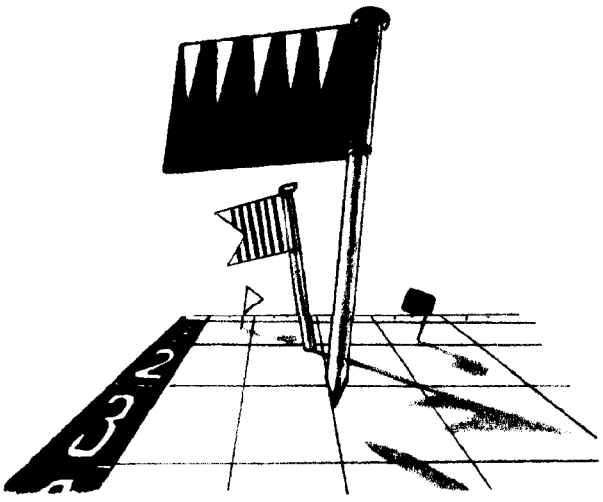
Ruraltown Chooses Priorities for Action

Action Is Urgent	
Drinking water samples exceed coliform MCL	✓ Obtain assistance from a circuit rider (immediately) ✓ Improve chlorination equipment ✓ Take the first steps in setting up a wellhead protection program; determine low-cost ways to protect ground water (immediately) ✓ Hire engineering firm to evaluate long-term needs (later)
High coliform counts in wells near septic systems in areas with high ground water	~~Install new onsite mound systems~~ ✓ Have engineers design and install cluster collection and treatment facility ✓ Install point-of-use/point-of-entry disinfection units in affected homes (temporary)
Landfill doesn't meet state design requirements; almost full	~~Construct a new landfill with new required design~~ ~~Close landfill and build transfer station~~ ✓ Enter regional agreement to build new disposal facility and materials recovery facility ✓ Implement source reduction program with public education; including yard waste collection/composting ✓ Charge residential customers by the bag and review results annually
Action Is Necessary	
Poor wastewater treatment performance; effluent exceeds organics and suspended solids limits	✓ Conduct full professional treatment plant evaluation ✓ Obtain circuit rider assistance/training ✓ Implement water supply program (water conservation, leak detection, new rate structure, and public education)
Failing septic tank systems	~~Replace with new onsite systems where soils are acceptable~~ ✓ Collect with low-cost sewers to cluster disposal system (see above) ~~Collect with low-cost sewers to existing sewer mains~~
Inadequate drinking water system capacity	✓ Conduct full professional evaluation ✓ Begin planning capital improvements (5 years) to upgrade current treatment facility and replace portions of distribution system ~~Dig new wells in protected areas~~ ✓ Implement water supply program (see above)
Drinking water plant does not meet monitoring requirements	✓ Apply for monitoring waiver for contaminants not present or used in the area ✓ Conduct all other monitoring ✓ Seek agreement with other communities to pool samples to obtain better analytical rate from commercial laboratory or academic institution in area

Ruraltown Chooses Priorities for Action (continued)

Action Is Necessary (continued)	
Household hazardous waste (including used oil) contaminating landfill leachate and ground water	✓ Start public education program about household hazardous waste and used oil disposal ✓ Identify or provide a market/use for used oil ✓ Ask the gas station to collect used oil ✓ Start periodic household hazardous waste collection days with neighboring communities (once or twice per year)
Pesticide use near private drinking water wells	~~Set limits on type and amount of pesticide application in wellhead protection areas~~ ✓ Encourage farmers and homeowners to use less hazardous chemicals with more efficient application ✓ Provide hazardous waste collection system for area (see above)
Might be asbestos in elementary school	✓ Make sure school is inspected ✓ If asbestos is found, determine if containment solution is feasible
Pollution of surface water by fertilizers (nitrates and phosphates)	✓ Educate farmers on use of grassy strips and other means to contain runoff pollutants ✓ Educate farmers and residents on more efficient use of fertilizers in the watershed protection area
Aging underground storage tanks owned by town	✓ Close the community-owned underground petroleum tanks ✓ Get petroleum products from nearby commercial sources ~~Replace tanks~~
Lead paint in homes	✓ Start educational program through schools about what hazards are and how to minimize them
Action Is Desirable	
Runoff from construction sites and tannery	✓ Notify construction companies and tannery about NPS pollution regulations and provide information on stormwater BMPs ✓ Monitor their implementation of these practices and keep state authorities informed of violations
Radon in homes	✓ Determine if radon exists in planning area; if so, start educational program through schools about what hazards are and how to check for and minimize them. If not, no action necessary
Leaf burning	~~Encourage yard waste composting by residents~~ ✓ Initiate town-wide yard waste collection and composting

7 Implementation: Putting the Plan Into Action and Keeping It On Track



Now you have your community environmental plan—your road map to the destination your community wants to reach. But even the best map will be worthless if you never buy your vehicle, gas it up, and hit the road. You'll need a maintenance schedule to keep things running smoothly. And don't forget—no matter how good your road map is, detours, flat tires, and accidents might force you off course. You need to check your progress regularly and see whether you need to change your route.

This chapter is about **implementation**: putting the plan into action, evaluating how well the plan works, and revising the plan as you need to. In your environmental plan, your community has outlined the solutions it wants to use to manage environmental issues. Now it is time to iron out the approach for implementing the plan, which includes:

- Developing a schedule for putting the plan into action.
- Financing the plan.
- Determining the role your local government and other governments and organizations will play.
- Determining the role individuals in your community will play.
- Evaluating and revising the plan as necessary.

Developing a Schedule for Putting the Plan Into Action

To begin implementing the plan, develop a step-by-step approach for each solution your community has chosen. Start by making a list of concrete actions that must be taken, in the order in which they should be taken, for each solution. Once these step-by-step approaches have been ironed out, draw up a schedule for taking the steps. The schedule should include a start date and a completion date for each step, when possible. Sometimes, however, the actual dates will have to be established after other actions are completed. An

approximate target date should be included in these situations. In some cases, the solutions will take only days or weeks to complete. In other cases, however, completion will take years. A schedule is especially important for issues that involve regulatory requirements; you will need to show regulatory agencies when you will be able to comply with those regulations.

After the schedule has been drawn up, determine who is responsible for "making things happen." List those responsible for completing each step. This way, you can easily check with the right people to see if the plan remains on schedule and to determine what should be done if the schedule slips. Check the schedule regularly to make sure things are happening as planned. If not, take steps immediately to keep up the momentum.

Your community should also set up a way to measure the plan's successes and failures. For each solution, specific goals should be given. For example, a specific goal might be to cut the amount of trash each family produces from three to two bags a week.

Your community might consider focusing on one major project in your plan that addresses a key concern—such as beginning a water conservation program—and mobilizing the community to get results. This can help build momentum and community support for other actions specified in your plan, and can help you identify and correct weaknesses in one project before you've gone far on other projects.

Financing the Plan

The approach your community uses to implement its environmental plan must include a strategy for how to pay for solutions. Your community must cover both the **operating costs** and the **capital costs** of any equipment and facilities included in your plan. Generally, different types of financing are used for operating costs than for capital costs. You will need to choose which combination of financing options you will use to cover both of these costs. Some excellent guides to financial management for small communities are listed in Appendix D.

Common operational costs include the costs of employee salaries and benefits; supplies; fuel, utility, rent, and insurance bills; maintaining equipment; monitoring; and interest payments on loans. Another type of operational cost that all communities face, but many do not think about, is depreciation, the reduction in value of a facility or piece of equipment. All of the equipment and facilities that your community uses are getting older. The older they get, the less valuable they are because they are more likely to break down. Each piece of equipment has a useful life, which is the duration of time that the equipment is expected to last before it must be replaced. Financially preparing to replace equipment when its useful life is over is important. Although depreciation is an operational cost, replacement is a capital cost, which is discussed on the next page.

Operational costs tend to stay about the same from year to year, although they can rise because of the age of equipment and because of inflation. A steady flow of funds should therefore be used to finance operational costs. Small communities usually generate these funds through local taxes and fees.

Capital costs are different from operating costs because they involve a one-time investment that is usually relatively large. Common capital financing options are grants, loans, bonds, and notes. For many of these options, the useful life of the equipment or facility must be considered when choosing a financing option and the level of debt. If the equipment or facility must be replaced before the debt is repaid, your community will be carrying more than one debt for the same service.

Table 7-1 presents information about common financing options for both operational and capital costs.

Another important alternative is saving money. Saving money allows your community to become more efficient and provide services at a lower cost. A community can save money in many ways, such as by using local people, equipment, and financial resources (including business donations and volunteer help); increasing employee productivity; properly maintaining equipment; running equipment at times when electrical costs are lower; and buying supplies in bulk with other towns at a discount. Although financing minor capital costs with money saved is possible, this rarely happens. Instead, savings are usually used to fund operational costs and to avoid the need to raise taxes or fees.

The affordability of your environmental solutions depends on community involvement as well as the funding available. If community residents have not participated in shaping the environmental plan, its affordability may well be reduced, because residents will be less willing to pay for changes in which they have had no role.

Roles of Government and Other Organizations

Your local government has three basic choices about the role it will play when implementing your community environmental plan: implement solutions alone, cooperate with other local governments, or form a partnership with private companies. Your community does not have to choose just one of these roles; you can mix and match roles to implement different solutions. For example, your local government can implement an underground storage tank program alone, become partners with other local governments to build and operate a wastewater treatment plant, and contract with a private company to collect and dispose of solid waste.

Working Alone

Working alone may be the easiest role for your community to play because it does not require you to develop any special arrangements. Working alone may be an option if the solutions you choose are inexpensive and do not require advanced technology. When more complicated systems or facilities are needed, you should consider cooperating with other communities or forming a partnership with private companies.

If local government organizations are understaffed or do not have the expertise to implement the new solutions, new organizations might be necessary. In these cases, your community can set up committees or agencies and delegate the power to perform certain functions. The members of the committee can also be specially trained to deal with the solution they are implementing. For example, many communities have set up wellhead protection committees that work with state agencies or local experts to define wellhead

protection areas, identify sources of ground-water contamination in those areas, and implement strategies to protect the community's ground-water resources.

Cooperating With Other Local Governments

Cooperating with other local governments can be the best way to implement some of the solutions in your community environmental plan. Small communities can cooperate through joint ownership and operation of drinking water, wastewater, and solid waste management facilities. Communities can also cooperate by sharing personnel who do certain common jobs, such as billing customers, purchasing supplies, maintaining equipment, and testing samples. To cooperate with other local governments, decide the role each community will have, how conflict among the communities will be resolved, and how the cooperative activity or facility will be paid for.

There are many advantages to cooperation. For example, communities can pool funds so that they can afford facilities or technologies that individual communities cannot afford alone. Providing a service to a small number of people is often more expensive per person than providing a service to a large number of people. Economies of scale allow you to increase the number of people that are served to achieve lower costs per person. Finally, larger operations are often more efficient than smaller operations because they allow full use of staff who otherwise are not fully occupied by a single smaller operation.

The major disadvantage to cooperation is some loss of local control. When you are cooperating with other communities, your community will no longer be able to act alone. Negotiations will have to occur to make any changes to the ways in which environmental services are provided. In addition, when communities are far apart or there is rugged terrain between them, increased costs for distribution pipes or transporting wastes can outweigh some of the savings achieved through economies of scale and increased efficiency.

Table 7-2 shows the different options for formally cooperating with other communities, along with their advantages and disadvantages.

Forming a Partnership With the Private Sector

In many cases, there are advantages to the private sector rather than the public sector providing environmental services. Your community might therefore want to consider forming a public-private partnership. The five main types of public-private partnerships are:

- *Contract Services.* The community contracts with a private company to provide a service (such as garbage collection) or to run a facility that is owned by the community (such as a wastewater treatment plant). Firms or experts also can be contracted with to perform specific duties, such as accounting or maintenance of electrical systems.
- *Turnkey Facilities.* The community owns a facility but contracts with a private company to design, construct, and operate the facility. The community is responsible for funding the facility, while the private company is responsible for providing a certain level of service or regulatory compliance.

- *Leasing.* The community pays rent to a private owner in exchange for using a facility for a specified period. The community controls the facility until the lease is over, when the facility is returned to the owner. With a finance lease, however, the community pays to lease a facility but then owns the facility at the end of the lease.
- *Developer Financing.* A private developer finances construction or upgrading of a facility to gain the right to build homes, stores, or other buildings.
- *Privatization.* A private firm owns, builds, operates, and partially or totally finances a facility or service. The local community decides it wants the facility or service, and might partially fund it.
- *Merchant Facility.* This is similar to privatization except that the private firm also decides to provide the service. The local community plays no role at all.

Just like cooperating with other communities, the main disadvantage of public-private partnerships is some loss of local control. To get rid of the headaches of responsibility, you also have to be willing to allow someone else to make most of the decisions. Partnerships also take work: Legal issues have to be ironed out, and the actions of the private company have to be overseen. Public-private partnerships aren't the right choice for all small communities because many communities do not need to use sophisticated technologies, or they are not located close enough to a company that provides the services they need.

If your community decides to use a private company to implement part of your environmental plan, you should choose that company carefully. Try to identify companies with experience working with small communities with problems similar to yours. Ask those communities about the company to make sure that it has a good track record. The companies should also have experience with the type of technologies you are interested in. In many cases, you can also find companies with experience helping small communities get the financing that they need. Finally, try to choose the company that can give the best service for the best price. (The state utility commission must approve rates, an important protection for the ratepayer.)

Some Reasons To Form a Public-Private Partnership

A public-private partnership can help your community by:

- Allowing your community to use a more sophisticated technology that the private company uses.
- Giving your community ways to finance environmental services using private capital.
- Letting your community know exactly how much the service will cost, because the cost is written into the contract.

Table 7-1
Financing Plan Options

Financing Method	Description	Advantages	Disadvantages
Taxes	**Property taxes** (e.g., on buildings, land, and/or vehicles) are the most common type of taxes used by local governments.	■ Easy to administer. ■ Generate a relatively steady flow of funds, therefore good for financing operational costs.	■ Tax burden is spread over a small number of people in a small community. ■ Taxes are unpopular and tax increases may require formal approval by those affected.
	Hotel taxes, rental taxes, and taxes on other tourist activities (such as restaurants, nightclubs, and guided tours) can be used by communities with high tourist populations.	■ Can increase revenues without placing a higher burden on permanent residents.	■ Higher taxes might discourage tourism. ■ Amount of revenue varies according to the number of tourists during a season.
Fees	**Service fees** can be charged for using an existing service (such as billing customers for the drinking water they use) or demanding a service (such as charging homeowners to be hooked up to the wastewater treatment system). Fees can be **flat fees** (everyone who uses the service pays the same price) or **graduated fees** (based on the amount each person uses).	■ Generate a steady flow of funds, therefore better for financing operational costs. ■ Graduated fees could provide customers with incentives to use less if fee rates are increased as more water is used.	■ Flat fees discourage conservation and promote wasteful use. ■ Service fees might be unpopular. ■ Fees based on how much water is used could discourage industries and other businesses from locating in an area.
	Punitive or corrective fees can be charged to people or businesses that pollute (e.g., releasing chemicals into wastewater treatment systems). The community can also give **special fee reductions** for industries that start out with water conservation and pollution prevention measures.	■ Generate revenue while discouraging pollution. ■ In some cases, avoid noncompliance with permit requirements caused by industrial pollutants.	■ Cannot be relied upon as a source of income. ■ If too stringent, could lose industry to another location or encourage illegal avoidance fees.
	Recreational fees can be charged for hunting and fishing licenses or privileges.	■ Only paid by those who participate in certain activities. ■ The money raised can be earmarked to protect the environment and maintain recreational areas.	■ Generate a relatively small amount of money. ■ If recreational fees are too high, they might encourage illegal activities.

Table 7-1
Financing Plan Options (continued)

Financing Method	Description	Advantages	Disadvantages
Fees (continued)	**Impact fees** can be charged to developers, who will create demand for local infrastructure.	■ Only paid by those who profit. ■ Money can be used to offset costs.	■ Might reduce potential for development.
Grants	Grants are funds that are provided by the federal government, states, or other organizations to pay for special projects (e.g., U.S. Department of Agriculture's Rural Development Administration, the U.S. Department of Housing and Urban Development [HUD]).	■ Small communities may be eligible for many different grants to build or upgrade their environmental facilities. ■ Grants do not have to be paid back.	■ Most grants have specific eligibility requirements that a community must meet. ■ Grants tend to be very competitive. Your community must invest time and money to apply for a grant that you might not get. ■ Grant use requirements may be expensive.
Loans	A loan is money lent with interest. **Low-interest loans** might be available through the state (e.g., State Revolving Funds) or federal government (e.g., from the Rural Development Administration or HUD). If federal and state loans are not available, your small community can borrow from a commercial bank.	■ A long-term, low-interest loan will allow your community to pay for capital expenses that require a large one-time investment. ■ Loan payments can be spread out over time so that repayment is manageable. ■ Loans can be used for shorter term financing while waiting for grants or bonds.	■ Unlike a grant, a loan must be repaid. Over time, both interest and principal must be repaid with money collected through taxes, fees, or money previously saved. ■ State Revolving Fund loans require adherence to federal rules and regulations. ■ Commercial bank loans may be difficult to obtain without adequate collateral.
Revolving Funds	Revolving funds are self-sustaining funds set up to provide loans to communities for construction and modification of facilities. As the loans are repaid, the money is returned to the fund so that it can be borrowed by other communities. State Revolving Funds currently finance wastewater treatment plants, but can be used for NPS pollution control and drinking water facilities.	■ Offer below-market interest rate loans. ■ Are often targeted toward the improvement of environmental facilities in communities.	■ Legal requirements can limit the use of funds. ■ Most communities have legal limits on the amount of debt they can accrue, including through revolving fund loans.
Privatization	Under privatization, a private firm owns, builds, operates, and partially or totally finances a facility or service.	■ Reduces or eliminates debt needed to provide service. ■ Reduces local government responsibility for providing service.	■ Some loss of local control occurs. ■ Oversight of private firm is necessary. ■ Legal issues must be resolved.

