

Alaskan Native Villages and Their Sanitation Problems

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GEOGRAPHIC SETTING

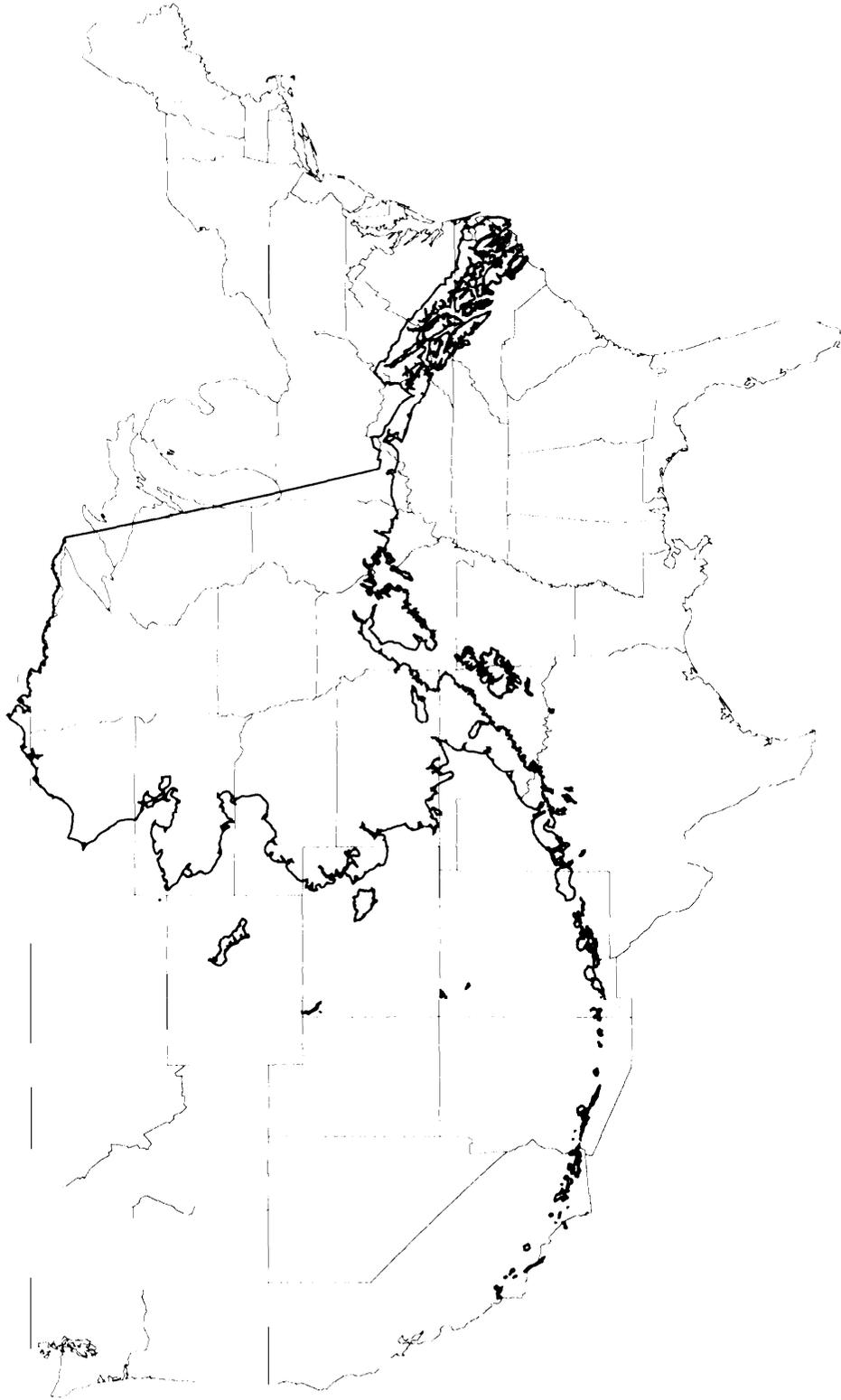
Alaska sweeps across approximately 30 degrees of longitude and covers a total of almost 600,000 square miles. It is the largest State of the United States and is approximately 2.2 times the size of Texas. If Alaska were placed as an overlay on the lower 48, with the western end of the Aleutians matching the southern California coast, Barrow would be found at the U.S.-Canadian border in Minnesota, and the tip of the southeast panhandle would be found near Charleston, South Carolina (figure 2-1). The vastness of this envelope, which is virtually devoid of roads, influences almost every aspect of life in the State.

Diversity is a hallmark of the Alaskan environment, as well as of its people. It has abundant examples of Arctic deserts, northern rain and timber forests, treeless tundra, swamps, and wetlands. It has sand dunes east of Kotzebue, ice fields and glaciers that are larger than some States, the highest mountains in North America, and broad expanses of lowlands. Considerable effort has been devoted to identify and classify the geographical wealth of Alaska technically; for the purpose of this report, however, only four general areas are arbitrarily considered: southwestern Alaska, western Alaska or the Bering seacoast region, interior Alaska, and the Arctic region.

Southwestern Alaska includes the Alaska Peninsula and the lengthy sweep of the Aleutian Islands, which reach out to the Orient. Of all four regions considered here, southwestern Alaska offers the most startling contrasts, ranging from the lightly wooded hillsides and rugged mountains of the Alaska Peninsula, to the barren, treeless volcanic Aleutian Islands. It also includes the Yukon-Kuskokwim Delta, a geography of meandering rivers and a scattered population dominated by Alaskan Natives. The large



FIGURE 2-1: Comparison of Alaska's Surface Area With That of the Lower 48 States



SOURCE: 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, DC, Aug. 15, 1993.

majority of Native villages located in the Yukon-Kuskokwim region are characterized by severe poverty and inadequate sanitation conditions—the latter being the major focus of this report. Box 2-1 briefly describes some of the historical characteristics of the Native groups who settled in this region.

Western Alaska, also referred to as the Bering seacoast region, stretches from Bristol Bay in the south to Norton Sound and the Bering Straits in the north. It is a typically cool, rainy, and foggy area, with summer temperatures of 50 to 70 °F and winter temperatures hovering around 0 °F. The significant and sudden changes in ambient temperature caused by the strong local winds generally render this region dangerous for the unprepared.

