

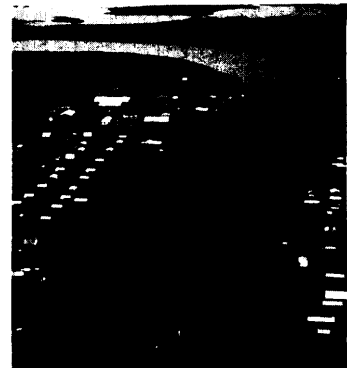
Roles and Responsibilities of Federal and State Agencies 4

INTRODUCTION

With the passage by Congress of the Indian Sanitation Facilities Construction Act in 1959,¹ the Indian Health Service (IHS) became the primary Federal agency directly responsible for planning, designing, and constructing water and sewer projects in Native communities. More than \$350 million of the \$1.3 billion already spent on sanitation projects in rural Alaska has been provided through IHS to accomplish these objectives. About an equal amount comes from the Village Safe Water (VSW) program within the Alaska Department of Environmental Conservation (IHS'S State counterpart). Coordination of efforts between these agencies often results in successful cooperative ventures for delivering water and sanitation services to Alaska Natives.

The major phases or steps associated with delivering water and waste sanitation are project planning, design, and construction. All of these steps, however, rely on the capital funding provided by Federal and State agencies. Other areas in which participation by these agencies is essential are the training and certification of facility operators, and the provision of technical and financial assistance.

The planning, designing, and construction of sanitation facilities in rural Alaska often face barriers not commonly found in other areas of the United States. Such barriers include, among other factors, limited drainage, ice-rich soils, water scarcity, high fuel



¹P.L. 86-121.

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and shipping prices, limited or inadequate roads, and short construction seasons. Early community involvement is also considered essential to ensuring project success. Many past failures have lacked this involvement.

Considerable political pressure has been placed on IHS and VSW to deliver adequate sanitation services to Native communities in rural Alaska. As a result of efforts to meet this challenge, these agencies have built many piped sanitation systems but with the considerably higher degree of complexity necessary to meet the harsh climatic conditions typical of the region. All of these factors have made sanitation projects among the most demanding and costly capital ventures found throughout rural Native communities of Alaska.

Despite considerable progress, more than half of the 191 rural Native villages identified by IHS still lack adequate or safe water and waste sanitation service. By themselves, these communities lack the resources to build large-scale piped sanitation projects. Moreover, many communities already served with piped sanitation lack the resources to operate them properly. In the future, expected declines in State revenues threaten to affect capital funding availability for new projects and reduce revenue for other municipal assistance, including technical training, to support existing sanitation systems. Many existing systems lack operation and maintenance (O&M). According to IHS, nearly 90 percent of the villages with piped sanitation services were out of compliance with relevant Federal and State regulations.

Although there is a continuing need to build new sanitation projects in Alaskan villages, they must have adequate operation and maintenance support as well. The poor economic conditions in most rural Native communities make system maintenance difficult. Agencies have to avoid installing complex technologies in communities with little economic and technical resources to operate them. IHS and VSW personnel have recently begun to work with Native communities in the

identification and testing of simpler and more cost-effective systems.

INSTITUTIONAL AND REGULATORY FRAMEWORK RELEVANT TO ALASKAN VILLAGE SANITATION

The U.S. Environmental Protection Agency (EPA) and the Alaska Department of Environmental Conservation are the two agencies with major regulatory oversight of sanitation projects and programs in rural Alaska. Permitting decisions by the U.S. Army Corps of Engineers are also relevant to the process in which village sanitation projects are proposed, built, and operated.

Since 1970, the U.S. Environmental Protection Agency has been the principal Federal agency responsible for the promulgation and enforcement of regulations designed to protect the environment and decrease pollution throughout the United States. EPA also coordinates and supports research and antipollution activities carried out by other Federal and State agencies.²

The primary focus of the Alaska Department of Environmental Conservation (ADEC) is on the conservation, improvement, and protection of Alaska's natural resources and environment. ADEC is particularly concerned with air, land, and water pollution. Agency responsibility extends to matters affecting the health, safety, economy, and social well-being of people throughout the State. It does so through enforcement of environmental laws, regulations, and quality standards developed in some cases by EPA. One particular function relevant to village sanitation, that of project construction and improvement, is carried out by the Village Safe Water program within ADEC. Less than 3 percent of the more than 450 ADEC employees make up the VSW staff, who until recently were delivering sanitation projects to nearly 60 rural Alaskan Native villages. (The Indian Health Service, discussed throughout this report, is VSW'S Federal counterpart.)

²40 C.F.R.1 "Statement of organization and General Information."

The Army Corps of Engineers is the Federal agency responsible under Section 404 of the Clean Water Act³ for reviewing, approving, or denying permit applications to discharge dredge or fill materials into U.S. waters. All sanitation projects proposed for construction in rural Alaska by IHS and VSW require Corps of Engineers' approval because many of the areas in which such projects are to be built have been designated wetlands. A large portion of the western Alaska region—where many Native communities have experienced disease epidemics from inadequate sanitary conditions—is located on wetlands.

The Corps is also responsible for carrying out projects relating to the development and management of water resources; and for the design, engineering, and O&M of flood control, navigation, and energy-related projects. No economic assistance for waste sanitation projects in rural Alaska is specifically listed in the Corps for fiscal year (FY) 1994 budget.⁴

Until very recently, the level of institutional interaction and coordination among EPA, ADEC, and the Corps of Engineers, or between these agencies and Native village governments, was limited. Some experts at the Office of Technology Assessment (OTA) Workshop on Alaska Village Sanitation held in Anchorage in August 1993 (246), voiced their concern about the lack of flexibility in regulatory programs to recognize the harsh environmental and socioeconomic conditions that prevail in rural Alaska. This concern continues to be evident today.

Native communities are often not in compliance with environmental regulations. In 1991, only 60 of 164 Native villages surveyed were identified as having some variation of a piped system capable of meeting established regulatory requirements. IHS has more recently reported that about 90 percent of the villages it serves operate a water or waste sanitation system that is not in

compliance with some aspects of Federal or State regulations. IHS data also show that the large majority of Native residents of rural Alaska do not have any other recourse but to haul water to, and human waste from, their homes (59,61).

The recent promulgation by enforcement agencies of additional regulations for drinking water and waste disposal practices is expected to adversely impact most Native villages with limited economies, particularly because substantial facility upgrades would have to be made to demonstrate compliance. Large expenditures are anticipated by many local Native governments in their efforts to comply with the new surface water treatment, lead, and copper rules (67,246). Providing Native villages with an opportunity to use less expensive alternative approaches could minimize compliance costs while ensuring relatively similar levels of health and environmental protection.

The regulatory framework applicable to Native villages also affects IHS plans to deliver sanitation projects within a reasonable time frame. According to IHS officials, about 20 percent of the time taken by agency engineers to carry out construction projects is devoted to developing the paperwork required by existing regulations. In some cases, IHS has needed as much as 39 months to prepare all the documentation required to obtain a construction permit from the U.S. Army Corps of Engineers alone. The extremely long time occasionally taken between submission of permit application and permit approval is viewed by many as highly incongruous with current poor sanitation and economic conditions of rural Alaska, as well as unnecessarily costly to Federal, State, and Native governments alike. Examples of some of the Federal and State permits that IHS must have approved are listed in table 4-1.