Table 7-1
Financing Plan Options (continued)

Financing Method	Description	Advantages	Disadvantages
Bonds	A bond is an interest-bearing certificate of public or private indebtedness, often sold to finance long-term projects with high capital costs.	■ Bonds typically are used for financing capital costs. ■ The community only has to make interest payments until the bond is due.	■ Issuing bonds can be complicated and may require the help of a financial advisor. ■ Bonds are usually only used when large amounts of money are needed for long periods.
	General obligation bonds are secured by the taxing power of the community, which means that the community pledges to pay back the interest and principal through taxes (if necessary).	■ General obligation bonds should be used, when possible, to save money in interest payments.	■ Most communities have legal limits on the amount of money they can borrow through general obligation bonds, and voters often must approve of using these bonds. ■ Because of the limits placed on them, general obligation bonds are usually used for facilities that do not generate revenues.
	Revenue bonds are secured by money that will be generated by the use of the loan, such as user fees from a wastewater treatment facility that will be built or upgraded.	■ Most communities do not have a limit on the amount of money they can borrow with revenue bonds. ■ Revenue bonds are appropriate for environmental facilities since most can generate revenues through user fees and tipping fees.	■ The interest rates for revenue bonds are usually higher than for general obligation bonds.
	Many states now have **bond banks** from which communities can obtain bond money. The state uses its taxing power to secure a large bond issue that can be divided among its communities.	■ Because the state has more taxing power than individual communities, it can get a bond at a lower interest rate. ■ Because the costs of issuing a bond are about the same no matter how big the bond is, bond banks also save money by spreading out the costs of issuing the bond. ■ With a state bond bank, the state can issue the bond in anticipation that its communities will need it, reducing the time it takes for each community to get bond money.	■ Many communities compete for a limited amount of available bank bond funds.

Table 7-1
Financing Plan Options (continued)

Financing Method	Description	Advantages	Disadvantages
Certificates of Participation	Certificates of participation (COPs) can be issued by a community instead of bonds. Unlike bonds, COPs are issued to several lenders that all "participate" in the same loan.	■ Costs and risks of the loan are spread over several lenders. ■ Where authorized under state law, COPs may be issued when bonds would exceed debt limitations.	■ Requires complicated agreements among the participating lenders.
Notes	A note is a written promise to pay a debt. The community promises to pay the principal and the interest at a specified time. Notes are a short-term option usually used to finance costs during construction. **Grant anticipation notes** are secured by a community's expectation that it will receive a grant. In essence, it allows the community to "borrow against" the grant. (You should never request a grant anticipation note for more money than the grant.) **Bond anticipation notes** are secured by the community's ability to sell its bonds. Your community must therefore satisfy all legal requirements for issuing a bond before it applies for a bond anticipation note.	■ Notes can be used as a short-term financing option while you are waiting for money from grants or bonds.	■ Grant anticipation notes should only be used when the organization giving the grant has made a firm commitment that your community will get the grant, and when you need money immediately and you don't expect to receive the grant for some time. ■ Voters usually have to approve a general obligation bond, making a bond anticipation note very risky unless the community has shown overwhelming support.

Roles of Community Members

Once your community has a picture of which organizations will play a role in implementing the plan, you'll need time to figure out how individuals will be involved. Your community should decide who is responsible for making the solutions work and what their specific responsibilities are. Some people on the planning committee might continue to be involved as the plan is implemented. Stay on the lookout for new people who might step forward to help carry out new programs and activities.

When the approach to implementing the environmental plan calls for community residents to play a role, they should be knowledgeable about their new responsibilities. If the plan includes a used oil program, for instance, the people of the community must be provided with clear instructions on how to collect their oil and where to bring it for recycling or proper disposal.

Actively seek volunteers to donate both time and materiel. The more you involve people in implementing the plan, the greater the support from the community and the fewer the problems.

Table 7-2 Options for Cooperating With Other Communities

Option	Advantages	Disadvantages
Authorities—Communities and counties can establish an authority to finance, build, and operate a public facility or system that generates revenues. The authority is a corporate body with a charter that must be approved by the state legislature. Authorities operate outside the regular structure of government and are financed through user fees or other revenues.	■ Local debt ceiling doesn't affect financing. ■ Voter approval of financing isn't necessary. ■ Local politics are less likely to affect service because private citizens, rather than government officials, are on the board. ■ Can increase efficiency by avoiding government budgeting and administration. ■ Revenues can make the service self-supporting. ■ Capital financing is tax-exempt.	■ Financing can be complex to administer. ■ Government or public control can be too limited. ■ In some areas, authorities can compete with private industry.
Special districts—Communities can establish a special district to perform a single function, such as drinking water treatment. The special district acts as a government agency outside the regular structure of government and uses special taxes for financing. Special districts must respond to local needs and cooperate with local jurisdictions to be successful.	■ The residents to which the district is responsible are a distinct constituency. ■ Elected officials can serve on the board for the district to give the local government some say.	■ State statutes limit powers. ■ Financing requires special taxes that must be approved by voters. ■ Might not be as responsive to residents as arrangements where voters elect the board.
Nonprofit public corporations—These are similar to authorities except that they must be approved by all member communities and state officials, as required by law. They are financed by issuing bonds, and directors of the corporation must be local government or state officials.	■ Local debt ceiling doesn't affect financing. ■ Voter approval of financing isn't necessary. ■ After bonds are paid, the corporation gives assets to member communities. ■ Not subject to real estate or federal taxes. ■ Capital financing is tax exempt.	■ It is difficult to get out of the corporation if better service becomes available. ■ The corporation cannot use taxing power of local governments to secure financing. ■ Local government and state officials might exert political influence.
Multicommunity cooperatives—This is a way to gain cooperation between governments without legal charters or agreements. Communities agree to work together to build a facility or provide a service. Usually, one community takes the lead.	■ These have less restrictive legal and institutional structure than other multicommunity options. ■ Communities can pool resources to provide services that they may not be able to provide alone.	■ Member communities lose independence and must cooperate in making decisions about how the service will be provided, where the facility will be sited, etc. ■ Interest rates on loans or bonds could increase if leader community is not as financially strong as other communities.
Intergovernmental agreements—Formal and informal agreements can be made between two or more local governments to provide services. Contracts are the most commonly used type of intergovernmental agreement.	■ Contracts are flexible, predictable, and enforceable. ■ Basic government structures are not affected. ■ Saves time because no new structures are necessary.	■ Because each community, rather than a single unit, must borrow money, it may be more difficult to get financing. ■ Misunderstandings may occur if the agreement is not spelled out in detail in a contract. ■ Each participant must reach agreement every time a new issue comes up.

Evaluating and Revising the Plan

No matter how much thought your community has put into the environmental plan, you might find that some of the solutions you have chosen just don't work out. Other solutions might work, but not as well as your community had hoped.

When solutions do not meet expectations, it's time to reevaluate your community environmental plan. In some cases, your community will decide not to do anything because the flaws in the plan are not big enough to justify the money and time it would take to fix them. For example, if trucking solid waste to the landfill costs more than you expected, building a more central landfill would probably not be a better solution.

Sometimes your community will have to modify solutions only slightly. If your plan includes wellhead protection and people are still accidently polluting the wellhead area, the only change that might be necessary is to increase public education and post signs that tell people what they can't do in the wellhead area. Unfortunately, in some cases major changes to the plan might be necessary. Some of Ruraltown's solutions, for example, relied on voluntary action by residents. To address surface water pollution by nitrates, the community got the local extension agent to explain to farmers the value of using fertilizers more efficiently and using grassy strips to contain runoff. If problems with nitrate pollution of surface water continue, the town might have to take stronger action to reduce fertilizer use.

Even if your community finds that all of the solutions in its environmental plan are effective, the plan might still have to be revised in the future. Changes outside the community might affect your plan. For example, new technologies might be developed that can better solve environmental problems, and new regulations might be made on how communities should handle environmental issues. Your community should be aware of these changes so that its environmental plan can be updated when revisions make sense.

Changes within your community might also affect the environmental plan. As your community grows, for example, solutions might have to be revised to handle unforeseen problems. Also, growth might allow you to implement solutions that previously were too expensive for a smaller community. Finally, the people in the community might develop new priorities, and your plan will need to change to reflect those priorities.

Just as water, soil, and air are connected, so are creating the plan and implementing it. What your community does with one will continue to affect what happens to the other.

Ruraltown Sets a Schedule

After Ruraltown chose the solutions it would implement in its environmental plan, the planning team filled out an implementation worksheet (page 89). First, the team drew up a detailed schedule for implementation. The schedule included the specific goals to be achieved, a step-by-step approach for each solution, and a list of people responsible for the plan. The team also listed the financing methods it would use for each solution.

The state environmental agency, which had helped the team throughout this process, approved Ruraltown's priorities for action and the schedule the team had set.

The state agreed that, if the town implemented the strategies according to the schedule the team developed, no enforcement actions would be taken regarding temporary, intermittent violations of effluent permit limits or drinking water requirements. To keep the plan on track, the team decided to meet every 3 months to review the schedule and progress with the plan. The team also agreed that the goals listed in the implementation worksheet would help them in the evaluation and review process.

Ruraltown's Implementation Worksheet

Problem/Specific Goals	Solutions	Step-by-Step Approach	Start/Completion Date	Person(s) Responsible	Financing Method(s)
ACTION IS URGENT					
PROBLEM: Drinking water exceeds coliform MCL GOAL: Consistently provide safe drinking water	*SOLUTION: Obtain assistance from a circuit rider.*	■ Call circuit rider to set up meeting.	■ Tomorrow (2/6/95).	■ Public works director.	■ Free.
		■ Hold meeting to discuss problems.	■ ASAP (target date 2/9/95).	■ Planning team (including public works director).	
		■ Follow appropriate recommendations of the circuit rider.	■ ASAP (target date depends on recommendations).	■ Depends on recommendations.	
	SOLUTION: Improve chlorination equipment.	■ Research alternatives.	■ 2/13/95 - 2/20/95.	■ Drinking water plant personnel and planning team.	■ Temporary fee increase.
		■ Review research, rank alternatives, and present to town council.	■ 2/21/95 - 3/1/95.	■ Public works director.	
		■ Purchase and install new equipment.	■ When received (target date 4/21/95).	■ Drinking water plant personnel.	
	SOLUTION: Begin setting up a wellhead protection program, and determine low-cost ways to protect ground water.	■ Form a wellhead protection team.	■ 2/14/95 - 2/28/95.	■ Led by the planning team.	■ Apply for federal assistance under EPA's Wellhead Protection Demonstration Project.
		■ Conduct research to delineate the wellhead protection area.	■ 3/7/95 - 4/4/95.	■ Wellhead protection team.	■ Enlist volunteer help.
		■ Delineate wellhead protection area.	■ 4/4/95 - 4/25/95.	■ Wellhead protection team.	
		■ Identify and locate potential sources of contamination.	■ 4/25/95 - 5/16/95.	■ Local volunteers led by the wellhead protection team.	
		■ Develop strategies to prevent/minimize contamination, focusing on low-cost alternatives.	■ 5/16/95 - 6/13/95.	■ Wellhead protection team.	
		■ Present to town council.	■ Depends on strategies chosen by town council (target date 8/1/95).	■ Depends on strategies chosen.	
	SOLUTION: Hire engineering firm to evaluate long-term needs.	■ Research firms in the area specializing in drinking water plants.	■ 2/22/95 - 3/1/95.	■ Planning team.	■ Graduated fee increase.
		■ Review research and interview firms.	■ 3/2/95 - 3/16/95.	■ Public works director.	
		■ Choose and hire best firm.	■ 3/17/95.	■ Public works director.	
		■ Complete evaluation.	■ 9/20/95.	■ Engineering firm.	
		■ Review firm's evaluation, discuss, and present to town council.	■ 9/20/95 - 10/4/95.	■ Planning team (including public works director).	
	SOLUTION: Follow appropriate recommendations from the engineering firm's evaluation.		■ Target date depends on recommendations (goal is to implement all recommendations by 2001).	■ Depends on recommendations.	■ Depends on recommendations.

Problem/Specific Goals	Solutions	Step-by-Step Approach	Start/Completion Date	Person(s) Responsible	Financing Method(s)
ACTION IS NECESSARY					
PROBLEM: Wastewater treatment plant performance is poor: effluent sometimes exceeds organic matter and suspended solids limits. GOAL: Consistently meet all effluent limits by 2005.	*SOLUTION: Implement water supply program.*	■ Form a water supply team.	■ 6/10/96 - 6/24/96.	■ Led by the planning team.	■ Water fee revenue increase.
		■ Quantify all water users in Ruraltown.	■ 7/1/96 - 7/22/96.	■ Water supply team.	■ Enlist volunteer help.
		■ Conduct water leak detection study.	■ 7/1/96 - 7/22/96.	■ Public works division.	
		■ Develop a plan to reduce water usage, including a revised fee structure.	■ 7/29/96 - 9/9/96.	■ Water supply team.	
		■ Create a fact sheet describing the water conservation plan.	■ 9/16/96 - 9/30/96.	■ Member of the water conservation team.	
		■ Send the fact sheet out with the water bills.	■ 10/1/96.	■ Drinking water plant personnel.	
		■ Develop and distribute a press release on the water conservation plan.	■ 10/1/96 - 10/15/96.	■ Member of the water supply team.	
		■ Research and purchase modern leak detection and repair equipment.	■ 10/15/96 - 10/28/96.	■ Public works director.	
	SOLUTION: Conduct full professional treatment plant evaluation.	■ Research firms in the area specializing in wastewater facility evaluations.	■ 4/1/96 - 4/15/96.	■ Planning team and wastewater plant personnel.	■ If possible, a loan from the State Revolving Fund. If not, a general revenue bond.
		■ Review research, and interview firms.	■ 4/16/96 - 4/30/96.	■ Planning team.	
		■ Choose and hire best firm.	■ 5/1/96.	■ Town council.	
		■ Complete evaluation.	■ 8/4/96.	■ Consulting firm.	
		■ Review firm's evaluation and present to town council.	■ 8/4/96 - 9/1/96.	■ Planning team (including the public works director).	
	SOLUTION: Follow appropriate recommendations from the professional treatment plant evaluation.		■ Target date depends on recommendations (goal is to implement all recommendations by 2001).	■ Depends on recommendations.	■ If possible, a loan from the State Revolving Fund. If not, a general revenue bond.

Problem/Specific Goals	Solutions	Step-by-Step Approach	Start/Completion Date	Person(s) Responsible	Financing Method(s)
ACTION IS DESIRABLE					
PROBLEM: Leaf burning. GOAL: Prevent disposal of yard waste with municipal solid waste.	*SOLUTION: Initiate a townwide yard waste composting program.*	■ Form yard waste team.	■ 1/7/97 - 1/21/97.	■ Led by the planning team.	■ Loan.
		■ Research yard waste composting alternatives.	■ 1/28/97 - 3/11/97.	■ Composting team.	■ Enlist volunteer help.
		■ Identify a composting site.	■ 3/18/97 - 4/15/97.	■ Composting team.	
		■ Develop a pamphlet that describes the benefits of composting and explains to residents how to participate in the composting program.	■ 3/28/97 - 4/25/97.	■ Member of the composting team.	
		■ Mail the pamphlet to all town residents.	■ 4/26/97.	■ Composting team.	
		■ Begin yard waste composting.	■ 5/14/97.	■ Member of public works department who is in charge of composting.	

Appendix A:

Environmental Community Agreement Between the Kenai Peninsula Borough and the Alaska Department of Environmental Conservation

a. Introduction

The goal of the Alaska Department of Environmental Conservation (DEC) is to protect public health and the environment through cost-effective environmental problem solving. In the spirit of achieving this goal DEC and the Kenai Peninsula Borough (KPB) agree to develop, maintain, and update a cooperative working agreement to identify public health and environmental issues.

This agreement is not to be construed as an enforceable document, but rather as a checklist for identifying issues, and solving problems within reasonable timeframes.

This agreement is limited to programs and activities that are the primary responsibility of the Department of Environmental Conservation.

b. Purpose Statement

By this agreement, KPB and DEC establish a common agenda to work together on environmental protection objectives and specific goals. This will include efforts to solve environmental problems in the KPB in a cost-effective manner.

c. Changes to the Agreement

The signatories will review this document annually from the effective date of this agreement. Amendments or additional appendices may be developed and implemented by mutual agreement at any time, without renegotiating the entire environmental community agreement.

d. Effective Date of Agreement

This agreement is effective March 20, 1992.

e. Contact Persons

The contact persons for initiating any of the activities defined in this agreement are: for DEC, Les Buchholz, the DEC District Manager (or his successor) located in Soldotna; for KPB, the Mayor or his designee.

f. Schedule and Purpose of Meetings

The contact people for KPB and DEC will meet at least once every two months at a mutually agreeable location. The purpose of these regular meetings is to identify and address environmental concerns within the KPB.

g. Regulations Assistance Workshops

DEC is available to conduct a regulations assistance workshop on state environmental regulations that affect the KPB. The workshop agenda can be expanded to allow participation from other communities and state and federal agencies. DEC expects to conduct the workshops on various regulation topics and issues in central locations around the state.

h. Pollution Prevention

KPB agrees to promote pollution prevention practices that focus on eliminating or reducing pollution to the air, land, and water rather than on controlling pollution after it has been created. In order to minimize present and future threats to human health and the environment KPB, with assistance from DEC, agrees to the pollution prevention hierarchy as local policy, declaring that:

1. pollution should be prevented or reduced at the source to the maximum extent possible;
2. pollution that cannot be prevented should be recycled in an environmentally safe manner;
3. pollution that cannot be prevented or recycled should be treated in an environmentally safe manner; and
4. disposal should be employed only as a last resort and should be conducted in an environmentally safe manner.

i. Pollution Prevention Technology Roundtable for Local Governments

KPB agrees to designate one or more local governmental personnel to attend Pollution Prevention Technology Transfer Roundtable meetings as they occur. The next scheduled meeting will occur in Anchorage on April 9 and 10, 1992. The Roundtables were established by DEC in cooperation with the Alaska Municipal League. The purpose of the Roundtable is to transfer information to local governments about opportunities to prevent pollution through waste reduction and recycling in their communities.

j. KPB Comprehensive Planning Effort

DEC is available to assist in developing environmental quality goals and objectives for the KPB Comprehensive Plan and to also assist in incorporating state regulations with borough regulations.

k. Areas of Agreement

The following pages will outline the programs that KPB and DEC have agreed to initially address as priority issues. The programs are ranked in the order of their priority.

l. Other Programs

Pursuant to the authority granted to DEC by A.S. Title 46 and the authority granted to KPB by A.S. Title 29, and their respective regulations and ordinances, other programs may be identified and added to the list of priority issues.

