Alaska

Sanitation Planning Guide for Small Communities

State of Alaska
Department of Community and
Economic Development

June 1999

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Sanitation Planning Guide for Small Communities

This community sanitation planning guide was initiated as a recommendation by the Governor's Council on Rural Sanitation in the *Rural Sanitation 2005 Action Plan* (February 1998) as part of the strategy to make safe water and hygienic sewage service a reality for all Alaskans.

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Introduction

"Things are changing. People are starting to be more involved. People are trying to work together. I think that is the most important thing-working together. If we work together then we can do a lot of things."

- Village Resident

Planning for sewer and water systems is called "sanitation planning." The Governor's Council on Rural Sanitation proposed this book about sanitation plans because they discovered that it is not enough to provide money and engineers and materials to rural communities. Building a good water and sewer system is part of building a good community, and it takes the whole community to do that, working as partners with agencies and consultants. To involve the community, residents need to know more about the planning process, and that is where this book can help.

This book is intended to be used cooperatively by community members and engineers. Many parts of the process can and should be done by members of the community. Other parts of developing a plan require specialized skills like engineering. By knowing what the community wants, engineers and planners can help you build projects that will work for your community. You and your neighbors will feel pride in owning your system because you will have worked together to plan the system and know it will be good for where you live.

You might be saying to yourself, "that sounds good - communities having more control over what gets built, but how do we go about this 'sanitation planning' so that everyone understands what we need?" That is exactly what this book is for – to help save your community money and to develop a good plan that engineers and others will understand.

What is planning?

We all spend time planning. We plan for hunting trips, vacations, and what we are going to eat for dinner. Taking off on a long hunting trip without thinking about how much fuel you need for the snowmachine or how much food you need is poor planning. Community planning for sanitation systems is only a little different. If you start building a sewer line without deciding how much money you can spend to keep it working or whether it is ok to block a community trail with a pump station, you might end up with a sewer system people do not like. Planning is an important first step in providing rural areas with water and sewer service.

Planning is a process that combines talking about what people want with information about the area they live in (where buildings sit, where wires and pipes and trails run, where people fish or pick berries, and how much a project will cost). No matter what we plan for, by thinking a project through in the beginning, we usually end up with better results. So go ahead and start talking with your neighbors. This book can help you put everyone's ideas together.

"We know what we need. Let's just build it."

Why Plan?

Good water and sewer planning builds better projects and better communities. Engineers can "design" or "build"

Planning is:

- *about setting priorities and solving problems*
- *a way to control your future rather than having it control you*
- *a way of communicating a community's wants and needs*
- *a way to use traditional knowledge*
- *a process that promotes creativity*

Who should help with water & sewer planning?

EVERYONE affected by the proposed project should help: Agencies and consultants can make the plan a good one, but the sewer and water system will belong to your community, and your community knows what it wants. This means the most important people to be involved in the plan are your fellow residents.

almost anything. A project's success, however, almost always is based on how well it is planned, how well it meets community needs, and how well it considers the limits of the environment. Other reasons to plan:

- **To save money.**
  Wisely planning water and sewer projects keeps the community from making expensive mistakes.

- **To encourage planning for the rest of the community.**
  Water and sewer planning allows everyone to think about the future (where housing will be, where stores should be, etc.).

- **To get funding.**
  Agencies that provide money for projects like to see a plan. A plan shows them that your community is organized and has thought about what it will take to care for your project once it is built. By having a good plan, you are more likely to get funding.

Failing to plan is planning to fail.
- Allen Lakein

- **To make the community strong.**
  Planning can bring people together to think about their future. A unified community is strong and healthy.

- **To make things happen.**
  Your community can solve old problems as it sets new goals. A good plan helps put old problems behind you. The community can meet the future head on and get things done instead of avoiding decisions.

- **To build businesses.**
  Businesses usually need dependable water and sewer. With a water and sewer plan and system in place, new jobs are more likely in your community.

You can do it! Your community can take the lead in planning for a new sewer and water system. Agencies and consultants can help with the process and provide technical information. You must lead the process and make sure it happens the way **YOU** want it to happen.

How to Use this Guidebook

A sewer and water plan is successful if it includes your community's desires and fits your situation. The steps in this guide book will help you figure out what the community wants. The community takes the lead in these steps while bringing in the skills of planners, scientists, and engineers that might be from outside your community. At the end, you will have a "Sanitation Master Plan" - a small book that reflects the thinking and decisions of your community. The adjacent "Planning Steps" table shows typical master plan contents and the planning steps. Notice that by following the planning steps, you will fill out the contents of the plan.

Planning Steps

This guide shows five main steps that create a successful sewer and water plan and project. They are:

(1) Getting ready to plan.
(2) Collecting information.
(3) Identifying choices (alternatives).
(4) Choosing the best alternative.
(5) Putting the plan into action.

Within each of these main steps there are several specific tasks. This guide book takes you through these steps in order. However, planning is a flexible process. You do not have to follow the steps exactly. The main idea is that each of these steps usually happens at some point before you finish a plan. Depending on the community, some of these steps may be easy and others hard. Use the guide in whatever way works best for you.

Other Help

In addition to this guide book, the appendices include information and materials that support the use of the guide book. The appendices at the back of this guide include:

- Ideas to Get the Community Talking (Public Involvement)
- Technical Sanitation Engineering Information

Step	*Task Checklist*	*What Does it Mean?*
1. Getting Ready to Plan	❑ Keys to success. ❑ Form a work group.	■ Do people want to plan for this? ■ Who is leading? ■ Are we ready to begin our plan?
2. Collecting Information	❑ Problems, goals, and objectives. ❑ Collecting background information. ❑ Forecast community growth.	■ What needs fixing? ■ What do we like? ■ What is here? ■ Where are we headed? ■ Where do we want to go?
3. Identifying Choices (Alternatives)	❑ Develop water and wastewater alternatives. ❑ Evaluate alternatives.	■ What kinds of water or sewer systems would work or not work for us? ■ Getting the information to help us decide which is best for us.
4. Choosing the Best Alternative	❑ Select a preferred alternative. ❑ Refine the preferred alternative. ❑ Develop a draft & final master plan document.	■ Choosing the system that we want. ■ Put our decisions in writing so everyone else will know what we want.
5. Putting the Plan Into Action	❑ Designing and building your system. ❑ Operating and maintaining the utility.	■ Finding money. ■ Getting permits. ■ Putting engineering details to our plan. ■ Building our improvements. ■ Keeping our system running.

Typical Sanitation Master Plan Table of Contents

- Introduction (purpose)
- Community Information (background information)
- Existing Community Sanitation Facilities
- Forecasting
- Improvement and Expansion Alternatives
- Alternatives Evaluation
- Master Plan Recommendations
- Funding Sources for Future Improvements

Step 1: Getting Ready to Plan

Before You Start Planning: The Keys to Success

Planning takes time and effort. Before you begin, is your community ready to plan? Here are some key things to consider.

"You've got to have one guy you can talk to."
-VSW Engineer.

"You've got to have people that are committed at the community level to make it happen. That's what makes it happen, not the document, it's the community."
- VSW Engineer

Commitment.

Get a commitment from your community's leaders and residents. The reason for the plan must be because your community wants it and because your leaders back it. If the reason for doing your plan is only because an agency thought it was a good idea, and your community does not care, you may as well stop now. Making a good plan means your community must put considerable time and energy into it. Without support and backing, your plan may not go far.

Start Talking.

What — ? We haven't even started the planning process and already we have to involve people? The answer is yes. Not only should you have support from leaders but there should be a high level of interest in the plan by residents before getting too far into the planning process.

Involving people before the process even starts helps them feel a sense of ownership in the plan's outcomes. Let them ask questions, and write down all issues. Let them know you care about what they think and will use their ideas in the plan. Any hint that you or outside agencies have made decisions before they even knew you were writing a plan will make them feel unimportant.

Inform residents about the planning process. For example, what are the steps that will be followed; why is the plan a good idea; and how they can help? You might find people ready and willing to be part of a planning group.
Get people talking by writing a newsletter or gathering people for a discussion. Maybe you could survey each household for opinions. Whatever method you decide on, make a big deal about it, make it special. Appendix A ("Public Involvement") has suggestions for getting people talking.

One of the most common ways people talk in a small community is through informal discussions - at the post office or store, in your office two days after a meeting…. The plan coordinator should keep a notebook to record comments and concerns gathered in this traditional way. Remember - people should be able to comment without having to give their names.

Public Involvement – You won't get anywhere without it.

With public involvement:

- Many different opinions, expertise, and experiences combine to help the community successfully achieve its goals.
- The community supports and has a long-term commitment to the plan.

Without public involvement:

- The proposed project may not be implemented.
- The best solution for the community, as a whole, may not be created.
- The project may result in unsatisfied community members or division in the community.

When ***everyone*** has been involved with planning, ***everyone's*** issues are heard, and plans will take ***everyone's*** needs and concerns into account. **Appendix A describes techniques you can use in your public involvement efforts.**

Planning Coordinator.

Before you begin planning, identify a plan coordinator. A plan coordinator is a resident, city staff person, or leader the community designates to run the day-to-day planning. This person supports the work group or

Council and is the driving force behind the scenes, making sure the things that need to get done, get done. The planning coordinator is the plan's cheerleader. The plan coordinator should be well respected, be a good spokesperson, and have the kind of personality that gets people motivated. The role of the plan coordinator takes time. Consider paying the person for their work. If the planning coordinator leaves during the process, find a new one. Don't let the process come to a halt because you don't have a coordinator.

Timing.

Is the timing right to start your plan? Are water or sewer issues important to a lot of people in your city? Or are there other things that might keep people from focussing on a water and sewer plan? Now may not be the time to start the plan if people are not focused on water and sewer planning.

Heading off Conflict.

Are groups in the community getting along? Will they be able to agree on a plan? If your community has a history of conflict or has groups of residents with strong opposing views, the success of your plan may be in jeopardy before you even begin.

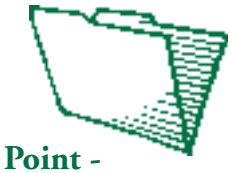
You might want to try a **conflict assessment**. A conflict assessment is a series of questions (see bulleted items) that bring issues out in the open before they create a new argument and work against the plan. Sometimes just talking can help resolve the issues or at least keep them at bay as you work through the plan. Other times, a conflict assessment may help you decide that your community is not ready to begin a plan.

If there are issues that cause conflict in your community, get the city council or another group to ask the following conflict assessment questions:

- **Can you easily describe the issues in the dispute?**
- **Can you easily identify who is on each side of the argument?**
- **Are water and sewer questions separate from the conflict, and can your community make decisions about water and sewer questions without getting into the dispute?**
- **Is the dispute over things *other than* core values (such as constitutional rights or cultural values)?**
- **Is there hope that those who disagree might each give a little to end the problem?**
- **Does each party have someone the other side will listen to?**
- **Is there a balance in power between the parties? In other words, is no one party more likely to control the results than another?**
- **Is there a likelihood of continuing relations between the parties?**

- Adapted from "Dispute resolution: A Handbook for Land Use Planners and Resource Managers."

If the answers to most of these questions are yes, the chance of working through the conflict is good. Appendix A has additional tips for dealing with conflicts.



Case in Point - Timing:

"After the flooding on the Koyukuk River, there was a flurry of activity. Somebody decided that plans needed to be developed for several villages affected by the flood. Plans were completed and the documents exist, but I don't think the communities were involved with the decisions. Consultants were asking the community to make decisions about what the community should look like 30 years from now-shall we relocate from our present location, etc.? But the plan was done during a time that people were uprooted from their homes, and had lost many of their personal effects, and really had a hard time concentrating and thinking about the way the village should be in the future. It was just a bad time to try to do a plan."

- Regional Health Corporation Engineer

Form a Work Group

Once you have decided the community is ready to plan, it may be useful for community members to form a work group or advisory committee to help make plan decisions. Although everyone should be encouraged to attend planning meetings, usually the small work group or council ultimately leads the planning process. The group should represent residents, state and federal agencies, and regional groups.

Who Should Be Involved in the Work Group?

To determine who should be involved in the work group or "who has a stake" in a community planning process, invite everyone who may be:

- **interested in the outcome of the group's efforts.**
- **affected either directly or indirectly by the planned action.**
- **knowledgeable about the planned action.**

Hold a community meeting. Make sure everybody knows about it. At the meeting, explain the work group and determine who will be on it. The group should get community, regional, and agency support by inviting someone to represent every important group (planners call them "**stakeholders**," because they are people who have a stake in the project). If essential people are missing, problems will likely occur later.

You might be able to encourage key people to be in the work group by pointing out the advantages of their involvement. While you will be asking them to volunteer time, they will get the satisfaction of having direct involvement in creating the plan and making a contribution that will make the community better.

See Appendix A "Public Involvement," for more information on stakeholders and on forming a work group.

ARE YOU READY TO MOVE ON?

- ☐ **Are leaders and residents solidly behind the project?**
- ☐ **Have you considered the timing of starting a plan now? Are water and sewer issues the most important?**
- ☐ **Have you identified a plan coordinator?**
- ☐ **Are residents aware of the plan and interested in it?**
- ☐ **Will groups be able to work together and agree on important decisions?**
- ☐ **Have you formed a work group?**

If so, you're ready to move on to Step 2 and begin planning your community's water and sewer system.

Step 2: Collecting Information

Are you ready for this step?
Check the box at the end of the last section to be sure.

Collecting Information on Problems, Goals, and Objectives: Where do we want to go?

It is important to find out the specific needs of the community early on. Community residents and leaders should identify the water and sewer problems in the community that need to be solved. It is also a good idea to establish goals to guide future development that people support.

Identifying Problems

To identify problems, the work group must hear from the public. Get residents to talk about the problems they have with the community as a whole and not just the water and sewer system. This is something people are generally readily able to do.

Planners typically find out about community issues through surveys, informal interviews with leaders, workshops, and public meetings. Ask residents to identify problems they have had. Also ask them about problems they see coming up (for example, the planned new fish plant will need a lot of water, and the community well doesn't produce enough). Make sure they tell you which problems are most important. List short-term and long-term problems.