Several encouraging efforts by Federal and State agencies to identify better methods of more

³33 U.S.C. 1344. See also 33 C.F.R. 323 "Permits for Discharges of Dredged or Fill Materials Into Waters of the United States."

⁴As part of the \$3.5 billion budget request for FY 1994, the Corps of Engineers plans to invest \$13 million in 21 navigation and flood control projects in Alaska, funding requests for sanitation-related projects are not included (247).

TABLE 4–1: Selected Permit Types To Construct or Upgrade Rural Waste Sanitation Facilities

Permit Grantor	Permit Type
Alaska Department of Environmental Conservation (ADEC)	<ul style="list-style-type: none"> ▪ <i>Plan Review for Sewerage or Water and Wastewater Works</i> requires submittal of project design drawings. On approval of the drawings, a Certificate to Construct is issued. ▪ <i>Wastewater Disposal Permit</i> is required if construction plans call for discharge of wastewater into State waters, State lands, or a publicly operated sewerage system. ▪ <i>Plan Review of Public Facilities</i> refers to the review of plans for public access buildings to ensure adequate ventilation, lighting, etc. ▪ <i>Certificate to Operate</i>—within 90 days of completion or sewer system construction, as-built drawings are submitted to ADEC and a Certificate to Operate is granted. Sewer system approval is granted by letter. ▪ <i>Community Sewer Main Minimum Size Waiver</i> is required in small communities where it is beneficial to reduce minimum main line diameter sizes from 8 to 6 inches.
Alaska Department of Fish and Game	<ul style="list-style-type: none"> ▪ <i>Title 16 Permit</i>—depending on the quality of treated discharge water, a title 16 permit may be required for the discharge of water to certain (e.g., anadromous) fish streams.
Alaska Department of Natural Resources	<ul style="list-style-type: none"> ▪ <i>Water Rights Permit</i> documents and reserves water source use by a community.
Alaska Department of Public Safety	<ul style="list-style-type: none"> ▪ <i>Life and Fire Safety Plan Check for the Construction and Occupancy of Buildings</i>—fire marshal construction plan review is required for all publicly owned buildings.
Alaska Department of Transportation and Public Facilities	<ul style="list-style-type: none"> ▪ <i>Notice of Proposed Construction or Alteration</i>—this form must be completed if construction is to take place within easements established for the community's airport. It applies primarily to height restrictions.
U.S. Department of Defense, Army Corps of Engineers	<ul style="list-style-type: none"> ▪ <i>Section 404 Permit for the Discharge of Dredged or Fill Material into Water of the United States</i>—required to build in areas designated as wetlands. Compliance with Section 401 (water quality certification) is required.
U.S. Department of Health and Human Services, Indian Health Service	<ul style="list-style-type: none"> ▪ <i>Environmental Assessment and Finding of No Significant Impact</i> is reviewed and signed by the project construction engineer.
U.S. Department of the Interior, Bureau of Indian Affairs (BIA)	<ul style="list-style-type: none"> ▪ <i>Section 106 Determination, National Historic Preservation Act</i>—Archaeological survey are to be conducted by archaeologists from the Bureau of Indian Affairs. ▪ <i>Archaeological Clearance</i> is coordinated with the State Historic Preservation Officer. ▪ <i>Lend Lease Authorization (Indian Land) and Rights-of-Way (Indian Land)</i> must be granted by BIA or the association acting on behalf of BIA.
U.S. Environmental Protection Agency	<ul style="list-style-type: none"> ▪ Permit to Discharge into Water (National Pollutant Discharge Elimination System) ▪ <i>Primary Discharge Waiver</i>
Notification of the Relevant Regional Corporation	<ul style="list-style-type: none"> ▪ Regional corporations need to be notified of proposed improvements on their lands. In most cases, formal procedures have not been established.
Office of the Governor, Office of Management and Budget, Office of Governmental Coordination	<ul style="list-style-type: none"> ▪ <i>Coastal Project Questionnaire and Certification Statement</i> is used for determination of consistency with the Coastal Management Plan of the particular regional corporation.

SOURCE: Arctic Slope Consulting Group, Inc., Water and Sewer Utilities Master Plan Report for Selawik, Alaska, prepared for City of Selawik, Alaska, January 1992.

effectively addressing regulatory enforcement and technology implementation in rural Alaskan Native villages are now under way. Of great relevance is the decision by the Corps of Engineers in 1994 to adopt policies for expediting the review of permit applications proposing the construction of sanitation projects in Native villages. Also significant is the work of the Federal Field-Alaska Rural Sanitation Work Group convened by EPA to identify and coordinate sanitation policy and programs among Federal and State agencies. Some of the agencies participating in this effort are the Bureau of Indian Affairs, Department of Transportation, Department of Education, Farmers Home Administration, Department of Energy, Department of Labor, Department of Housing and Urban Development (HUD), Alaska Department of Environmental Conservation, and Alaska Federation of Natives.

Other examples include EPA's funding of programs designed to provide technical training assistance to Natives (e.g., the Rural Utility Business Advisor (RUBA) and Volunteers In Service To America (VISTA) programs)⁵ and the effort led by Bureau of Indian Affairs and other Federal agencies (including IHS, EPA, and HUD) to coordinate future construction and improvement efforts in Native villages and to share costs. In this way, community needs such as housing, roads, and sanitation will be addressed simultaneously.

Despite these efforts, the approach taken is still largely piecemeal, rather than the result of a coherent plan developed by all relevant Federal agencies to ensure adequate sanitation in all Alaskan Native communities. In other words, although individual agency missions are pursued with vigor and dedication by generally well-qualified and motivated staff, overall policy guidance and unity of focus at the highest levels appear to be lacking. Several examples of State and Federal agencies

with programs relevant to Native villages are given in box 4-1.

CAPITAL CONSTRUCTION FUNDING

1 Role of Federal Government in Capital Construction

The concern of the U.S. Congress about sanitation issues in rural Alaska spans more than three decades. In recognizing the need to develop formal solutions to this problem, Congress passed the Indian Sanitation Facilities Construction Act in 1959⁶, giving the Indian Health Service the authority to plan, design, and construct water and sewer projects in Native communities. Since passage of the Act, IHS has contributed more than \$350 million to sanitation projects in rural Alaska.

Setting priorities within the IHS process takes into consideration, among other factors, the overall health of the population; the deficiencies in sanitation systems found in the community in question; and the community's perception of the project (priority, nonpriority). Of great importance to IHS officials is identifying with some certainty the capability of Native villages to finance the operation and maintenance of sanitation projects under consideration for construction (123).

Funds for construction of sewer systems in Native village communities of rural Alaska are provided under the Indian Sanitation Facilities Construction Act and distributed through the Alaska Area Native Health Service. Provision of Federal funds for capital construction, however, requires certain commitments from the receiving communities. For example, IHS will not provide the City of Selawik with capital funds to construct or improve sewer systems unless it is assured of the community's commitment to: 1) pay for operation and maintenance costs; 2) manage it via a

⁵The RUBA program will provide additional capability for improving government, financial, and managerial activities of Native communities. EPA will also contribute about \$100,000 to have five VISTA volunteers, already trained by IHS, provide technical planning assistance to Native communities. About 25 VISTA volunteers already operate in Alaska (163).