Much of the Bering seacoast is virtually treeless tundra with underlying areas of continuous and discontinuous permafrost. It also contains uncounted thousands of small lakes, tundra ponds, and rivers that are wide, shallow, and of very low flow velocity. Low-lying areas and their communities are subject to annual flooding caused primarily by low relief and ice jamming during spring breakup. Most local residents often seem to endure this condition as an inevitable feature of life, and even though some have moved to higher ground, a large number still refuse to relocate. Poor sanitation conditions continue to be found among many Western Alaska Native villages.

The Interior Region of Alaska lies between the Alaska Range north of Anchorage and the Brooks Range in the far north. The Continental Divide extends east-west through the Brooks Range, ending at the Chukchi Sea on the Arctic Coast. The region contains the upper reaches of the Yukon, Kuskokwim, and Tanana rivers, although the headwaters of the first two are found deep in the Northwest Territory of Canada. The Yukon is the longest river in Alaska, with a total length of some 1,875 miles.

Temperatures in the interior region often drop to -60 °F in winter, producing ice fog that hovers persistently over frigid communities in mercifully still air. Although winters are cold, summers can

be hot, with temperatures commonly in the 90s. Although rainfall may only average about 12 inches annually, snowfall can reach 10 feet or higher. Because of the prolonged low winter temperatures, snow tends to be finely divided, fluffy, and easily drifted. Winter melting and loss of snow through sublimation are insignificant, and an entire winter's snowfall is usually preserved until spring. Fairbanks, with a population of 32,000 people, which makes it the second largest city in Alaska, is in the heart of the interior region.

The Arctic region extends from the southern limits of the Brooks Range, which forms a 9,000-foot barrier between the interior and the North Slope. It extends from Kotzebue, just north of the Seward Peninsula, eastward to the Canadian border. The North Slope, which is some 750 miles long from east to west, and about 250 miles wide, consists of vast areas of rolling uplands, mountains, and extensive coastal plains that stretch northward toward the Arctic Ocean. Trees are absent from the entire Arctic Slope region, except for occasional thickets of alders, willow, and Arctic or resin birch, which can be found mostly in river valleys.

The Arctic region is characterized by Summer's midnight sun and sunless winters. Low winter temperatures are moderated by prevailing northerly winds. For example, the average July temperature at Barrow is 40 °F, whereas the average January temperature is -17 °F. A total annual precipitation of some 5 inches renders the area a desert. A historical perspective of the Natives who settled in the Arctic is presented in box 2-1.

The Arctic Slope is where the oil is. Vast deposits of petroleum were discovered in the vicinity of Prudhoe Bay during the late 1960s, along with equally vast deposits of natural gas. The Prudhoe Bay oil fields lie alongside the Sagvanirktok River Delta, about 70 miles west of the Arctic National Wildlife Refuge. These resources have made the North Slope and its few communities some of the wealthiest in the State.

BOX 2-1: Native Peoples of Alaska

The first humans who populated Alaska, and subsequently the Americas, were thought to have migrated from the Siberian Far East. These early nomadic hunters and gatherers probably crossed a land bridge between Asia and North America. Today, some 60 miles of cold ocean exists in place of the now submerged historical route. It is thought that this migration contributed significantly to human occupation of what is now the United States, Canada, Central America, and South America. In modern Alaska, several groupings of Natives can be distinguished. All have seemingly arisen from the original period of migration. The following is a historical perspective of the major Native groups whose descendants now live in the State

Southeast Coastal People

The coastal Indians comprise three distinct groups, including the Tlingits, Haidos, and Tsimshians. These people are found in southeastern Alaska and Canada roughly between Yakutat, Alaska, in the north, and Prince Rupert, British Columbia, in the south.

The Tlingits (pronounced "Klink-its")—the most numerous of the three—were scattered throughout the southeast in relatively permanent villages. The historical permanence of Tlingit villages is thought to be due to the relative immobility imposed by the mountainous terrain. These people made a living by fishing and hunting in the moderate climate and generally abundant coastal environment of the southeast.

The Tsimshians and Haidas (pronounced Sim'-she-ans, and High' -alas, respectively) occupied the Queen Charlotte Islands, the southern part of Prince of Wales Island, and the mainland of southeast Alaska. They collectively represent a small part of the Native population of the southeast. These people are culturally distinct from the Tlingits, but subtly so. It is thought that during the time of the first Russian contact, the Haidas were in the process of displacing the Tlingits northward through periodic warfare. In general, the Natives of the southeast were and are significantly more aggressive than other groups found elsewhere in Alaska.

The indigenous people of the southeast, or Indians as they have come to refer to themselves, are people averaging 5 feet 8 inches in height. They are known to use fish traps, nets, and dip nets for fishing, and harpoons for both hunting of sea mammals and fishing. The surrounding environment, and the proximity to the ocean and inland marine channels, created a strong cultural focus on marine resources that continues today. Until the early 20th century, the Indians utilized large spruce and cedar trees on the immediate shoreline to craft canoes, totem poles, and dwellings, but they never developed inland settlements to any significant degree.

Warfare was a well-developed practice among the Natives of southeast Alaska. Strife was usually directed toward driving out or even exterminating neighboring groups of another matrilineal line. In doing so, the victorious group would acquire all the possessions of the vanquished, including its land, dwellings, and access to traditional resources. This belligerence is in stark contrast to the conciliatory nature of the Natives in the Arctic and western Alaska. In these regions, environmental conditions were thought to be so severe as to require cooperation among nomadic groups to ensure collective survival.

Inland People

The Athapaskan Indians occupied a vast expanse of inland Alaska stretching from the Arctic and sub-arctic regions along the entire northern perimeter of North America. This region is generally referred to as '(the Interior. " It offers a demanding and harsh environment without easily accessible resources. With no access to the bounty of the ocean and the coastal margin, the Athapaskans turned to the land and rivers for subsistence.

The Athapaskans of the northern interior lived along the Yukon River and its tributaries, ranging from just north of the Yukon Delta westward into Canada to the Mackenzie River. This region is mountainous and is dominated by a series of small mountain ranges bounded on the north by the Brooks Range. The Brooks Range serves as a natural barrier to north-south migration and contains great environmental contrasts. The region is characterized by long cold winters and brief but warm summers,

The Athapaskans had limited social organization in contrast to the people of the southeast. They generally followed a somewhat mobile lifestyle and interacted loosely with the various roving bands with whom they had contact. They were not generally regarded as a nomadic people. A subsistence lifestyle emerged in which they relied on caribou, moose, migratory salmon and other fish, and berries. In addition, they were adept at trapping fur-bearing mammals both for food and for use as clothing. These people today consider themselves to be true Indians of the north, and are strongly adapted and bonded to an inland life in broad river valleys, mountainous terrain, and forests.