The work group may want to have an engineer inspect the existing water and sewer systems and list their problems from a professional engineering perspective. If you ask, the engineer can put a cost on fixing the problems. Also, it is not too early to begin thinking about the work and cost of operating and maintaining a new water and sewer system. The problems you may be having operating or maintaining your current system are important to know about as you start to think about the system you want in the future.

The issues identified should focus not only on your water and sewer problems but also on more general community development. Problems, like a runway that is eroding into the river or high demand for new housing, can change the kind of water and sewer improvements you will need. Write out the problems and issues so that everybody can see them.

Example Problem Statement

The problem is that not all households have flush toilets. Many homes are still using honeybuckets that residents must take to the sewage lagoon for dumping. Agency officials, as well as residents, think this is a public health hazard. The problem is only getting worse as our population grows.

Setting Goals and Objectives

A goal is a broad statement designed to solve one or more of the community problems you have identified (see the example below). In other words, goals are guiding statements of what the community would like to become in the future. Setting goals and defining your community's vision for the future provide answers to key questions, such as:

- **Where are we headed?**
- **What values do we find most important?**
- **What kind of future do we want to create?**

Have you involved your water-sewer system operator? It is likely that no one in the community knows more about your existing system and its needs and what you need to consider in your future system than this person.

"Obstacles are those frightful things you see when you take your eyes off your goal."
~ Henry Ford

Community goals:

- *Goals describe what people want.*
- *Goals look to the future.*
- *Goals say things that most everyone can agree with.*
- *Goals are short statements.*
- *Goals state the issues that residents find most important.*

There are several questions that your community can ask to help identify problems, goals, & objectives.

- What is the problem? (Issues Statement)
- What do we want for the future and how will we achieve it? (Goals and Objectives)
- What is the condition of what we have now? (Background Study, Inventory)
- What will change and how? (Forecasting, trends analysis)

The answers to these question guide your water and sewer plan. For example, if your goal is to provide adequate housing for your growing population, you will need to know where that housing will be built *before* you make decisions about your water and sewer system.

Example Goals

(1) To provide flush toilets to each house in the community.
(2) To provide houses for the people who live here.

An objective, to planners, is a specific way to attain the broader "goal." Its results can be measured. It identifies what is going to be done to achieve the goal, when it will be done, and sometimes who will do it.

Example Objectives

- **At least 60% of all households shall be hooked up to sewer by the year 2003.**
- **Build 20 new homes in a new subdivision in the west part of the community.**

Objectives guide action. Writing goals and objectives is more challenging than naming problems, because goals and objectives refer to the future and not to your everyday experience. Nonetheless, they are important for guiding future development and therefore critical for planning your water and sewer upgrades.

Everybody must help to identify problems, needs, goals, and objectives. See Appendix A for information on involving the public. Do not be afraid to try a new technique.

ARE YOU READY TO MOVE ON?

- ☐ **Have you formed a work group?**
- ☐ **Has an engineer looked at your water and sewer system and written down its problems?**
- ☐ **Has the community written down its planning, community development, and water/sewer problems?**
- ☐ **Has the community written down its needs specific to water and sewer?**
- ☐ **Has your community written down its goals and objectives? Vision?**
- ☐ **Have you looked at the community's ability to operate and maintain a water and sewer system?**

If so, you are ready to move on to collecting background information.

Collecting Background Information: What is here and where have we been?

How do you pick a site for a new building or sewage lagoon? How do you get an idea of how many people will live in your community 20 years from now? These are some of the most important planning questions. To be able to answer them, you need information about where you live. One of the early tasks is to collect this background information.

To decide good sites to build on, you need to know about land and water patterns. To predict how many people will live in your community in 20 years, you need to know how many people there are now and how many there have been each year in the past. The checklist at the end of this section can help to define the types of information you might want to collect for your plan. If you had an engineer look at your water and sewer systems, you will include that information too.

When drafting a water and sewer plan, you must have information on the existing water and sewer systems and about your community's ability to build, operate, and maintain the system.

The facts you learn are what you need to make decisions about future development. You will use the information to analyze different types of sewer and water systems, and to select one that will guide development in a way your community likes. This information will guide the water and sewer system plan by making sure you and the work group take everything into account.

Where to Get Information

When you begin collecting information, it may seem like an enormous task. Organizing your efforts may help. Use the checklist at the end of this section to make a list of the information you need and where you might get it. The list will undoubtedly change as you gather data and new information needs and sources appear.

Information About the Community

Community Members. Elders and others are the best place to begin collecting information on the community. Traditional local knowledge is an important part of the information about the community. In many communities, there is little environmental or cultural information except in the heads of long-time residents. Methods for collecting information from community members include surveys, interviews, and public meetings (see Appendix A on 'Public Involvement').

"Involve the people, especially the elders in the communities, because they know things that we don't. I am always constantly amazed by what they know about things."
- Village Resident

"You can't get to where you're going until you know where you've been."
-Anonymous

Gather information through mapping.
At a meeting or during your everyday conversations encourage people to mark traditional knowledge, important areas, problem areas, and other information you need to collect (see the information checklist later in this section) on a map or aerial photo of the community. Using mapping is a good way to get people talking and it's easy to document what they have to say.

Getting Information Over the Phone

- Be prepared before you call; have a list of questions, be ready to take notes. Remember this person may be busy!
- Identify yourself and the reason for contacting the agency/organization/person.
- Determine whether you are talking to the right person, if not ask for the right person.
- Ask clear concise questions. Have follow up questions. Ask whether the person knows of others who may have additional or different information.
- Ask for hard copies of reports, etc.
- Thank the person for their time.

Community Surveys and Assessments are a good way to evaluate your water and wastewater system to get an idea of your community's ability to operate and maintain what you have already. Determining this information will help the community plan for its future needs.

Community Capacity. In planning for sanitation improvements, figuring out your community's capacity *or ability* to build, operate, and maintain the planned project should be determined early. Many projects have been planned, designed, and implemented when later it was determined that the community did not have the capacity to run the system or improvement. Knowing your community's ability to administer and manage your sanitation improvements should be a consideration in the alternative you ultimately select.

Assessing Community Capacity

- *Are there people in the community who could do the work?* In some places, there are too few people to administer a project. A community should determine whether there are people in the community that could do the kind of work it will take to operate and maintain your system (See Step 5).
- *Do people have the training/expertise/skills to do the work?* In some communities, there may be people available to do the work. However, they may need special training or education to do the job effectively.
- *Can the community support people to do the work?* A community should determine whether it has the money for training and wages, room, and time to supervise potential workers.

Depending on the project, other questions should be considered to determine community capacity.

Information from Other Organizations

State and Federal agencies may have written reports about your community or region. Contact the agencies to ask if they have background information that would help your plan. Agencies like the Alaska Department of Transportation and Public Facilities (DOT&PF) will have community transportation information. The Alaska Department of Community and Economic Development (DCED) and the Alaska Department of Labor (ADOL) will have information about people and the economy in your community. The U.S. Fish and Wildlife Service and the Alaska Department of Fish and Game (ADF&G) will have some of the land, water, and wildlife information you need.

Nonprofit organizations, like regional health corporations and regional non-profit organizations, the University of Alaska, and statewide tribal organizations, may have valuable background information on your community or region.

Libraries. Libraries have useful information, but the bigger libraries are not in rural Alaska. One of the easiest ways to get information from a library is over the Internet. You can get to Alaska libraries and other information links on the Internet at hyperlink **http://www.wln.com/inetsvcs/lkalaska.htm**.

In addition, most agencies and other nonprofit groups have their own libraries with specialized information. If your community does not have Internet access, you can get help from many libraries by calling directly and asking the **reference desk** for assistance. It is helpful if you know the specific type of information (for example, subject, author, etc.) you need before calling.

Internet. If your community has Internet access, you may want to try gathering background information by doing an Internet search directly. Use key words like the community's name, issues, and resources. Try a variety of "search engines" to gather this information. It may be useful to recruit community members for help with gathering information. Children are often taught how to use the Internet in school. Having school children help with your Internet search gets kids involved and can be good if you are unfamiliar with the Internet.

What if the Information Does Not Exist? Field Studies

Some of the information you may need will never have been collected before by anybody. Your community may need to do field studies or other research. You can do this yourself, ask an agency to complete a study, or hire a private consultant to do the work. Qualified people, preferably with experience, should do the work to ensure that the findings provide you with accurate information.

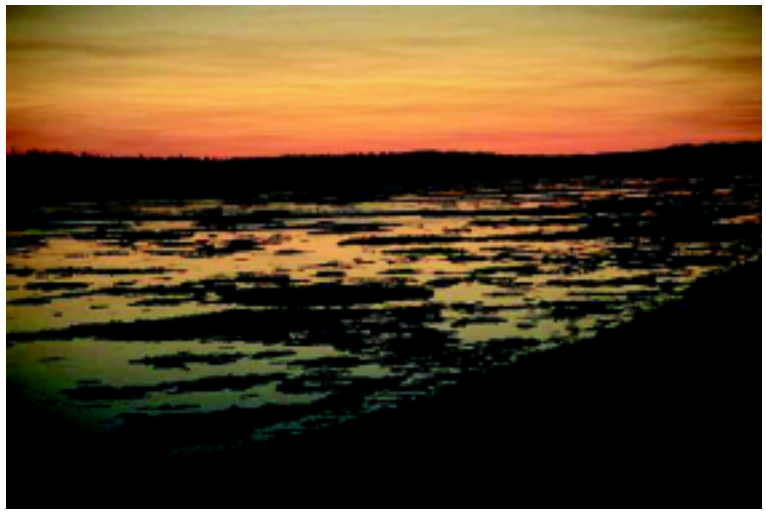
There are lots of field studies that you can do yourselves, depending on the information gaps that you have. Examples of the types of field studies the community could do include collecting information about plants or animals in your area, keeping track of weather or flooding information, collecting water samples, or identifying culturally important areas. The limits to the information you can collect yourself depend on how technical the information you need is and whether you have residents with the time and knowledge to collect the information.

If you don't have people in your community that you feel can do the field study, you can often get help from agency representatives or Native corporations and organizations. Contact agencies like the Alaska Native Tribal Health Consortium, the U.S. Environmental Protection Agency (EPA), and the Alaska Department of Environmental Conservation's Village Safe Water (VSW) program to find funds for studies. One idea is to have an agency or private consultant help you set up your study and then pay residents or find local volunteers (students or church groups) to help collect the information needed.

Whether you find information already in a report or have someone complete a new report for you, some studies may be technical and hard to understand. For example, geotechnical surveys (about soil and rocks), wetland surveys (marshes), flood hazard information, and geographical information systems (computer maps) may be essential to your plan but not easy to read, depending on your background and experience. Technical advisors like engineers or scientists employed by an agency (especially those that wrote the reports), your regional health corporation, or a regional housing authority, may be able to help you understand studies. Additionally, you can hire private consulting firms to help understand the reports.

Getting Help from Private Consultants

- Get consultant recommendations from other rural communities.
- Check references and ask around about prospective consultants.
- Interview prospective consultants to see if you can work together.
- Obtain several cost estimates.
- Remember the consultant is working for you, not leading the effort. The community is in charge of making decisions.



Mapping Your Information

Once you have collected information, organize it so that you can use it to create the plan. Maps are a good way to organize much of the information that you have collected. Making maps can be simple or technical, depending on your needs and knowledge. Draw as much information as you can on a Mylar (clear plastic) sheet overlying an aerial photo or a good map. Then you can look at the map and the overlay when deciding where water pipes should go. State and federal agencies or Native corporations may even have mapping or aerial photography that would be useful to your plan. Geographic Information Systems (GIS) or computer mapping is a more technical way to make the same map layers. The computer can also keep track of all the information about things on your map: information on buildings (typical gallons of water use, for example), streams (peak flows, types of fish, spawning times), etc.

The checklists on the following page can help you keep track of the kinds of information you might need to collect.

"The more successful plans clearly have more interest and involvement from local people, and the less successful plans do not. If you look down across the failures, one of the element in every case is a lack of interest in planning."

- Regional Health Corporation Engineer

Community Information Checklist

Social & Economic Information* (Information about people)

Community Descriptions
- ❑ Location
- ❑ History and Culture

Demographic Profile
- ❑ Population (ages, race, sex, etc....)
- ❑ Immigration rates

Local Government Organization Roles and Responsibilities
- ❑ Tribal Council
- ❑ City Government
- ❑ Village & Regional Corporations
- ❑ Relationships between governments

Health and Social Services Systems
- ❑ Past/current health risks/problems (information from clinic, school officials, regional/local sanitarian, etc...)
- ❑ Health workers (amount, function, etc....)
- ❑ Regional Health Corporation

Local Economy
- ❑ Local Businesses (type, successfulness)

Physical Environment & Natural Resources Information*

Climate
- ❑ Temperature
- ❑ Rain/Snowfall, Winds

Surface Hydrology and Ground Water
- ❑ Rivers/Streams
- ❑ Groundwater Level
- ❑ Groundwater Flow
- ❑ Availability of Year-round Water Supply
- ❑ Flooding (how often, when, recorded depths, etc.)

Fish and Wildlife Habitat
- ❑ Species of fish and wildlife
- ❑ Current and Historical Locations of Breeding/Rearing/Feeding Habitat

Important Land Features
- ❑ Lakes
- ❑ Rivers
- ❑ Hills
- ❑ Coastline

Geology and Soils
- ❑ Soil Types and Locations
- ❑ Permafrost, Poor Soils (type, depth, engineering issues, etc.)
- ❑ Earthquake Susceptibility
- ❑ Erosion

Vegetation and Wetlands
- ❑ Plant Types and Locations
- ❑ Wetland Type and Location
- ❑ Land Disturbances or Impacts

Community Information*

Land Ownership and Availability
- ❑ Allotment Locations
- ❑ Village or City Land
- ❑ Village Corporation Lands
- ❑ Regional Corporation Lands
- ❑ Other Land Ownership

Existing and Future Locations For:
- ❑ Residential Development (houses, apartments, duplexes, etc.)
- ❑ Commercial Development (store, hatchery)
- ❑ Institutional Development (schools, government offices, churches, clinic, community center, Headstart, etc.)
- ❑ Industrial Development (water and sewer infrastructure, landfill, power plant, phone/cable lines, fire department, police department, etc.)
- ❑ Transportation Infrastructures (airport, roads, docks, trails, boardwalks, harbors, etc.)