⁶P.L. 86-121,

BOX 4-1: Additional State and Federal Agencies With Programs Relevant to Alaska's Native Villages

The following are examples of State and Federal agencies with programs that might also be considered relevant for improving overall conditions in rural Alaska Native villages:

- Department of Housing and Urban Development (HUD)—Although the major focus of this Federal agency is to help Native communities meet their housing needs, the agency can also provide funds for improving existing community water and sewer projects that serve HUD-financed homes. Funds provided to local housing authorities for improvements originate from HUD's Comprehensive Improvement Assistance Program and from the Comprehensive Grant Program.
- Farmers Home Administration—The Farmers Home Administration (FmHA) is another Federal agency with the authority to actually fund water and waste sanitation projects in rural areas. Provided in the form of loans or grants, agency funds can be applied to the construction, repair, upgrade, or expansion of sanitation systems in communities with fewer than 1,000 residents. FmHA's financing of sanitation projects has been done primarily in conjunction with Indian Health Service (IHS) since it does not have engineering or construction personnel.
- Bureau of Indian Affairs—The major responsibility of the Bureau of Indian Affairs (BIA) in rural Alaska is to strengthen the development of tribal government infrastructures, as well as coordinate with all Native village governments (State municipal governments, housing authorities, rural electrification authorities, etc.). The involvement of this Federal agency in sanitation projects is relegated to funding the installation of plumbing fixtures inside village homes or connecting homes to the community piped collection system, as part of its housing or road improvement programs. Funding improvements related to sanitation is coordinated with IHS.
- Department of Commerce and Economic Development (DCED)—This State agency serves the dual role of public protection and economic development. As public protector, the Department exercises regulatory authority over financial institutions, securities activities, land development, and the insurance industry in the State. It also supports a number of professional and trade regulatory boards and, through several commissions, monitors activities and ensures compliance in regulated areas such as gas and oil conservation, public utilities, and transportation. To stimulate economic growth, the Department encourages development of the tourist industry, provides loans for purposes generally not fundable by traditional financial institutions, and encourages the development of broad-based economies. These functions can allow DCED to play a pivotal role in identifying and developing local economic potential of the Native villages.
- Department of Community and Regional Affairs (DCRA)—Traditionally a State community development agency, DCRA has recently become one of the key State agencies responsible for working with village governments in finding a solution to their waste sanitation problem. This department is responsible for providing financial, advisory, and management assistance to local governments at both the community and the regional levels. It offers a broad range of planning services, technical training, and financial aid to the State's municipalities, regional planning organizations, and unincorporated communities. This agency has the expertise needed in an overall strategy to assist rural Alaskan Native communities.
- Department of Transportation and Public Facilities—The State's largest department has responsibility for administering State programs for the planning, design, construction, maintenance, and operation of all State-owned buildings and other facilities. It also has specific responsibility for maintaining the Alaska Marine Highway System.

(continued)

- Department of Fish and Game (DF&G)—This State agency is charged with the responsibility for maintenance, development, and enhancement of Alaska's fish and wildlife resources and providing for their sustained optimum use consistent with the social, aesthetic, environmental, and economic needs of the State. Participation of this agency in an overall coordinating strategy is essential because of the significant economic and cultural role that DF&G's decisions play in the quality of life of Native villages.
- Department of Health and Social Services—This State agency administers a broad range of programs to ensure the optimum mental and physical health and well-being of the Alaskan people. It includes family services, public assistance, public health and health care programs, mental health and developmental disability, and alcohol and drug abuse services.
- Alaska Department of Natural Resources (DNR)—DNR manages all the natural resources of the State including, land, water, forests, grass and wetlands, oil, gas, energy, hard rock minerals, parks, historical sites, agriculture, and all related resource development activities. The Department surveys land, surface, and subsurface resources, and offers land for disposal including remote parcels for agriculture and subdivision settlement. It selects land entitled to the State by the Statehood Act, leases oil and gas areas such as Prudhoe Bay, and develops new agricultural resources.
- Department of Transportation and Public Facilities—The State's largest department has responsibility for administering State programs for the planning, design, construction, maintenance, and operation of all State-owned buildings and other facilities. It also has specific responsibility for maintaining the Alaska Marine Highway System.

SOURCES: Arctic Slope Consulting Group, Inc. (ASCG), *Water and Sewer Utilities Master Plan Report for Selawik, Alaska*, prepared for City of Selawik, Alaska, January 1992. John A. Olofsson and H. P. Schroeder, University of Alaska Anchorage, *Sanitation Alternatives For Rural Alaska*, report prepared for the Congressional Office of Technology Assessment, Washington, D. C., August 15, 1993. Michael L. Black, Special Projects Supervisor, Alaska Department of Community and Regional Affairs, Municipal and Regional Assistance Division, information provided at the Office of Technology Assessment workshop on "Waste Sanitation Problems of Rural Alaska," Anchorage, Alaska, Aug. 4, 1993; and Office of Technology Assessment.

local government structure and provide the expertise required to operate the system; and 3) provide equipment and materials required for successful operation of the system (78). As part of their efforts to meet these requirements, local governments in turn may delegate many of these responsibilities to a Utility Board, a Public Works Manager, or a City Administrator (78). Local government leaders of the City of Selawik in the Nana Regional Corp., for example, have appointed a utility board as a means to assure IHS of their commitment to properly operate the \$2.3 million water and waste sanitation project currently planned for construction,

Several approaches are used by IHS to determine overall project funding. They range from performing an engineering analysis, to defining the steps that must be taken to develop a particular level of service, to preparing a feasibility study or master plan. The high costs of producing a master

plan (\$1 50,000 in Selawik's case) limit the widespread use of this option. Many of these approaches can: 1) involve coordinating activities and identifying available funding from other agencies (e.g., Housing and Urban Development, Village Safe Water, Farmer's Home Administration); 2) recommend, as for Selawik, that improvements to the "basic utility infrastructure" (e.g., water treatment and sewage disposal) be completed prior to construction of the recommended piped distribution and collection systems (78); or 3) provide IHS and receiving Native villages with the estimated capital and operational funding needed for the project, along with a phased construction schedule.

Feasibility studies and master plans are used by IHS primarily as a means to support decisions and to coordinate and work with community leaders and residents. Through these documents, the IHS discusses how to achieve the following goals:

1) to provide the safe water and sewage disposal needed for improved health; 2) to develop projects that are “*within the economic abilities of the communities;” 3) to improve sanitation service delivery to all village residents; 4) to reduce operation and maintenance costs as a means of ensuring continued support for the project; and 5) to utilize facilities already built in the community to the maximum extent possible (78,1 23).

IHS may also arrange the construction projects contained in feasibility studies, master plans, or other planning documents, into packages. Each package tends to be a stand-alone project that can be built and put in service when demand warrants and funds are available. The master plan for the City of Selawik, for example, consists of several interrelated, intermediate steps planned for the next two decades, culminating with the construction, operation, and maintenance of a piped vacuum sewage collection system. A phased schedule is considered essential by IHS for providing the community with a strategy that is realistic enough to allow it to successfully improve water and sewer service (78,123,127).