The department is available to assist KPB in these program areas.

- Village Safe Water (Facility Planning, Construction, and Operations)
- Safe Drinking Water
- Domestic & Industrial Waste Water Treatment
- Solid & Hazardous Waste
- Water Pollution Prevention
- Animal Health and Dairy
- Pesticides
- Radiation Protection
- Underground Storage Tanks
- Pollution Prevention (waste reduction and recycling)
- Environmental Health

The following consent to the above agreement for the mutual benefit of the State of Alaska and to the Kenai Peninsula Borough.

Don Gilman 3-19-92

Don Gilman, Mayor
Kenai Peninsula Borough Date

Jon Sandor 3/26/92

Jon Sandor, Commissioner
Alaska Department of Environment Conservation Date

Svend Brandt-Erichsen 3-24-92

Svend Brandt-Erichsen
Regional Administration
Southcentral Regional Office
Alaska Department of Environment Conservation Date

Les Bucholz 3/19/92

Les Bucholz
Kenai District Manager
Alaska Department of Environment Conservation Date

Present Situation	Strategy	Goals
1. Oil and Hazardous Substance Spills		
There have been a number of hazardous substance spills in the KPB.	Assist KPB with development of a local emergency plan.	Assist KPB with implementation of the local emergency plan after it is approved by the SERC. Ongoing.
DEC recognizes local concern about hazardous substance spill prevention and response.	If the Emergency Response Commission approves the local emergency plan, then an amendment to this agreement will be developed which assures that DEC will reimburse KPB for expenditures that may occur in the event KPB participates in oil spill or hazardous substance discharge response and cleanup.	
2. Solid Waste and Disposal		
The KPB has responsibility for solid waste disposal throughout the entire borough. KPB operates a number of landfill sites with DEC permits.	DEC will process applications for solid waste disposal permits as efficiently as possible, assist the city in public meeting, and provide suggestions for different techniques for disposing of wastewater and solid wastes.	Assist in long-range planning for operation of solid waste sites in a cost-effective and environmentally safe manner.
3. Leaking Underground Storage Tank Program		
There are leaking underground storage tanks in the KPB area.	DEC will meet regularly and coordinate activities with other State agencies, local governments within the KPB to assist in problem identification and to promote compliance. Assist tank owners to remain in compliance with all applicable State and federal regulations to maintain eligibility for participation in the State's Underground Storage Tank Assistance Fund Program.	Cleanup of existing leaks and spills, prevent future leaks from UST systems in order to prevent the public from contamination of drinking water and to protect the environment.
4. Treatment/Disposal of Contaminated Soils		
There are contaminated soils at many and scattered locations within the borough but there is no place to store or dispose of this material.	Assist in locating an acceptable site for disposal of contaminated soils. Assist in developing methods for treatment of contaminated soils.	To provide an environmentally safe location for storage/disposal of contaminated soils. To assist in development of treatment methods.
5. Household Hazardous Waste (Spring Cleanup)		
Residents and small businesses generate hazardous wastes.	Since 1983 DEC has funded an annual hazardous waste cleanup. The strategy is to first determine how much waste exists and to divert as much hazardous wastes from landfills.	Continue to fund KPB for this year and divert as much residential and small business waste as possible from the landfills. In the future DEC wants to bring this service to more communities.
6. Air and Water Quality		
There are concerns regarding existing and the future quality of air and water resources.	Continue to identify sources of pollution and provide monitoring assistance.	Work toward improving and maintaining high quality of air and water resources.

Present Situation	Strategy	Goals
7. Subdivision Plan Review		
There are conflicting interpretations of the subdivision review process.	Cooperate in resolving procedural problems regarding subdivision plat reviews and approvals.	To ensure that new parcels created by subdivisions are adequate to support onsite septic systems.
8. Hazardous Waste Sites		
There are a number of hazardous waste sites located in the KPB.	The ADEC will provide to the KPB quarterly copies of the Hazardous Site Status Report and provide the KPB with further guidance and assistance to determine the impacts of these sites.	A detailed impact assessment of existing hazardous waste sites as identified in the Kenai cleanup inventory is needed.
9. Septage Disposal and Small Incinerators		
The KPB is concerned about the number and impact of small incinerators as well as the impacts of septage disposal.	A continued dialogue will be maintained with the KPB with regard to incinerator sites and impacts from septage disposal to ensure that actions serve the public purpose.	Ensure that ADEC actions meet with goals of the KPB and serve the public purpose.
10. Public Relations		
The amount of information provided to the public and the KPB regarding environmental issues and regulations is limited.	Provide for continued dialogue with the KPB to ensure adequate transfer of information and enhance the relationship and understanding between the KPB and the ADEC. Develop a Kenai Environmental Advisory Board to provide community input and guidance regarding local environmental issues.	Ensure that the KPB and the public are kept informed about changes to and new environmental regulations and issues in their community.
11. Oil and Hazardous Substance Release and Response Fund (OHSRRF)		
Limited information is available regarding the expenditure of OHSRRF monies.	Provide the KPB a statement of accounting for this fund upon request.	Ensure that the KPB has adequate information regarding the expenditure of OHSRRF monies.

Appendix B:

What Environmental Regulations Affect Your Community?

This appendix is a starting point for determining which federal regulations affect your community. Not all of the regulations described here will apply to your community, and many others, not described here, might affect you. In addition, state and local regulations might differ from the federal regulations listed here. The best approach is to contact your state environmental or health agency to find out how their regulations differ. Staying in contact with your state regulatory agency also will help keep you informed about any new regulations that might affect your community in the future.

Finally, remember the U.S. Environmental Protection Agency's (EPA's) first rule of thumb: Prevention is the best medicine. The best way to protect people's health and your community's environment is to reduce the amount of waste and pollution created in the first place. Pollution prevention should be a priority for every community.

Drinking Water Quality

Congress passed the **Safe Drinking Water Act** in 1974 to make sure that the drinking water supplied to the public is safe. In 1986, Congress strengthened the Act because of concerns about the growing number of threats to the safety of the nation's drinking water. The Safe Drinking Water Act applies to your community if you have a public water system with at least 15 service connections (homes and businesses that receive water from your system) or that regularly serves at least 25 people. In most states, the **State Department of Health** or **Environmental Protection** provides technical and regulatory assistance for *public* water systems.

The Safe Drinking Water Act also applies to privately owned public water systems such as mobile home parks and water companies. noncommunity systems, such as factories, schools, and campgrounds with their own water supply, also fall within the regulations. Compliance is the responsibility of the owner/operator of these nonmunicipal systems, but people will probably turn to local officials if something is wrong with their water system. Therefore, if such systems exist in your community, it's a good idea to be aware of the requirements for these systems and work with the systems' owners/operators to provide safe drinking water. These systems may also benefit from consolidation with the municipal system.

As a local official responsible for a community water system, you need to do several things to make sure that your community is in compliance with the Safe Drinking Water Act:

- Make sure that a **certified operator** runs your public water system. Most states have mandatory certification for operators.
- Make sure that your operator takes advantage of training opportunities by the state and others.
- Your operator is responsible for **water quality testing**. Make sure that your operator is taking water samples correctly and sending them to a state-certified laboratory for analysis. Test results must be reported to the state agency within 10 days of receiving them. If samples exceed safe levels of a regulated contaminant, the operator must notify the state within 48 hours and the public as soon as possible and begin efforts to correct the problem.
- According to the **Surface Water Treatment Rule**, if your water system uses surface water (an intake in a river or lake) or ground water that is under the direct influence of surface water (your state agency will determine this), you must disinfect your water. Your state agency can tell you if your system also requires filtration. If your drinking water source is surface water, you may also want to work with the state to protect the watershed area from contamination.
- If your drinking water source is ground water, find out more about **wellhead protection**. Work with your state to protect wellhead areas from contamination. Also consider working with private water systems in your community to implement wellhead protection.
- Some communities find that forming partnerships with neighboring communities to share the cost of needed monitoring, improvements, or qualified personnel is a good way to save money.

What Contaminants Does My Community Need To Test For?

EPA has established **maximum contaminant levels (MCLs)** based on estimated health risks that many contaminants might cause. Eighty-three substances are regulated by the Safe Drinking Water Act, and the list is growing. Most of these substances fall into one of the following categories: **coliform bacteria, disinfection byproducts, inorganic chemicals, synthetic and volatile organic chemicals, fluorides, lead and copper, radionuclides, nitrate/nitrite,** and **asbestos**. Information about each of these categories

is provided below. In addition, basic monitoring requirements for these categories are listed in the table on page 106. Contact your state agency to find out more information about drinking water standards as they apply to your community.

Coliform Bacteria

Total coliform bacteria are known as "indicator organisms" because they are easily measured and serve to "indicate" if disease-causing bacteria (pathogens), such as fecal coliform, are present.

Most community water systems, as well as most noncommunity water systems (public water systems that do not serve residential populations), must submit samples for coliform bacteria on a regular monthly basis. You are required to submit at least one routine sample per month for your system depending on its size. Follow procedures for sampling provided by your testing laboratory or state agency.

If your system does not test positive for total coliforms:

- Continue to submit regular samples and review results.
- Maintain a good operation and maintenance program for your water system, including regular line flushing at fire hydrants and on dead ends.

If your system has a positive total coliform sample result:

- Immediately call your state agency and ask for help in repeating sampling and analysis and locating any possible sources of contamination.
- Follow the state agency's direction in issuing public notices and any state emergency measures that may be required.
- Correct any problems causing contamination immediately. Contact one of the resource agencies listed in Appendix D of this book if you need technical support or help in financing arrangements.

Disinfection Byproducts

Disinfectants (such as chlorine) are the primary defense against diseases caused by microbiological contaminants in public water systems. The disinfectants themselves, however, have the potential to react with organic materials in the water and form byproducts that can contaminate the water. All public water supply systems are required to disinfect their water, although exceptions may be granted if the water comes from sources that are determined not to be at risk from microbiological contamination. Individual states will determine if monitoring for disinfection byproducts is necessary, depending on each system's vulnerability to byproduct development. At present, four disinfection byproducts are regulated, but only in community water supplies serving populations of 10,000 or greater. New rules are under development that might include smaller systems.

Contact your state agency for more information about monitoring for disinfection byproducts.

Inorganic Chemicals

Even if your community has little pollution, inorganic chemicals are likely to enter your water naturally from the rocks and soil surrounding the water supply. Exposure to high levels of certain inorganic chemicals can cause damage to the liver, kidneys, nervous system, and circulatory system.

EPA has set MCLs for 17 inorganic chemicals. All community water supply systems must monitor for regulated inorganic chemicals in their water supplies. Under the present rules, sampling for inorganic chemicals is required every 3 years from each sampling point for ground-water supplies and every year from each sampling point for surface water supplies. Contact your state agency to obtain more detailed information about sampling requirements and MCLs for inorganic chemicals.

Nitrates/Nitrites

Nitrates and nitrites are inorganic compounds that can occur naturally or can be introduced into drinking water from feedlots, fertilizers, and wastewater. Community water systems must monitor annually for nitrates/nitrites if they use ground-water sources and quarterly if they use surface water sources. Contact your state agency for more information about nitrate/nitrite monitoring requirements.

Synthetic and Volatile Organic Chemicals

Synthetic organic chemicals are human-made compounds used for a variety of industrial, manufacturing, and agricultural purposes. For testing purposes, synthetic organic compounds are divided into two groups: volatile synthetic organic chemicals (VOCs) and nonvolatile synthetic organic chemicals (SOCs), depending on how easily they are released into the atmosphere. The effects of these chemicals include damage to the nervous system and kidneys, as well as possible cancer risks.

Unless you are granted a waiver by the state, all public water supply systems are required to test for SOCs, such as pesticides and polychlorinated biphenyls (PCBs). All small water systems (defined as less than 150 service connections) must monitor for 21 regulated VOCs. Contact your state agency for more specific information on monitoring requirements and MCLs for both SOCs and VOCs.

Fluoride

Fluorides are compounds that contain the element fluorine. They occur naturally in many water sources and are added in the treatment process by many public water supply systems. In small amounts (between 1.0 and 1.5 milligrams per liter), fluoride helps reduce tooth decay; amounts greater that 2.0 milligrams per liter can have harmful health effects.

All community public water systems must test for fluoride at every entry point to the distribution system after treatment. Tests must be made every 3 years for ground-water supplies and/or every year for surface water supplies. Contact your state agency for information about fluoride sampling requirements.

Lead and Copper

Lead and copper are inorganic chemicals that often come from pipes or plumbing fixtures in water systems that have corrosive water. Lead can cause damage to the nervous system and kidneys, and can be very toxic to infants and pregnant women. Copper causes stomach and intestinal problems.

In June 1991, EPA published new rules requiring tests at customer taps. Monitoring must be conducted in "high-risk" homes (those with newer lead solder, lead pipes, or lead service lines). High levels of lead and copper require treatment to reduce the corrosiveness of the water, and possibly replacement of lead service lines. Ask your state agency for more information about monitoring, treatment, and public education requirements.

EPA also banned the use of solder and flux with more than 0.2 percent lead and the use of pipes containing more than 8.0 percent lead in new plumbing installed in facilities connected to the public water supply. This law only applies to plumbing that distributes drinking water and does not require the removal of existing solder. Check with your state agency for more information about the Lead Materials Ban.

Radionuclides

Radionuclides are radioactive particles that occur naturally in areas of uranium and radium deposits and also are found in nuclear waste. Radionuclides that can occur in drinking water include gross alpha, gross beta, radium 226 and 228, uranium, and radon. Radionuclides, even in very small concentrations, pose a cancer risk. Radon, for example, can occur in almost all ground-water supplies, and concern exists about possible cancer risks from air exposure to radon volatilized through shower heads or laundry.

All community public water supply systems must test for radionuclides (except radon and uranium) every 4 years. Check with your state agency to find out if there have been any changes to the monitoring requirements.

Asbestos

Asbestos fibers in drinking water are a suspected cancer-causing agent. Asbestos occurs naturally in some water supplies, or it can enter water in the distribution system as a result of corrosive action on asbestos cement water pipes. All public water supply systems must monitor for asbestos. If asbestos is not likely to occur in your water source, you do not have asbestos cement pipes, or your water is noncorrosive, you could be eligible for a waiver from your state agency. Contact your state agency for more information about asbestos monitoring requirements and waiver eligibility.

What Should I Do if Test Results Exceed MCLs?

In all cases, if the level of a contaminant in the public water supply is higher than the MCL, you should:

- Notify your state agency as soon as possible.
- Notify the public of the violation as directed by your state agency.
- Work with your state agency and/or an engineer to find the source of contamination and the best way to reduce the amount of the contaminant in your water supply.
- Work with your state agency to see if your community can continue to use the water supply while you explore solutions to the contamination.
- Ask your state agency and other assistance agencies (listed in Chapter 8) for help in finding the financial resources you need to make the necessary changes in the water system.

Public Notification

The Safe Drinking Water Act requires that all owners or operators of public drinking water systems notify their customers when drinking water standards are violated. The purpose of public notification is to inform consumers of any potential adverse health effects, and to tell them what steps they can take to minimize their impact. Always notify your state agency of the violation first, and ask their direction in proceeding with public notification.

Where Are the Regulations Published?

The regulations implementing the Safe Drinking Water Act can be found in the *Code of Federal Regulations*, Title 40, Parts 141, 142, and 143.

Wellhead Protection

The best way to avoid contamination and expensive cleanup procedures is to prevent your water supply from becoming polluted in the first place. The 1986 Amendments to the Safe Drinking Water Act ask each state to develop a **wellhead protection program** to protect public water supply wells and wellfields from contamination. The law specifies that all states participate; however, there are no penalties for states that do not participate, nor are there funds available to help states develop these programs. In addition, EPA has no authority to set up a wellhead protection program if a state chooses not to establish one.

According to the 1986 Amendments, each state must develop a wellhead protection program that:

- Specifies roles and duties of local governments, state agencies, and public water suppliers with respect to the state's wellhead protection program.
- Establishes a wellhead protection area for each wellhead.
- Identifies the sources of contamination at each wellhead.
- Develops ways to protect the water supply within wellhead protection areas from those contaminants.
- Develops plans for each public water supply to respond to well or wellfield contamination.

An effective wellhead protection program requires the participation of all levels of government. Your responsibilities as a local government official depend on the specific requirements of your state's wellhead protection program. Frequently, local governments are responsible for ensuring that the wellhead areas are properly protected from contamination. Typical practices used by local governments to protect ground-water quality include:

- Implementing zoning ordinances that protect wellhead areas, such as ground-water protection districts, and implementing restrictions on certain types of land uses.
- Developing land-use plans, such as a regional or local master plan.
- Developing health regulations that prohibit certain activities, such as the use of underground fuel storage tanks or chemical septic cleaners, within the wellhead protection area. Local health regulations also can require businesses using hazardous materials to register with local authorities, who can inspect these facilities periodically to ensure proper handling of those materials.

If your state adopts a wellhead protection program, you will be required to enforce your state's specific requirements for your area. Even if your state does not adopt a wellhead protection program, it is in your community's interest to do everything possible to protect your water supply. To find out more about protecting the quality of your community's water supply, contact your state agency.