Land Areas of Community Importance
- ❑ Hunting & Fishing Areas
- ❑ Berry Picking and Plant Gathering Areas, fish racks etc.
- ❑ Spiritual Places, cemeteries, old village sites etc.

* *Depending on your project, more or less information may be required.*
The State of Alaska has much of the information you may need on its website (www.state.ak.us)

ARE YOU READY TO MOVE ON?

- ☐ Have you collected *all* the existing background information you need (community, social and economic, and physical and natural resources)?
- ☐ Have you completed new studies to get the information you need?
- ☐ Have you organized the information in a way you can understand and use as you plan?

If so, you're ready to move on to the forecasting phase of planning your community's sanitation system upgrades.

Collecting Information about the Future: Forecasting Community Growth

Do you have enough houses, or do you need to plan for new subdivisions? How many houses must your water source serve in five years? Ten? Twenty? How big must your sewage lagoon be in 20 years? Before you can list alternative water and sewer systems that will really work in your community, you need to decide how many people will live there in the years ahead. This is called **forecasting.** From population projections, you can estimate needs for housing, other land uses, and the type and size of the water and sewer system.

The background information you gathered in the previous step is the basis for forecasting. Trends in population growth, economics, and housing can help predict what may happen in the future:

- **Has your community been growing rapidly or slowly?**
- **Is the economy growing, or are there opportunities for its growth?**

Answers to these and other questions provide a picture of what may happen in the future.

Communities are not necessarily at the mercy of past trends or future impacts that often appear beyond their control. Your community's goals can influence growth. For example, your community may state goals about how to use and sell land, how to make sure people have jobs, and how to build and take care of roads, boardwalks, docks, and airports. If the community decides not to sell any city land, the population may shrink. If it decides there is a goal to sell a lot of land for housing, the population could grow. The goals and objectives you have been developing will influence the forecast and can powerfully direct your plan.

Forecasting Techniques

There are a number of techniques for forecasting population. **Extrapolation,** means extending past trends into the future. **Theoretical models** are more complex. Trained people link things like jobs and population growth to see what would happen in the future. The Institute of Social and Economic Research at the University of Alaska uses a model based on oil prices and production, fish prices and catch, and many other parts of the state economy to predict future population around the state using this method. **Intuitive prediction** relies on professional judgement about what is likely to happen in the future. For example, you might get information on the impact of welfare reform on your community population and economy by interviewing people from the Department of Labor or other State departments.

Here are two quick and relatively easy methods for making estimates of future population that you can do yourself.

(1) Base your future growth on a population projection that someone else has already done. Has the borough or state done a population projection that covers your area or community? If there is a projection for your region, you could use it to estimate your community's population relative to the projection for the larger area. It is easiest, but not necessarily accurate, to assume that your population will change in the same proportion to the borough or state population.

"The best way to predict the future is to invent it."
-unknown

(2) Another quick way to forecast population is to use a computer spreadsheet program. Develop a spreadsheet with your community's historic population numbers. Use the spreadsheet's "trend" functions to project your population into the future (search for "trends," "forecasts," or "growth" in the spreadsheet's 'Help' function). Use local knowledge to get a feeling for the accuracy of your prediction.

Once you have estimated the number of people who will live in your community in the future, you can direct engineers to figure out whether or not the existing water or sewer system can handle the future demand. For example, based on the population projection and the information you have collected on past water use, you might determine that the existing water storage tanks will not be big enough for the number of people living in your community in 8 to 10 years. This is the kind of information you need to propose alternative water and sewer systems.

The forecasting task should end with a written community growth projection. There should also be projections of demand for houses, demand for different land uses, and demand for water and sewer service.

ARE YOU READY TO MOVE ON?

- ☐ **Have you used your social and economic information to estimate your future population?**
- ☐ **Have you converted your population information into demand estimates for water and sewer services?**
- ☐ **Have you figured out if your current water and sewer system can handle the future water and sewer demand?**

If so, you're ready to move on to the next step of planning your community's sanitation system upgrades.

Step 3: Identifying Your Choices (Alternatives)

Developing Water and Wastewater Alternatives

Have you completed all of Steps 1 and 2? Check the "Are You Ready to Move On" boxes on the previous pages to be sure.

With all the work your community has done in Steps 1 and 2, you are ready to plan future water and sewer alternatives. When planning a new or better water and sewer system, take into account:

- engineering recommendations.
- community goals and objectives.
- environmental limitations.

The process proposed here blends these so that you can come up with a good system.

Identifying Choices

You may have as many ideas for where, when, and how you will go berry picking as there are berries.

You would probably consider a number of factors for where, when, and how you will go berry picking by asking yourself questions like:

- Where should you go? (You could take a boat up river or take the four wheeler over the next hill. Will others have already picked all the berries near the community?)
- When will you leave? (Lots of mosquitoes in the morning, but not much time to go in the afternoon?)
- How will you dress (Boots for wet patches? Rain? Will you need a coat?)
- Whom do you want to take with you? (Kids and dogs, friends, nobody?)

After considering the above questions you may have a *list of alternatives*, or choices, like:

- You will go berry picking up river by boat, alone this morning, wearing your rain gear, or
- You will stay near the village in the after noon, not wear any gear (since you can get home easily), and bring the kids, or
- You will wait until the weekend, use the four wheeler, bring the dogs, and decide how to dress before you leave.

Finally, you will decide on an exact choice by *evaluating the alternatives* (discussed in next chapter).

"People may agree on where they are going (goals and objectives) but see different trails for getting there. Alternatives are the different trails."

It is essential that the work group you formed lead the "Developing Alternatives" effort. By now, the work group is aware of community concerns and future expectations, has knowledge of the community's background information, and has been involved in forecasting the future demand for water and sewer service. The work group has the knowledge and expertise to create a number of water and sewer plans and alternatives.

There are several types of water and sewer systems available for rural Alaska. Knowing the different components of a system and their relative advantages and disadvantages is important to the overall understanding and selection of a system that meets your community's needs today and in the future. Appendix B provides a summary of the available technologies for water and sewer systems used in Alaska. The tables on the following pages explain the main differences.

Sitka, Alaska

Water Systems*

Systems	Advantages	Disadvantages
Individual Wells Water is pumped from the ground into the house.	• Inexpensive to operate. • Requires little community organization.	• Poor water quality in some locations. • Well owner is responsible for operating and maintaining. • Can become contaminated if not properly maintained.
Self Haul/ Community Watering Point Residents haul water from a treated watering point to their homes.	• Costs are comparatively inexpensive. • Extended watering points can provide additional convenience. • Washeteria can provide facilities to wash clothes and shower. • System is not limited by soil conditions or topography. • System can be used year-round. • No additional infrastructure improvements are needed.	• Residents must haul their own water to their homes. • Potential risk of contamination during hauling or storage. • Operation and maintenance costs may be expensive in communities with low washeteria demand. • Extended summer or winter watering points require additional operation and maintenance.
Community Haul An operator delivers water transported by vehicle to a holding tank at each resident's home.	• Provides adequate water supply to operate toilets, sinks and showers. • Promotes good personal hygiene. • Less potential for contamination than the self-haul systems. • Reduced maintenance requirements by individual residents. • Less restricted by soil conditions and topography.	• Higher operating costs to community and households. • System is dependent on utility organization and operation and maintenance. • Water use must be conserved to keep user rates affordable (households pay for each haul). • System requires some infrastructure improvements (trails, boardwalks, etc.)
Community Piped Water Water is distributed to each home through a series of pipes.	• Residents can fully plumb homes. • Requires the least amount of individual operation and maintenance by users. • Allows more water use. • Convenient and reliable service for users.	• High level of operator training is required. • High operating cost to community and household. • System can freeze and repairs can be difficult and expensive. • Difficult to serve widely separated residences. • Initial construction costs can be high. • Distribution lines cannot be buried in some soils. • Above ground pipes can limit access and act as barriers to walking and vehicles. • Maintenance is required to keep pipes protected from vehicles and snowmachines. • Freeze protection costs are increased with above ground pipes. • Needs a high volume water source.

* *More detail on water systems used in Alaska can be found in Appendix B.*

Wastewater Systems*

Systems	Advantages	Disadvantages
Self Haul—Honeybuckets, Bunkers, and Privies Individuals are responsible for carrying their own wastes to a disposal site.	• Requires little community organization. • No user fees for hauling. • Initial construction is also inexpensive.	• Inconvenient - Individuals must carry their own waste to a disposal facility. May have spills causing unsanitary conditions. • Sick or disabled people have difficulty in carrying waste. • Permafrost and poor soils exclude the use of privies or other on-site systems. • Privies can fill up quickly if used for trash disposal. • Privies must be relocated to a new spot when full. • Overflow can create a public health hazard. • Multiple privy installations can become unsightly and unsanitary. • Adequate separation distances must be maintained to prevent contamination of wells, springs, or other drinking water sources.
Community Haul and Disposal Residents carry their waste to centrally located containers. A paid worker drives the containers to a disposal site.	• Distance residents must travel to dispose of wastes is reduced. • Waste is disposed at a central collection site and a lagoon. • User fees can be affordable.	• Residents must haul waste to the collection center. • Spills still occur and may result in public health hazard. • Operator must be employed, well-trained and reliable for this method to work effectively.
Community Flush and Haul Houses have plumbing. Waste is stored in a tank. A paid worker pumps the wastes to a portable tank and drives to a disposal site.	• Residents no longer have to haul waste. • Residents can provide their homes with a toilet and sink. • Sanitary conditions improve greatly. • Less chance of drinking water contamination. • More convenient for residents.	• Requires high level of community organization. • Requires reliable operator and equipment. • Higher level of operation and maintenance. • User costs may be comparatively high. • Relatively new technology that may have associated problems. • Occasionally odors can back up into the house.
Septic Tank/Drainfield Systems Wastes flow from the home to a buried tank. Solids are periodically pumped out of the tank for disposal.	• Allows home to be fully plumbed. • Fewer responsibilities to the homeowner. • High level of convenience and service. • Improved sanitary conditions compared to other systems.	• Soil conditions, permafrost, and flood hazards may limit use. • Drainfield will typically need replacement (approximately 20 year life). • Backed-up or nonfunctioning systems can create a public health hazard. • Pumping out tanks is required every so often. • Where feasible it can be relatively cheap.
Community Piped Sewer Sewer pipes transport wastes from homes to a disposal site.	• Provides sanitary method of sewage collection, treatment and disposal. • High level of convenience and service to residents. • Promotes good personal hygiene. • Can be used in a variety of topographic and soil conditions.	• Soil, permafrost, and hilly conditions may result in high construction costs. • Requires a high level of operator training. • Can be expensive to operate and maintain. • Pressure systems require the homeowner to maintain individual lifts. • Above ground pipes create barriers and have high heating demands.

** More detail on wastewater systems used in Alaska can be found in Appendix B.*

Create Ideas

The first task in developing water and sewer system alternatives is to generate ideas. The work group should use the public participation activities outlined in Appendix A to come up with as many water and sewer system upgrade ideas as possible. Some of the ideas may be feasible and realistic, and others not. Write all of them down, even if they do not seem realistic. It is wise to list as many options as possible because:

- **You are less likely to overlook the best ideas.**
- **By considering everyone's ideas, you will gain community support for the final alternative selected.**
- **Good ideas may be generated out of seemingly weak suggestions.**

Form Alternatives

Once you have developed an extensive list of ideas, the work group should *briefly* consider each idea and make a shorter list of alternatives that the community can consider in more detail. Base this list on which alternatives seem like they would work the best in your community. The work group should keep in mind:

- **Public concerns and desires.**
- **Forecasted population and demand for services.**
- **Existing and future uses for land in the community.**
- **Engineering criteria.**
- **Other communities' experience with their systems.**
- **Your community's ability to keep each alternative running and to pay for keeping it running.**

To shorten this list, the work group should organize the ideas. They could group similar ideas, geographical areas, most popular, or least popular ideas, etc. If you want to know the cost differences between a pipe system and a haul system, isolate these two types in two alternatives. If you want to know the costs and impacts of expanding your community eastward as opposed to northward, compare those areas in two alternatives.

As you group ideas to form alternatives remember that:

- **An alternative may use different types of technology together (for example, flush/haul and pipes).**
- **An alternative may focus within one type of technology but explore a range of locations or variations (for example, a pipe system with variety of routes).**
- **The type of technology and range of alternatives should be based on your community's goals and objectives and its circumstances.**

Sometimes work groups are pressured to consider certain ideas when it is apparent that the idea would not work under any condition. There are ways to respectfully consider unusual ideas forced upon a work group by influential community members or groups. For example, the work group can group all the unusual ideas together for further consideration during Step 4 (when it will become apparent that the ideas will not work).

After you have organized the ideas into groups and have considered which would work best, you should have a range of different water and sewer system types. These are the alternatives for your plan. The work group should draft a detailed, written description of each water and

"Without the planning document, without having gone through that process, the community really had no idea what their best alternative was. They knew that they needed to do something, but they had no idea of exactly where to put it, or how much it would cost. Planning helped them to really focus in, and be able to address their priorities."
-Regional Health Corporation Engineer

Developing water and sewer system alternatives from an extensive list of community ideas involves:

- **Common Sense**
- **Logical Thinking**
- **Creativity**
- **Political Savvy**

A little tricky? Yes.
Can you do it?
You bet!