Aleutian Islands People

The Aleuts, like other Alaska Natives, adapted themselves superbly to life in the unique marine archipelagic environment of the Aleutian Islands. This is a harsh environment of volcanic peaks, almost constant high winds, dampness, fog, and moderate temperature. The unique weather found throughout the island chain is the result of cold Arctic water on the north side of the islands meeting warm northern Pacific waters on the south. Primarily because of high winds, the Aleutian Islands are essentially treeless, with vegetation dominated by grasses and low shrubs.

The Aleuts, living in a relatively ice-free marine environment, developed sophisticated open-ocean hunting and fishing techniques that allowed them to harvest sea otters, hair seals, sea lions, and an occasional whale. Abundant populations of these animals were found on Kodiak and Unimak, which resulted in a concentration of Aleuts on these two islands. Nevertheless, virtually the entire Aleutian Chain was populated with these indigenous people who are characterized as inventive, and generally mild and agreeable.

Arctic Coastal People

The Eskimos ranged all along the Arctic Coast of North America from just north of the Seward Peninsula eastward around the pole to Greenland. A great deal of literature has been written about these unique people who have adapted so well to life in the Arctic. They inhabit a land of great environmental diversity and, contrary to popular belief, do not generally live amid perpetual ice and snow. Also, Alaskan Eskimos did not live in ice block houses as some Greenland Eskimos historically have.

It is fair to say the Eskimos in Alaska, and probably elsewhere, are traditional subsistence people with a strong bond to a coastal and marine lifestyle. Although the traditional Eskimo lifestyle and culture have been lost, the hunting of marine mammals and subsistence on the bounty of both the land and the ocean remain vitally important.

Historically, physical survival depended on the ability of individuals and groups to execute successful hunts. Even today when the first whales of the season are sighted, entire villages will mobilize to capture them, and all other activities cease. This spirit of cooperation, even to the point of helping one's opponent succeed, characterizes modern Eskimos. Competitiveness as conceived in Western cultures is foreign to many Eskimos.

The Native peoples of Alaska are many and varied in character. All of them have adapted to the specific demands of distinct regions of Alaska and have succeeded historically in establishing viable lifestyles. They came in direct conflict with the lifestyle of Western explorers, traders, and settlers, who generally tended to be much more aggressive and effective in imposing their culture. The Native people of Alaska, like those in other parts of the world, have suffered the loss of culture, lifestyle, and identity as a virtually inevitable result of the introduction of foreign attitudes, values, and practices.

The Native people of modern Alaska represent a people in transition. Traditionally, Natives simply relied on their own resourcefulness, and that of their extended families, to tap the bounty that surrounded them. In some cases it took considerable ingenuity to access resources that to the Western eye may have appeared nonexistent. Despite the apparent desolation, it was possible to subsist and thrive on available resources as long as a balance was maintained.

(continued)

BOX 2-1: Native Peoples of Alaska (cont'd)

The concept of subsistence as a lifestyle is typically interpreted by Westerners as a condition of bare survival. This is almost diametrically opposite to the Native concept in which subsistence comprises all of the activities associated with living, sometimes quite comfortably and securely, on the resources available from the surrounding environment.

It is important to realize that subsistence Natives in Alaska generally do not work in the Western sense they subsist. Historically, no need existed for work in the Western, commercial cash-based sense. This significant distinction must be recognized in order to understand Native attitudes.

SOURCE 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, DC, August 15, 1993

MODERN ALASKA AND EMERGENCE OF NATIVE CORPORATIONS

The five most distinct cultural groups found in Alaska are the Inupiat (Northern Eskimo), Yupik (Southern Eskimo), Aleuts, Athapaskans, and Indians (Tlingit, Tsimpsian, and Haida) (figure 2-2). Throughout most of their history, these indigenous cultures were affected by the climate and geographic characteristics of the region in which they settled. Western contact, which intensified throughout the 20th century, brought about social and cultural changes that were rapid, extensive, and difficult for many of these groups to assimilate.

By the mid-1900s, the last of the hunters and fishermen had abandoned their nomadic ways of life. Fur trading was usually the entry activity for Alaska Natives into a cash economy. Seasonal wage-paying jobs subsequently became more commonplace. Although nomadic ways were generally abandoned, and "village" lifestyles adopted, many villagers continued to depend on seasonal subsistence hunting and fishing. This tradition continues, and in fact is growing in some areas, as Native peoples select a modified traditional or "subsistence" lifestyle as a compromise with truly Western living.

Originally, the introduction of Western diseases wrought havoc among susceptible Native

populations. As the effects of diseases subsided during the first half of the 20th century, they were replaced by a full range of social problems. These included alcoholism, physical abuse, suicide, sexually transmitted diseases, and lately, drug and substance abuse. The aboriginal population, which was estimated to be approximately 80,000 a few years earlier, had declined to a low of 25,000 by 1909.

During the most recent period, two separate and seemingly conflicting movements have emerged among Alaska Natives. One is led by more "assimilated" Natives who are working to administer land and financial resources under the corporate structure mandated by the Alaska Native Claims Settlement Act of 1971.¹ The second movement began with the more traditional Natives who are seeking to protect their land base and their hunting and fishing lifestyle, as well as to obtain greater control and autonomy over community life. These movements seem to be advocating contradictory "modern" or "traditional" lifestyles. The land claims and tribal movements are discussed in detail in appendix A.

Life in Alaskan villages began to take its current shape by the 1950s. By this time the last of the truly nomadic groups had settled into permanent communities. This ended the transformation that began with the establishment of fur trading cen-

¹P.L. 92-203, Dec. 18, 1971, 85 STAT. 688 (Title 43, 1601-1624).

ters, government and missionary schools, and other centers of Western influence. The process was begun by the Russians in the 1780s and advanced by Americans a century later after the purchase of Alaska. Inupiat hunters of the northeastern portion of Alaska were the last of the indigenous people to abandon nomadic lifestyles. New village communities were generally established on sites previously occupied as semipermanent camps.