1 Role of the State in Capital Construction

The Village Safe Water (VSW) program within the Department of Environmental Conservation is Alaska’s main agency responsible for improving water and sewer systems in Native communities of the 49th State. As of July 1993, VSW was carrying out projects in nearly 60 different Native villages throughout rural Alaska.

State funds for construction of sewer systems in Native communities are provided under the Village Safe Water Act. Once funds have been appropriated and an engineering feasibility study is completed, engineers work with communities to select the firm responsible for developing the project design. Potential candidates are invited to visit the community and interview with State and Native village representatives. Once a particular firm is selected, work on investigating geotechnical characteristics and possible technologies begins (104).

To identify the waste sanitation needs of Native communities and secure funds to address them, Village Safe Water officials distribute a questionnaire to each community annually. Returned questionnaires are scored and prioritized according to a capital project ranking methodology that considers factors such as health needs, contamination, local priorities, Federal assistance, and project planning status. If the scoring of the returned questionnaire is sufficiently high to consider the requested project a priority, the VSW program then tries to secure State funding for its construction.

The Alaska Area Native Health Service (AANHS) also reviews the ranking methodology and returned questionnaires to ensure data reliability, check coordination, and sometimes secure matching funds (58). If its review also finds the proposed sanitation project a priority, the AANHS Environmental Health and Engineering Branch participates with Village Safe Water in project planning, design, and ultimate construction. One extremely important result of this interaction is that many construction projects have become cooperative ventures between VSW and IHS.

Alaskan officials have noted a recent decline in State revenues. Many believe this might adversely affect the State’s support of sanitation projects in the future (43). One effect anticipated by many is a reduction in funds to support capital construction programs. Another significant effect is the reduction in both revenue sharing and municipal assistance programs, two major funding sources on which the operating budgets of many Native communities now depend (43,87).

1 Community Concerns Regarding Capital Construction in Rural Alaska

According to public health officials working in Native communities of Alaska, the installation of wells and water treatment plants during the 1950s and 1960s constituted a “dramatic step forward” because it virtually eliminated one cause of disease and even death, namely, the drinking of water from lakes and rivers. Prior to that, diarrhea was the cause of death of 1 in 10 children in the Yukon-

Kuskokwim Delta region, for example. Since the 1960s, however, Natives in communities with poor economic potential, such as those found in the Yukon- Kuskokwim Delta, have seen “little viable progress” (173).

In recent years, VSW and IHS have experienced substantial political pressure to deliver sanitation services to Native communities in rural Alaska. To meet this challenge, they have built a considerable number of sanitation projects but with more special features and rugged construction than similar systems built in the lower 48 States—primarily to withstand the harsh conditions typical of rural Alaska. Many concerned individuals, however, have voiced the need for developing a process that refrains from forcing VSW and IHS to build complex water and sewer systems in communities that have neither the financial nor the technical resources to maintain and operate them. Even when communities tax themselves and hold fund-raising activities, the constant increase in O&M costs outpaces their financial capability to manage such sanitation projects properly. As pressure for building new sanitation projects continues to increase, it must be understood by all relevant Federal, State, and Native entities that, in time, Native communities will be forced to support these sanitation projects financially with even less revenue sharing.

Concerns about the methodologies employed to set priorities for capital construction projects in terms of cost ceilings applicable to all 50 States have also been raised. These relate in particular to claims by Native leaders that financial assistance to Alaskan villages is unfairly curtailed through the application of cost evaluation formulas that may be applicable to the lower 48 States but are irrelevant to rural Alaska. Leaders argue, for example, that when such formulas are used to compare transportation costs, rural Alaskan communities are at a disadvantage because their transportation costs are incrementally higher than those of communities in the lower 48 States, where roads not only exist but are federally subsidized (300). In their view, the high construction costs in extremely cold areas of rural Alaska render the majority of potential IHS projects in the

49th State “infeasible.” In addition to the weighting of capital cost ceilings, these critics point to the lack of uniformity in data collection throughout the State as another adverse factor.

Contrary to critics, IHS officials report the use of higher cost factors when considering potential sanitation projects for rural Alaska. But even with the use of higher cost indices, the agency finds that it is difficult to obtain funding approval because its budgetary process does not allow for the difference in required complexity—and therefore cost—between building a sanitation project in Alaska and one in the lower 48 States. Greater attention to this factor might be warranted since the cost of pipe alone, generally \$2 per linear foot in the lower 48 States, may be \$30 or more in rural Alaska because of the insulation and heating required to keep it functional, as well as transportation costs.

Critics maintain, however, that the level of service, rather than cost, should be the criterion for providing sanitation services to Native communities. Such is the case for IHS, whose funding recommendations are traditionally based on cost considerations rather than level of service. Since protection of human health is the primary goal, critics claim that “. . . the objective should be to provide uniform basic levels of water and sanitation services to all communities” (300).

In light of the limited economic base of many Native communities, careful planning and periodic reevaluation of projected user fees might become necessary to ensure project success. One example is the City of Selawik in western coastal Alaska. In this community, IHS foresees providing local residents with adequate sanitation services in about 12 years, with work that began in 1993. As part of its plan, every household is expected to pay \$100 per month at the initiation of the \$2.3 million project and up to \$203 by the end of the planning process. However, the expected decline in the State economy might reduce Selawik’s projected revenue sharing funds even more, rendering the project infeasible unless subsidies are provided to reduce household payment requirements.

Most concerns relating to capital construction logically originate in communities where such

projects do not exist or are in the planning phase. With the increasing limitation of available funding, responsible agencies may also find it necessary to work with communities in which sanitation facilities already exist to ensure their proper operation during the remaining design life of the project. Because the design life of certain components of sanitation facilities does not generally exceed 15 years, a large number of them are expected to require replacement of their mechanical equipment in the near future. Finding the funds necessary for this purpose appears increasingly difficult today.

| Factors Affecting Capital Construction Funding

Based on IHS projections and current State and Federal funding rates, many researchers suggest that by adopting nonpiped systems, waste sanitation problems in the areas of greatest concern could be solved within two decades for \$2.5 billion, or an estimated annual cost of about \$125 million. In light of recent appropriations, however, State and Federal agencies appear unable to meet this funding level. For instance, in FY 1993, the IHS appropriated budget was \$40 million less than the estimated \$125 million needed annually to meet its schedule. Although the remaining gap in capital expenditures is being filled by agencies such as Village Safe Water (\$25 million), the Environmental Protection Agency (\$6 million), and the Farmers Home Administration (about \$6 million), future increases in IHS appropriated budgets, as well as the long-term budgetary commitment by these agencies to capital construction projects, remain largely undetermined.

Provision of seed money to construct sanitation projects in some cases has been neither sufficient nor expeditious. After the Alaska Legislature ap-

propriated \$1.8 million in 1983 to the City of Emmonak, for example, additional funding was requested so that the project could be carried to completion by the Village Safe Water program. The time between requesting and obtaining State money, and the actual start of construction of the Emmonak project, was about 8 years (104).