Sometimes the Best Way to Compare Alternatives is to See Alternatives…

- *Drawings*
- *Photographs*
- *Videos*
- *Visiting other systems in other communities*
- *Walking through the route or location of pipes, buildings, or lagoons*

Check with remote maintenance workers in your area or with other regional health corporation staff to help you evaluate how well different alternatives might work in your area.

sewer system alternative that the community wants to consider. Professional engineers and planners can help you form ideas into alternatives and describe them.

Evaluate Alternatives

You may want to have an engineer work with each alternative to give more detail about how it would work in your community. The work group, with help from the engineer and the community as a whole, can list the criteria to use to evaluate the alternatives (see below). The information that is developed should help community residents and leaders select a water or wastewater alternative that works for the community.

Criteria for Evaluating Alternatives

Listed below are a number of characteristics that the work group and technical folks may want to take into account. However, different factors are important to different communities, and more or different information may be required for your community to make a decision on your preferred alternative.

- Community Input. Does the alternative do what the community wanted (look back at your goals from Step 1)? For example, does the alternative avoid areas that are important to the community, like the old graveyard or a berry picking area?

- Forecasts and Vision. Will the alternative work in the future, based on the forecasting and the community vision you came up with in Step 2? For example, will the alternative work for proposed tourism ideas?

- Community Function. Does the alternative work okay considering the community's buildings, land ownership, other pipes or wires, etc. For example, does the alternative block boardwalks or trails?

- The Land, Water, and Wildlife. Does the alternative harm the land or wildlife that is important to the community or agencies? State and Federal agencies will look at flood areas and erosion, fish and wildlife habitat, and other sensitive areas.

- Effects on Residents. Will people be willing to pay what it will cost to run the system? For example, how much will the system cost each resident? How will it affect current lifestyles?

- Experience of Other Communities. Has this kind of alternative worked well in other communities? Look at other villages' water and sewer systems either by visiting or talking on the phone. If a particular system was not successful in another community, it may not be in yours.

- Engineering. Do the engineers think the alternative will work well in your location. Ask an engineer whether each alternative will work taking into account specific engineering points like:

  - Are the soils good for building on?
  - Does the alternative involve unusual construction work?
  - Is the alternative reliable?
  - How much is construction likely to cost?

- **What are the operation & maintenance costs and considerations?**

- **The Community's Capacity. Think about how your community would operate and maintain each of the alternatives. What kinds of management does the alternative require? Consider the reliability of your work force, training needs, number of operators needed for the alternative, and the sophistication of the system (e.g. would it require more from a plumber or more from a computer expert—or both?).**

Presenting and Considering Your Choices

Comparison Chart. A chart is probably the easiest method for presenting how well each alternative will work. After the work group has come up with a list of criteria, you can create a chart (see the "Scorecard" box) to present what is good and bad about each alternative. The work group can fill in the chart either by marking with a + or – or by using a scoring system. Also, instead of + or - or scoring, you can write short comments or cost amounts under each of the criteria. Use the chart to show how well each alternative rates against important community and engineering criteria.

Mixing and Matching Alternatives. Sometimes a community will look at several alternatives in detail and decide that none is exactly right. The work group may choose to use a part of one alternative and another part of another alternative. This may be a good idea in communities having difficulty reaching agreement on one alternative or in communities open to all the alternatives. Either way, there is no harm in choosing the parts of each alternative that you like for a final preferred alternative, as long as the combined alternative meets the goals and scores well against the criteria. During the discussion on mixing and matching ideas together to form alternatives, it is a good idea to get input from an engineer to help with considering the more technical aspects.

In the End. Create a final list of the alternatives that appear to work for the community. Make sure you have an equal amount of information on each one. Get ready to select one of the alternatives in Step 4 and to celebrate the decision!

"It's very difficult—you're asking people in a community, who don't have any running water or sewer, to make a decision about the type of system that they'd like. And you want them to make these decisions with no background or knowledge about that, just from pictures or even from verbal descriptions, or worse yet, with only written material. It's so difficult for people to picture even what the options are, let alone come to a decision."

-Regional Health Corporation Engineer

"Scorecard" Technique
Make a big chart. List the alternatives down the side and the criteria across the top. "Score" each alternative on each of the criteria, using numbers or writing (may be as simple as "good, fair, poor"). This will allow your community to look at how alternatives compare against each other.

Case In Point—Looking at more than one alternative:

Ruby is on the south bank of the Yukon River, in the Kilbuck-Kuskokwim Mountains. It is about 50 air miles east of Galena and 230 air miles west of Fairbanks. In 1998, 204 people were estimated to live in Ruby. There are 92 total housing units, and 31 of these are vacant. The majority of residents haul water from the washeteria and use outhouses or privies. Approximately 20 percent of homes have individual wells and septic systems with household plumbing.

An initial sanitation master plan for Ruby started without much community involvement. After gathering some environmental and socioeconomic background information, but no information on the wants and needs of the community, an agency decided that a piped water and sewer system was the best alternative for Ruby. At a public meeting with one of the largest community turnouts ever, the agency announced that they were planning a piped system for the community. However, residents of Ruby were not happy. They were concerned about costs to households and their ability to operate the system. Some of the people were adamant, saying, "I will not be on that system!"

Following the meeting, the agency developed a door-to-door questionnaire to determine what the community wanted. However, the survey was seen as biased toward the piped system alternative. Ruby decided it was time to work with another agency.

Ruby is currently working on another study, one that involves the community in examining the wants and need of the residents in more detail and looks at more than one alternative.

Lessons Learned:

- *Community involvement is important from the beginning of the sanitation planning process.*
- *Examine a variety of sanitation alternatives before deciding on one.*

ARE YOU READY TO MOVE ON?

- ☐ Did the work group consult the community to come up with a wide range of water and sewer alternatives?
- ☐ Did you figure out whether each alternative meets community goals, fits well in the community vision, and can serve the forecast number of people without disruption?
- ☐ Did the work group consult with an engineer about each alternative and how well it would work in your location?
- ☐ Do you have a short list of water and sewer system alternatives that you have described in detail?
- ☐ Are you sure the residents understand the alternatives?
- ☐ Is the community ready to choose a preferred sanitation system alternative?

If so, you're ready to move on to choosing the best alternatives for your community's water and sewer system.

Step 4:
Choosing the Best Alternative

Is your community ready to select a preferred alternative? Check the "Are You Ready to Move on?" boxes on the previous pages to be sure.

Selecting a Preferred Alternative

The community should have a list of alternatives and all the information about the alternatives to decide on a preferred water and sewer system. Remember that once you pick a preferred alternative, it will be hard and expensive to choose a different alternative because the engineer will have started designing the system and estimating costs. It is important that your community does not feel rushed into a decision because of funding deadlines, construction timing, or other constraints. Instead, your community should look over each alternative, weigh it against the criteria and the other alternatives, and make a choice. Select your preferred alternative based on:

- **acceptance by your community**
- **engineering feasibility**
- **other criteria important to your community**

To get a decision that everybody can live with, you must give everybody a chance to say what they think about the alternatives. Present each of the alternatives with a description of how well each meets criteria established for the project. To make a good decision, residents and community leaders must fully understand the pros and cons of each alternative before selecting one to build.

Resolution and Celebration

Once your community has agreed on a preferred water and wastewater system, make a big deal out of it. Your community has worked hard to get to this point, and it should be a time for a celebration! Additionally, funding agencies may require a resolution from your governing body on the selection of the preferred alternative prior to releasing funding for the remaining stages of your plan's development. If you are funding the design or construction on your own, a resolution is not required, but would provide a means of documenting your community's decision. A good way to bring the community together to celebrate all of the hard work could be a *"Signing Ceremony"* held when the community leader signs the resolution. Another suggestion might be to have all those involved in the plan sign and then frame the document to put on the wall.

Refining your Preferred Alternative

There are no set rules on how a water and sewer project moves from a preferred alternative selection (the concept/planning phase) through "preliminary engineering" to the development of a "Water and Sewer Master Plan." The process depends on the community and project. However, there are some standard procedures that engineers follow and ways you can actively involve your community.

Preliminary Engineering

Preliminary engineering is a typical step in refining the alternative you have selected. During this step, the engineer takes the concept and designs it into a project that agencies can fund. You will need an engineer to do this detailed examination of your preferred alternative.

What Are Those Engineers Doing?

Your engineer takes a closer look at all the components of the preferred alternative like:

- ✓ **Environmental constraints (soils, flooding)**
- ✓ **Details of the engineering**
- ✓ **Scheduling and phasing the project**
- ✓ **Detailed costs of the different phases of the project**

If there are changes to the preferred alternative, ask your engineer to provide written justification for the changes.

Ask your engineer to:

- ✓ Show diagrams, figures, or maps of the preliminary engineering findings
- ✓ Walk the community through the designed system explaining everything from where the important buildings will be to what "in-house" plumbing will look like.

If there are changes to the preferred alternative, ask your engineer to provide written justification for the changes.

The final CIP list, containing ranked projects with costs, can be used to demonstrate to funding agencies that monies will be spent on well-planned projects with a demonstrated need.

Direct the engineer to conduct preliminary engineering that refines the selected alternative to (1) provide a project location (or pipe route), (2) details on what you will build at that location, (3) the timing of construction, (4) construction and operating costs, and (5) maintenance requirements.

When the preliminary engineering is done, the typical presentation will be a series of drawings and maps made with a computer-drafting program. Although this takes the preferred alternative from a concept to design level, the design is not "set in stone." The primary purpose of preliminary engineering is to come up with engineering plans detailed enough for a good cost estimate and construction schedule.

Developing a Capital Improvement Program

After preliminary engineering, you and your engineer can develop a capital improvement program (CIP). The CIP typically contains:

1. A list of capital improvements (things to build) in order of importance.
2. A short description of each part of the project, including cost estimates.
3. A schedule for seeking funding.
4. A construction schedule.

The CIP should group related work items together into separate **fundable projects.** For each of the projects, the work group and engineer should estimate the construction cost and the operations and maintenance costs. The CIP should contain an assessment of potential local, state, and federal funding sources. A well-developed master plan with a realistic CIP is one of the best tools a community has for securing state and federal funding.

After the engineer provides you with the refined project estimates, you have all the information needed to prepare a water and wastewater master plan and make it available for review by residents and agencies.

Draft and Final Master Plan

At this point, all information that has been collected and developed can be bound into a draft water and sewer master plan. Fill in the sections of the outline, using the information your community came up with at each step. Be sure everyone gets a look at the draft plan. Include:

- work group
- funding agencies
- agencies that consider permit applications
- private businesses
- engineers
- community leaders
- the public

All should have a chance to review and comment on the draft plan. Use their comments to revise the plan. While the plan is in draft form, there is still an opportunity to refine or change aspects of the preferred alternative. Extensive changes in alternatives means lost time and money and probably means something has gone wrong. The city or tribal government can adopt the final plan using a resolution or a formal letter. Funding agencies like to see this formal step to show that your community has accepted the final plan.

Local climate should be considered in selecting your alternatives.

ARE YOU READY TO MOVE ON?

- ☐ Have community wants and needs been reflected in the preliminary engineering of the preferred alternative?
- ☐ Has your engineer explained the design plans and any engineering changes to the preferred alternative?
- ☐ Have you designed a Capital Improvements Program?
- ☐ Has all the information been incorporated into a draft "Sanitation Master Plan?"
- ☐ Have you changed the draft plan, based on the comments, and crafted the final "Sanitation Master Plan?"
- ☐ Has the Tribal or City Council signed a resolution approving the final "Sanitation Master Plan?"

If so, *Congratulations!* You have a plan. You're ready to move on to building your water and sewer upgrades.

Step 5:
Putting the Plan into Action

Designing and Building What You Wanted

Before Construction

Your community should ask two questions when deciding whether or not to use force accounting.

1.) Is the local governing body capable of handling the engineering aspects and labor requirements of the project?

2.) Does the community have a committed labor force, training program, and viable support?

Construction of your water and sewer system can begin once you have both the design and the funding. Constructing your water and wastewater system requires people who are good managers.

Some things you should be aware of before construction actually begins include:

Funding. At this point, funding for planning the project is replaced by funding for building the project. Your community should make sure to pursue funds for each phase of your project, as outlined in your Master Sanitation Plan. You should know when money will be needed, where to get it, and when grant or funding applications are due. That way, you will not slow down construction because of lack of funds. You may need to work with several sources to fund your project.

Project Management. You will manage construction differently, depending on how much control your community wants. Your community can build the project itself, hiring the workers itself (called "force account" construction), or you can contract with a construction firm. Contracting means a company comes into the community to build the system. The contract may or may not bring all of its own construction crew. Both systems have a number of advantages and disadvantages:

Force Accounting

Advantages

- The community has direct control over the project.
- There are opportunities to employ and train local residents.
- The community makes decisions regarding wages, hiring practices, and working hours.
- Money (wages) stays in the community.

Disadvantages

- There may be a lot of pressure on the local government, because the community is responsible for keeping the project on schedule and within budget. This requires good payroll and accounting systems.
- Not every community has local labor, management experience, or equipment.
- Trained people must maintain the construction equipment.
- Good project management is needed throughout the project.

Contracting Construction

Advantages

- There is less impact and stress on the community government, accounting systems, and management.
- Contract can include a provision requiring local hire.
- Professional companies usually do the job well and quickly.

Disadvantages

- **You may have less local control and decision making power.**
- **Local hire might not be used.**
- **There may be fewer benefits to the local economy.**
- **Money leaves the community.**

Often, regardless of whether the community decides on force accounting or contracting construction, the community can request that the funding agency or a consultant assist with project management.

Final Design. Use an engineer to complete the design of the water and sewer system based on the Sanitation Master Plan, CIP, and the preliminary engineering. A construction company or the community will be able to use final designs to build the system. The work group should ask for discussions with the engineer while the final design is taking shape. Check that the plans continue to meet local needs and take into account local concerns. If there are design changes from your master plan, ask the engineer for written justification.

Permits. You may need permits from several agencies for different parts of the project. For example, many projects require that gravel or dirt is put in wetlands or along the edges of ponds or streams. This requires a permit. Sewer and water system plans must be approved to ensure drinking water is clean and sewage is treated. Permit applications can be complex, and it may take more time to complete and receive approval than you think. You should submit permit applications before building begins, and maintain close contact with permitting agencies to ensure permit approval.