Drinking Water Regulations

Substance	What Should Be Done To Comply With the Regulation?*†	How Often Do I Need To Take Samples?
Coliform bacteria	■ Test for total coliform bacteria. ■ Work with state to establish a "sample-siting plan" for your community that lists where samples should be taken each month. ■ Complete a sanitary survey of your water system at least once every 5 years. This is usually done by the state agency. The initial survey must be conducted by June 29, 1994.	■ Take and submit at least one sample per month. The number of samples required depends on your system's size. ■ If the sample tests positive for total coliform, collect four repeat samples within 24 hours of notification of the positive result. Repeat samples must be collected within five service connections of the original sample, with at least one at the original location, one upstream and one downstream. Analyze the positive sample for fecal coliform (E. coli). ■ After the state reviews the sanitary survey, it can change the monitoring frequency, which may reduce the number of routine samples required. Without the sanitary survey, you need to collect five routine samples every month.
Inorganic chemicals	■ Test water for inorganic chemicals. ■ If levels of inorganic chemicals in your water are low, apply for a waiver from your state agency to reduce required testing. ■ Nitrate/nitrite sampling requirements cannot be waived.	■ Test surface water systems yearly and ground-water systems every 3 years. ■ With waiver, test every 9 years (from 1993). ■ For nitrates, test surface water systems quarterly and ground-water systems yearly. ■ Every public water system must sample for nitrites once. The state then determines whether and how often systems must do repeat sampling.
SOCs	■ Cooperate with your state agency to determine your water supply's vulnerability to SOCs. If your system is not vulnerable, apply for a waiver from the state exempting you from sampling requirements until 1996. ■ If your system is vulnerable, work with your state agency to take the first round of samples.	■ Vulnerable systems must be sampled every 3 months, beginning in 1993. ■ If no SOCs are found in the first round of sampling, repeat sampling as follows: Population Served — Number of Samples > 3,300 — Two samples every 3 years < 3,300 — One sample every 3 years ■ With a waiver, no monitoring is required until 1996. Before 1996, the vulnerability assessment must be updated and a new waiver must be granted for the next compliance period.
VOCs	■ Conduct initial sampling and repeat sampling, if necessary, for regulated VOCs in the water supply. ■ Inform your customers if you find out that your public water supply has VOCs violations or a monitoring waiver.	■ For initial sampling, take one sample every 3 months for 1 year before 1996. Your state will designate either 1993, 1994, or 1995 as the year in which your system will be required to take samples. ■ For repeat sampling, take yearly samples for both ground-water and surface water systems. ■ Conduct a "vulnerability assessment" and use data from initial sampling or previously collected data to apply for a waiver for additional sampling requirements.

*If MCL is exceeded, see "What Should I Do If Test Results Exceed MCLs?" on page 104.

†Contact your state agency for more detailed and up-to-date information on drinking water regulations affecting your community.

Drinking Water Regulations (continued)

Substance	What Should Be Done To Comply With the Regulation?*†	How Often Do I Need To Take Samples?
Fluoride	■ Test water at every entry point to the distribution system after treatment. ■ If fluoride levels are over 2.0 mg/L, ask your state agency and/or engineer how to lower the fluoride level, and notify the public about the health effects of fluoride.	■ Test surface water systems yearly and ground-water systems every 3 years.
Lead and copper	■ Complete a "materials evaluation" of the distribution system. ■ Collect tap water samples from high-risk places (homes with lead pipe, lead service lines, and copper pipe with lead solder installed after 1982). Contact your state agency for sampling procedures. ■ If the system exceeds either action level in more than 10 percent of tap samples, additional monitoring, corrosion control, and public education requirements apply. Your state will help you.	■ Collect one tap sample from the following number of sites every 6 months: Population — Number of Sites <100 — 5 < 500 — 10 501-3,300 — 20 ■ Collect samples from each entry point into the distribution system every 6 months. ■ If the system meets the action levels for copper and lead for two consecutive monitoring periods, check with your state agency about reducing the sampling frequency to once per year. If the system continues to meet action levels for 3 years, sampling frequency may be further reduced.
Radionuclides	■ Test for gross alpha particle activity and combined radium 226 and 228.	■ For initial sampling, take one sample every 3 months for 1 year. ■ Unless the average of initial tests results shows radionuclide levels above or near the MCL, repeat the test once every 4 years. ■ A revised regulation, which will include monitoring requirements for uranium and radon, is scheduled to be published in April 1995. Contact your state agency to find out how the new regulation will affect your community.
Asbestos	■ Cooperate with the state agency to perform a vulnerability assessment. ■ If you have asbestos cement pipes, take samples from the tap. ■ If you have asbestos in the source water only, take samples from each entry point to the distribution system. ■ If asbestos is unlikely to be in your system, apply for a waiver from your state agency to avoid unnecessary testing.	■ Test for asbestos once every 9 years (at least once before 1996). ■ With an asbestos waiver, no testing for asbestos is required.

*If MCL is exceeded, see "What Should I Do If Test Results Exceed MCLs?" on page 104.

†Contact your state agency for more detailed and up-to-date information on drinking water regulations affecting your community.

Wastewater Treatment

Federal regulations have been developed to govern various aspects of wastewater treatment. These regulations cover:

- Pretreatment of industrial wastewaters.
- Limitations on the level of pollutants in wastewater discharged into waterways.
- Management of the solid materials removed from the wastewater during the treatment process (sludge).

Each of these topics, and the federal regulations governing them, are discussed below.

Pretreatment of Industrial Wastewater

Pretreatment of industrial wastewaters refers to the steps that industries take to remove pollutants from wastewater before they discharge it into the public sewer system. Pretreatment must remove toxic and hazardous pollutants from wastewaters, which could either pass through or interfere with the community treatment plant. The Clean Water Act of 1977 set **National Pretreatment Standards** to control pollutants that cannot be removed by or might interfere with wastewater treatment processes.

The National Pretreatment Standards specify quantities or concentrations of pollutants that may be discharged to a treatment plant by industrial users. In addition, the National Pretreatment Standards prohibit everyone, including the public, from putting the following pollutants in their wastewater:

- Flammable, corrosive, solid, or viscous pollutants.
- Any pollutant released at a high concentration that can interfere with the collecting sewer and the treatment process.
- Petroleum oil, nonbiodegradable cutting oil, and products of mineral oil origin.
- Pollutants that result in toxic gases or vapors.
- Any trucked or hauled wastes, except at discharge points designated by the publicly owned treatment works (POTW).

Does This Regulation Apply to My Community?

Traditionally, small wastewater treatment plants with a design flow of less than 1 million gallons per day are not required to establish local pretreatment programs. Very small communities often have few, if any, industrial users.

If your community does have industrial users (such as sawmills, food processing plants, and metal finishers) that discharge the type of pollutants described on the previous page, which could pass through or interfere with your treatment facility, your community might have to implement a pretreatment program to satisfy the National Pollutant Discharge Elimination System (NPDES) permit requirements. EPA or approved state environmental control agencies have the responsibility for administering these permits. (NPDES permits are discussed later in this section.) In addition, state agencies will implement pretreatment programs for communities that are too small to implement their own.

What Action Should My Community Be Taking?

To determine whether you are required to set up a pretreatment program in your community, contact your state water quality agency. If such a program is necessary, the agency will assist you in its development. Make sure that all affected industries are aware of the pretreatment standards that they need to meet.

If you are required to establish a pretreatment program, you must establish local ordinances and other procedures to implement program requirements. You must also identify personnel who will be responsible for administering and enforcing the program.

Finally, any time you suspect a problem caused by a nondomestic wastewater producer, notify your treatment works operator, county sanitarian, *and* appropriate state agency or department.

Where Are the Regulations Published?

The regulations for pretreatment of industrial wastewater are in the *Code of Federal Regulations*, Title 40, Part 403.

The National Pollutant Discharge Elimination System

In response to the nation's growing concern about water pollution, major federal laws were passed in the 1970s that required the restoration and maintenance of clean water for residential, commercial, recreational, and agricultural uses. The 1972 Amendments to the **Water Pollution Control Act**, which was later amended and renamed the **Clean Water Act** in 1977, set federal water quality standards and cleanup schedules for meeting pollution control requirements. One way in which the goals of these acts are achieved is through **NPDES permits**, which set limits on the level of pollutants allowed to be discharged. These permits, issued mostly by state agencies but in some cases by EPA, are issued to operators that discharge any pollutant from point sources to a navigable waterway, such as a lake, river, stream, wetland, or ocean.

Under the Clean Water Act, states must determine how each body of navigable water is to be classified. This classification designates the water body for one or more of the

following uses: drinking, fishing, swimming, and deep water ports. The water quality standards used to develop NPDES permits are intended to maintain the designated use or uses of the water body. For example, permits are likely to be less restrictive for a facility that is discharging wastewater into a river that is not used for drinking water or recreational purposes than for a facility that is discharging into a recreational lake that is designated for fishing and swimming. New permits also will include residuals quality. These same regulations also govern the disposal of septic tank pumpings (septage) for unsewered communities.

NPDES permits are required for wastewater treatment plants that discharge into waterways. For most wastewater treatment plants, their NPDES permit requires that they must (at a minimum) meet secondary treatment standards. Secondary treatment means that the plant must install technologies that go beyond the settling of solids to remove 85 percent of the conventional pollutants (materials that deplete oxygen from the water) and control acidity.

Do These Regulations Apply to My Community?

Every community deals with the issue of wastewater. Not all communities, however, have to comply with the surface water quality standards established under the Clean Water Act. Thousands of towns and communities are subject only to state and local requirements, since they use septic tanks or communitywide systems that do not discharge treated wastewater into navigable waters.

All wastewater treatment facilities that discharge to U.S. waters, however, must comply with the NPDES requirements. Most of these plants need only meet the secondary treatment standards, but plants that discharge into high-quality waters may have to meet more stringent standards.

What Action Should My Community Be Taking?

To make sure that your community complies with the wastewater regulations established by the Clean Water Act, you should do the following:

- If your community has a wastewater treatment facility that discharges into a body of water, make sure that you have an NPDES permit for operating the treatment plant.
- Make sure that the treatment plant operator meets all permit requirements, such as monitoring pollutant discharge quantities and reporting the results to state authorities.
- If you suspect that your community has a problem with wastewater or water pollution and might need to install a wastewater treatment plant, contact your state environmental agency to find out information about technology options, NPDES permits, and potential funding sources.

Where Are the Regulations Published?

The regulations governing the NPDES permitting process are in the *Code of Federal Regulations*, Title 40, Parts 122 to 125. The Secondary Treatment Regulations are in Title 40, Part 133.

Sludge Management

Sewage sludge (biosolids) is removed from wastewater during the treatment process. Federal regulations require that sludge be handled properly when it is used for beneficial purposes (such as for a soil conditioner or fertilizer) or when it is disposed of in a landfill, other surface disposal site, or an incinerator. Different requirements apply for sludge that is used for beneficial purposes and sludge that is disposed of. Sludge can be stored on site for up to 2 years before use or disposal. Sludge that remains on site for more than 2 years must meet disposal requirements.

Do These Regulations Apply to My Community?

These regulations apply to all communities that use a central wastewater treatment plant or mechanical plant, including a lagoon, which produces sludge.

What Action Should My Community Be Taking?

If your community generates sludge through its wastewater treatment process, you should:

- Contact the water division of your EPA regional office to find out about obtaining a permit for sludge generation and management. You will have to apply for a sludge permit during your next NPDES permit renewal.
- Collect representative samples of the sewage sludge and test for regulated metals.
- Properly dispose of the sludge. Sludge may not be placed in unlined surface areas when arsenic, chromium, and nickel levels are above regulatory pollutant levels.

If your community uses sludge for beneficial purposes, you should be aware of and follow proper methods for the agricultural and nonagricultural land application of sludge. The use of contaminated sludge can threaten the health of the residents of your community.

Where Are the Regulations Published?

Sewage Sludge Program Regulations are contained in the *Code of Federal Regulations*, Title 40, Parts 122, 123, and 501. Technical regulations for sewage sludge use and disposal are in Title 40, Parts 258 and 503.

Wetlands Protection

"Wetlands" are marshes, swamps, bogs, and other similar wet areas. Wetlands can be coastal or inland, saltwater or freshwater. They are an important resource because they help improve water quality, reduce flood and storm damages, provide important fish and wildlife habitats, and support hunting and fishing activities. The two most important laws dealing with wetlands protection are **Section 404 of the Clean Water Act** and the **Swampbuster Section of the Food Security Act**.

Under Section 404, EPA and the U.S. Army Corps of Engineers established a permit program to control the release and dumping of dredged or fill materials into most wetlands. As a result, you need to apply for a permit for almost any type of activity that affects or might affect wetlands, such as dumping or building on or near a wetland. The Swampbuster program withholds federal farm program benefits from anyone who:

- Plants a crop on a wetland that was converted into farm land after December 23, 1985.
- Converts a wetland to use as farm land after November 28, 1990.

Does This Regulation Apply to My Community?

Wetlands can be found in almost every county of every state in the United States. Although there are many exceptions, especially for farmers, you should always assume that you need a permit and check with someone from the U.S. Army Corps of Engineers before you begin any activities that might affect a wetland. The U.S. Army Corps of Engineers will be able to tell you if you need an individual permit or not. Anyone who violates Section 404, either by not getting a permit or by disregarding the conditions of a permit, may have to pay to restore the area, pay fines, and/or go to jail.

What Action Should My Community Be Taking?

To comply with Section 404 of the Clean Water Act, you should:

- Find out where wetlands are located in your community by ordering wetland maps (800-USA-MAPS).
- Before beginning any projects that might affect wetlands in your area, check with the U.S. Army Corps of Engineers to see if a Section 404 permit is needed.
- Inform your community about the requirements of Section 404 of the Clean Water Act through public education, particularly directed to land developers and builders, so that correct procedures are used and costly violations are avoided.

Where Are the Regulations Published?

The regulations implementing Section 404 of the Clean Water Act are in the *Code of Federal Regulations*, Title 40, Part 230.

Nonpoint Source Pollution

Nonpoint source (NPS) pollutants—such as grease and oil from streets and parking lots, pet wastes, lawn fertilizers, pesticides, chemicals from agricultural and industrial sites, soil from construction sites—can enter ground water and surface waters, causing problems with water quality in your community. NPS pollutants are typically carried over and through the ground by rainfall and snowmelt. Rivers, lakes, estuaries, coastal waters, and wetlands all experience major negative effects as the result of nonpoint source pollution.

NPS pollution is difficult to regulate because it comes from a variety of sources and often results from the ordinary and necessary things that we do, such as farming and building houses. EPA has decided that flexible state and local decision-making is the best way to control NPS pollution. The **National Nonpoint Source Program** under Section 319 of the **Clean Water Act** requires states to identify:

- Any navigable waters that are affected or threatened by NPS pollution
- The pollution sources affecting those same waters

How Do NPS Pollution Control Regulations Affect My Community?

Control of NPS pollution is voluntary for most small communities. If NPS pollution is having a major effect on the water quality of your community, it is in your best interest to control the problem. EPA's system for choosing a plan to control NPS pollution is called **best management practices (BMPs)**. BMPs can be cost effective and easy to use if they are prudently applied.

What Action Should My Community Be Taking?

As a local official, you are responsible for finding out if your state has laws regulating NPS pollution. You should:

- Contact your state environmental agency to ask if any navigable waters in your community are affected or threatened by NPS pollution.

- If your community has a problem with NPS pollution, cooperate with your state environmental agency to develop BMPs. Many states already have carefully planned management strategies to control NPS pollution and protect water quality. Your state agency will help you develop a BMP program that considers local environmental, economic, and geographic factors as part of the solution.
- Keep informed about new stormwater regulations that could affect small communities. For more information on stormwater regulations, call the Stormwater Hotline at 703-821-4823.

Where Are the Regulations Published?

The stormwater regulations are contained in the *Code of Federal Regulations*, Title 40, Parts 122 to 124.

Solid Waste Management

Municipal solid waste is nonhazardous waste generated by people in their homes, offices, schools, restaurants, and other places. Solid waste that is not recycled must be disposed of and landfilling is still the most common disposal method. The regulations affecting municipal solid waste disposal facilities (landfills) are the **Resource Conservation and Recovery Act (RCRA) Subtitle D, Municipal Solid Waste Landfill Criteria**.

The purpose of Subtitle D is to prevent solid waste from polluting the soil or ground water by being disposed of improperly. Subtitle D regulates the location, design, operation, ground-water monitoring, and closure and postclosure care (including financing) for both old and new municipal landfills.

Subtitle D applies if your community owns and operates a landfill, is planning to build a landfill, or is disposing of solid waste anywhere except in a landfill. If you have questions about the regulations and whether they apply to your community, contact your state environmental agency for help. Also contact your state agency to discuss your options, and cooperate with neighboring communities to find an appropriate solid waste management solution.

Planning for New Landfills

RCRA Subtitle D restricts the construction of new landfills in floodplains, wetlands, fault areas and seismic zones, unstable areas, and in the vicinity of airports. According to Subtitle D design requirements, in states with EPA-approved permitting programs, landfills must be designed to ensure that federal drinking water standards are not exceeded in the ground

water. In states without EPA-approved programs, landfills must be designed with a composite liner (made of synthetic material) covering a 2-foot clay liner and a collection system to capture and treat leachate.

Small community landfills are exempt from the design requirements of the regulation if they receive less than 20 tons of solid waste each day (based on a yearly average), show no evidence of ground-water contamination, *and* meet one of the following conditions:

- Weather or other causes make it difficult for community residents to get to a regional landfill for 3 months in a row of every year.
- There are no practical alternatives for solid waste disposal, and there is less than 25 inches of precipitation each year.

Your state agency must approve of the design before a landfill can be built or structural changes to an old landfill or dump can be made.

All landfills must have monitoring wells to detect any ground-water contamination. If ground water is contaminated, the owner/operator is required to clean it up to acceptable standards to protect people's health and the environment.

Check with your state agency to learn the schedule you must follow to comply with the ground-water monitoring requirements.