Mechanized means of all-terrain travel and the availability of firearms increased the land area available for harvesting fish, berries, and game, making possible the establishment of permanent settlements. There was no longer a need to travel to the resources on foot or by dogsled when they could be easily reached by snowmobile and four-wheeler. The understandable result is an increase in population density, and a decrease in the intrinsic worth of traditional hunting, fishing, and “country” living skills. A diminished sense of self-value was also created because not every one was needed as a provider. Many social and emotional problems have resulted from these changes.

By 1960, approximately 70 percent of the total Alaskan Native population, numbering about 53,000 individuals, was living in some 178 villages of predominantly Native inhabitants. These villages were scattered across the 600,000 square miles of Alaska and ranged in size from 25 to 2,500 residents. An additional 50 locations were occupied by fewer than 25 inhabitants, usually including one or a few Native families. Only six communities that were predominantly Native had populations of more than 1,000. The median village population was 155, with larger communities serving as regional centers—now sometimes referred to as service centers or air hubs. In western Alaska, these hubs are Bethel, Dillingham, McGrath, Galena, Nome, and Kotzebue.

The remainder of the Native population lived in communities that were predominantly non-Native. The non-Native communities were often established in areas that had traditionally been inhabited by Natives. In the 1950s the migration of Natives from villages in Alaska to urban centers began, and it continues today. An estimated

16,000 Natives now live in Alaska’s urban centers.

Anchorage is sometimes referred to as the largest Native village in Alaska because of its estimated population of some 10,000 Native residents. This can be misleading because of the high degree of seasonal migration among the urban Native population. Many urban Native people return to their village seasonally to participate in harvesting activities, such as fishing, whaling, berrying, and hunting, and in this way they preserve elements of a traditional way of living.

Almost all Native villages are geographically isolated from major urban centers. Virtually inaccessible by land during the warmer part of the year due to extensive wetlands, their primary means of extended travel is by air. Overland winter travel is somewhat easier but hazardous, as is travel on rivers, whether frozen or not. Fewer than a dozen villages are accessible on Alaska’s limited road system. Access to the majority of the villages is available by airplane, boat, snowmobile, or dogsled. In the last decade, the Alaska Ferry System (the Marine Highway) has been expanded to include several villages in southeastern and southwest Alaska. It is helpful to keep in mind that even Juneau, the capital of Alaska, is not directly accessible by road and is frequently unreachable by airplane due to poor weather.

Communication with the villages is generally by mail, radio, or telephone (since the 1970s), and more recently through the use of communication satellite. Television is available in most villages through the Rural Alaska Television Network, bringing full exposure to world events and entertainment to the most remote parts of the State.

Alaskan aboriginal hunting and gathering economies of the past were independent, autonomous, and truly of the subsistence type—meaning a dependence on traditional activities for living off the land. Modern subsistence hunters and fishermen now require cash to purchase tools, equipment, and supplies. Items such as snowmobiles, outboard motors, fuel, rifles, and ammunition have improved the efficiency of subsistence productivity and have altered many traditional subsistence harvest methods. The elevated level of

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productivity has resulted in a better standard of living, a greater capacity to support one's family, increasing village populations, and hence, an induced need to sustain the higher level of productivity. High levels of subsistence productivity are possible only with the increased productivity enabled by cash-purchased goods. In this way, Natives have become wedded to cash economies for goods that cannot be manufactured by village resources alone. Today, the term "subsistence" has been adapted to include the mixed economy of true subsistence and cash-based pursuits.

The current nature of the village economy in Alaska is a blend of subsistence and cash, sometimes with a preferred emphasis on subsistence. Cash is infused into the subsistence-based economy from wage employment, the sale of goods produced through subsistence activities, and transfer payments from various governmental sources.

Members of the traditional social groups or extended families will often alternate among themselves between various subsistence activities and wage-paying jobs to ensure that their needs are met. It is not unusual for a wage-earning individual in a village to simply not perform cash work for several days or weeks during the salmon or caribou migration. For Alaskan Natives, this is considered a balanced approach that satisfies both the subsistence need and the need for cash. (Consideration of a village's subsistence practices by Federal and State agencies planning to use the local labor force to build sanitation projects can often help to avoid costly construction delay s.)

This attitude is not unusual in indigenous societies elsewhere in the world where cash is not a primary motivator. For Alaskan Natives, survival (subsistence off the land) has historically been a matter of living through long winters. As in the past, it is still possible to live off the land. But gathering the stores of food needed to survive the long winter without cash may prove difficult for those Natives grown accustomed to purchasing bullets, fuel, nets, and snowmobiles. Even today, this stark reality is made apparent to non-Native visitors in remote Alaska when travel in the "bush" is forcibly interrupted by weather and other natural phenomena. Most prudent winter travel-

ers, even those driving along the highway between Anchorage and Fairbanks, will carry the food and shelter needed to survive a day or two of forced delay.

Certain village members will often contribute cash, or purchase supplies and equipment for the hunters, in exchange for a share of the subsistence harvest. The elderly do this by contributions of various longevity transfer payments and thereby support the subsistence lifestyle. In addition, arts and crafts production for sale in the cities and to local visitors is another source of cash to support subsistence pursuits.

Cash also circulates through the subsistence economy as compensation for special skills and services such as sewing, beading, and preparation of traditional artifacts for ceremonial uses. [Individuals may also receive cash as a ceremonial gift in rituals such as the Tlingit and Athapaskan potlatch.

In almost all cases, kinship will dictate membership in a subsistence lifestyle production unit. Generally, households or extended family members comprise the basic production unit. These will often join forces with other such units to form larger groups in the communal pursuits required for hunting bowhead whales, walrus, and beluga whales. It is not unusual for family members living in the cities or even "outside" Alaska to return to the village family in order to participate in seasonal subsistence activities.

The cash economy of a typical rural Alaskan village is dependent largely on the public rather than the private sector. This is likely to be true into the foreseeable future due to the tradition of the people, their desires, the harshness of the climate, and the utter absence of any potential local economy in many village locations. In most rural communities, local, State, and Federal Government expenditures account for fully two-thirds of all earned cash income, the private sector being responsible for the remaining third. The reverse situation characterizes urban Alaska.

Village residents have a per capita income that is considerably lower than that of other Alaskans. The average per capita income for all Alaska is on the order of \$18,000 to \$20,000, whereas the aver-

age per capita income of rural residents is somewhat less than half of this amount. For Native villagers who live outside of regional centers (i.e., hubs and service centers), the average annual per capita income is about \$6,000. Most villagers also receive welfare payments (a part of this income) that are about four times that of the average urban Alaskan recipient.