During Construction

Once construction begins, remember that you still need to keep the community involved. You will want to hold public meetings to update the entire community on how the project is going, when construction on the current phase will be done, and what construction comes next. If there are any planned breaks in water or power service, you need to alert the community. Additionally, you should make changes to how the work is being completed based on community input (work may be occurring too early or late in the day and is disrupting people, trash from the job site may be an eyesore). The community should be informed of any job openings.

The funding agency or consulting engineer should be directly involved during construction of the project. They can help the community determine whether the project is within budget, on schedule, and within the engineer's specifications.

Operator Training. Your community should not wait until the system has been built to look into training your system operators. By training your operators before construction is done, you may avoid any delays in having the system up and running.

Establish a Utility Management Team. Start to plan for how the system will pay for itself. More information on developing a utility management team and fee structure is detailed in the next section.

Vision without action is a daydream. Action without vision is a nightmare.
-Japanese proverb

After Construction - Start Up

Before the project is complete, the funding agency will perform a final inspection of the system at which time all problems should have been addressed. The system should be tested. If the project was contracted to an outside company, you should ask about any concerns you might have with the system. If the operator has not been involved in planning, designing, or constructing the system, have the engineer introduce the system details to them.

Finally, the builders will turn the "keys" to the system over to the community. You should inform the entire community that construction of this phase of the water and sewer system is complete. Together the community has accomplished something huge, and it is time for a celebration. You may want to commemorate the "first drink of running water" or "first toilet flush" with a potluck, dance, or another type of event.

ARE YOU READY TO MOVE ON?

- ☐ Is the final design completed?
- ☐ Has funding been secured for construction of the project, and are you planning future phase funding?
- ☐ Has the community decided whether they would like to force account or contract the construction project?
- ☐ Have the proper permits been submitted and approved?
- ☐ During construction, have you kept the community informed and involved?
- ☐ Have the operators been trained?
- ☐ Have you looked at organizing a utility management team?
- ☐ Is the system up and operational?

If so, congratulations! Your system is up and running.
Don't forget about the operation and maintenance aspect of your system (next section).

Operating and Maintaining Your Water and Wastewater System

Usually, when people think of operating and maintaining (O&M) a water and sewer system, they think of fixing leaks, changing filters, and making sure the pipes don't freeze (preventive maintenance). However, an important aspect of O&M is bookkeeping, paying employees, and collecting bills (utility management). Your community should keep the water and sewer system's pipes and filters healthy and running *and* keep the system's finances healthy and running.

Remember: the pipes, buildings, and equipment belong to your community, not to the State or the contractor who built it. Before you build the water and wastewater system, your community should be prepared to operate and maintain it. To do this, the community should have:

- **Trained staff to maintain the system's pipes and machinery.**
- **Trained people to do bookkeeping.**
- **Operating routines in the form of an "owner's manual," with scheduled tasks.**
- **Written accounting policies and procedures.**

Preventive Maintenance

Successful O&M of the system means following an "owner's manual" prepared by the contractor and engineer that spells out a schedule for maintenance. It should also describe procedures for ensuring health and safety in utility operation. Training is available for operators from a number of organizations. Make sure several people take the training courses before the community takes over the system.

Most communities do not have difficulties handling the plumbing aspects of O&M. Many communities, however, have trouble dealing with bookkeeping issues. For that reason, the rest of this section focuses on utility management and administration.

Utility Management: "The Six Cs"

To successfully operate and manage the water and wastewater system, you will have to have enough revenue from water and sewer customers to operate the utility or have other sources of revenue. Also, you will need to manage the money so that you can pay your bills and your employees. Developing a system to do this can be complicated. However, the good news is that there are many sources of help. You will not have to invent a management system from scratch. Below are six critical system management strengths your community should have before your new water and sewer system comes on line If you are unfamiliar with these concepts ask for help. There are "Six Cs" outlined in this section to help with utility management.

"If you can keep up routine maintenance, and you can do preventive maintenance, -your system is going to last a long time. But if the operator either doesn't have the training to do the maintenance, or doesn't have the education levels to understand how to do the maintenance, then there's going to be problems."

- DEC Plan Review Engineer

Controlling Cash

Having procedures in place that allow you to have control over the funds and assets of the water and sewer system is very important. Community control requires:

- **Bill-approval procedures to ensure that different people share the responsibility of preparing/signing checks and approving bills and payroll records.**
- **Revenues, accounts receivable, and debts should be scheduled by source, interest rate, and due dates.**

The "Six Cs":

- **Controlling Cash**
- **Creating Structure**
- **Comparing Data**
- **Council Oversight**
- **Cost Figuring**
- **Communicating**

- **Outside monitors and auditors should examine records and assets on a yearly basis to provide independent assurance that cash control systems are working well.**

Controlling cash presents special problems because coins and bills can be handled without leaving any record on paper. Cash control procedures include:

- **Making sure that receipts are written for each payment made.**
- **If doing coin exchange or selling miscellaneous items, make sure a ledger is kept to track sales.**
- **Store cash in a locked, secure safe after it has been counted but before its deposited in a bank.**

Creating Structure

Your community should create a structure that gives meaning to records. By themselves, receipts, check registers, and completed operations checklists are just pieces of paper. Even if you have handled every preventive task accurately and handled every penny of cash with utmost care and responsibility (the 1st C), you still have to put records together to tell a story of how you are doing. By creating an organization system, you will be able to know how much money is coming in and where it is going.

A utility must decide whether to create a computerized system, paper records system, or a combination of both. Whatever system you choose, training is needed to ensure competence in the accounting system.

Comparing Data

Your community should use current and past records and data to create reports that compare information over time. Utility managers can use these comparisons to make decisions. Use the reports to:

- **Answer questions** about problems or changes from past experience. (Example: Why are this year's washeteria repair expenses so high compared to last year's?)
- **Initiate a budget process** for future operations based on past records of revenues and expenses and likely changes in the future. Making a budget is important because it is the primary tool for allowing the utility board or village council to monitor your utility's success.
- **Compute unit costs** of providing products or services. (Example: How much does it cost to produce one gallon of clean water or complete one sewage haul?) Unit costs provide the basic information required for setting rates.
- **Employee Evaluation System.** For example: This year, the washeteria operator has spent less time on preventive maintenance than last year. Investigation by the supervisor shows that the operator has learned to do this work more efficiently. Should additional job duties be added? If the additional duties justify a raise, you will need to revise the budgets.

Assuming accurate input, a competent utility manager can get useful information by comparing data from one month (or year) to the next that can help head off problems early before they get out of hand.

Council Oversight

The city or tribal council will have ultimate responsibility for the water and wastewater system. The council should get a "budget variance report" (also known as "actual versus budget") each month. This report will show how the utility is performing financially versus what was budgeted. Problems revealed in the reports may be up corrected by the utility manager, if the utility's policy allows it. Typically, however, if the problems involve changes in policy, they should be brought to the council.

Council members have **fiduciary responsibility** for the water and sewer system. This term refers to council members' obligation to ensure that the utility operates on a sound financial basis and benefits its users. Although the primary utility employee (city manager, village administrator, or utility manager) is responsible for providing information to the council for its deliberations, it is the council that is ultimately responsible. For this reason, it is wise to authorize a yearly review and audit by qualified independent outsiders (either a Certified Public Accountant, representatives of regional non-profit, or the State).

Cost Figuring

One critical aspect of running your water or wastewater system is setting rates. The community should determine costs of user services and set rates. As every community leader knows from residents' complaints, everyone always wishes local store prices and utility fees were lower. While elected council members want to satisfy consumers' demands for low fees, they also have the responsibility for long-term, efficient utility operation. Because fees must cover both operating costs and savings accounts for future repairs, accurately figuring the cost is critical to a long-term successful utility operation.

Communicating

Like any other successful community organization, the water or wastewater utility cannot operate without the support of its users. The best way to get that support, and to build on it, is to interact and communicate with residents on utility issues.

Case In Point—A unique approach to operations.

Tanana is located in Interior Alaska about two miles west of the junction of the Tanana and Yukon Rivers, 130 air miles west of Fairbanks. In 1998, the estimated population of Tanana was 317.

Water for the community is derived from three wells near the Yukon River, and four watering points are available. In 1970, 55 individual wells were drilled, but due to permafrost and poor water quality, the project essentially failed. Currently, nearly all residents haul treated water from the washeteria and use outhouses. In 1976, a piped water and sewer system was constructed to serve the school, teacher's quarters, clinic, senior center, and Tribal council building. Over 20 homes are connected to a piped sewage system and associated sewage lagoon and river outfall.

In 1996, the Tanana City Council and the Tanana Tribal Council formed Too'gha, a non-profit corporation that operates and manages the water and sewer utility and works towards developing future sanitation infrastructure. Too'gha was formed because the two councils were having difficulties "seeing eye to eye" on planning issues related to upgrading their sanitation systems. Too'gha has successfully acquired funds to overhaul portions of the city's piped system and install arctic mains. Preliminary work on expanding the piped system west of Garden Street, a new washeteria, watering point, and water treatment plant began in 1998.

Too'gha has a board of directors made up of the Tanana city manager, the Executive Director of Tanana Tribal Corporation, a member from the tribal and city councils, and an at-large elected member. According to local residents, the formation of Too'gha has not taken politics out of planning for and managing utilities, but it has helped bring Tanana's entities together.

"It's brought them face to face, actually across the table from each other, which I think is good," says one Tanana resident.

Lessons Learned:

- *By bringing parties together to make community decisions, disagreements can be worked out.*
- *Utilities can be successfully planned and managed by joining the community governments into a common group.*

Appendix A:
Public Involvement

Public Involvement

This appendix contains public involvement ideas and techniques that may be useful as you proceed through your sanitation master plan. Look through the ideas and use the ones that make the most sense for your community or situation.

Ideas for Organizing Your Public Involvement Effort

Citizen Advisory Committee or Work Group. Some kind of community group should lead the planning process. It might be called a "planning work group" or a "citizen advisory group" or an "advisory council." What is most important is that the group should represent everybody who has a "stake" in the plan. The work group should represent the community, state and federal agencies, and regional groups. Although everyone should be encouraged to attend planning meetings, it is usually the small work group or council that ultimately leads the planning process.

To determine who should be involved in the work group, hold an initial meeting. Invite the people who have a stake in the project (sometimes called **"stakeholders"**-see box on page A-2). These are people who may be:

- **Particularly interested in the group's efforts.**
- **Affected by the planned action.**
- **Knowledgeable about the planned action.**

The meeting can explain the work group's mission and determine who will be involved. The group will gain community, regional, and agency support if every potential stakeholder is invited. If essential participants are missing, problems are likely to occur later. At the first meeting, people important to the planning effort should be determined, a list with contact information should be drafted, and the next meeting should be scheduled.

The Role of Those Involved. Work group members have special responsibilities. They must:

- **Represent their interest by voicing the knowledge and opinions of those they represent at work group meetings.**
- **Take information, decisions, and questions from the work group back to those they represent.**
- **Actively attend work group meetings and complete special projects, as necessary.**
- **Represent the work group by listening and answering questions outside of meetings. For example, if stopped at the store, the representative should be prepared to listen and respond.**

"Never doubt that a small group of committed citizens can change the world. Indeed, it's the only thing that has."
-Margaret Meade

Plan Coordinator. It is suggested that someone in your community become the "coordinator" of the planning process. This simply means that there is single person who is committed to the plan and to making sure it happens. This is the person who does the leg-work for the work group—makes sure everyone on the work group knows when the next meeting is, encourages people to participate, talks with agencies and officials, and so on. This is the person who makes sure important things get done. This may be the person most familiar with this guidebook and who helps the work group go through the steps in the guidebook. The city should strongly consider paying the plan coordinator if it is not somebody already on the city staff.

Community Participation: When and How?

In community planning, public participation is needed during all planning phases. There are many ways to involve the entire community. At a minimum, the work group should ask for public comment during each stage of planning to determine community wants and needs. The work group should present suggestions, decisions, actions, or alternatives to the public, at which time other members of the community can comment on and perhaps change the group's decisions.

Who Should be Involved? *(Potential Stakeholders)*

Community Members

- Interested People
- Allotment Owners
- Tribal Council
- Village Corporation
- Tribal Administrator
- Elders
- School
- Community Groups
- Store
- Other Businesses
- Health Clinic
- Utilities
- Village
- Environmental Health Workers

Regional Representatives

- Regional Corporation
- Regional Non-profit Corporation
- Housing Authority

Agency Representatives

- Alaska Native Tribal Health Consortium
- Alaska Department of Environmental Conservation, Village Safe Water Program
- Army Corps of Engineers
- Environmental Protection Agency
- US Fish & Wildlife Service
- Alaska Department of Fish & Game

Technique 1.
Informal Small Group Discussion

One of the most common ways people talk in rural Alaska is through informal discussions—at the post office or store, in your office two days after a meeting…. The plan coordinator should keep a notebook to record comments and concerns gathered in this traditional way. Remember—it can be important for people to be able to comment without having to give their names.

Technique 2. Public Meetings

"In '73, when the first water treatment plant was built in Tanana, the engineer took all kinds of pictures, and there's this picture of Maxie, Louis Grant, I think Peter Charles, and Johnny Albert. They were little boys then. And the caption says, "Public Meeting." And there was just these four little boys there, because they were curious. They [the engineers] had maps and everything on the wall, and the community input was just these four little guys there."

-Village Leader

Public meetings are a good way to present information to the public and get comments from community members. Such meetings are one of the best ways to involve everyone in community planning. Public meetings should be flexible and held throughout the planning process to address specific issues or phases of planning. For example, hold a public meeting in the beginning to get early input from residents. Hold one to gather traditional and local knowledge. Hold one to get input on community planning alternatives, and to select a preferred alternative to build.

A public meeting should be advertised to attract all interested community members. During a public meeting, a facilitator may be needed or appropriate, and brainstorming, visioning, or some type of structured technique may be used.