Operation

Owners and operators of both new and existing landfills must observe the following operating criteria:

- Keep out hazardous waste.
- Cover each day's waste with soil to prevent the spread of disease by rats, flies, mosquitoes, and other animals.
- Monitor for methane gas. If emission levels in the landfill are over a certain limit, notify your state agency and develop a plan to solve the problem.
- Restrict access to the landfill to prevent illegal dumping and other unauthorized intrusions.
- Control stormwater runoff and discharge to surface waters.
- Refuse bulk or noncontainerized liquid waste, such as from tank trucks or in 55-gallon drums.
- Control air emissions. Emissions from landfills may not violate state and federal clean air laws and regulations. Open burning of waste is prohibited at landfills.
- Keep records.

Closure and Postclosure Care

Landfills can close for many reasons. Eventually every landfill becomes full and cannot accept more solid waste. Landfills also may be required to close if they violate a requirement, such as location or design, or if the presence of the landfill has become a threat to people's health or the environment in the area. When a landfill closes, the owner and operator must follow very specific procedures to prevent the closed landfill from causing health or environmental problems:

- Prepare, in advance, a written plan that describes all of the steps that will be taken to close the landfill.
- Develop a plan to pay for the maintenance, closure, and postclosure care of the landfill. Owners and operators need to prepare a detailed written cost estimate of how much it would cost to hire someone else to complete the closure, postclosure care, and any necessary cleanup. They need to assure the state that they will set aside at least that much money. Each owner or operator should consult with the state agency about the best way to do this.
- Notify the state agency of the intention to close the landfill.
- Complete closure activities within 180 days of starting closure.
- Install a final cover over the landfill to prevent rainwater from getting into the landfill and to prevent as much erosion as possible.
- Hire an engineer to verify that the closure has been completed according to the closure plan.
- Make a note on the property deed to inform anyone who might buy the land in the future that the land had been used as a landfill and therefore its use is restricted.
- Prepare, in advance, a written plan for postclosure that includes:
  - A description of the required monitoring and maintenance equipment.
  - The name, address, and telephone number of the person or office to contact about the landfill during the postclosure period.
  - A description of the planned uses for the property during postclosure.

The owner or operator is also responsible for postclosure care of the landfill area for 30 years after the landfill closes. Postclosure care includes:

- Maintaining the final cover, including making repairs caused by erosion or any other damage.
- Maintaining and operating the leachate collection system, if there is one.
- Monitoring the ground water as necessary.
- Maintaining and operating a gas monitoring system.
- Hiring an engineer to inspect the landfill at the end of the postclosure period to verify that everything has been done according to the postclosure plan.

What Action Should My Community Be Taking?

To comply with the Subtitle D Municipal Solid Waste Landfill Criteria, you should contact your state agency to find out if your community's landfill is exempt from any of the Subtitle D regulations. Then follow the regulations that do apply.

In addition, as a community leader, you should try to reduce the amount of solid waste that your community produces by:

- Conducting public education programs that encourage people to buy reusable products and products with less packaging.
- Evaluating a recycling program for materials such as glass, aluminum, plastic bottles, white paper, and newspaper, either alone or in cooperation with other communities in your area.
- Considering the pros and cons of a community program for composting yard wastes.
- Educating your community about the proper way to deal with wastes that should not be taken to the landfill, such as tires, batteries, used motor oil, and many hazardous household products. Contact your state agency about ideas for collecting these materials.

Where Are the Regulations Published?

The Municipal Solid Waste Landfill Criteria can be found in the *Code of Federal Regulations*, Title 40, Part 258.

Hazardous Waste Management

RCRA, as amended in 1984, regulates the disposal of all household, municipal, commercial, and industrial waste, including hazardous waste. The main goals of RCRA are:

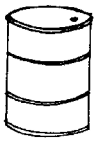
- To protect people's health and the environment from the potential hazards of waste disposal.
- To reduce the amount of waste generated, including hazardous waste.
- To conserve energy and natural resources.
- To ensure that wastes are managed properly.

A hazardous waste is a waste that poses a potential danger to people's health and/or the environment when improperly treated, stored, transported, disposed of, or otherwise

managed. **RCRA Subtitle C** regulates hazardous waste from the moment the waste is generated until its ultimate disposal.

There are three categories of hazardous waste generators under the RCRA program requirements:

- **Large Quantity Generator**—Facilities that generate more than 1,000 kilograms (2,200 pounds) of any hazardous waste each month, or more than 1 kilogram (2.2 pounds) of any acute hazardous waste. Large quantity generators are subject to all RCRA requirements.
- **Small Quantity Generator**—Facilities that generate between 100 and 1,000 kilograms (220 to 2,200 pounds) of hazardous waste each month. Small quantity generators generally may accumulate hazardous waste on site for up to 180 days, and may not accumulate more than 6,000 kilograms on site at any one time.
- **Conditionally Exempt Small Quantity Generators**—Facilities that generate less than 100 kilograms of any hazardous waste each month. These facilities are exempt from most RCRA hazardous waste requirements. Conditionally exempt small quantity generators, however, must identify waste to determine if it is hazardous; treat or dispose of the waste in either a recycling or permitted hazardous waste facility; and not accumulate more than 1,000 kilograms of hazardous waste at any given time.



= 1 barrel = about 55 gallons or 200 kilograms of hazardous waste

Does This Regulation Apply to My Community?

The requirements of RCRA Subtitle C apply to hazardous waste generators, transporters, and storage, treatment, and disposal facilities. Some types of hazardous wastes might be generated by businesses in your community or by your municipal facility operations themselves. A waste is considered hazardous if it has been listed by EPA as a hazardous waste or if the waste has any of four hazardous characteristics:

- **Ignitability**—Wastes that are easily combustible or flammable, such as paints or solvents.
- **Corrosivity**—Wastes that dissolve metals or other materials, or burn the skin. Examples are rust removers, acid or alkaline cleaning fluids, and battery acid.
- **Reactivity**—Wastes that are unstable or undergo violent chemical reactions, such as explosions, and/or release toxic fumes, gases, and vapors when mixed with water or other materials.
- **Toxicity**—Wastes that are harmful or fatal when eaten or absorbed. When toxic wastes are disposed of on land, contaminated liquid can drain (leach) from the waste and pollute

ground water. Toxicity is identified through a laboratory test called the **Toxicity Characteristic Leaching Procedure (TCLP)**.

EPA regulations require all waste generators to evaluate whether their wastes have any of the four hazardous characteristics. Wastes that have any of these characteristics are subject to Subtitle C hazardous waste regulations. In addition, some wastes are considered to be "acutely hazardous." These are wastes that EPA has determined to be very dangerous, even in small amounts, such as certain pesticides and wastes containing dioxins.

The following wastes are among those *not* included in the RCRA hazardous waste regulations:

- Domestic sewage.
- Irrigation return water or industrial wastewater effluent permitted under NPDES (see the section on wastewater treatment).
- Household hazardous wastes.
- Agricultural wastes generated by the growing or harvesting of crops or raising of animals (including animal manures) that are returned to the soil as fertilizer.
- Wastes from businesses that generate fewer than 100 kilograms (220 pounds) of hazardous waste each month.

If you are not sure if a business, industry, or municipal facility in your community is generating a hazardous waste or is subject to the RCRA hazardous waste regulations, contact your state agency or the RCRA Hotline at 800-424-9346.

Where Are the Regulations Published?

The hazardous waste regulations can be found in the *Code of Federal Regulations*, Title 40, Parts 260-272.

Underground Storage Tank Safety

There are several million underground storage tanks (USTs) in the United States that contain petroleum or hazardous chemicals. As many as 20 percent of all USTs might now be leaking, and many more are expected to leak in the future. Leaking USTs can cause fires or explosions that threaten people's safety. They also can contaminate nearby ground water and cause problems with drinking water quality.

Congress responded to the problem of leaking USTs by adding **Subtitle I** to **RCRA**. The goals of the UST regulations are to:

- Prevent leaks and spills.
- Find, correct, and clean up leaks and spills.
- Make sure that owners and operators of USTs can pay for fixing the problems caused by their leaks.

Does This Regulation Apply to My Community?

These regulations apply to you if you own or operate a UST storing either petroleum or certain hazardous chemicals. A UST is one or any combination of tanks, including underground piping connected to the tank, that has at least 10 percent of the volume underground.

Some kinds of tanks are *not* covered by these regulations:

- Farm and residential tanks holding 1,100 gallons or less of motor fuel used for noncommercial purposes.
- Tanks storing heating oil that is used on the premises where it is stored.
- Tanks on or above the floor of underground areas, such a basements or tunnels, where it is possible to physically inspect the tank for leaks.
- Septic tanks and systems for collecting stormwater and wastewater.
- Tanks holding 110 gallons or less.
- Emergency spill and overfill tanks.

If you are unsure whether or not the UST regulations apply to you, contact your state environmental agency or the RCRA Hotline at 800-424-9346.

What Are the Specific Requirements of RCRA Subtitle I?

RCRA Subtitle I regulates the installation, maintenance, monitoring, and closure of both new and existing USTs. The regulations also give specific instructions for the proper way to deal with leaks and spills, including corrective action. According to the regulations, new USTs are those installed after December 22, 1988, and existing USTs are those installed on or before December 22, 1988. All new USTs must comply with the regulations before installation. Existing USTs will eventually need to comply with the same regulations as new USTs. The deadlines for compliance, however, are spread out over time. The requirements for petroleum and chemical USTs are very similar, although there are a few special requirements for chemical USTs.

Installation

Subtitle I requires that you:

- Use qualified installers who follow industry codes.
- Certify on a notification form (available from your state agency) that you have used a qualified installer who can assure you that your UST has been installed correctly.

Corrosion Protection, Spill/Overfill Prevention, and Leak Detection

The box on page 122 lists the regulations regarding corrosion protection, spill/overfill prevention, and leak detection for new and existing USTs. Existing tanks must be equipped with leak detection by December 1993 and must have corrosion protection and spill/overfill prevention by December 1998. All existing piping must comply with corrosion prevention requirements by December 1998 and with leak detection requirements by December 1993; however, spill/overfill prevention requirements do not apply to piping.

Leaks and Spills

There are several requirements for both reporting and correcting leaks and spills. In general, here is what you should do when you have a leak or spill:

- Stop the leak or contain the spill immediately.
- Within 24 hours, notify your state agency of the leak or spill. Report all underground leaks. Report petroleum spills and overfills of 25 gallons or more, or any that cause an "oil slick" on nearby surface water. *If you are not sure of the amount, report it.*
- Identify and mitigate fire, explosion, and vapor hazards. Ask your local fire department to test for explosive conditions and to help you decide how to deal with any poisonous vapors or flammable liquids and how to go about cleaning up the leak or spill.
- Contact professionals who might be able to help you determine the extent of contamination, prepare a cleanup plan, and clean up the site.
- Keep detailed records of the actions you have taken or plan to take:
  - Report your progress to your state agency or regulatory authority no later than 20 days after the leak or spill.
  - Report whether the leak has damaged or might damage the environment within 45 days of the leak or spill, including how you plan to remove leaked petroleum.

You must repair your UST system in accordance with a national code of practice, which generally requires retesting of repaired cathodic protection within 6 months, replacement of all damaged metal piping, and lifetime recordkeeping. Chemical leaks and spills have the added requirements of also reporting the spill or overfill to the National Response Center at 800-424-8802 or 202-267-2675 if they exceed "reportable quantities." You can

Underground Storage Tank Requirements: Corrosion Protection, Spill/Overfill Prevention, and Leak Detection

Corrosion Protection		
New tanks (Three choices)	■ Coated and cathodically protected steel. ■ Fiberglass. ■ Steel tank clad with fiberglass.	
Existing tanks (Four choices)	■ Same options as for new tanks. ■ Add cathodic protection system. ■ Interior lining. ■ Interior lining and cathodic protection.	
New piping (Two choices)	■ Coated and cathodically protected steel. ■ Fiberglass.	
Existing piping (Two choices)	■ Same options as for new piping. ■ Cathodically protected steel.	
Spill/Overfill Prevention		
All tanks	■ Catchment basins and one of the following: — Automatic shutoff devices. — Overfill alarms. — Ball float valves.	
Leak Detection		
New tanks (Two choices)	■ Monthly monitoring.* ■ Monthly inventory control and tank tightness testing every 5 years (only an option for 10 years after installation).†	
Existing tanks (Three choices)	■ Monthly monitoring.* ■ Monthly inventory control and annual tank tightness testing (only an option until December 1998). ■ Monthly inventory control and tank tightness testing every 5 years (only an option for 10 years after adding corrosion protection and spill/overfill prevention or until December 1998, whichever date is later).†	
New and existing pressurized piping (Choice of one from each set)	One of the following: ■ Automatic flow restrictor. ■ Automatic shutoff device. ■ Continuous alarm system.	And one of the following: ■ Annual tightness testing. ■ Monthly monitoring (except automatic tank gauging).*
New and existing suction piping (Three choices)	■ Monthly monitoring (except automatic tank gauging).* ■ Tightness testing every 3 years. ■ No requirements (if the system has the characteristics described in the regulations).	
Chemical USTs	■ Interstitial monitoring (monitoring between the layers of double-walled tanks and pipes) and secondary containment.	

* Monthly monitoring includes: automatic tank gauging, vapor monitoring in soil, interstitial monitoring (i.e., monitoring between the layers of double-walled tanks and pipes), ground-water monitoring, statistical inventory reconciliation, and other approved methods.

†Very small tanks may also be able to use manual tank gauging.

get information about the "reportable quantities" by calling the RCRA Hotline at 800-424-9346.

Closure

If you close your UST, you must follow the requirements for **permanent closure**. Notify your state agency 30 days before you plan to close your UST. Your state agency will help you decide how to meet all local requirements for closure. Although USTs can also be closed temporarily, the requirements are difficult. Details of temporary closure requirements can be obtained from your state agency.

Reporting and Recordkeeping

As noted above, you will need to report to your state agency at the beginning and end of your UST's operating life, and in the case of a leak or spill. You will also have to keep records that can be provided to an inspector during an onsite visit that prove your facility meets certain requirements. These records must be kept long enough to show your facility's compliance status in four major areas:

- Keep the following **leak detection** records:
  - — Last year's monitoring results and the most recent tightness test.
  - — Copies of performance claims provided by leak detection manufacturers.
  - — Records of recent maintenance, repair, and calibration of leak detection equipment installed on site.
- Keep records showing that the inspections of the **corrosion protection** system were carried out by properly trained professionals.
- Keep records showing that **repairs and upgrades** to the USTs were properly conducted.
- For at least 3 years after **closing** an UST, keep records of the site assessment results required for permanent closure.

Check with your state agency about the particular recordkeeping requirements in your area. The general rule of thumb for recordkeeping is: When in doubt, keep it.

Financial Responsibility

Owners and operators of USTs are required to show, through insurance coverage or other acceptable financial mechanisms, that they can pay for the cost of cleanups and third-party damages resulting from any leaks that might occur. The other acceptable mechanisms for compliance include state assurance funds, letters of credit, surety bonds, a financial test of self-insurance, guarantees, and trust funds. Four additional mechanisms are available for

local government entities: bond tests, government guarantees, local government funds (trust funds), and a local government financial test.

As of January 1994, 40 states had state assurance funds that can be used as partial or even full mechanisms for compliance with the financial responsibility regulations. For additional information about these funds, call your state regulatory agency.

The compliance deadline for petroleum marketers and nonmarketers was December 31, 1993, and the deadline for local government entities was February 18, 1994.

Contact the RCRA Hotline (800-424-9346) for more information.

Where Are the Regulations Published?

The Underground Storage Tank regulations are contained in the *Code of Federal Regulations*, Title 40, Part 280.

Emergency Response to Hazardous Substance Spills

In 1986, Congress passed the **Emergency Planning and Community Right-to-Know Act (EPCRA, also known as SARA Title III)** to help U.S. communities deal safely and effectively with the many hazardous substances that are used throughout our society. The law has two main purposes:

- To encourage and support emergency planning for responding to chemical accidents.
- To provide local governments and the public with information about possible chemical hazards in their communities.

EPCRA requires facilities to notify communities and states immediately if there is a chemical spill. In addition, the act requires all facilities—large or small, manufacturing or nonmanufacturing, industrial or government—to report information about the amounts, location, and potential effects of certain hazardous chemicals present above the threshold levels specified by EPA.

Does This Regulation Apply to My Community?

Yes, every community in the United States must be part of a comprehensive plan for responding to chemical emergencies. The governor of your state has appointed a **State**

Emergency Response Commission (SERC). Each SERC, in turn, has divided its state into local emergency planning districts and appointed a **Local Emergency Planning Committee (LEPC)** for each district. At a minimum, each committee must include representatives of state and local government; law enforcement officials; firefighters; first aid, health, hospital, environmental, and transportation workers; community groups; broadcast and print media; and owners and operators of industrial plants and businesses. The LEPC is responsible for:

- Developing a plan to prepare for and respond to chemical emergencies in its district and reviewing the plan annually.
- Receiving emergency release and hazardous chemical inventory information from local facilities and making this information available to the public upon request.
- Visiting facilities in the district to find out what they are doing to reduce hazards and prepare for accidents.
- Serving as an informal source of information and discussion about hazardous substances, emergency planning, and health and environmental risks for the community.

What Chemicals Must Be Reported Under the Act?

Over 1,000 chemicals are considered to be **hazardous or extremely hazardous substances** that could represent an immediate danger to the community if they are spilled or released into the environment. Releases of these substances must be reported immediately to the SERC and LEPC. Thousands of other chemicals are considered to be hazardous or toxic chemicals that represent a significant physical or health hazard when present in critical amounts. Facilities need to inventory these chemicals and submit specific information about these materials to the SERCs, LEPCs, and local fire departments (the fire department, paid or volunteer, that serves your community). For more information on how to comply with these regulations, contact your SERC or LEPC.

What Action Should My Community Be Taking?

As a local official, you are responsible for making sure that all public facilities in your community (such as hospitals, schools, wastewater or drinking water treatment plants) comply with the act by immediately reporting any hazardous or extremely hazardous substances that they release or spill to the SERC and LEPC.