Village economies are dependent on a subsistence-based lifestyle and governmental support, and therefore are fundamentally different from urban economies. They are extremely sensitive to governmental actions. For instance, decisions to restrict hunting and fishing or to reduce government payments may not affect city dwellers, but these actions can have a severe impact on rural village economies. Among the most essential needs—one that is frequently unavailable to Native villages because of their limited economies—is adequate sanitation.

SANITATION IN NATIVE COMMUNITIES OF RURAL ALASKA

The type of sanitary waste disposal in rural Alaska often varies among native villages; however, the honey bucket system remains the most widespread and least protective of human health in northwest Alaska and the Yukon -Kuskokwim Delta.

The level of sophistication of sanitary waste disposal systems in remote Alaska varies among the 191 Native village communities identified by the Indian Health Service (IHS) for sanitation purposes². As of April 1994, only 102 of these communities were being provided some form of piped sewer service (conventional, circulating, vacuum, gravity, etc.) with flush toilets. In the remaining 89 communities a crude honey bucket is the only

sanitation system in operation (figure 2–2).³ This leads to a high risk of exposure to human waste, poor hygiene, and widespread incidence of disease.

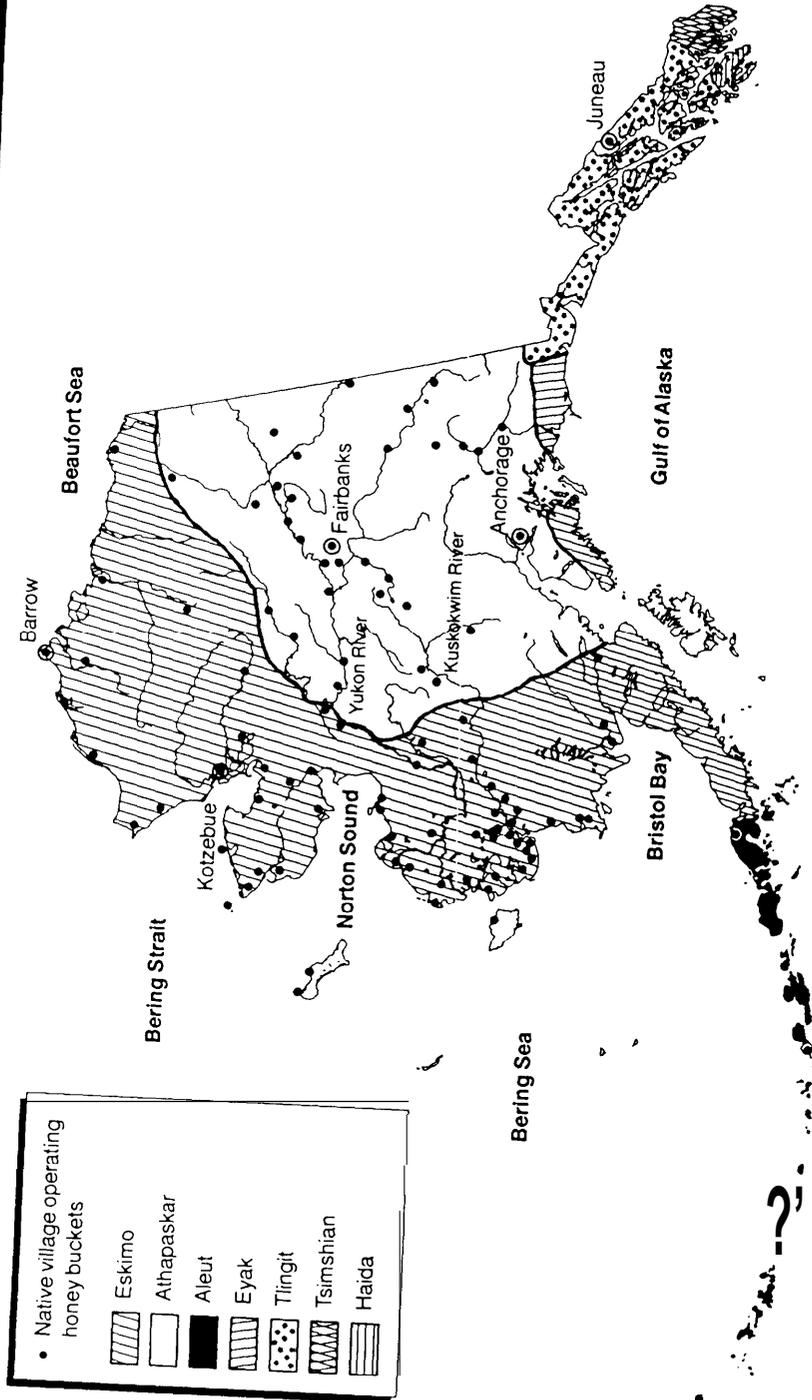
Nearly 20,000 Natives, or about 3.6 percent of the State's entire population, live in these 89 communities that operate only honey buckets. According to II-IS, about 55 of the 89 rural communities, with an estimated population of 8,300 Alaska Natives, have high disease exposure risk because they operate honey bucket systems that require the users to carry untreated wastes to a sewage pond, bunker, or simple privy behind their homes. Lesser risks of human contamination and disease from exposure to human waste appear to exist, IHS officials believe, at the remaining 34 of the 89 Native villages that operate honey buckets because waste is hauled from each house by a truck or all-terrain vehicle. Honey buckets continue to be the most rudimentary sanitation technology in use today by rural Alaska Natives.

Use of a truck-operated system for removing honey bucket wastes is not always a reliable health protection measure. In fact, the management and operation of honey bucket haul systems have been found to vary from village to village: from efficiently operated, well-managed systems, to those in which honey bucket waste is often spilled on streets, boardwalks, or backyards throughout the community. Under the worst-case conditions, the potential for Natives to contract hepatitis A and other diseases is unacceptably high. Such conditions also have a serious effect on village aesthetics and quality of life. About 200,000 physician-patient encounters per year were recently reported in the Yukon -Kuskokwim Delta alone (304). Such statistics help support the impression that current sanitation conditions in many villages of Alaska are no better than those found in developing na-

²A considerably higher number of villages are listed in other databases, for example, 317 by the Alaska Department of Environmental Conservation; however, the IHS list is most commonly used when village sanitation issues are being discussed.