Be prepared:
Requirements for a successful public meeting

- Advertise for good meeting attendance.
- Consider incentives for attending the meeting (raffle, food, etc.).
- Reserve a meeting place (community center, classroom, gym).
- Develop an agenda and have a stated purpose for the meeting.
- Copy handouts beforehand.
- Provide a facilitator or meeting chairperson (see Technique 3).
- Write and display important points on a black board or flip chart, or use an overhead projector.
- Have a secretary or note taker record the discussions and provide notes to interested participants.

Techniques for Great Public Meetings

- Have a public meeting in conjunction with a potluck/doughnuts/good food. Invite community dancers or a speaker to open the meeting.
- Put up large colorful flyers throughout the community (post office, store, school, airport) inviting everyone interested.
- Personally invite people. Tell them their input is essential (it is!) and will directly affect the plan's outcome.
- Plan meetings at times when nothing else is going on (you may not have many attendees during the Super Bowl or a fishing opening).
- If someone doesn't show for the first meeting don't count him or her out. Invite everyone to every meeting—some people need more time to warm up to the process.

Technique 3. Facilitation

A facilitator is a group leader who helps a group work towards a decision based on general agreement.
A facilitator should be a leader who is respected, confident, and perceptive. Sometimes an unbiased facilitator must come from outside the group or even outside the community, particularly if there are people or groups at the meeting that do not get along. However, if an outside facilitator is invited, he or she should be aware of community issues and culture.

A facilitator should provide a group with leadership. A facilitator should:

- **Focus:** Provide a focus for the group.
- **Stimulate:** Encourage constructive debate between group members.
- **Support:** Bring out information from quiet members of the group and allow new ideas to be submitted.
- **Participate:** Promote new discussion when the group is interacting poorly or is off the subject.
- **Build Team:** Form a close, productive team.

A facilitator should act as a referee. The facilitator should:

- **Regulate:** Maintain order and discourage participants from talking at the same time or dominating the meeting.
- **Protect Members:** Ensure that all comments are treated equally and that no one is "put down" for their input.
- **Deal with Problems:** Control problem people within the group and allow everyone to participate freely.
- **Keep Time:** Adhere to the meeting timetable to ensure completion of the agenda.
- **Be Sensible:** Take a detached look at the discussion and view each point on its merits.
- **Encourage Feedback:** Promote discussion of each point raised by all members of the group.

Technique 4. Brainstorming

Brainstorming is a simple way to get as many solutions to a problem as possible. It is a process where a person or group writes down as many solutions to a problem or ideas as possible in a set amount of time.

Brainstorming sessions are frequently used when a group is starting a planning process or a new phase of planning. A group should have brainstorming sessions to come up with possible solutions to problems without criticism or evaluation.

- **A free-thinking atmosphere will encourage bright ideas that may seem outrageous at first and outstanding in the end.**
- **A brainstorming session will also help reduce conflict by helping participants see other points of view and possibly change their perspective on problems.**

Finally, brainstorming sessions are beneficial because all participants have an equal status and an equal opportunity to participate.

Brainstorming Sessions Rules

- **No criticism.**
- **Wild ideas are welcome.**
- **The greater the number of ideas the better.**
- **Combinations and improvements to ideas are excellent.**
- **Everyone is encouraged to contribute.**
- **Listen and contribute.**

Technique 5. Creating a Vision

Creating a statement of "vision" means that residents develop a shared image of what they want their community to be in the future. "Visioning," as it is sometimes called, leads to goal statements for the community. Once a community has a vision of the future, other planning efforts are often less difficult, because the community can look at the "big picture," and not get bogged down by small issues.

Visioning helps the community plan future infrastructure systems, like sanitation upgrades, to meet expected demands. For example, if the Village Corporation is planning on building a fishing lodge (even if it will not happen for five or ten years), the sanitation system needs to be designed to accommodate expansion for future summer visitors.

A group of community members should conduct a visioning session early in the community planning process. One person should lead the discussion, and another should write down responses to visioning questions, like those listed in the box, on a large piece of paper or a blackboard. Responses to questions should be reworded and refined to be as clear as possible and to capture on paper the community's consensus of what they want their future community to be like. The group should be given quiet time to think over, identify, and prioritize their responses.

The community vision can then be considered when addressing future community actions.

Sample "Vision" Questions

- **What is the best part of our community?**
- **What do you like most about our community?**
- **What do you miss when you leave?**
- **What do you like least about our community?**
- **What is bad about our community?**
- **What would you like to change about our community?**
- **"Wouldn't our community be wonderful if we ___"**

"If you can dream it, you can do it."
-Walt Disney

"There is nothing like a dream to create the future."
-Victor Hugo

"The future belongs to those who believe in the beauty of their dreams."
-Eleanor Roosevelt

Technique 6.
Structured Problem Solving

A structured problem-solving meeting (sometimes called a "charrette") is a quick-paced planning technique in which a group of people concentrates on a specific problem and its potential solutions. A large or general problem is broken down into small manageable pieces. Small groups work on each separate piece before coming back together as a larger group. The meeting's leader brings out all points of view from concerned community members, agency representatives, and experts within a set time limit. Participants work together intensely to reach a resolution.

The technique can be used for specific projects, such as planning sanitation upgrades or as a first stage in the planning process leading to a community master plan. Structured problem solving meetings may last a morning or several days. Since a high level of organization and discipline is required with this technique, a person experienced in the process should lead the meeting.

Problem Solving Meeting

Step 1: Define problem or issues to be resolved.
Step 2: Analyze problem and alternative solutions.
Step 3: Interpret issues in small groups.
Step 4: Develop proposals to respond to issues.
Step 5: Develop alternative solutions.
Step 6: Present and analyze final proposal(s) to the larger group.
Step 7: Agree upon approach to be taken.

Technique 7. Public Survey

A survey can determine public opinion and can be useful in community planning. A survey can be written (a questionnaire), or it can be spoken (an interview). Surveys can include multiple-choice questions or open-ended questions. Open-ended questions allow people to say or write what they want, but are harder to analyze. If the community is small enough, you might consider surveying every adult or every household to determine the entire community's views and to allow everyone to feel heard. When a community is too large to survey everyone, a representative group of people can be questioned.

Voluntary surveys do not put people "on the spot" and may be a good way to get an idea of general attitudes outside the public meeting process. Survey questions or results can be misunderstood, however, or poor memory can cause errors in gathering data through survey answers. Sometimes the people who respond to surveys do not adequately represent the community.

The Survey Process:

Stage 1: Determine what information is needed and whether a survey is the best way to get the information.
Stage 2: Make a survey time line and budget.
Stage 3: Determine what is already known.
Stage 4: Determine how many people to question to get an accurate representation of the community.
Stage 5: Design the survey by writing well-thought-out questions.
Stage 6: Test the survey to determine whether it is easily understood.
Stage 7: Select and train interviewers if the survey is done face to face or over the phone.
Stage 8: Complete the survey.
Stage 9: Tally the survey results.
Stage 10: Analyze the data and report the findings.

Consider hiring someone locally from your community to administer the survey or conduct the interviews. People are generally more receptive, and you will usually get better, more complete information.

Technique 8.
Intensive Interviewing

Unlike surveying at random, where many people are asked questions to determine the opinions of the community as a whole, "intensive" interviewing involves talking to key people who are knowledgeable or who have a special knowledge of an event or process. This can be a helpful way to gather data. Some of the best information related to community planning could come from people who may be unable or unwilling to attend public meetings or respond to written questionnaires. Elders or long-time community leaders may have traditional or local knowledge that could be important in the community planning process.

Special considerations must be taken when interviewing people in the community. The interviewer may want to start with small talk, thanking the person for taking the time to answer questions, before moving on to business. The interviewer should ask simple, factual questions in the beginning and move towards more complex ones. Open-ended questions usually work best in interviews. All the questions should be prepared beforehand and should be simple, short, and clear. The interviewer should be a good note-taker or can use a tape recorder if the person being interviewed is comfortable with it.

Sample Open-Ended Interview Questions:

- What do you think of this idea (explain idea/plan/alternative)?
- Do you know if this idea was tried in the past?
- Do you think that this plan (explain idea/plan/alternative) will affect the fish or wildlife? Why?
- Do you remember anything here (floods/ buried tanks/ anything that could affect the project (show map of community).
- What ideas do you have for solving (explain problem)?

Technique 9.
Large Group Response Exercise

The large group response exercise is a way to quickly gain, display, and summarize responses of a large group of people to a set of questions. It can be successfully used in public meetings with groups of up to several hundred people. The benefits of the large group response technique is that it is quick (a session usually lasts 45-90 minutes), inexpensive, easy, and can be documented. The exercise should involve no more than about three questions—not many more. If the organizer(s) can anticipate the issues involved in each question, they can prepare large sheets of paper with simple, one-word or two-word headings (for example: "environment" or "economy" Participants will post their specific thoughts on these sheets in Step 3, below.

A large group response exercise involves five steps:

Step 1 Questions and Responses: The group is presented with the first question and given three minutes to respond on a sheet of paper. This step is continued, with three minutes for each of the questions.

Step 2 Most Important Responses: Each group member gets one or two post-it or "sticky notes" for each question. In three minutes, they select and write their "most important responses" to each question on separate sticky notes.

Step 3 Wall Walk: Members of the group visit flip charts set up on the side of the room and stick their "most important responses" on the wall. They should stick their responses under the general headings that are most related. Blank sheets should be posted for new issues. Alternatively, the first person can post their thoughts, and then others can read those responses and post any similar ideas on the same sheet.

Step 4 Summary: The group moderator presents the summary of the responses to each question, and the group may want to discuss the results.

Step 5 Post-Exercise Analysis: The group may read the responses to get informed about others' ideas, draft key words for the responses, or critique the content of the responses. All sheets of paper can be collected and tallied to provide additional information.

Sample Questions for Large Group Response Exercises for Sanitation Planning:

- *What is our community's biggest sanitation problem?*
- *What should the work group consider when planning sanitation upgrades?*
- *Who should be involved in planning our sanitation system?*
- *How do you see our sanitation system in the future?*
- *What is the most important aspect of our community that we should consider when planning our sanitation system?*

Technique 10. Visual Presentations

People learn and remember things in different ways. Some people need to hear things, some people need to read things, and some people need to see things. In particular, in community meetings where choosing an alternative is the subject, it may be helpful to *see* what it is you are getting. Here are some ideas for helping your community see the sanitation improvement before it is built.

- Drawings of the proposed system
- Photographs of similar systems
- Videos of similar system
- Visiting other systems in other communities
- Walking through the route or location of pipes, buildings, or lagoons

Technique 11. "Scorecard" for Choosing Alternatives

Make a big chart. List alternatives down the side and criteria across the top. "Score" each alternative on each of the criteria, using numbers or writing (this can be as simple as "good, fair, poor"). This will allow your community to look at how alternatives compare against each other.

	Community Preference	Cost	Environment
Alternative 1	3	Moderate	Impacts Wetlands
Alternative 2	1	Least	None
Alternative 3	2	Most	None
Alternative 4	4	Moderate	Impacts subsistence area

Communication Styles and Techniques

Sometimes meetings among community members can be difficult. Participants may be quiet or shy, overly talkative, or downright disagreeable. However, there are ways to deal with all personality types so that everyone can be heard.

A quiet person can be encouraged to speak by assuring during a break or in private that everyone is interested in what he or she has to say. An overly talkative person can be thanked for their comments while they pause for breath or the group as a whole can be reminded of the time limit. A disagreeable person can be handled by finding merit in the participant's suggestions, expressing agreement, then moving on, or responding to the participant's comments, not the attack.

A good leader or facilitator should have methods for conducting meetings with all personality types. Additionally, the techniques discussed in previous pages can help get everyone's ideas out. If personalities start to get in the way, other techniques should be tried.

Cross-Cultural Communication

Sometimes it is difficult to communicate with people from outside the community and vise versa. Outsiders and community members should attempt to understand each other's cultures and work together to achieve planning goals. When beginning to work on community planning, everyone should keep in mind these guidelines:

- Each culture has its own way of viewing the world and communicating with others (see text box).
- Learn from generalizations about other cultures, but don't use those generalizations to stereotype.
- Don't assume that there is one right way (yours!) to communicate. Keep questioning your feelings about the "right way" to communicate.
- Don't assume that breakdowns in communication occur because other people are on the wrong track. Search for ways to make the communication work, rather than searching for who should get the blame for the breakdown.
- Listen. Try to put yourself in the other person's shoes. Especially when another person's perceptions or ideas are very different from your own, you might need to operate at the edge of your own comfort zone.
- Respect others' choices about whether to engage in communication with you. Honor their opinions about what is going on.
- Stop, hold off judgment, and try to look at the situation through the other person's eyes.
- Be prepared for a discussion of the past. Use this as an opportunity to develop an understanding of the other person's point of view, rather than getting defensive or impatient.

Remember that we are all shaped by many factors (family, education, friends, workplace) that are more complicated than any ethnic, religious, or economic culture or generalizations can explain.

Cross-Cultural Communication Styles

Western European

- Talks a great deal
- Looks for details
- Assertive
- Literal/scientific
- Public recognition
- Direct communication
- Rapid paced speech
- Dislikes silence

Alaska Native

- Listens a great deal
- Looks for large picture
- Reserved
- Intuitive
- Public restraint
- Indirect communication
- Slower paced speech
- Comfortable with silence

Tips for working through conflicts:

1. **State the problem in a constructive way so that the group can work on it.**

   - Describe the problem as a problem, not as someone's fault.
   - Push the group to agree on the specific decision that needs to be made, so they don't waste time on other matters.

2. **Suggest ways to break the problem into workable pieces the group can deal with separately.**

3. **Bring out opinions.**

   - Encourage the expression of various viewpoints.
   - Call attention to strong disagreements for the group to work on creative solutions.
   - Ask people to speak only for themselves (or those they represent) and to be specific.