Under current procedures, the IHS has limited time to work adequately with Natives to identify relevant community needs and arrive at well-thought-out solutions prior to the selection of projects. The limited time allowed for obligating funds can leave the impression that decisions by IHS must also be made in haste; however, once the obligation occurs, IHS can hold funds until the project construction phase is completed. One significant adverse consequence created by the accelerated schedules of the Federal appropriation process is that they place an additional burden on already limited IHS resources and personnel to carry out project decisions in a timely manner and with ample community involvement. The recently mandated financial participation by the Farmers Home Administration in sanitation programs (\$15 million for FY 1994⁷) is considered highly beneficial to improving the sanitation needed in other villages. Some experts, however, are concerned because this decision might only serve to increase the already accelerated pace of the planning process, particularly since the Farmers' Home Administration role is simply to provide construction funds with little or no personnel or guidance to assist IHS and VSW.

Contrary to the Federal budgetary process, State funding of capital construction projects is conducted on a line-item basis. For this reason, agencies such as Village Safe Water sometimes have a greater opportunity to work with Native communities in advance, to identify the types of

⁷Maintaining this level of support in future years will depend on congressional action (148).

sanitation projects that might be most suitable for them.⁸ Considerable attention would have to be given, however, to the implementation of the interagency efforts to fund sanitation projects in rural Alaska as a means to avoid accelerating the funding process and increasing the work load of engineering personnel at IHS and VSW.

PROJECT PLANNING, DESIGN, AND CONSTRUCTION

Planning and designing sanitation facilities in rural Alaska often require taking into consideration physical, social, and economic barriers not commonly found in other areas of the United States. Such barriers may vary from limited drainage and poor soil conditions caused by discontinuous permafrost, to seasonal variations in the quantity and quality of water that is available, to the high costs of electricity and fuel. It is not unusual to find that Federal and State agencies responsible for providing sanitation facilities must delay their project schedules to repair the structural damage caused by spring floods or by ice floes that follow extremely cold winters.

In addition to these factors, agencies must also deal with other rather unique challenges during the critical construction phase. For instance, they must order supplies well in advance, such as toilets, plumbing fixtures, and hundreds of other systems and components, including thousands of feet of specially insulated pipe. Shipping equipment from distant locations, such as Seattle, requires that inspectors visit manufacturing sites to ensure good-quality products prior to shipment and, therefore, avoid unnecessary costs and delays associated with having to store inadequate—and perhaps no longer guaranteed or needed—parts. Without proper planning, the relatively short

length of the construction season and erratic barge schedules can result in costly construction delays.⁹

The pace of construction can also be delayed by the slowness and uncertainty of the funding process. The untimely availability of State construction funds, for instance, is a factor that must be carefully considered by agencies involved during the design, planning, and construction phases of a sanitation project. This uncertainty results primarily from the appropriations process of the State Legislature, which calls for allocating funds on a yearly basis. As a consequence, funds do not become available until July or August—the middle of the construction season (104). A notorious case of insufficient and inexpeditious funding practices involves the construction of Emmonak's sanitation project, for which, not only initial funding was inadequate, but more importantly, the time taken between requesting and obtaining State funds to actually start project construction was about 8 years. The adverse consequences of funding uncertainties can be easily prevented in most communities by developing projects that are properly scoped and planned. Multiyear sanitation projects, such as those built by IHS, are not affected by funding uncertainties because funds are appropriated in full before construction starts.

The absence of adequate roads to waste disposal areas is another barrier that makes planning, design, and construction of, for example, truck haul sewage collection projects difficult. During a recent visit to western coastal Alaska, primarily villages in the Calista and Nana regional corporations, the Office of Technology Assessment observed many roads and boardwalks lacking the design and maintenance to ensure safe transport of wastes from collection containers to sewage la-

⁸ Traditionally, the Alaska State government has dealt not with tribal governments but just with cities and, until recently, with for-profit tribal corporations. Recent State Administration efforts to recognize tribal governments have allowed Village Safe Water to expand its community participation work-up to 2 years in some cases—to increase a community's understanding of, and support for, State-funded sanitation projects.

⁹ A significant increase in the unreliability of barge schedules, for example, was experienced in several Alaskan communities during clean-up operations of the Exxon Valdez oil spill.

goons. Although no evaluation was done, one might also predict that the transport of heavier, larger construction equipment and materials would be similarly problematic. According to the draft report prepared by the Governor's Sanitation Task Force, nearly 100 Native villages in rural Alaska, including many in the areas visited by OTA, lack adequate roads today. Remedying this deficiency, the Task Force estimated, would cost at least \$100 million (71)

Another important consideration in planning, designing, and constructing sanitation systems is the number of persons residing in each household, as well as the perception they have about particular sanitation technologies. In Calista Regional Corp. villages, for example, the average household consists of about five persons, the highest ratio for the entire State.⁹ Some believe that, with the exception of piped systems, this large household size reduces the number of possible sanitation alternatives that can be built readily to meet such demand. Biological or composting toilets are assumed by some to be limited in capacity and prone to shock loading, whereas septic and holding tank systems are considered unsuitable under low or inadequate drain field conditions. As an effort to evaluate the actual performance of technological alternatives, the University of Alaska Anchorage is conducting a field demonstration study of composting toilets in the Northwest Arctic with funds from the Alaska Science and Technology Foundation, and in cooperation with the Nana Regional Corp., the Alaska Department of Environmental Conservation, and IHS.

Opportunities for local employment are also relevant to project planning. Communities naturally want the contractor that is building the new water or sewage facility to use local labor to the greatest extent possible. Sometimes this requires additional time and resources to provide the necessary training and to develop mutually acceptable wage scales, working hours, and hiring or firing practices. IHS and VSW are committed to

using local workers on almost all projects. This commitment is often met through the use of "force accounts" or labor agreements that ensure employment to local residents.

Communication begun in the planning phase must be maintained constantly and effectively during the construction phase to eliminate tensions and avoid unnecessary or costly delays (104). Early communication with Emmonak leaders, for example, was crucial in obtaining the community's approval and support, which allowed outside contractors to come in and perform highly specialized electrical work for the project.

The perception by many local Natives that Federal and State agencies have failed to involve them early in the planning process sometimes leads to the erroneous conclusion that sanitation projects built in the past were merely "costly waste sanitation problems" rather than "solutions." In the city of Buckland, for example, some believed that the failure of engineers to consult with city residents was the primary reason for construction of the community sewage lagoon at a site where raw sewage was washed out of the lagoon and down the city streets during spring floods. Information provided by IHS shows that, contrary to this belief, the site selected for the lagoon was based on a sound engineering decision. Unfortunately soon after the facility was built, a catastrophic flood occurred that filled the lagoon and washed the contained waste downtown. To prevent this from recurring, IHS built a steel structure around the lagoon at a cost exceeding \$300,000. Efforts by IHS and VSW to work more closely with Native leaders and residents in Buckland and other villages continue to be instrumental in improving communication with Natives.

Failure to involve Natives in the planning, design, and construction of sanitation facilities may also result in the community's perception that it has little ownership of the project. This perception is considered a major roadblock in solving the waste sanitation problems of Alaskan villages.