³The wastetechnology euphemistically known as a "honey bucket" is simply a 5-gallon plastic bucket lined with a plastic bag, with a toilet seat on top of it. When filled, the plastic bag is sealed, and the bucket is hand carried and emptied into a haul container, a sewage lagoon, or sometimes merely any convenient location.

Figure 2-2: General Distribution of Alaska's Major Indigenous Cultures and of Native Villages Operating Honey Buckets



SOURCE: Alaska Department of Community and Regional Affairs, *Community/Borough Map, 1993*; Indian Health Service, Alaska Area Native Health Service, *Alaska Area Native Health Service: Description of the Program* (Anchorage, AK: Indian Health Service, 1979); National Geographic Society, *Alaska, supplement to National Geographic*, May 1994; U.S. Federal Field Committee for Development Planning in Alaska, *Alaska Natives & the Land* (Washington, DC: U.S. Government Printing Office, October 1968).



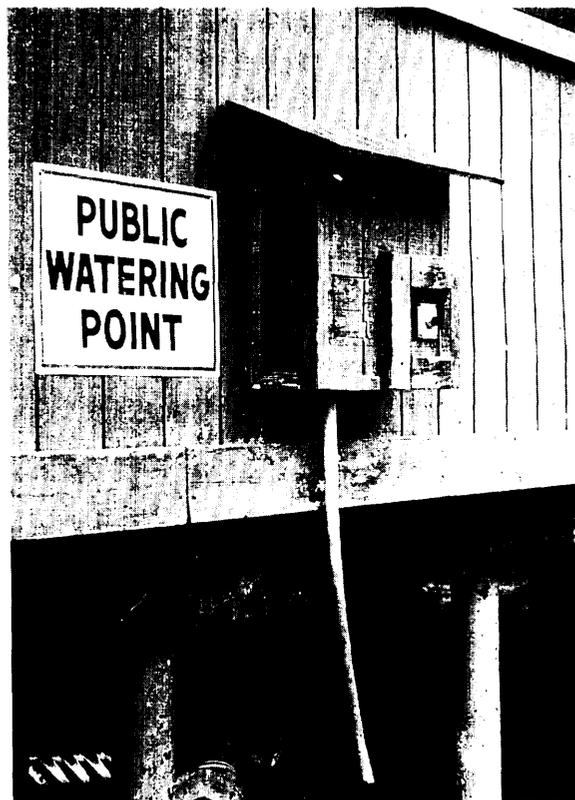
Piped water systems do not exist inside homes in villages that operate honey bucket systems. As a consequence, drinking water must be hauled by hand from a central public watering point

tions. Table 2-1 shows the total number of cases of hepatitis A reported in Alaska for 1987 to 1992. The number of reported cases per individual Native village is listed in appendix B.

Current plans are to replace honey buckets with piped sanitation systems in 10 of the 89 IHS-listed villages. If completed, this will reduce the Native population that depends on this rudimentary sanitation technology from nearly 20,000 to about 16,000. However, most Native villages have little or no local economy and must obtain external financial assistance to build the advanced but costly sanitation technology (i.e., conventional piped systems) traditionally favored by Federal and State agencies. Federal and State agencies have not formally supported the development of alternative sanitation technologies that may be more affordable than conventional piped systems.

9 Health Epidemics and Sanitation Services

The outbreak of epidemics repeatedly experienced by Alaska natives is primarily the result of poor hygienic conditions caused by inadequate sanitation services.



Throughout rural Alaska, but particular] yin the western, southwestern (mostly the Yukon-Kuskokwim Delta), and parts of the Arctic regions, the outbreak of disease is commonly a result of exposure to human waste and deficient personal hygiene. These conditions range from chronic influenza-like symptoms to hepatitis and enteric diseases. Endemic enteric diseases are certainly caused by habitual contact with human waste. Contact occurs on an individual basis, as a matter of casual contact between individuals, particularly through changing diapers or children playing, contact with waste in the open environment, and inadequately protected disposal areas. Because of the spillage of human waste that occurs on community roads and boardwalks during its transportation to the disposal site or lagoon, the exposure of residents, particularly children, is frequent.

TABLE 2-1: Reported Cases of Hepatitis A in Alaska Between 1987 and 1992

Year	1987	1988	1989	1990	1991	1992
Cases	241	596	643	190	96	130

SOURCE John A Olofsson and H P Schroeder, University of Alaska Anchorage, *Sanitation Alternatives For Rural Alaska*, report prepared for the Congressional Off Ice of Technology Assessment, Washington, DC, Aug. 15, 1993

Although the majority of rural Native villages in these regions are provided potable water at a central location, the residents' inability to truck water to their homes limits the amount of water that could or should be available for hand washing and personal hygiene. This, in turn, increases the risk that individuals, especially children, have of contracting diseases from exposure to human waste.

The outbreak of epidemics of otherwise commonly preventable diseases such as hepatitis A, hepatitis B, bronchitis, serious ear infection (otitis media), impetigo, and meningitis in remote Alaskan communities is often attributed to poor sanitary facilities (300). In fact, virtually all sanitation improvement projects for Native villages cite the frequency of disease outbreaks as a major factor justifying the need for such projects.

As part of this Office of Technology Assessment (OTA) study,⁴ the 1988 outbreak of hepatitis A was examined to determine the correlation between the level of sewer service and the incidence of disease. Although the spread of this disease is often caused by close contact and person-to-person transmission, as opposed to transmission from the environment directly to the individual, OTA's evaluation showed, as have many similar studies, that the prevalent cause in most epidemic cases of enteric diseases among rural Native villages is a lack of running water to practice good sanitation and maintain good personal hygiene (wash, flush toilets, etc.).

In communities where water is hauled from a watering point, the predominant method of dis-

posal is usually the honey bucket. This conclusion has been supported by previous studies (204) that correlated water supply and sewage systems with the incidence of preventable disease. In fact, OTA's brief evaluation of epidemiological data shows that throughout the State of Alaska, Native villages with honey bucket systems accounted for 72 percent (218 of 301) of the reported cases of hepatitis A in 1988.