In addition, you should take the following steps to ensure that your community is prepared to respond to chemical accidents:

- Learn who represents public institutions (hospitals, schools, state and local government) on the LEPC, and contact that person to find out the information that affects your community.

- Make sure that the local fire department is familiar with the emergency response plan for your community and that the LEPC is satisfied with its preparedness.
- Use the information collected by the SERC and LEPC to find out about hazardous chemicals in your community to help identify any potential risks to people's health and the environment.
- Encourage public facilities in the community to voluntarily report inventories of the hazardous chemicals present at these facilities. Even though public facilities are not required by law to provide this information, this effort would ensure that the local responders (fire departments, law enforcement officials, etc.) would be better informed of the hazards present in the community. This information could also be incorporated into the local community planning efforts for emergencies.

Where Are the Regulations Published?

The regulations implementing EPCRA can be found in the *Code of Federal Regulations*, Title 40, Parts 300, 350, 370, 372.

Asbestos-Containing Materials in Buildings

The **Asbestos Hazard Emergency Response Act (AHERA)** of 1986 requires schools to inspect buildings for materials containing asbestos and to develop a plan to properly manage asbestos-containing materials in all school buildings. The management plans were submitted to state agencies in May 1989, and school districts and individual private schools began implementing their plans in July 1989. School districts and individual private schools should update their management plans to reflect any actions that they have taken.

Under the **National Emission Standards for Hazardous Air Pollutants (NESHAP)**, all public buildings must be inspected for asbestos-containing materials before any renovation or demolition occurs. The owner must notify the appropriate regulatory agency for all demolition activities, even if asbestos is not found. If asbestos is found in a building to be demolished, NESHAP establishes certain work practices, waste disposal methods, and recordkeeping requirements that must be followed. For renovations, the owner must only notify the regulatory agency and meet work practice, waste disposal, and recordkeeping requirements if the quantities of asbestos-containing materials exceed 160 square feet, 260 linear feet, or 35 cubic feet. In addition, the 1990 amendments to AHERA mandate that if a building owner renovates or demolishes a building regulated under NESHAP, people accredited under AHERA must be used to inspect, design, and conduct all asbestos-related activities.

Finally, under the **Asbestos Abatement Projects Worker Protection Final Rule (WPR),** employers of public employees that are handling friable asbestos-containing materials must comply with provisions to protect their employees from exposure to asbestos fibers. Employers must monitor the air, use specific engineering controls and work practices, provide medical surveillance and training to employees, and notify the EPA regional asbestos coordinator of their activities.

Do the Asbestos Regulations Apply to My Community?

Every local public school system or nonprofit private school (K-12) must designate and train one person to oversee asbestos-related activities, including:

- Conducting inspections in every school building for asbestos-containing materials. Reinspections are required every 3 years.
- Preparing and submitting management plans to the state agency. A management plan includes maintenance, repair, encapsulation, enclosure, and removal, if absolutely necessary. The plan should include a time frame for implementation of recommended actions.
- Ensuring that only properly authorized people conduct inspections, develop the asbestos management plan, and design and conduct any asbestos-abatement actions.
- Informing custodial and maintenance workers about the location of asbestos and posting warning labels.
- Providing appropriate training for custodial and maintenance staff.
- Notifying parents, teachers, and other school employees about the asbestos inspection and the fact that they have the right to review the school's management plans.
- Keeping records of all asbestos-related activities in the plan and making them available for public review.

All small communities involved with the renovation or demolition of buildings must comply with NESHAP and AHERA accreditation requirements. In addition, if public employees are used to handle friable asbestos-containing materials, the community must also follow the WPR.

What Action Should My Community Be Taking?

As a local official, you should ensure that:

- Any school district within your community has complied with AHERA.
- You have the names of people who are responsible for all asbestos-related activities in the district and trained and certified asbestos inspectors and removers in the area.

- The proper regulatory agency is notified before the demolition of any buildings.
- Public employers are aware of their responsibilities under the WPR and have notified the regional asbestos coordinator.

Where Are the Regulations Published?

The Asbestos-Containing Materials in Schools Rules and the Worker Protection Rule are in the *Code of Federal Regulations*, Title 40, Part 763. The NESHAP rules for asbestos are in Title 40, Part 61.

Radon Gas in Homes and Other Buildings

Radon is a radioactive gas that comes from the natural breakdown (radioactive decay) of uranium in soil, rocks, and water. The U.S. Surgeon General has warned that radon is the second leading cause of lung cancer in the United States today. Radon moves up through the ground and enters homes and other buildings through the basement or foundation. In almost 1 out of every 15 homes in the United States, indoor radon levels are estimated to exceed levels recommended by EPA to protect people's health.

In 1988, Congress enacted the **Indoor Radon Abatement Act (IRAA)** with the goal of reducing indoor radon levels to those found in outside air. In response to IRAA, EPA has:

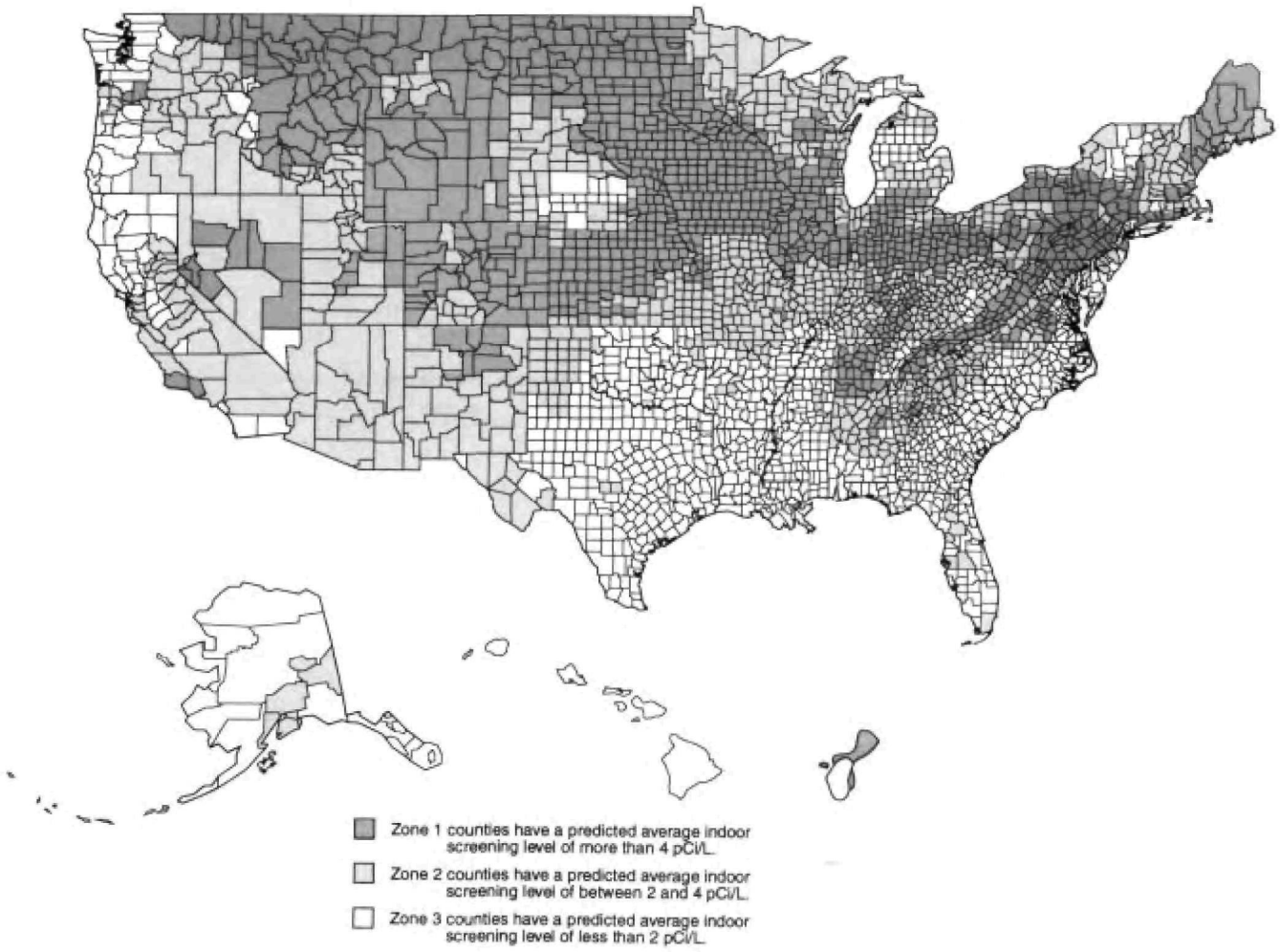
- Published the *Citizen's Guide to Radon* and other documents describing suggested procedures for testing homes, schools, and buildings.
- Completed national surveys on radon exposure in homes and schools.
- Drafted suggested standards and techniques for controlling radon in new buildings. A draft of these guidelines will be available for public comment soon.
- Set up programs to train radon professionals.

IRAA also provided funds for state governments and Native American tribes to help local governments and communities encourage residents to test for and reduce radon levels.

Does the Indoor Radon Abatement Act Apply to My Community?

Your community might have homes, day care centers, schools, or commercial buildings with indoor radon levels higher than the federal guidelines. Most radon-related policies,

Predicted Average Indoor Screening Levels For Radon in the United States (by County)



however, are not federal laws. EPA, state, and local governments have focused their energies on educating the public about the health risk of radon and encouraging voluntary testing of homes and buildings. Some states have developed radon regulations, however, including training and certification of radon experts and required testing of all public schools.

What Action Should My Community Be Taking?

To protect your community from the harmful effects of indoor radon, you should contact your state radon office. Ask them to give you public information about radon, including:

- The *Citizen's Guide to Radon.*

- Lists of EPA- or state-certified radon experts who can test homes and other buildings for radon levels.
- Information on state radon regulations.

Use this information to educate your community about the risks of radon and encourage voluntary testing. Make the list of EPA- or state-certified radon inspectors available for anyone in your community who would like to test for radon.

Air Pollution

The **Clean Air Act Amendments** of 1990 give EPA the authority to set national outside (ambient) air quality standards to protect people's health and the environment from air pollutants. Most air pollution comes from **stationary sources** (e.g., factories, power plants, and smelters) or from **mobile sources** (e.g., cars, buses, planes, trucks, and trains).

Do the Clean Air Act Amendments Apply to My Community?

Most provisions of the Clean Air Act Amendments will not affect very small communities. Some communities, however, might have wood burning or particulate problems that will need to be solved. In addition, the act contains several new requirements that are of particular concern to small businesses, including:

- Lower emissions from small industrial and service companies that contribute to ground-level ozone pollution (smog).
- Reduce automotive emissions by establishing tailpipe inspections and maintenance programs for motor vehicles, and by expanding the development of cleaner automotive fuels.
- Sharply curb emissions of 189 toxic air pollutants from hundreds of industries.
- Prevent or minimize the risks from the accidental release of very hazardous chemicals into the air.
- Recycle and eliminate the production and use of products and substances that destroy the earth's upper ozone layer.
- Require many sources affected by the Act to have a permit listing their air pollution control methods.

This is a general list of the typical kinds of small businesses that will be affected by one or more of the air pollution control programs under the 1990 Clean Air Act Amendments:

- Agricultural chemical applicators
- Asphalt manufacturers/applicators
- Auto body shops
- Bakeries
- Distilleries
- Dry cleaners
- Foundries
- Furniture manufacturers and repairers
- Gasoline service stations
- Hospitals
- Laboratories
- Lawnmower repair shops
- Lumber mills
- Metal finishers
- Newspapers
- Pest control operators
- Photofinishing laboratories
- Printing shops
- Refrigerator/air conditioning services
- Tar paving applicators
- Textile mills
- Wood finishers

All small businesses should consult their state pollution control agency for more details about the specific controls required in their area.

What Action Should My Community Be Taking?

Before taking any action on air pollution issues, contact your state air pollution agency or county health department and your regional EPA small community coordinator for guidance. If problems with air pollution exist, meet with your state air pollution agency or regional EPA office to discuss problems and possible solutions.

Where Are the Regulations Published?

The regulations implementing the Clean Air Act Amendments can be found in the *Code of Federal Regulations*, Title 40, Parts 1 to 99.

Floodplain Zoning

Floodplain zoning is part of the federal government's national flood insurance program. Flood insurance is not available through private insurance companies. If a community wishes to be part of the national flood insurance program, it is required to follow certain

building and zoning requirements set by the **Federal Emergency Management Agency (FEMA)**. FEMA is responsible for:

- Publishing floodplain maps.
- Preparing minimum standards for development within floodplain zones, including building codes and zoning ordinances.
- Requiring communities that apply for national flood insurance to adopt these standards.

FEMA has prepared flood insurance maps for every community in the country. These maps outline the flood hazard areas in each community. To order a map of the floodplains in your area, call the Flood Map Distribution Center at 800-333-1363.

Does Floodplain Zoning Affect My Community?

Floodplain zoning is not a federal regulation. If your community wants to be covered by the national flood insurance program, however, it must meet the minimum standards set by FEMA's building codes and zoning ordinances to qualify.

What Action Should My Community Be Taking?

As a local official, you need to decide whether your community is at risk for flood damage and if your community could benefit from being a part of the national flood insurance program. You should:

- Call FEMA's Flood Map Distribution Center to get a map of flood hazard areas in your community.
- Contact your state environmental agency or state department of natural resources to discuss floodplain zoning requirements for your community.
- If your community is already part of the national flood insurance program, make sure that it meets FEMA zoning requirements.

Appendix C:

Assessing Risks from Environmental Problems in Your Community

This appendix presents information about how to assess potential risks to public health, the environment, and the quality of life in your community. In addition, it lists states and cities that have undertaken or are planning projects using "comparative risk" to help set priorities in environmental decision-making. Information from one of these projects in your state or a nearby city might be valuable in your efforts to identify "high-risk" problems in your community.

Much of the information in this appendix is adapted from Richard Minard and Ken Jones, *Comparative Risk Lab Manual*, Northeast Center for Comparative Risk.

Questions to Help You Assess Risks to Health, Ecosystems, and Quality of Life

Answers to the following questions will help you assess risks to health, ecosystems, and quality of life in your community:

- What harmful effects can the substance or activity cause to public health, the environment, or the quality of life? Examples include cancer, gastrointestinal illnesses, or a decline in the number of fish or birds in the area.
- Are the effects permanent or reversible?
- What are the effects at different levels of exposure?

- How much of the substance do people (or ecosystems) in your planning area come in contact with? How many people are affected (or how widespread an area)? Information for answering these question can come from many different sources, such as results of environmental monitoring (e.g., for drinking water or surface water quality); discharge limits set by permits; reports made by businesses under the Title III "Right to Know" law about how much of certain substances they discharge to air, water, and land; and mathematical models that estimate the distribution of hazardous substances in air and water.
- Is there evidence of harm to people, ecosystems, or quality of life in your planning area? For example, do data about human health and natural resources in your community point to any areas of concern (such as a higher rate of certain diseases than the national average)? What pollutants are known to contribute to these conditions? Federal, state, and county agencies have useful data on these issues.

Assessing Human Health Risks in Your Community

Chemicals and biological contaminants in the environment can cause a variety of health problems. Some of these health effects are temporary or easily treated, such as headaches, nausea, diarrhea, or rashes. Other health effects can be permanent and difficult or impossible to treat, such as learning disabilities, chronic pain, or disabling heart or respiratory problems. Some stressors* can cause cancer.

Individual health risk depends on two variables, hazard and exposure, as shown by the following equation:

Risk = Hazard x Exposure

Hazard—Toxicity, a measure of the stressor's potency or ability to cause health problems.

Exposure—How much of the stressor individuals come in contact with, and over what period of time.

Many chemicals and organisms in the home or outside environment pose little or no risk because they are nontoxic: they have no effect on biological processes. Other stressors are very hazardous but may pose little health risk if individuals are not exposed to them.

In assessing the risk of a chemical, scientists examine all the available scientific data for that chemical, including data from animal studies, human data (when available), and results of tests with isolated human cells or microorganisms. They use this information to estimate whether and to what degree the chemical poses a human health risk.

*The term "stressor" refers to many different types of pollution, including any material, organism, radiation, temperature change, or activity that puts a stress on human health, the environment, or quality of life.

For noncancer effects, scientists usually assume there is a threshold of exposure. Below this threshold level, the harmful effect will not occur, and above it, the exposed individual is at risk. Risk information for noncancer effects is usually expressed as an estimate of daily exposure of a chemical that is likely to have no significant harmful effects during an individual's lifetime (estimated at 70 years).

For cancer, scientists assume that any dose of the substance poses some degree of risk, and that risk increases as exposure increases. Risk information for cancer is usually expressed as a mathematical factor that relates the level of exposure to the number of additional cases of cancer that are expected to be caused by that exposure.

To get an idea of the potential health risk of a chemical in your community, you'll need to know (1) the level of actual exposure to that chemical in your community, and (2) risk information on the degree of hazard that particular chemical poses. Local emergency response coordinators should have complete listings of hazardous chemicals in the area, along with material safety data sheets with information on toxic and hazardous characteristics of those chemicals. A public health expert or toxicologist can help you obtain available risk information, assess local risks by comparing your community's exposure with the chemical's estimated hazard level, and provide perspective that will be useful in constructively interpreting the risk information for your community. To locate this assistance, start by contacting your state agency or local college or university.

Assessing Ecological Risks in Your Community

Ecological risks are threats to ecosystems themselves: the health and diversity of plants, animals, and natural communities.

When considering ecological damage, four measures can be used. The measures help distinguish between localized problems and those that threaten much larger areas, and between problems that cause short-term damage and those that cause permanent damage. The measures also focus on whole natural communities rather than individual species. The four measures are:

Structure—The diversity and interrelationships of species inhabiting or using an ecosystem.

Function—Ecological processes, such as the conversion of energy and nutrients into plants and animals, decomposition, and movement of water.

Recovery time—How long it takes an ecosystem to recover from stress or damage after the stressor is removed.

Space or scale—The size of the area affected by an environmental stressor.