⁹ Alaska averages slightly fewer than four persons per household.

Soliciting community participation early in the planning process and actively responding to the community suggestions and concerns are means by which to institute community ownership (70).

To ensure a positive ownership perception, IHS and VSW have, for several years, adopted Native community participation as an integral part of their programs responsible for building piped sanitation facilities in rural Alaska. One of several IHS strategies to improve the community's perception of ownership involves a two-step process. Step one consists essentially of providing a grant to the community for planning purposes. This is followed, about a year later, by a second grant so that the community can review alternative technologies and develop operation and financial management plans well in advance of actual project construction. Through these types of strategies, community leaders and residents are provided with an opportunity to significantly influence project planning and design decisions, as well as identify economically feasible solutions.

The pressure placed on IHS to build sanitation facilities soon after construction funds have been appropriated often limits its time for working with communities. IHS and VSW regularly find themselves making decisions too quickly. One notable exception is in Emmonak, where the time provided for technical design teams to consult with residents (e.g., explaining details, listening to suggestions, and making changes), and allow community members to modify proposed plans and designs, was largely responsible for the successful completion of the project. The Emmonak success story shows that instilling a sense of ownership requires that Federal and State agencies be provided needed construction funds, as well as sufficient flexibility to work with Native communities in identifying and carrying out solutions that are truly suitable for eliminating their waste sanitation problems.

TRAINING AND CERTIFICATION OF SANITATION FACILITY OPERATORS

Traditionally, funds to support training programs for operators of sanitation projects in Native vil-

lages of rural Alaska have been provided through Federal and State training programs. IHS involvement in operator training has existed for more than 17 years (123). The Alaska Department of Environmental Conservation (ADEC) is the State organization with primary responsibility for the certification of sanitation project operators, whereas Village Safe Water, also under ADEC jurisdiction, is responsible for their training. VSW efforts to train operators generally begin during the construction phase of the project. Areas covered in the training of operators include water chemistry and treatment, vacuum pumps, controls, safety, and record keeping. As a result of recent changes in State policy, many operators must now pass State certification prior to running a Native community's sanitation facility (104).

Use of off-the-shelf packaged training programs has not always been successful. The programs and materials are often not relevant to the rural community for which they are intended. As a solution, the Governor's Sanitation Task Force suggested that the State develop culturally sensitive and practical training programs whose main focus is to address realistic village situations. According to the Task Force, "[Operator training] Manuals which require extensive reading skills and [contain] outdated 'canned' programs should not be used. Lectures should be kept to a minimum and real life problems emphasized" (70). In addition, some suggest that training be repeated at periodic intervals to limit the adverse consequences associated with the high rate of operator turnover experienced among Native communities.

Like local funding shortages, training is another critical factor that must be supported if proper operation, maintenance, and management of sanitation facilities are to be achieved in rural Alaska. According to the Alaska Native Health Board, the greater emphasis placed on enforcing regulations rather than supporting training programs has been partially responsible for the deterioration and breakdown of sanitation facilities in various Alaskan villages (58). Others experts, however,

point to the limited functionality of local governments as a barrier to training programs.

As the State's inability to fund an expanded training program increases, the suggestion has been made that needed revenues be obtained by setting aside a small fraction of the Federal and State capital budgets. Financial assistance for training programs could also be sought from private organizations and foundations. And although improved funding for training programs is crucial to ensure adequate sanitation in rural Alaska, many firmly believe that complete success will not be attained unless such support emphasizes recruitment of local Native workers (58, 223).

The Governor's Sanitation Task Force, perhaps recognizing the need for training programs to include a business management component, recommends in its unpublished report that once relevant training programs have been assembled, an associates program on "rural government management and administration" be developed at the University of Alaska Anchorage.¹⁰ Because of the limited funding available at the village level, the Task Force suggested that Federal and State agencies provide the financial support (e.g., scholarships) needed by members of Native villages to participate in the program and learn to manage and operate their sanitation systems (70).

TECHNICAL ASSISTANCE

Technical assistance to Native communities in rural Alaska is provided through various independent programs supported by Federal, State, and Native corporation funds. The most relevant programs today include the Remote Maintenance Worker (RMW) Program and the Rural Utility Business Advisor Program. Another program with potential is the Local Utility Matching Program (LUMP) being tested by Village Safe Water. IHS also funds a Utility Maintenance Specialist program whose four staff members provide a ser-

vice similar to the RMW program but in areas not served by RMWS (83,127,177). Technical and training assistance is also provided by smaller regional groups.¹²

| Remote Maintenance Worker Program

Created by Alaska's Legislature in 1981, the Remote Maintenance Worker Program under the Department of Environmental Conservation provides expert assistance to Native communities on how to maintain their water and sewer systems while complying with environmental regulations (105). In the view of a regional health expert, the crucial role of the RMW program is that it allows villages to become self-sufficient (229).

Individuals in the Native community expected to benefit most directly from the creation of the RMW program were initially thought to be the local utility operators. More recently, however, the entire community has been the benefactor because, in addition to routine operation, maintenance, and emergency response, RMW staff help Native communities to minimize the adverse effects of frequent operator turnover. Since inception of the program, RMWS have become "circuit riders," each serving anywhere between 10 and 15 communities. The State currently funds a program composed of nine RMWS serving rural parts of Alaska (219). The Governor's Sanitation Task Force has termed the success of the RMW program "phenomenal" (65).

Continued provision of technical assistance will be extremely difficult in the future without funding increases for the RMW program. According to the Alaska Native Health Board, the number of RMWS is inadequate to assist the increasing number of remote villages that need to be covered by the program. In 1991, for example, only eight RMWS were available to assist Native nonprofit institutions (58). Recent estimates indicate that more than 100 additional Native villages could

¹⁰Because only a few of its recommendations have actually been implemented to date, many concerned experts would like the Governor's Task Force report to be published and disseminated to all relevant agencies.

¹¹These include groups such as the Manilaq Association and the Yukon-Kuskokwim Health Corp.

use the assistance of skilled RMW staff. In the view of many members of organizations who deal with RMWS in the field, expansion efforts would be highly beneficial, particularly if the staff added include Alaskan Natives (223).

| Rural Utility Business Advisor Program

The activities of the Rural Utility Business Advisor Program, though originally financed by Federal government agencies such as IHS, are now funded by the Environmental Protection Agency and Village Safe Water Program, and carried out by the Alaska Department of Community and Regional Affairs. The program's objectives focus primarily on improving government, financial, and managerial activities in Native communities (89). Although variations might exist among communities, carrying out these objectives frequently requires RUBA staff to develop policies and procedures for effective utility management, including record keeping, accounting, and budgeting. Ensuring continuity when staff turnover occurs and serving as a local information source for Federal and State agencies are also important functions.

Program assistance is available to Native villages now served by water and sewer utilities, as well as those that are planning future sanitation projects. By building close working relationships with village leaders and administrators prior to providing management training, RUBA staff have already contributed to strengthening sanitation programs in at least 10 Native villages. Training provided to key village personnel is "one-on-one, over-the-shoulder" (227). Once training is completed, city administrators become equipped in areas essential to managing their piped sanitation facilities. Included among the areas of training are organizational structure, budgeting, billing and collection procedures, contract negotiations, and accounting. Table 4-2 lists some of the major tasks

associated with the program.