4. **Help everyone participate.**

   - Don't allow a few participants to monopolize the discussion.
   - Recognize the need for intensive discussion and identify ways to accomplish it (for example, break into small discussion groups to create proposals and present them to the whole group).
   - Do not allow one person to interrupt another person before he or she is finished.
   - Accept ideas even if they are incomplete; encourage the group to try to complete them.

5. **Keep the discussion on track.**

6. **Summarize what has been said.**
   - Summarize feelings as well as content.
   - Record everything that is said for the group to see (use a chalkboard or flip chart).

7. **Listen carefully and point out areas of agreement or hesitancy.**

   - State an apparent consensus in question form and test it with the group for agreement.
   - Insist on a response, do not accept silence as consent on points of agreement.
   - Ask for specific points of disagreement and alternative proposals from those who disagree.

8. **Establish and enforce time limits and breaks to avoid frustration and irritability from being tired.**

-From Dispute Resolution: A Handbook for Land Use Planners and Resource Managers (adapted from A Manual for Group Facilitators, Center for Conflict Resolution, Madison, WI.

Conflict Resolution:

- **Rely on traditional ways that work in your community.**
- **Separate the people from the problem. Work together to attack the problem, not each other.**
- **Focus on the real underlying interests and values people bring up.**
- **Make sure anybody that was part of an argument helps to work through the conflict.**
- **Establish a process for solving the problem that all parties can agree to.**
- **Invent options that help everybody.**
- **Think creatively.**
- **Don't exclude people or organizations from the discussion.**
- **Don't let one person or organization disrupt the discussion.**

Case In Point—Successful Public Involvement.

A consultant was hired in 1993 to help the 750 residents of Chevak draft their sanitation master plan. Currently, residents haul water and use honeybuckets to dispose of human waste. Some homes have rain barrel water systems. However, construction began in 1996 to provide piped water and sewer service to 170 homes and to the school.

The entire community, along with the council, was involved in the planning process from the beginning. All design plans were sent to the residents, council members, and the operator of water and sewer systems for comments. Valuable input was incorporated into the final designs. That way, the community always knew what the engineers were doing, and the engineers were aware of what the community wanted.

Projects completed as of 1998 include a new landfill, a washeteria renovation, and a new sewage lagoon. Other upgrades include a 150,000-gallon water storage tank, a new well, and a vacuum sewer plant. The old sewage lagoon was closed. Water and sewer pipes and household connections will be completed over the next four years in construction phases.

According to a Chevak resident, "Unlike other villages, I bet in Chevak people know what is going to happen (with their plan). They know what's going on."

Lesson Learned:

- ***Successful sanitation planning involves the community in every step.***

Appendix A:
Public Involvement

Introduction

This appendix presents available and appropriate water and sewer technology for Alaska. It includes the advantages and disadvantages of a variety of technologies for:

- Water supply
- Water treatment
- Water storage
- Water distribution
- Wastewater collection
- Wastewater treatment
- Wastewater disposal

The accompanying table summarizes the level of service (or convenience), the construction cost, and the operations and maintenance costs generally associated with different systems in rural Alaska. For instance, the cost of an individual well may be relatively inexpensive, but if individual wells are to be put in for each household in the community, the capital cost (or construction cost) could be actually comparable to a piped system for a typical small Alaska community.

Water Systems	*Level of Service*	*Capital Cost*	*Operations & Maintenance Costs*
Individual Wells	◖	●	○
Self Haul/Community Watering Point	○	◔	◔
Community Haul	◔	◖	●
Community Piped Water	●	●	●
Wastewater Systems			
Self Haul - Honeybuckets, Privies	○	○	○
Community Honeybucket Haul & Disposal	◔	◔	◖
Community Flush and Haul	◖	◖	◖
Septic Tanks & Drain Fields	◖	◖	◔
Piped Sewer	●	●	●

Key: ○ ◔ ◖ ●
Low to High

This section presents available technology for water systems in Alaska.

Water Source Development

Groundwater and surface water are the two usual sources for water. There are special considerations for Alaska in the selection of a community water supply.

Groundwater can be an excellent water source and may be considered the most desirable for many Alaska communities. The temperature of most groundwater is more constant and typically warmer than surface water. Water quality in groundwater is also typically more constant than surface water which can experience seasonal fluctuations. In some areas, however, there may be high mineral content in groundwater. This can affect water quality and taste.

There are often high costs associated with the exploration, drilling, development, and maintenance of wells in cold, remote locations. In many regions of Alaska, extensive drilling can be required to find and develop a water source. Expensive, thermally-protected wells may also be needed in permafrost areas. If there is high mineral content or other water quality issues, the raw groundwater water may require treatment, at additional cost.

Using surface water for a community poses more limitations than using groundwater. There are many rivers, lakes, and streams in Alaska where water collection can be impracticable from many of these sources. Shallow lakes in cold climates can freeze solid or freeze so much that the storage capacity and quality are severely reduced. Many lakes are not large enough to offer an adequate community water supply. Surface water may also have contaminants (biological, chemical, or physical). During winter, clean water may be collected from below the ice of large frozen rivers, but during breakup and floods, ice and floating debris can damage a water intake system. The silt content of many rivers in Alaska can be extremely high. Consideration must also be given to the increased possibility of surface water contamination. Surface waters can also be subject to stricter regulatory requirements than groundwaters.

Water Quality

The ease or difficulty of treating raw water to make it drinkable, and the cost of treatment, are important concerns in regard to water quality. Reliability in quality is as important as reliability in quantity.

Surface water is more readily polluted than groundwater. Bacteria and viruses that cause illness can live for long periods in cold water. Therefore, a primary goal in surface water treatment is removing these “bugs.”

Groundwater is susceptible to contamination by outhouses (pit privies), septic systems, and animals. However, a primary concern in the treatment of groundwater is the potential for high concentrations of minerals such as iron, manganese, magnesium, and calcium. Some groundwater in Alaska has also been found to contain unacceptably high levels of arsenic and nitrate concentrations.

Regardless of the water source, raw water quality is a main issue in the development of a clean, sustainable community water supply.

Water Treatment

The objective of water treatment is to provide water of high quality that may be used for drinking. Water treatment promotes good health and helps control diseases that can be spread through contaminated water. Raw water temperatures can influence water treatment. Special steps must sometimes be taken to heat water prior to treatment. From a regulatory standpoint, individual wells (one per house) do not require treatment. However, any public water system, including a well to a central water spigot shared by several households, requires disinfecting to ensure no contamination occurs during water distribution and storage. Most often, chlorine added to the water supply provides the necessary treatment.

Water Storage

Water storage requirements vary depending on the size and needs of the community. Storage must be considered as an integral component of any community water supply system. Storage needs are based largely on population, fire protection, and emergency demands. The type of water distribution system also plays a part. For example, communities in which people haul their own water need less storage capacity than communities with piped systems, because people tend to use less water if they have to haul it. It is also necessary to consider water quantities needed for fire fighting and emergency storage in case of malfunctions in the water supply or treatment systems.

Most water storage tanks installed in cold climates and remote communities in Alaska must be insulated and heated to prevent the formation of ice and must provide a thaw recovery should freezing occur. In addition, many locations require special foundation designs and other environmental considerations. Construction costs, maintenance, labor, and transportation all must be addressed when developing water storage.

Water Systems

Individual Wells

For some communities in Alaska, individual wells are a cost-effective and simple method of obtaining water. Typically, a submersible electric pump is used to move groundwater to the home. Plumbing and a household pressure system provide water to sinks, showers, and toilets. It is important that the well is properly constructed to avoid contamination by surface water, septic systems, or other sources of pollution and to keep sediments from getting into the plumbing systems. The ground surrounding the well casing must be kept mounded so that surface water cannot contaminate the well. The home owner is typically responsible for operating and maintaining the well. Individual wells are also subject to state or local regulations. State regulations dictate separation distances from any septic tanks, drainfield systems, or privies; community sewer line; private sewer line, petroleum line, or petroleum storage tank. Once properly constructed and developed, the individual well can provide an independent, year-round source of water.

INDIVIDUAL WELLS

Advantages

- Inexpensive to operate.
- Requires minimal community organization.

Disadvantages

- Poor water quality in some locations.
- Well owner is fully responsible for the operation and maintenance of their system.
- Subject to contamination if not properly maintained.

There are disadvantages to the use of an individual well. Usually, such a system depends on groundwater that is of high quality and does not require treatment. In some locations, water quality may be so poor that it is unusable. Although the wells themselves are simple by design, the well owner and not a water utility is typically responsible for operation and maintenance. Improper, or a lack of maintenance, can result in unpleasant, or even unhealthy drinking water. In addition, state standards dictate that disposal of wastewater must not affect the well, to protect public health. Because the water that comes into a house must go back out, the wastewater system may influence whether or not a well is practical. In some regions of Alaska, conditions may be reasonable for a well but not for a leach-field or other on-site wastewater system. In these areas, an individual well may not be practical.

Self Haul - Community Watering Point

A "community watering point" or "self haul" water system provides residents with a single building from which to obtain potable water. Residents haul water from the watering point to their homes in buckets, jugs, or barrels. A water treatment plant is typically housed in the same building as the watering point and ensures that the water meets regulatory requirements.

Additional convenience can be added with extended watering points. Extended watering points are supplied with water from the central facility but are located throughout the community to provide residents with more convenient access to the water. Extended watering points are typically connected to the central watering facility with high-density polyethylene (HDPE) plastic pipe. Uninsulated lines are typically used only during the summer. Proper insulation and the use of a heated circulating water loop, however, can make these units available year-round.

The addition of a washeteria provides a central building where residents can shower, have access to flush toilets, and can wash and dry clothes. Often, the services at the washeteria are coin operated and help to pay for the cost of operations and maintenance.

An advantage of the community watering point is that it can provide residents of rural Alaska communities with safe, clean water, and with facilities in which to wash clothes and bathe, for much less cost than piped water systems. If these facilities were something a community would otherwise have to do without, the washeteria and watering point can be a great advantage. The self-haul system proves most beneficial to communities where funding is not available to construct, or users cannot afford to pay monthly rates, for a piped distribution system.

Disadvantages are that residents must haul their own water, which may be difficult or impossible for some individuals. Residents must also take care to reduce the risk of contamination when hauling and storing their water. Communities without sufficient population or desire to use a washeteria facility may find operation and maintenance too costly. Extended summer or winter watering points also require additional operation and maintenance, which adds additional cost.

SELF HAUL

Advantages

- Costs are comparatively inexpensive.
- Extended watering points provide additional convenience.
- Washeteria provides facilities to wash clothes and shower.
- System is not limited by soil conditions or topography.
- System can be used year-round.
- No additional infrastructure improvements are needed.

Disadvantages

- Residents must haul their own water to their homes.
- Risk of contamination during hauling and storage.
- Operation and maintenance costs may be expensive in communities with low washeteria demand.
- Extended summer or winter watering points require additional operation and maintenance.

Community Haul

The community haul system, in which a community employee delivers water to homes from a central watering point and treatment plant, has been described as an intermediate service between self-haul and a piped distribution system. The community-haul system began in Alaska in the 1980s. A community haul water system serves the community much the same way the self-haul system does but eliminates the necessity and some of the sanitation concerns with individuals hauling their own water. Water typically is transported in an insulated tank mounted on a trailer that is pulled by an all-terrain vehicle. Each home typically has a 100 to 300-gallon holding tank in a heated and insulted portion of the home. With the addition of a small, on-demand pressure pump, the holding tank supplies water to kitchens and bathrooms. Haul systems usually charge a fixed rate per fill-up. Consequently, increased water use means increased cost to the user.

Careful management and significant community organization is critical to the successful operation of the community haul system. Haul vehicles must be maintained and accessible year-round, snow removal and road maintenance is required to ensure prompt and regular delivery, and costs and payments must be tracked to keep the system economically viable.

COMMUNITY HAUL

Advantages

- Provides adequate water supply to operate toilets, sinks and showers.
- Promotes good personal hygiene.
- Less potential for contamination than the self-haul systems.
- Reduced maintenance requirements by individual residents.
- Less restricted by soil conditions and topography.

Disadvantages

- Higher operating costs.
- System is dependent on utility organization and operation and maintenance.
- Water use must be restricted to keep user rates affordable.
- System requires some infrastructure improvements (trails, boardwalks, etc.).

Although the safest water system is a piped system with in-home plumbing, the community haul system provides a high level of service in areas where a piped system may not be feasible. The community haul system provides residents with safe, clean water and requires less operation and maintenance by the user than with an individual well. With proper training of the operator, the potential for contamination is also reduced, compared to self-haul systems.

Water systems that provide safe, reliable service typically cost more, require a higher degree of operation and maintenance, and a larger source of water. Although this system provides greater volumes of water, residents must still conserve water to avoid costs.

Community Piped Water

Piped community water provides the highest level of service to residents, but may also have the highest user rates. Water is distributed to each home through a series of main water pipes (usually called "water mains") and smaller water service lines. Such a system typically uses a larger-volume water source, treatment plant, and storage tank. Water distribution lines are either buried or placed above ground. Above-ground pipes, and those buried in permafrost areas are insulated and often heated with circulated warm water to prevent freezing. Piped systems require a high level of operation and maintenance to provide reliable service and to prevent freezing. Additionally, the state requires that a wastewater collection system be in place at each building with water service (this is also true with flush/haul systems, i.e., community haul). Water coming into a building must go back out, and the state wants the wastewater system not to cause a public health hazard. Residents are usually responsible for in-house plumbing and fixtures.

A community piped water system offers significant advantages to residents. Homes may be fully plumbed with toilets, sinks, showers, washing machines, and dishwashers. Greater volumes of water are available to residents and businesses. The piped system provides a high level of convenience.

Arctic conditions present many challenges to the development of a community-wide, piped water system. The technological nature of the system requires a high level of operator training to keep the system maintained and operating smoothly. This can drive up operation and maintenance costs. Poor soils and permafrost make the use of a buried system impractical in many Alaska locations.