Hepatitis A and B cases are most widespread in the Yukon-Kuskokwim Delta region of southwestern Alaska. There, the rate of incidence of hepatitis A and B is, according to local public health experts, one the highest in the United States. Nearly 2,000 people in the region, mostly children, were affected in the last hepatitis outbreak that occurred in the mid- 1980s, whereas the number of cases in areas with adequate water and sewerage was minimal (173). Reviews of the 1988 hepatitis A outbreak data show that village members of the Calista Regional Corp. in the Yukon-Kuskokwim Delta accounted for almost half (46 percent) of the cases reported throughout Alaska that year. Because epidemic waves of these diseases are expected every 15 to 20 years, a greater number of casualties may result in the future if proper sanitation measures are not taken in advance. However, prevention of an epidemic does not seem possible unless communities are provided with sufficient water to practice good sanitation and more adequate means of handling human sewage than the 5-gallon plastic container, euphemistically called a honey bucket, now provides.

| Categories of Sanitation Conditions

The Village Safe Water (VSW) program of the Alaska Department of Environmental Conservation is the State agency with primary jurisdiction over sanitation planning and construction issues associated with Native villages. As part of its responsibilities, the VSW has established five lev-

⁴ Although the OTA analysis was directed at a specific outbreak of hepatitis A in 1988, additional analyses of similar epidemics may well reveal the same results.

els of service to categorize the different methods used by Native communities to dispose of human sewage.

Level a represents the most rudimentary service and consists principally of the use of pit toilets, privies, and honey buckets. Unlike pit toilets and privies where use and disposal are closely related, proper operation of honey buckets requires that residents carry the accumulated wastes out of the house to a disposal site away from the community. More frequently, however, one finds that honey buckets either are emptied on the ground in the immediate vicinity of the residence or carried to nearby pit bunkers by residents of individual households. Alternatively, they are emptied in other convenient locations, including frozen rivers, the ocean, tidal plains, tundra ponds, and sewage lagoons. The rural Native villages currently operating honey bucket systems in Alaska as their only sanitation technology are shown in figure 2-2 and listed in appendix C.

Level b sanitary waste disposal service provides for the hauling of honey bucket wastes by a community employee. Individual residents in these communities haul the waste from their respective households to central collection points known as honey bucket bins. There are more than 800 black plastic bins in use today. When filled, the bins are hauled to the community sewage lagoon by snowmobile, all-terrain vehicle, or truck. Although truck haul represents an improvement over level a sanitation, the inadequate design of certain system components (e.g., lids, trailers, and bins) means that some village residents come in contact with the waste.

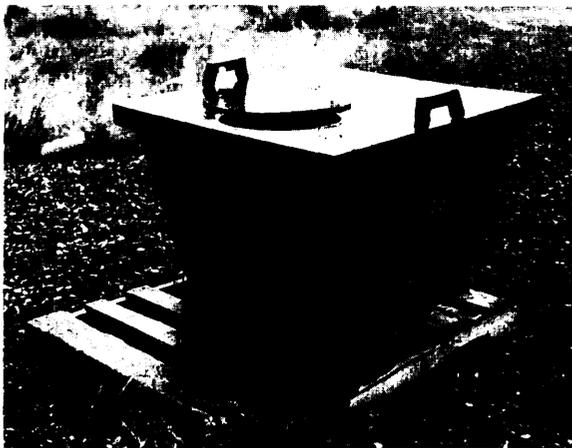
In some villages operating levels a and b systems the health risks are lower than others. For example, in the coastal areas of southeast Alaska, small villages might dispose of honey bucket waste directly in the ocean. Although environmental damage is possible, if the populations are small enough the amount of waste disposed in this manner may cause little environmental harm and have little impact on public health. However, improved sanitation services will be needed as the size of these communities increases.



Bagged human wastes are sometimes stored temporarily at a convenient location, perhaps adjacent to the home, prior to their disposal.

Level c encompasses systems with flush toilets, holding tanks for collecting waste, and hauling of wastes to a disposal area by a truck service. Sewage collection tanks can be either large insulated tanks located outside the residence or smaller containers located inside the home. The tanks are emptied periodically by a pump or vacuum collection vehicle operated by the community. Adequate water must be provided for flushing year-round. Although residents provided with this level of sanitation service are ensured minimum contact with the waste, the costs for operating truck haul technologies (operator's salary, truck repairs, road maintenance, etc.) are higher than those incurred by communities with sanitation levels a and b.

Level d systems have flush toilets that discharge to septic tanks and leach fields. About 26 of the 191 villages identified by IHS operate this sys-



In some villages, honey bucket wastes are emptied into haul containers or bins strategically placed along village streets or boardwalks. Bins are periodically hauled and emptied at the village disposal area.

tern. A high degree of community sanitation can be achieved cost-effectively with the use of septic tanks; however, they work only in regions with well-drained soil above the seasonal water table. An adequate water supply for flushing must also be provided year-round. Such requirements preclude the application of level d systems in many remote Alaskan locations, particularly those with riverine delta topography such as the Yukon-Kuskokwim and Northwest Arctic regions. Operation and maintenance costs for villages operating septic tanks (appendix C) are generally lower than those of level c primarily because road maintenance activities, for example, are no longer required.