From the time of its creation, however, funding for the RUBA program has typically been minimal. For instance, in 1990 the future of the program and its expansion to other villages became doubtful when State funding was nearly depleted. Only when EPA assumed responsibility for providing funds was program stability ensured. Many argue that compared to the more than \$1 billion invested in the construction of sanitation facilities in rural villages, or the total that would have to be spent for premature facility repairs and equipment replacement, the amount needed to improve utility management through the RUBA program is negligible: \$125,000 per year for every 10 to 15 communities. As a probable solution to this funding shortage, the Alaska Native Health Board has suggested that Federal agencies (e.g., EPA, IHS) work with the Alaska Department of Environmental Conservation to ensure adequate funding and needed expansion of the program—from a staff of 8 to 16 (58). Recognizing the importance of the infusion of Federal funding into RUBA, the Governor's Sanitation Task Force concluded in its draft report that "[RUBA] is possibly the most important program the State could institute to ensure the success of rural sanitation systems" (70).

If future funding permits, RUBA officials plan to provide management and training assistance related to water and waste sanitation utilities to at least 16 additional Native communities during FY 1994. These villages are listed in table 4-3. The most active RUBA participation is planned in low-income villages of the Yukon-Kuskokwim Delta and the community of Gambell (Norton Sound) since most chronic O&M problems are found in these areas (89). To help communities more effectively, RUBA activities will be coordinated with those being carried out by other agencies such as the Indian Health Service and the Environmental Protection Agency (89).

TABLE 4-2: Activities Associated with the Rural Utility Advisor Program in Native Communities of Alaska

Need/problem	Objective	Method of accomplishment	Benefits obtained
<p>Villages do not plan for future replacement or major repairs, and rely on outside agencies (Public Health Service (PHS) and VSW) for assistance in O&M of sanitation utilities facilities,</p>	<ul style="list-style-type: none"> • Develop/revise utility ordinances when they do not exist or are outdated. ▪ Develop office policies and procedures for implementing local ordinance provisions. • Determine proper rate or fee structures and shutoff policies. • Develop better financial record keeping and reporting tools so community can exercise more effective utility management, ▪ Develop more realistic budgets that reflect needed O&M, as well as reserves for future emergency problems. ▪ Increase village awareness of utility maintenance and budgeting Issues. 	<ul style="list-style-type: none"> ▪ Hold meetings with staff and council on developed/revised utility ordinance. ▪ Work with staff to develop policies and procedures for implementing utility ordinances; hold regular meetings with village administrators; and issue brief, periodic newsletters on utility-related issues relevant to the village, ▪ Work with Remote Maintenance Worker Program staff to ensure that operational concerns are reported to the village council and management 	<ul style="list-style-type: none"> ▪ More consistent management policies that can be used by Natives. ▪ Better understanding of O&M obligations and responsibilities of council members during the budgeting process. ▪ Advanced Identification of potentially serious fiscal problem areas ▪ Increased awareness of budgeting and O&M needs among administrators
<p>PHS and VSW programs often need reliable onsite Information about Village management capabilities during the planning of projects</p>	<ul style="list-style-type: none"> ▪ Act as a resource to VSW or PHS personnel to provide current local information on village successes and potential problem areas, particularly in relation to economy and management, 	<ul style="list-style-type: none"> ▪ Maintain village Information files, Focus on management as well as financial and economic indicators 	<ul style="list-style-type: none"> ▪ Increased awareness by other agencies of the community's social and economic realities, particularly during the planning phase of future sanitation projects.
<p>Due to lack of training, village staff do not have adequate training on record keeping, billing, and use of computers for data processing. Maintaining qualified personnel is often difficult</p>	<ul style="list-style-type: none"> ▪ Ensure program continuity when staff turnover occurs. ▪ Help villages in proper record keeping activities such as billing and receivables. 	<ul style="list-style-type: none"> • Help staff develop written policies and procedures for billing, budgeting, and handling revenues from water and sewer utilities. 	<ul style="list-style-type: none"> ▪ More consistent policies that might be implemented independently of staff or Council composition. ▪ Better recovery of revenues by villages.

NOTE: PHS= Public Health Service, VSW= Village Safe Water

SOURCE W.B. Smith, RUBA Advisor, letter to Mike Black, Department of Community and Regional Affairs, Feb 18, 1993, W B Smith, RUBA Advisor, letter and informational sources sent to German E. Reyes, Office of Technology Assessment, Aug 5, 1993

TABLE 4-3: Native Communities Receiving and Proposed for RUBA Management Assistance and Training in FY 1994

Area	Native villages receiving RUBA assistance	Native communities to benefit from program expansion
Yukon-Kuskokwlm	Emmonak Kotlik Marshall Mt. Village Pilot Station Pitkas Point Sheldon Point Russian Mission St. Mary's	Alakanuk ^a Chefornak ^a Eek ^a Hooper Bay ^a Kongiganak ^a Nunapitchuck ^a Quinhagak ^a Tuluksak ^a Tununak ^a
Interior region		Chalkyitsik Birch Creek Rampart
Northwest arctic region		Shungnak
Southeast region		Angoon
Kenai Peninsula		Port Graham
Norton Sound region		Gambell

^a Village considered a priority for RUBA assistance

SOURCE Michael L Black Special Projects Supervisor, Alaska Department of Community and Regional Affairs, Municipal and Regional Assistance Division letter to German E Reyes, Off Ice of Technology Assessment, Aug. 9, 1993

| Local Utility Matching Program

The Local Utility Matching Program (LUMP) is a pilot subsidy program established under Village Safe Water of the Alaska Department of Environmental Conservation. Because of its experimental nature, the LUMP program is being implemented only in 11 Native villages of the Northwest Arctic Borough,¹³ at an estimated cost of nearly \$500,000 (106). Among the main goals of the program are the creation of incentives to improve O&M within local governments and increasing the amount of revenue available to manage the utility. To achieve these objectives, the program requires communities to collect user fees, promote hiring of qualified facility operators, and establish effective preventive maintenance procedures at each receiving village.

To provide technical assistance more effectively, LUMP staff have very specific areas of expertise, including training and certification of facility operators, O&M budgeting, and compliance with

drinking water regulations (51,106,152). LUMP has already initiated communication with all villages in the Borough; collected partial data relevant to village qualification for the program; and established monthly collection rates and payroll deductions, facilitating the work of many village administrators. The Village of Noorvik has already met the requirements for receiving LUMP assistance (152).

As a way to supplement the program, LUMP officials require Native communities to match program contributions with revenues collected from local user fees. Many experts consider the functions of this program essential to raising community ownership of sanitation projects (106, 153,171). Because of current funding shortages, these experts suggest that an infusion of Federal funds, at least at a matching level, would enable the expansion of the program to other Native communities in need of training in utility management.