Above-ground systems solve some of the permafrost problems but are more susceptible to freezing. User costs and initial construction costs can be high especially to communities with relatively few year-round residents or where residences are widely settled (requiring a large network of pipe). The water system operators should also be trained and qualified to properly operate and maintain the system, and particularly to act quickly to repair the system in the event of a freeze-up.

COMMUNITY PIPED WATER

Advantages

- Residents can fully plumb homes.
- Requires the least amount of individual operation and maintenance by users.
- Allows more water use.
- Convenient and reliable service for users.

Disadvantages

- High level of operator training is required.
- High operating costs.
- System can freeze and repairs can be difficult and expensive.
- Difficult to serve widely separated residences.
- Initial construction costs can be high.
- Distribution lines cannot be buried in some soils.
- Above ground pipes can limit access and act as barriers to pedestrians and vehicles.
- Additional maintenance is required to keep pipes protected from vehicles and snowmachines.
- Freeze protection costs are increased with above ground pipes.
- Needs a higher rate water source.

Wastewater

Proper sewage collection, treatment, and disposal is vital to promoting sanitary living conditions in a community and are required by State regulations. This section provides a brief discussion of wastewater systems in Alaska. The following topics are covered in the discussion below:

- wastewater collection
- wastewater treatment and disposal

Wastewater Collection

Wastewater collection systems are designed to collect wastewater and transport it to a sewage treatment facility or disposal point. In rural Alaska, the methods for wastewater collection vary greatly. In general, the simpler the method, the more potential there is for individual contact with sewage, increasing the risk to public health.

Sources of wastewater production in rural Alaska are typically limited to domestic (residential) and industrial wastes (canneries and cold storage facilities). Public institutions and water treatment plants in some rural Alaska communities discharge additional wastewater that must also be considered when creating a collection system. In a well-constructed and maintained system, the total quantity of wastewater collected should be approximately the same amount of potable water used by the community.

Typical types of collection systems include:

- individual buckets ("honeybuckets")
- privies (outhouses),
- community haul
- community flush-and-haul
- septic tank and drainfields
- piped sewer systems

Detail on each of these appears later in this document.

Sewage Lagoons are a typical wastewater treatment option.

Wastewater Treatment and Disposal

The primary aim of wastewater treatment and disposal is protection of community health and the environment. Again, less complex treatment and disposal methods have greater potential for human contact with wastewater, thus raising the risk to public health. Systems employing complex collection and treatment methods typically require less user contact with wastewater and reduce potential public health hazards but cost more to operate.

Treatment refers to the breakdown of the harmful waste products (bacteria, viruses, etc.), usually through biological processes or by adding chemicals such as chlorine.

Wastewater treatment plants provide the most effective level of treatment. For many rural Alaska communities, however, the operation and maintenance and the administrative requirements of a wastewater treatment plant exceed the community's technical resources and financial capabilities. For these reasons wastewater treatment plants are nearly nonexistent in rural Alaska.

Sewage lagoons are the most common form of wastewater treatment and disposal. A lagoon is a designated tundra pond or constructed body of water that is a disposal point for raw sewage. Natural processes in the lagoon breakdown the contaminants, and the discharge usually percolates into the ground or drains away slowly to a wetlands, stream, or river.

Lagoons are relatively simple to operate, inexpensive, and require less maintenance than a wastewater treatment plant. Many communities opt for a sewage lagoon when soil and terrain conditions permit. Lagoons ideally are at some distance from the main population and must be well fenced to keep residents and pets from contacting the wastewater and causing a health threat. Another important concern are prevailing winds. Offensive odors can be created by the lagoon contents and carried to residential or other developed areas.

Another method of community disposal is a septic tank that preferably drains to an ocean or river (the pipe the leads to the ocean or river is called an "outfall"). This may be an appropriate disposal method for smaller communities and for communities where discharge is to an active tidal or river environment with large volumes or water that can absorb the wastewater without environmental harm. The community septic tank holds solids. This "sludge" is occasionally pumped out and deposited on land in a designated and fenced disposal area.

Smaller communities with less organization often have to depend on individual pit privies to dispose of human waste. Outfalls, pipes, and treatment are non-issues with

this method of disposal, but public health and aesthetics can be an issue. In areas where the soils are suitable, on site septic systems with leach fields can be an effective disposal method.

The following sections cover each type of wastewater system in more detail.

Wastewater Systems

Self Haul and Independent Systems - Honeybuckets and Pit Privies

So-called "self-haul" and independent wastewater disposal systems require individual residents to transport their own wastes to a disposal site. Some rural Alaska communities lacking indoor plumbing use lined plastic pails (honeybuckets) to dispose of waste. The disposal site may be a personal pit privy, which residents may use as a toilet or as a place to dump a honeybucket. The disposal site can also be a central sewage lagoon. The honeybuckets typically are lined with plastic bags for better control of spills and odors and are used to haul wastes to a disposal facility. Residents using pit privies are also responsible for the operation, maintenance, and eventual relocation of these facilities.

Some cities have historically used bunkers, which are essentially large community style pit privies. Bunkers, however, have proved to result in greater sanitation problems than private privies and are therefore no longer permitted by the State of Alaska.

Self-haul wastewater systems provide the lowest level of service and can present the greatest risk of unsanitary conditions, contamination of drinking water, or contamination of the ground or other water bodies.

There are few advantages to these systems except low cost. These systems are simple and require little community organization. They are inexpensive to construct and require little or no user fees. Many communities continue to use these systems.

Soils and permafrost typical to many rural Alaska areas prevent the successful use of privies. Improper use and maintenance can result in a public health hazard. While privies may work at remote camps and cabins, in more densely populated communities, they can be unsanitary and unsightly.

SELF-HAUL AND INDEPENDENT SYSTEMS

Advantages

- Require little community organization.
- No user fees for hauling.
- Initial construction is inexpensive.

Disadvantages

- Inconvenient—individuals must transport their own waste to a disposal facility.
- Some people are unable to transport wastewater (the elderly, ill, disabled).
- Permafrost or poor soils may exclude use of privies or other on-site systems.
- Privies can fill up quickly if used for trash disposal.
- Privy building must be relocated to a new spot when full—waste stays in the ground.
- Overflow can create a public health hazard.
- Multiple privies in densely populated areas can be unsightly and unsanitary.
- Spills can cause unsanitary conditions.
- Adequate separation distances must be maintained to prevent contamination of wells, springs, or other drinking water sources.

Community Haul and Disposal

Under the community haul and disposal system, residents transport their own wastes and wastewater and dump it in collection containers that are located conveniently throughout the community. A paid operator transports the larger containers to a disposal site using an all-terrain vehicle (ATV) or truck. The disposal site is usually a lagoon located away from the community. Although an improvement over the self-haul/self-disposal system, the potential for spills and unsanitary conditions remains. Residents must haul their waste to the collection containers site. In some communities, it has been difficult to prevent spills when dumping waste into the central tanks and random dumping on the ground when the disposal tanks are full. This system also requires a trained and reliable operator to properly transport and dispose of waste.

COMMUNITY HAUL AND DISPOSAL

Advantages

- Distance residents must travel to dispose of wastes is reduced.
- Waste is disposed at central collection site and a lagoon.
- The need for bunkers and privies is eliminated.
- User fees can be affordable.

Disadvantages

- Residents must haul waste to collection center.
- Spills still occur and may result in public health hazard.
- Operator must be employed, well-trained, and reliable to manage system effectively.

Community haul station in Wales

This system is more convenient for residents and eliminates random dumping and random privy sites. A sewage lagoon provides a single disposal site, removed from the community, reducing potential unsanitary conditions. Because there are limited operator responsibilities, operating costs (and thus user costs) may be low compared to piped systems.

Community Flush and Haul

This is a system that provides residents with a significant level of improved service. A toilet and sink are installed in the home. A holding tank located in a heated and insulated area collects and stores wastewater. The community hauler pumps wastewater from the holding tank to a portable tank transported by ATV or truck. Wastewater is picked up as needed and usually transported to a sewage lagoon. Because of the convenience, the amount of water used by residents is greater than that of a self-haul system. User costs are higher because there is a greater quantity of wastewater and higher costs for the pumping service. An ATV or truck is also required to conduct the hauling activities.

COMMUNITY FLUSH AND HAUL

Advantages

- Residents no longer have to haul waste.
- Residents can provide their homes with a toilet, sink and shower.
- Sanitary conditions improve greatly.
- Less chance of drinking water contamination.
- More convenient for residents.

Disadvantages

- Requires high level of utility organization.
- Requires reliable operator and equipment.
- Higher level of operation and maintenance.
- User costs may be comparatively high.
- Relatively new technology that may have associated problems.

This system greatly improves sanitary and public health conditions. Residents do not have to haul waste, and there are no unsanitary collection centers located within the community. The toilets and sinks provide substantial convenience to residents.

This system is highly dependent on a trained and reliable operator maintaining the equipment in good working order. As the complexity and amount of time required of trained operating personnel increases, so must the level of community organization. User costs may also be higher due to labor and maintenance. Snow removal may be required to operate the hauling vehicle.

Septic Tank and Drainfield Systems

When feasible, and if care is taken in the operation and maintenance, an on-site septic tank and drainfield system can be a relatively inexpensive and effective method of wastewater disposal. Wastewater flows by gravity from the home to a buried septic tank where liquids separate from solids and flow to a drainfield through a series of small perforated pipes. Final treatment of the liquids occurs, mostly by natural processes, within the soils of the drainfield. Solids are periodically pumped out of the septic tank and disposed of at a designated sludge disposal site. The septic tank and drain fields require above-freezing ground temperatures.

This system provides a high level of service and convenience and requires relatively little operation and maintenance effort. Homeowners need only to have the septic tank pumped periodically to remove solids. Homes can be fully plumbed with toilets, sinks, showers, and washing machines, which results in improved sanitary conditions and convenience for residents.

Although a simple and sanitary wastewater disposal system, soil conditions and permafrost limit the use of septic tank and drainfields in many parts of Alaska. This system is also not safe or effective where population density is high. State regulations may also limit the feasibility of this system for many communities. Though residents have few maintenance responsibilities, it should be expected that the drainfield would eventually (usually in about 20 years) fail and need replacement. On-site systems must also be located to provide separation from wells and other drinking water supplies.

SEPTIC TANK & DRAINFIELD

Advantages

- Allows home to be fully plumbed.
- Fewer responsibilities to the homeowner.
- High level of convenience and service.
- Improved sanitary conditions compared to other systems.

Disadvantages

- Soil conditions, flood hazards, and permafrost limit use.
- Drainfield will need replacement (approximately 20-year life).
- Backed-up or nonfunctioning systems can create a public health hazard.

Community Piped Sewer System

Providing the highest level of service, personal hygiene, and public health, a community piped sewer system can be a cost-effective wastewater collection system for some rural Alaska communities. Sewer pipes collect and dispose of wastes in a closed system, reducing human contact and providing the least risk for unsanitary conditions.

Household plumbing is connected to a sewer service pipe that connects to a larger main sewer pipe (called a "sewer main"). These mains transport wastewater to a treatment site by gravity or pumping. Lagoons or community septic tanks with outfalls to rivers or tidal waters are typically chosen as the treatment systems because of their simplicity and relatively low operating costs.

Systems using pipes come in a variety of configurations. The most economical systems use gravity to create the flow of wastewater, but this may not be feasible in very flat or very hilly areas. Sewage "lift stations" are often necessary as part of a gravity system to help "lift" sewage over small hills or obstacles from central collection mains to the treatment facility. The pumps and other equipment involved raise the operating costs and maintenance requirements.

Some systems depend on a mechanical vacuum that sucks the wastewater from homes to the treatment area. Pressure systems pump the wastewater to the treatment plant. Pressure and vacuum systems rely on constant pressure or a vacuum created by pumps and valves to transport sewage. Vacuum systems need special fixtures and a high degree of training to operate.

Low pressure systems use grinder pumps at each home and small-diameter pipelines to transport wastewater. These systems are attractive in areas of hilly or flat terrain. The grinder pumps and valves require periodic maintenance and replacement. Rags, toys, and other objects can clog or damage the pumps. These systems typically result in higher electricity costs for homeowners than the other alternatives.

Conventional (gravity), pressure, or vacuum actuated piped sewer systems require a high level of community organization and administrative ability. There are fees to collect and track. Also, it is necessary to employ reliable operators and managers.

COMMUNITY PIPED SEWERS

Advantages

- **Sanitary method of sewage collection, treatment, and disposal, and can be at a reasonable cost.**
- **High level of convenience and service to residents.**
- **Promotes good personal hygiene.**
- **Can be used in a variety of topographic and soil conditions.**

Disadvantages

- **Soil, permafrost, and topographic conditions may result in high initial construction costs.**
- **Requires a high level of operator training.**
- **Can be expensive to operate and maintain.**
- **Pressure systems require the homeowner to maintain their individual lift stations.**

Community piped sewer provides the highest level of service and, in many cases, the least amount of home-owner responsibility. With a sufficient base of customers, and if operated and maintained well, user costs can be reasonable. Homes can be fully plumbed, and the improved convenience promotes good personal hygiene. Community piped sewer systems can be used in a variety of configurations to accommodate soil and topographic challenges.

Again, the more complex a wastewater system becomes, the more training and operations and maintenance that are required. Soil conditions and permafrost may require additional lift stations or above-ground pipes, which result in higher construction costs and greater long-term operations and maintenance costs.

In communities with widely separated homes, or long distances to treatment/disposal facilities the lengths of pipe required may make this type of system too expensive to be practical.

Buried pipes are most commonly used in areas where the soil is thawed and are installed below the frost penetration depth. Buried pipes in permafrost areas are practical only if the permafrost is "cold" and will remain stable if thawed. Above-ground pipes are often required in "warm" permafrost areas and can create barriers to pedestrians and vehicles. The heating demand for above-ground pipes is greater than for buried pipes.

Conclusion

This appendix has covered the basic types of water and wastewater collection, treatment, and disposal systems used in rural Alaska. Further technical information is available from state and federal agencies specializing in water and sewer systems. Civil and environmental engineers can also provide information and expertise.

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