Below are three examples of how a community might consider the ecological risks of human activities:

EXAMPLE: A Chemical Spill

A chemical spill in a small river might kill many of the fish and insects living downstream. For a time, the complex balance among fish, insects, aquatic plants, birds, and mammals may be disrupted, leaving only a few pollution-tolerant species alive. This sharp reduction in the river's diversity would be a fairly severe **structural** change, but it might have little impact on some of the river's basic ecological **functions**, which include transporting water and breaking down biological debris.

The polluted stream may recover quickly. Flowing water will immediately dilute the chemical spill and push it downstream. When the water chemistry returns to normal, plants and animals from upstream will probably move back into their own niches, replicating the system's original structure. If the same chemical had spilled into a pond, the recovery time might be much longer because the chemical might persist in the standing water or bottom sediment, and because some lake species are less mobile than river species. If the spill affects a drinking water supply, it will pose health as well as ecological risks.

EXAMPLE: Filling a Wetland

Filling a substantial wetland to create developable land would cause both structural and functional changes. The diverse community that thrives in wetland soils would be replaced by a much simpler system. The area also would lose its ability to absorb pollutants from flood water in a storm.

A drained and filled wetland will likely never recover, even if the fill were removed. Most ecologists agree that wetlands soils and their connections with ground-water systems are so complex that they are extremely difficult to repair or recreate.

EXAMPLE: Building a New House

The ecological impact of building a new house depends on where it is built. If it is built in the woods at the edge of a forest, the house may have a tiny local impact: a few trees may be lost, but the health of the forest community is undiminished. If the same house consumes a deer-wintering yard, however, it may affect the deer population in the whole region. If the construction were to destroy a unique habitat, it would have a wider impact.

Natural environmental stressors, such as droughts, floods, forest fires, or even beavers, also can have dramatic effects on ecosystems. Today's ecosystems have evolved in response to natural and human-made stressors.

Assessing Risks to Quality of Life in Your Community

Environmental problems can degrade a wide range of resources, activities, or intangible values that are important to people. The costs may be direct or indirect, monetary or emotional. These risks come under the broad heading of "Quality of Life."

One way to look at quality-of-life risks is to consider how environmental problems threaten the following seven broadly held values:

Aesthetics

Negative impacts include:

- Reduced visibility.
- Noise, odors, dust, and other unpleasant sensations (e.g., water weeds or turbidity in a lake, grime on buildings).

Economic Well-Being

Negative impacts include:

- Higher out-of-pocket expenses or taxes to fix, replace, or buy support services (such as higher waste disposal fees, cost of replacing a well, higher housing costs) without any improvements in those services.
- Net loss of jobs, higher health care costs, or lost productivity.

Fairness

Negative impacts include:

- Unequal distribution of costs and benefits (costs and benefits may be related to economics, health, aesthetics, etc.).

Future Generations

Negative impacts include:

- Shifting the costs (economic costs, health risks, ecological damage, etc.) of today's activities to people not yet able to vote or not yet born.

Peace of Mind

Negative impacts include:

- Feeling threatened by potentially risky structures or facilities (such as hazardous waste sites).

Recreation

Negative impacts include:

- Loss of access to recreation lands (public and private).
- Degraded quality of recreation experience (spoiled wilderness, fished-out streams, dammed whitewater, etc.).

Sense of Community

Negative impacts include:

- Development that changes the appearance and characteristics of a town.
- Loss of mutual respect, cooperative spirit, or willingness to solve problems together.
- Individual liberty exercised at the expense of the common good.
- Community authority exercised at the expense of individuals.

These seven values are intangible and therefore are extremely difficult to measure. However, they focus attention on issues of importance to whole communities (or large parts of communities), and so are useful tools for understanding and comparing risks.

Status of Comparative Risk Projects: States, Cities, and Tribes

Projects with Completed Rankings

California: Dan Liebermann, Project Administrator, at 510-849-5211; and Michael DiBartolomeis, Office of Health Hazard Risk Assessment, 2151 Berkeley Way, Annex 11, Berkeley, CA 94704; 510-540-2665.

Colorado: Gerard Bulanowski, Colorado Department of Health, Office of Environment B-2, 4300 Cherry Creek Drive South, Denver, CO 80222-1530; 303-692-3004.

Guam: Mike Hammet, Center for Development Studies, Social Science Research Institute, Porteus Hall 719, University of Hawaii, Honolulu, HI 96822; 808-956-7469.

Louisiana: Chuck Killebrew, Office of the Secretary, Department of Environmental Quality, P.O. Box 82263, Baton Rouge, LA 70884; 504-765-2726.

Michigan: Keith Harrison, Environmental Administration Division, Department of Management and Budget, P.O. Box 30026, Lansing, MI 48909; 517-335-3666.

Seattle, WA: Steven Nicholas, Room 200, Seattle Municipal Building, 600 Fourth Avenue, Seattle, WA 98104; 206-684-8377.

Vermont: Doug Kievit-Kylar, Pollution Prevention Division, West Office Building, Agency of Natural Resources, 103 South Main Street, Waterbury, VT 05676; 802-241-3888.

Washington: Dee Peace Ragsdale, Dept. of Ecology, P.O. Box 47600, Olympia, WA 98504-7600; 206-407-6986.

Wisconsin Tribes: John Haugland, U.S. EPA Region 5, Planning and Management Division, 77 West Jackson Boulevard (ME-19J), Chicago, IL 60604-3507; 312-886-9853.

Projects Under Way

Alabama: Marilyn Elliott, Alabama Department of Environmental Management, 1751 Congressman W.L. Dickenson Drive, Montgomery, AL 36130; 205-271-7715.

Arizona: Pat Mariella, Department of Environmental Quality, 3033 North Central Avenue, Phoenix, AZ 85012; 602-207-4603.

Florida: Nancy Muller and Gil Bergquist, Florida Center for Public Management, Florida State University, B-149, Tallahassee, FL 32306-4025; 904-922-8042.

Atlanta, GA: Eric Wilson, Atlanta Department of Planning and Development, 55 Trinity Avenue SW, Suite 1450, Atlanta, GA 30335-0308; 404-330-6348.

Hawaii: Patrick Felling, Department of Health, Environmental Planning, 500 Ala Moana Boulevard, Suite 250, Honolulu, HI 96813; 808-586-4337.

Illinois: Bob Liebermann, Office of Research & Planning, Illinois Department of Energy and Natural Resources, 325 West Adams, Springfield, IL 62704; 217-785-0124.

Jackson, MS: Scott McDonald, Public Policy and Administration Program, Jackson State University, 3825 Ridgewood Road, Jackson, MS 39211; 601-982-6405.

Kentucky: Karen Armstrong Cummings, Kentucky Natural Resources Environmental Protection Cabinet, 4th Floor, Capital Plaza Tower, Frankfort, KY 40601; 502-564-3350.

Maine: Cindy Bertocci, Maine Department of Environmental Protection, State House Station 17, Augusta, ME 04333; 207-287-7842.

Maryland: Matt Thayer, Maryland Department of the Environment, 2500 Broening Highway, Baltimore, MD 21224; 410-631-3114.

Ohio: Michelle Morrone, Ohio Environmental Protection Agency, 1800 Watermark Drive, Columbus, OH 43266-0149; 614-644-3638.

Greater Cleveland (OH) Area: Norman Robbins, Department of Neurosciences, School of Medicine, Case Western Reserve University, 10900 Euclid Avenue, Cleveland, OH 44106-4975; 216-368-2194.

Columbus, OH: Richard Hicks, Columbus Health Department, 181 Washington Boulevard, Columbus, OH 43215-4096; 614-645-6189.

Oregon: Dick Nichols, Environmental Partnership for Oregon Communities, 2020 SW 4th, Suite 400, Portland, OR 97201-4987; 503-229-5323.

Texas: Wendy Gordon, Texas Water Commission, P.O. Box 13087, Austin, TX 78711-3087; 512-463-8448.

Houston, TX: John D. Wilson, Houston Advanced Research Center, Center for Global Studies, 4800 Research Forest Drive, The Woodlands, TX 77381; 713-363-7913.

Utah: Bruce Slater, Utah Department of Environmental Quality, P.O. Box 144810, Salt Lake City, UT 84114-4810; 801-536-4480.

Charlottesville Area, VA: Mike Collins, Thomas Jefferson Planning District, 413 East Market Street, Suite 102, Charlottesville, VA 22901; 804-972-1720.

Elizabeth River, VA: Marjorie Mayfield, Elizabeth River Project, 100 West Plume Street, Suite 220, Norfolk, VA 23510; 804-625-3648.

Western Tribes: Mike Frost, Southern Ute Tribe, Box 737, Ignacio, CO 81137; 303-563-0135.

Projects in the Planning Stages

Alaska: James Powell, Division of Environmental Quality, 410 Willoughby Avenue, Suite 105, Juneau, AK 99801-1795; 907-465-5260.

Arkansas: Dick Cassat, Department of Pollution Control & Ecology, P.O. Box 8913, Little Rock, AR 72219-8913; 501-570-2131.

Minnesota: Paul Schmiechen, Minnesota Pollution Control Agency, 520 Lafayette Road North, St. Paul, MN 55155; 612-296-7795.

Mississippi: Sam Mabry, Chief, Hazardous Waste Division, Mississippi Department of Environmental Quality, P.O. Box 10385, Jackson, MS 39289-0385; 601-961-5545.

Missouri: David Bedan, Missouri Department of Natural Resources, P.O. Box 176, Jefferson City, MO 65102; 314-751-4533.

New Hampshire: Kate Hartnett, Water Supply and Pollution Control Division, New Hampshire Department of Environmental Services, P.O. Box 95, 6 Hazen Drive, Concord, NH 03301; 603-271-2989.

New Jersey: Martin Rosen, Division of Science and Research, Department of Environmental Protection and Energy, CN 409, Trenton, NJ 08625-0409; 609-984-5312.

New York: Mary Werner, Pollution Prevention Unit, New York State Department of Environmental Conservation, 50 Wolf Road, Albany, NY 12233; 518-457-2480.

North Dakota: Teri Lunde, North Dakota Department of Health and Consolidated Laboratories, P.O. Box 5520, Bismark, ND 58502-5520; 701-221-5150.

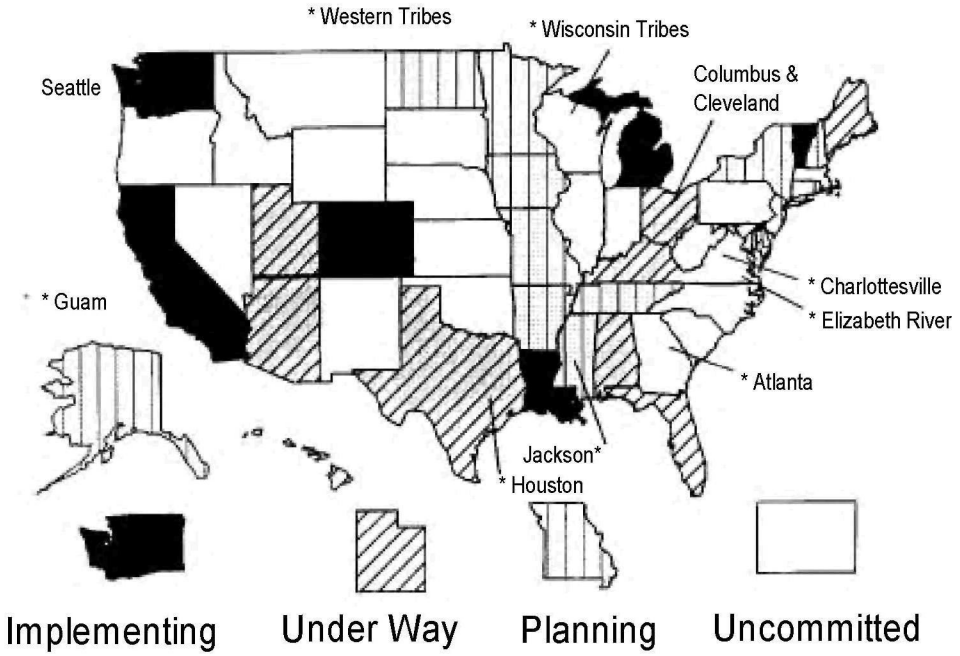
Hamilton County (Cincinnati), OH: Walter S. Handy, Jr., Cincinnati Department of Health, Community Services Division, 3101 Burnet Avenue, Cincinnati, OH 45229; 513-357-7271.

Allegheny County, PA: David Piposzar, Allegheny County Health Department, 3333 Forbes Avenue, Pittsburgh, PA 15213; 412-578-8030.

Tennessee: Angie Pitcock, Tennessee Department of Environment and Conservation, Division of Pollution Prevention and Environmental Awareness, 401 Church Street, 14th Floor, Nashville, TN 37243-1551; 615-532-0736.

Wisconsin: Tim Mulholland, Bureau of Environmental Analysis and Review, Department of Natural Resources, 101 South Webster Street, Madison, WI 53707-7921; 608-266-0061.

Comparative Risk Projects: July/August 1994



Appendix D:

Where To Turn for Help

This guide provides general information about environmental issues facing your community and offers suggestions for dealing with many of these issues. After reading the guide, you will still have questions about what your community can and should do. In addition, you will need technical help to accomplish many of the things that this guide suggests. This chapter tells you about some places and resources where you can find more help. These listings are up-to-date as of mid-1994.

U.S. Environmental Protection Agency Regional Small Community Contacts

EPA's small community contacts are designated by the Agency to provide assistance to small communities. They will provide assistance directly or refer you to others within their offices who are best suited to provide the help you need.

EPA Region 1

- JFK Federal Building, Room 2203
  Boston, MA 02203
  617-565-3412
  Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island, Vermont

EPA Region 2

- 26 Federal Plaza
  New York, NY 10278
  212-264-7834
  New Jersey, New York, Puerto Rico, Virgin Islands

EPA Region 3

- 841 Chestnut Street
  Philadelphia, PA 19107
  215-597-9072
  Delaware, Maryland, Pennsylvania, Virginia, West Virginia, District of Columbia

EPA Region 4

- 345 Courtland Street, NE
  Atlanta, GA 30365
  404-347-7109
  Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee

EPA Region 5

- 77 West Jackson Boulevard
  Chicago, IL 60604
  312-353-6218
  Illinois, Indiana, Ohio, Michigan, Minnesota, Wisconsin

EPA Region 6

- 1445 Ross Avenue, 12th Floor, Suite 200
  Dallas, TX 75202
  214-655-2203
  Arkansas, Louisiana, New Mexico, Oklahoma, Texas

EPA Region 7

- 726 Minnesota Avenue
  Kansas City, KS 66101
  913-551-7768
  Iowa, Kansas, Missouri, Nebraska

EPA Region 8

- One Denver Place
  999 18th Street, Suite 500
  Denver, CO 80202
  303-294-7009
  Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming

EPA Region 9

- 215 Fremont Street
  San Francisco, CA 94105
  415-744-1568
  Arizona, California, Hawaii, Nevada, American Samoa, Guam, Trust Territories of the Pacific

EPA Region 10

- 1200 Sixth Avenue
  Seattle, WA 98101
  206-553-1138
  Alaska, Idaho, Oregon, Washington

Other Organizations

- **American Petroleum Institute**
  1220 L Street, NW
  Washington, DC 20005
  202-682-8000

  Provides information and technical assistance to communities on how to set up used oil collection programs and encourage used oil recycling.

- **USDA Extension Service**
  United States Department of Agriculture
  14th & Independence Avenue SW
  Room 3547 S
  Washington, DC 20250-0992
  202-720-0987 (or see your local directory for your local or county extension agent)

  Provides education in wastewater and other environmental subjects for local officials and residents.

- **International City/County Management Association**
  777 North Capitol Street, NE, Suite 500
  Washington, DC 20002
  202-289-4262

  Provides information and training for local governments on a variety of issues. Sets up peer matches for people to learn from one another.

- **Northeast Center for Comparative Risk**
  Vermont Law School
  P.O. Box 96
  Chelsea Street
  South Royalton, VT 05068
  802-763-8303
  or
  Western Center for Comparative Risk
  5398 Manhattan Circle
  Boulder, CO 80303
  202-494-6393

  Work with EPA to help states and cities use comparative risk. Can provide small communities with publications on comparing environmental risks.

- **National Association of Towns and Townships**
  1522 K Street, NW
  Washington, DC 20005
  202-737-5200

  Offers educational services, technical assistance programs, and public policy support to local governments.

- **National Environmental Training Center**
  West Virginia University
  P.O. Box 6064
  Morgantown, WV 26506
  800-624-8301

  Develops training materials on water, wastewater, and solid waste issues.

- **National Recycling Coalition**
  1101 30th Street, NW
  Suite 305
  Washington, DC 20007
  202-625-6406

  Answers requests for information on recycling; maintains lists of state recycling associations and market development contacts.

- **National Rural Water Association**
  2715 M Street, NW
  Suite 300
  Washington, DC 20007
  202-333-8830

  Provides training and technical assistance to small water and wastewater systems. Contact the national NRWA office to find out about the Rural Water Association in your state.

- **Rural Community Assistance Program**
  602 South King Street
  Suite 402
  Leesburg, VA 22075
  703-771-8636

  A national network of nonprofit organizations assisting rural and small communities with drinking water, wastewater, and solid waste management.

- **Rural Development Administration**
  United States Department of Agriculture
  14th and Independence Avenue, NW
  Washington, DC 20250
  202-720-9589

  Provides loans for rural water and wastewater systems and communities with populations less than 10,000.

- **Small Towns Environment Program**
  The Rensselaerville Institute
  Rensselaerville, NY 12147
  518-797-3783

  Helps small towns solve water and wastewater problems. Provides tools for local action, self-help approaches to design and construction, nonbureaucratic low-interest loans, and technical support.

- **Solid Waste Association of North America**
  P.O. Box 7219
  Silver Spring, MD 20907
  800-677-9424

  Works to improve solid waste management services to the public and industry via training, education, technical assistance, and technology transfer. Also maintains information on local government issues as they relate to solid and hazardous waste management.