¹² The communities are Ambler, Buckland, Candle, Deering, Kiana, Kivalina, Kobuk, Kotzebue, Noatak, Noorvik, Selawik, and Shungnak. Of these, Buckland, Kotzebue, Noorvik, and Selawik were visited recently by OTA staff.

| Coordination Needs Among Training Programs

The bulk of training and technical assistance provided to Native communities of rural Alaska originates at three major agencies: the Indian Health Service, Alaska Department of Environmental Conservation, and Department of Community and Regional Affairs (DCRA). Whereas the major emphasis of IHS and ADEC training programs is to provide operators with the technical skills needed to keep their utilities operational, DCRA focuses on improving government operations and the financial and managerial skills of utility operators in Native communities.

All training and certification programs developed to ensure that Native communities operate and maintain their water and sewer projects properly were created independent of one another. As a consequence, there has been little interaction among them in the past. This has recently been improved by various coordinated efforts and inter-agency agreements to streamline training. With the increasing need to protect the health of community residents, and the expected decline in Federal and State funding, continued coordination is an absolute necessity

EXTERNAL SUBSIDIES FOR OPERATION AND MAINTENANCE ACTIVITIES

Sanitation facilities are still among the most demanding and costly capital projects found among Native communities in rural Alaska. Their high cost is associated not merely with their construction but also with high expenditures for electric power, fuel, equipment, training, and labor. In most cases, the more remote the community is, the higher are the costs and the greater is the difficulty encountered in operating the system (69). According to government reports, the greatest need for funding sanitation projects in the United States is still found in Alaska. Of the \$633 million in Federal assistance funds estimated by IHS in 1990 as required to build sanitation facilities in U.S. Native areas, nearly 74 percent was needed for Alaska's rural areas (254).

The Indian Health Service is the primary Federal agency responsible for funding the planning, design, and construction of sanitation projects in rural Alaskan Native villages. In the past, IHS evaluated the capital investment needed to provide sewage treatment and collection on the basis of the economic and technical feasibility of construction. Because of the high costs of construction, past IHS criteria often excluded recommendations for piped systems. Today, IHS evaluates capital investment needs in terms of the cost of providing piped indoor systems (254).

Construction funds have essentially been utilized by Federal and State agencies to provide sanitation technologies or systems with a significant degree of advanced engineering. During Alaska's "oil boom," millions of dollars were spent to build sanitation projects in rural communities. Not all villages benefited during this period, and in those that did, the overwhelming emphasis was on facility construction, not O&M. Many of these communities are now experiencing facility breakdowns and costly repairs or replacements.

Although IHS funding is also essential for repairing existing facilities, one element not traditionally permitted under existing Federal and State systems is the funding of operation and maintenance of sanitation projects in Native villages. Until 1992, only one State agency supported—in a limited and sporadic fashion—O&M in a few Native communities. The virtual absence of any external contribution to enable local Native governments to properly operate and maintain their piped sanitation projects has forced them to use already-limited municipal and State revenue sharing and entitlements, and local revenues from fund-raising activities, to pay for O&M of sanitation projects.

The majority of rural Alaskan Native communities rely almost completely on transfer payments and subsidies from Federal and State agencies to operate all basic village programs. Quantifying the actual level of external subsidies provided today is difficult. Nonetheless, most experts agree that without this assistance, Native communities would most likely be unable to survive for long. In the villages, a lack of O&M

funding, shortage of technical assistance from outside agencies, and inadequate training of facility operators continue to shorten the useful life of existing sanitation projects, lead to their breakdown, and sometimes even result in human casualties.

As operational costs of sanitation projects increase, so does the need to obtain external O&M assistance. These higher costs, combined with a nearly 50-percent decline in State revenue sharing and municipal assistance, are making the O&M problem even more acute. It is not rare to find a multimillion dollar sanitation project in rural Alaska in need of preventive maintenance because of inadequate O&M and limited funding. Added to this concern is the fact that most 'Native villages do not have, as the Governor's Sanitation Task Force noted in its report, an "equipment replacement account" to ensure facility replacement once existing projects reach the end of their design life (69).

Recognizing these deficiencies, Congress amended the Indian Health Care Improvement Act of 1976¹⁴ by enacting the law commonly known as the Indian Health Amendments of 1992.¹⁵ In Section 302 of the new law,¹⁶ Congress authorized the Indian Health Service to fund up to 80 percent of the costs incurred by Native villages and Indian Tribes for the operation, maintenance, and management of their water and sewer systems. This is considered by many experts and Native residents essential not only for avoiding the frequent premature wear-down of system components, but also for providing an opportunity for villages with honey buckets to obtain more adequate sanitation technology—an expectation often rejected because of their lack of O&M funds. However, appropriation of funds under the Indian Health Amendments of 1992 to assist Native communities has not yet been requested by the Indian Health Service.

¹³ 25 U.S.C. et seq.

¹⁴ P.L. 102-573, October 29, 1992; 106 STAT. 4526-4592.

¹⁵ 106 STAT. 4560-61.

CONCLUSION

As a result of Federal and State mandates to deliver adequate sanitation services to Native communities in rural Alaska, IHS and VSW have built large-scale piped sanitation systems in more than half of the 191 Native villages identified by IHS for sanitation purposes. In addition to project construction, IHS and VSW also support training for operators of sanitation projects and provide technical assistance to Native communities through various programs (e.g., RMW, RUBA, IHS operator training, and LUMP). The high degree of complexity inherent in these systems, however, has made sanitation projects some of the most demanding and costly capital ventures in all of rural Alaska.

Even though funds are provided for project construction and technical support and training programs, one element not provided under the present Federal and State system is O&M subsidies for the villages. In the absence of external financial assistance, local Native governments are often forced to use their limited funds—primarily from municipal and State revenue sharing and entitlements, and from fund-raising activities—to pay for O&M of sanitation projects. Continued dependence on this practice can not ensure proper operation and maintenance of sanitation projects, and most likely will continue to shorten the useful life of existing sanitation projects or cause their breakdown. Recognizing these deficiencies, Congress enacted the Indian Health Amendments of 1992 to assist Native communities with Federal O&M funds. Requests for funds to carry out this congressional mandate have not yet been submitted by the Indian Health Service.

IHS and VSW continue to experience growing pressure to provide improved sanitation projects to villages still operating honey buckets. The increasing economic and O&M-related difficulties

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faced by those communities in which sanitation projects have already been built, illustrates the need to avoid installing similarly complex technologies in other communities that appear to have few economic or technical resources to operate them, unless outside support for O&M could be guaranteed. IHS and VSW personnel have recently begun to work with Native communities in the identification and testing of other simpler and less costly systems.¹⁷

Problems surrounding sanitation in rural Alaska are complex and should demand participation by all potentially relevant Federal and State agencies. In addition to IHS and VSW, a considerable number of Federal and State agencies currently

exist with programs that directly or indirectly support sanitation-related functions in Native communities. A strong framework for cooperation between agencies exists at all levels; however, there does not appear to be an overarching rural village policy to guide agency coordination and concrete action in the field. It appears that throughout the organizational structures of existing agencies, government officials interact with counterparts only in accordance with the demands of their individual responsibilities. And although some success has been achieved by this action-oriented process, greater efficiency of service delivery could be realized with more coordinated inter-agency policies and guidelines.

¹⁷ Alternative waste sanitation technologies with potential for application in rural Alaska are discussed in ch. 5.