- **United States Department of Housing and Urban Development**
  451 7th Street SW
  Washington, DC 20410
  202-708-2690

  Provides grants to drinking water treatment utilities through the Community Development Block Grant Program.

Technical Support Centers and Hotlines

Air and Radiation

- **Control Technology Center (CTC) Hotline**
  919-541-0800

  Provides technical support and information on air pollution emissions and control technology.

- **Emissions Measurement Technical Information Center**
  919-541-1060

  Provides information on air emissions testing methods and federal testing and monitoring requirements.

- **National Radon Hotline**
  800-767-7236

  Hotline callers receive a brochure on radon health effects and home testing.

Hazardous and Solid Waste

- **Solid Waste Assistance Program**
  800-677-9424

  Provides information on all aspects of solid waste management.

- **Hazardous Waste Ombudsman Program**
  800-262-7937 (202-260-9361 for District of Columbia callers)

  Assists the public and regulated communities in resolving problems concerning any program or requirements under EPA's hazardous waste program.

- **National Response Center**
  800-424-8802

  Receives notification of oil, hazardous chemical, biological, and radiological releases, and passes them on to a federal On-Scene Coordinator, who coordinates cleanup efforts.

- **Resource Conservation and Recovery Act (RCRA)/Superfund/Emergency Planning and Community Right-to-Know Act (EPCRA) Hotline**
  800-424-9346
  800-535-0202
  Provides general assistance and information on solid and hazardous waste management and on EPCRA.

Pesticides and Toxics

- **Asbestos Ombudsman Clearinghouse/Hotline**
  800-368-5888 (703-305-5938 for Virginia callers)

  Provides the public sector with information on handling and abatement of asbestos in schools, workplaces, and homes.

- **Asbestos School Hazard Abatement Act Hotline**
  800-462-6706

  Provides information about the Asbestos School Hazard Abatement Act loan and grant program, which provides funds to public and private schools to aid in asbestos abatement.

- **Toxic Substances Control Act (TSCA) Information Service**
  202-554-1404

  Provides technical and general information on TSCA regulations.

Pollution Prevention

- **Pollution Prevention Information Clearinghouse**
  703-821-4800

  Provides technical, policy, programmatic, legislative, and financial information about reducing industrial pollutants.

Underground Storage Tanks

- **RCRA/Superfund/EPCRA Hotline**
  800-424-9346
  800-535-0202

  Provides general assistance and information regarding underground storage tanks.

Water and Wastewater

- **AWWA Small Systems Technical Assistance Line**
  800-366-0107

  Provides technical support for operators of drinking water systems serving fewer than 3,300 persons. Sponsored by the American Water Works Association.

- **Clean Lakes Clearinghouse**
  800-726-LAKE

  Provides information on lake and watershed restoration, protection, and management.

- **National Drinking Water Clearinghouse West Virginia University**
  P.O. Box 6064
  Morgantown, WV 26506
  800-624-8301

  Assists small communities by collecting, developing, and providing timely information about drinking water issues.

- **National Small Flows Clearinghouse**
  800-624-8301

  Provides information for small communities about wastewater management.

Water and Wastewater *(continued)*

- **National Water Efficiency Clearinghouse**
  6666 West Quincy Avenue
  Denver, CO 80235
  303-347-6134

  Provides information on water conservation and water efficiency issues.

- **Safe Drinking Water Hotline**
  800-426-4791

  Assists public water systems and the public with their understanding of the regulations and programs developed in response to the Safe Drinking Water Act Amendments of 1986.

- **EPA Water Resource Center**
  401 M Street, SW
  Washington, DC 20460
  202-260-7786

  Distributes EPA Office of Water publications.

- **Wetlands Information Hotline**
  800-832-7828

  Responds to requests for information about the value and functions of wetlands and options for their protection.

General

- **U.S. EPA Center for Environmental Research Information (CERI) Publications**
  26 West Martin Luther King Drive
  Cincinnati, OH 45268
  513-569-7562

  Distributes brochures, reports, handbooks, newsletters, and manuals based on the scientific and technical environmental information produced by EPA.

- **U.S. EPA Public Information Center (PIC)**
  401 M Street, SW
  Washington, DC 20460
  202-260-2080 or 202-260-7751

  Distributes a wide variety of general, nontechnical information about EPA and its programs.

- **U.S. EPA National Small Community Contact**

  U.S. EPA-OROSLR (1502)
  401 M Street SW
  Washington, DC 20460
  202-260-0244
  Coordinates efforts within EPA related to small communities.

Publications

Air and Radiation

EPA's *The Clean Air Act Amendments of 1990: A Guide for Small Businesses* is available from the EPA Control Technology Center at 919-541-0800.

Citizen's Guide to Radon (OPA-86-004) and other information on how to find and reduce radon in homes is available from EPA's Radon Hotline (800-767-7236).

Solid Waste

Decision-Makers Guide to Solid Waste Management (EPA-530/SW-89-072), *The Solid Waste Dilemma: An Agenda for Action* (EPA/530/SW-89-019), *The Consumer's Handbook for Reducing Solid Waste* (EPA/530/K-92-003), *Environmental Fact Sheet: Yard Waste Composting* (EPA/530-SW-91-009), and *Recycling Works! State and Local Solutions to Solid Waste Management Problems* (EPA/530-SW-89-014) are available from the RCRA/Superfund Hotline (800-424-9346).

Why Waste a Second Chance? A Small Town Guide to Recycling (1989) is available from the National Association of Towns and Townships (202-737-5200).

Criteria for Solid Waste Disposal Facilities: A Guide for Owners/Operators (EPA/530-SW-91-089) and *Safer Disposal for Solid Waste: The Federal Regulations for Landfills* (EPA/530-SW-91-092) are available from CERI Publications (513-569-7562).

Solid Waste Disposal Facility Criteria: Technical Manual (EPA/530-R-93-017, PB94-100-450) is available from the National Technical Information Service (703-487-4650).

Hazardous Waste

Solving the Hazardous Waste Problem: EPA's RCRA Program (EPA/530-SW-86-037), *Understanding the Small Quantity Generator Hazardous Waste Rules: A Handbook for Small Businesses*, (EPA/530-SW-86-019), *Household Hazardous Waste Management: A Manual for 1-Day Community Collection Programs*, (EPA/530-R-92-026), and *Household Hazardous Waste: Steps to Safe Management* (EPA/530-F-92-031) are available from the RCRA/Superfund Hotline (800-424-9346).

Toxic Substances

Chemicals in Your Community: A Guide to the Emergency Planning and Community Right-to-Know Act (U.S. EPA, 1988) can be ordered from the Emergency Planning and Community Right-to-Know Information Hotline (800-535-0202).

Accidents Will Happen—A Small Town Guide to Planning for Hazardous Materials Response is available from the National Association of Towns and Townships (202-737-5200).

Managing Asbestos in Place: A Building Owner's Guide to Operations and Maintenance Programs for Asbestos-Containing Materials, *The ABC's of Asbestos in Schools*, and *100 Commonly Asked Questions About the New AHERA Asbestos-in-Schools Rule* can be ordered from the Toxic Substances Control Act Hotline (202-554-1404).

Underground Storage Tanks

Musts for USTs, a summary of regulations for USTs, is available from the U.S. Government Printing Office, Washington, DC 20402, (202-783-3238). Stock no. 055-000-00294-1. Also available in Spanish.

Dollars and Sense (a summary of financial responsibility regulations for USTs), *Leak Lookout* and *Straight Talk on Tanks* (summaries of leak detection methods for petroleum USTs), and *Oh No!* (a brochure on what to do in the case of petroleum leaks and spills) are available from the National Center for Environmental Publications and Information (513-891-6561).

Getting Out From Under: Underground Storage Tank Alternatives for Small Towns, National Center for Small Communities (1991), is available from the National Association of Towns and Townships (202-737-5200).

Recommended Practices Package on Tank Management (Video) is available from the American Petroleum Institute (202-682-8000).

Ground Water and Drinking Water

Environmental Pollution Control Alternatives: Drinking Water Treatment for Small Communities (EPA/625/5-90/025) is available from CERI Publications (513-569-7562).

The Local Decision-Makers' Guide to Groundwater and Wellhead Protection, *Small System Guide to the Safe Drinking Water Act*, *Small System Guide to Risk Management and Safety*, *Small System Guide to Financial Management*, *Small System Guide to Board Responsibilities for Operation and Maintenance*, *Small System Guide to Developing and Setting Water Rates*, and *The Board Guide to Small System Policies* (1993) are available from Community Resource Group, Inc./Southern RCAP, 2705 Chapman, Springdale, AR 72762 (501-756-2900).

Why Do Wellhead Protection? and *Protecting Local Ground-Water Supplies Through Wellhead Protection* are available from the National Drinking Water Clearinghouse (800-624-8301).

Seminar Publication: Wellhead Protection—A Guide for Small Communities (EPA/625/R-93/002) can be ordered from CERI Publications (513-569-7562).

The Watershed Protection Approach—Annual Report 1992 (EPA 840-S-93-001) is available from the National Center for Environmental Publications and Information (513-891-6561).

Pocket Sampling Guide for Operators of Small Water Systems (EPA/814-B-92-001 for Phase I volatile organic chemicals, total coliform rule, surface water treatment rule, and lead and copper rule; EPA/814-B-94-001 for Phase II and Phase V chemicals) is available from CERI Publications (513-569-7562).

Tapping Your Own Resources—A Decision-Maker's Guide for Small Town Drinking Water is available from the National Association of Towns and Townships (202-737-5200).

Water Conservation and Leak Detection

Decision-Makers' Guide to Water Supply Management (EPA 570/9-80-003, PB158-973) is available from the National Technical Information Service (703-487-4650).

Leaks in Water Distribution Systems (1987), *Water Conservation* (1987), *Water Conservation Strategies* (1980), *Before the Well Runs Dry (Volumes I and II)* (1984), *Water Resources Audit* (1988), and *Water Audits and Leak Detection* (1990) are available from the American Water Works Association, 6666 West Quincy Avenue, Denver, CO (303-795-2449).

An Introduction to Water Loss and Leak Detection (1988) is available from the National Rural Water Association (405-252-0629).

Wastewater

It's Your Choice: A Guidebook for Local Officials on Small Community Wastewater Management Options (EPA 430/9-87-006) is available from the National Small Flows Clearinghouse (800-624-8301).

Treat It Right: A Local Official's Guide to Small Town Wastewater Treatment (1989) can be ordered from the National Association of Towns and Townships (202-737-5200).

Manual: Wastewater Treatment/Disposal for Small Communities (EPA/625/R-92/005) is available from CERI Publications (513-569-7562).

Wetlands

America's Wetlands: Our Vital Link Between Land and Water (U.S. EPA, 1988) can be ordered from the Wetlands Protection Hotline (800-832-7828).

Protecting Coastal and Wetlands Resources: A Guide for Local Governments (EPA 842-R-92-002) is available from EPA's Water Resource Center (202-260-7786).

Nonpoint Source Pollution

Managing Nonpoint Source Pollution (EPA-506/9-90) is available from EPA's Water Resource Center (202-260-7786).

Development and Water Quality: A Decisionmaker's Guide to Protecting the Urban Environment (1994), *Decisionmakers Stormwater Handbook* (1992), *Urban Runoff and Stormwater Management Handbook* (1990), and *Lake Smarts: The First Lake Maintenance Handbook* (1994) are available from the Terrene Institute, 1717 K Street, NW, Suite 801, Washington, DC 20006 (202-833-8317).

Financial Management and Intergovernmental Cooperation

A State and Local Government Guide to Environmental Program Funding Alternatives (EPA841-K-94-001) is available from CERI Publications (513-569-7562).

Building Together: Investing in Community Infrastructure (1990) is available from the National Association of Counties (202-393-6226).

Decision-Makers Guide to Solid Waste Management (EPA/530-SW-89-072) is available from the RCRA/Superfund Hotline (800-424-9346).

Small System Guide to Financial Management is available from the Rural Community Assistance Program (703-771-8636).

Public-Private Partnerships for Environmental Facilities: A Self-Help Guide for Local Governments (EPA/20M-2003) is available from the National Center for Environmental Publications and Information (513-891-6561).

Helping Small Systems Comply With the Safe Drinking Water Act: The Role of Restructuring (EPA/812-K-92-001) is available from the National Center for Environmental Publications and Information (513-891-6561).

Restructuring Manual (EPA/570-9-91-035) is available from the National Center for Environmental Publications and Information (513-891-6561).

The Self-Help Handbook by Jane W. Schautz is available from Rensselaerville Institute, Rensselaerville, NY (518-797-3783).

Innovative Grassroots Financing—A Small Town Guide to Raising Funds and Cutting Costs is available from the National Association of Towns and Townships (202-737-5200).

Touching All the Bases: A Financial Management Handbook for Your Wastewater Treatment Project (EPA/430-9-86-001) is available from the Safe Drinking Water Hotline (800-426-4791).

Affordability of Major Wastewater Systems Improvements for Small Montana Communities is available from the Montana Department of Commerce (406-444-3757).

Electronic Bulletin Boards and Databases

- **Drinking Water Information Exchange Bulletin Board System (DWIE-BBS),** Phone 800-624-8301, Modem 800-932-7459 or 304-293-7108.

  The National Drinking Water Clearinghouse's electronic bulletin board service, which provides information regarding drinking water systems in towns of up to 10,000 people.

- **WATERNET,** Phone 303-794-7711

  The American Water Works Association's database of information on water conservation; utility management; drinking water quality, analysis, and treatment; water pollution; wastewater treatment; and legal issues.

- **Wastewater Treatment Information Exchange Bulletin Board Service (WTIE-BBS),** Phone 800-624-8301, Modem 800-544-1936.

  The National Small Flows Clearinghouse's forum for discussion and exchange of information about small-scale wastewater systems.

- **Solid Waste Information Clearinghouse (SWICH),** Phone 800-677-9424, Modem 301-585-0204.

  Provides information on all aspects of solid waste management.

- **Nonpoint Source Information Exchange,** Phone 703-385-6000 or 301-589-5318, Modem 301-589-0205

  A bulletin board that provides information about nonpoint source water pollution and other water environment-related issues.

- **Alternative Treatment Technology Information Center (ATTIC),** Phone 800-424-9346, Modem 703-908-2138.

  Provides information on innovative treatment technologies for hazardous waste cleanup.

- **Environmental Financing Information Network (EFIN),** available through the Local Exchange (202-626-2400), LEGISNET (303-830-2200), and the Government Finance Information Network (312-977-9700).

  A service of EPA's Office of Water that provides access to an on-line search of financial materials and publications and information about environmental programs and events.

- **EPA Office of Research and Development Bulletin Board System (ORD-BBS),** Phone 513-569-7272, Modem 513-569-7610.

  A forum for exchange of scientific and technical research information. Includes a database of all ORD publications produced since 1976.

Tools

- **Farm*A*Syst**
  B142 Steenbock Library
  550 Babcock Drive
  Madison, WI 53706
  608-262-0024

  A voluntary program in which states, in conjunction with the Cooperative Extension Service, the Soil Conservation Service, and EPA, conduct farmstead assessments to identify potential sources of and solutions to ground-water pollution.

- **Waterplan 1.0.** Available from California Department of Water Resources, P.O. Box 942836, Sacramento, CA 94236.

  A software package that allows planners to evaluate the costs and benefits of more than 75 water conservation measures.

- **Optimizing Water Treatment Plant Performance Using the Composite Correction Program** (EPA/625/6-91/027). Available from CERI Publications (513-569-7562).

  Provides procedures for evaluating and improving the performance of drinking water treatment facilities. Includes methods to optimize existing unit process without major capital improvements.

- **Drinking Water Treatment Plant Advisor.** Available from CERI Publications (513-569-7562) or from EPA's Office of Research and Development Bulletin Board System.

  A software product for evaluating the performance of small-to-medium drinking water treatment plants. Can help optimize plant performance to achieve compliance with the surface water treatment rule.

- **POTW Self-Assessment: Mechanical Wastewater Treatment Facility (April 1993) and Non-Mechanical Wastewater Treatment Facility** (November 1993). Available from Water Management Division, U.S. EPA Region 8, Denver, CO.

  Guidance and workbook materials to help POTWs achieve compliance with NPDES permit limitations.

- **Retrofitting POTWs** (EPA/625/6-89/020). Available from CERI Publications (513-569-7562).

  Describes methods for evaluating and improving the performance of wastewater treatment facilities. Focuses on optimizing existing facilities without major capital expenditures.

- **POTW Expert, Version 1.1: An Advisory System for Improving the Performance of Wastewater Treatment Facilities** (EPA/625/11-90/001). Available from CERI Publications (513-569-7562).

  A software program designed to help operators identify causes of inadequate wastewater treatment plant performance using the Composite Correction Program (CCP) approach.

- **TANKMAN, Version 1.0** (U.S. Army Environmental Center. ATTN: SFIM-AEC-ECS, Mr. Durant S. Graves, Aberdeen Proving Ground, MD 21010-5401).

  A management and reporting software tool developed for the U.S. Army's underground storage tanks (USTs). Allows the user to track a wide range of information about their USTs, including physical characteristics, compliance status, historical data, and budget information.

- **Solid Waste Management Options (SW-Options) for Municipal Planners, Version 1.0,** 1992. Available from CERI Publications (513-569-7562) or from EPA's Office of Research and Development Bulletin Board System.

  A user-friendly computer software package for people responsible for evaluating and selecting municipal waste options.

- **Environmental Compliance Assessment System** (U.S. Army Corps of Engineers Construction Engineering Research Laboratories, 1992).

  Contains procedures developed for U.S. Army installations and facilities to determine compliance with federal environmental regulations. Brings together environmental regulations, good management practices, and risk management issues in easy-to-use checklists.

- **RISK *ASSISTANT** (Available from Thistle Publishing, P.O. Box 1327, Alexandria, VA 22313).

  A software system designed to evaluate human health risks associated with chronic exposures to chemicals. Provides analytical tools and databases covering approximately 500 chemicals, and information-handling capabilities for risk assessment tailored to individual sites or situations.