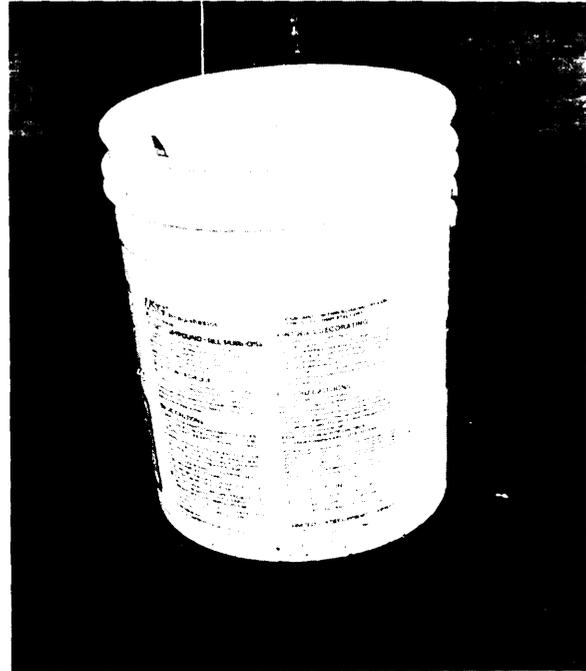
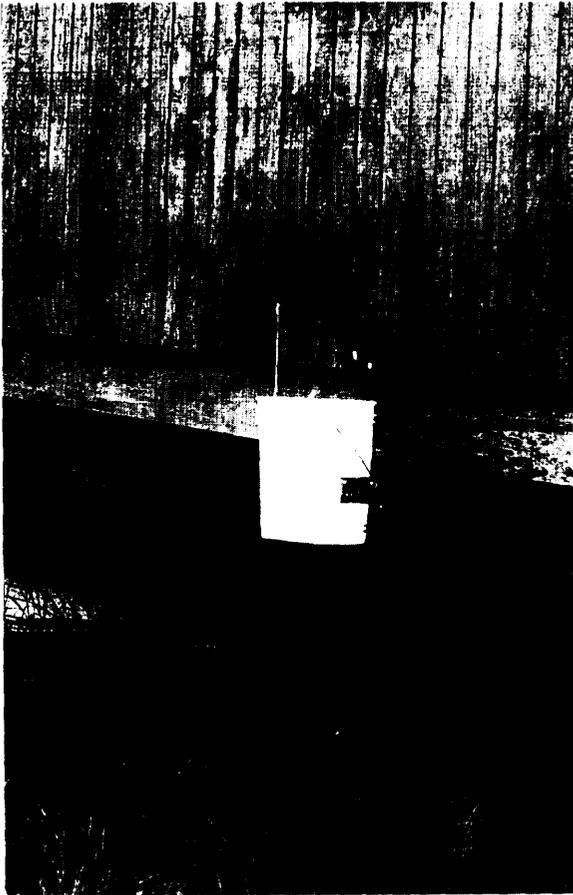
Level e-flush toilets and piped sewerage—represents the highest technical and safety level of wastewater disposal service provided to Native communities of Alaska. Contact with waste is virtually eliminated, provided there is an adequate supply of water to operate the piped technology (including gravity, pressure, or vacuum systems). To date, 72 of the 191 Alaskan Native villages identified by IHS have been provided with level e piped waste sanitation services (appendix C). However, the construction of these systems has often been difficult and costly because of the harsh environment and remoteness of the villages.

WATER AVAILABILITY AND SANITATION IN RURAL ALASKA

Despite the large bodies of water found throughout the state of Alaska, the water actually available at any time for practicing good sanitation is generally inadequate.

Rural Alaska, particularly the western, Arctic, and interior regions, appears to contain an almost endless number of rivers, lakes, and tundra ponds. Despite this hydrologic abundance, obtaining water for drinking and sanitation on a continuous basis in these areas is often difficult. During the warmer months, for example, water can be collected from surface sources such as rivers and lakes, but treatment is generally required to eliminate glacial silt and other dissolved organic or inorganic materials prior to drinking. The use of gutters or drains to collect rainwater from house roofs, as noticed during a recent visit by OTA staff to rural Alaskan villages, is also popular. Different methods are employed during the winter months, including drilling intake holes through frozen Arctic rivers and lakes, digging wells sometimes 200 to 400 feet under the permafrost, or chopping ice from lakes and rivers (ice chunks are placed in 30-gallon plastic trash cans and brought into the home to melt).

Because of the absence of some means of piping and hauling water to the home, all water consumed and discarded by residents must be hauled by hand. The work involved in hauling water, usu-



The use of gutters or drains to collect rainwater from house roofs for domestic consumption is also popular among many Native villages.

ally by 5-gallon pail, is burdensome and continual. A village watering point may be a hundred yards or more from the point of intended use, thus discouraging increased consumption.

Summer conditions in the interior areas of Alaska with severely limited rainfall include dusty roads, temperatures in the 80s, mosquitoes, subsistence demands,⁵ and other factors that conspire to reduce one's willingness to haul water for use and then haul it again for discharge. Under winter conditions of short days, cold temperatures, and blowing snow, the manual hauling of water is an onerous task.

Typically, rural residents will use and reuse water-filled wash basins in the bathroom for per-

sonal hygiene. Such basins are frequently used until the water becomes visibly contaminated, at which point it is discarded. This is often accomplished by simply tossing it out the back door. Clearly, the opportunity for transmission of disease is increased under such conditions.

The lack of adequate water supplies often increases the risk of disease in Native villages that operate on honey buckets (61). In these communities, honey buckets are used not only in residences but also in local government and commercial buildings, and even medical clinics. When filled, the buckets are generally carried and emptied by hand into the village disposal site. Unfortunately, the community's lack of adequate running water for washing hands after using or disposing of honey bucket contents makes it very difficult to

⁵ Subsistence is defined by economic experts as the "household production of goods and services for domestic consumption or sharing. In its ideal form, subsistence is autarkic and precludes extm-local trade or cash markets for goods and labor services" (249).

limit human contact with the raw sewage and avoid disease (300).

Limitations on water availability in rural Native villages also affect the operation and delivery of health care. For instance, 26 out of the 47 villages with clinics utilized by the Yukon-Kuskokwim Health Corporation are without water and sewers, even though nearly 200,000 physician-patient encounters per year were reported recently. Although clinics are the communities' "front line of defense," a respected Native leader recently concluded that the lack of running water precludes either the community or its clinics from having good sanitary conditions (304).

The prevalence of enteric disease in rural Alaska may not be reduced until personal hygiene in the home can be improved. This seems unlikely without sufficient quantities of clean water that can be obtained easily and inexpensively—a difficult prospect to achieve.

CONCLUSION

To telescope history, Western man found in Alaska a fully subsistence-based aboriginal people living nomadically in small groups. Their lives were originally controlled, sometimes severely, by natural events and the requirements of the environment surrounding them. With the advent of improvements in subsistence harvesting, due largely to the availability of cash and the implements it made available, populations were able to increase and the average life span lengthened.

Now, a new composite cash-subsistence lifestyle has emerged that is based not only on subsistence

abilities, but also on the vagaries of external economies. Changes in external economies ripple through Native villages and cause their residents to revert to a subsistence lifestyle they have more immediate control over—only to later find that regulations, controls, and the realities of existing village conditions prevent successful reliance on past practices to fulfill all their needs. The most basic of these needs is sanitation, which cannot be provided at adequate levels by local economies alone. Continuing subsidy appears essential if Natives living in rural Alaska are to have adequate water and sewerage facilities.

In spite of these advances, nearly 20,000 Native people living among 89 rural village communities continue to live in conditions created by inadequate sanitation that are highly conducive to contracting hepatitis A, hepatitis B, and other diseases. Children are specially at risk. Concerned individuals and critics commonly refer to the poor sanitary conditions found in Native communities as being no different from those found in developing nations. And, because epidemic waves of these diseases are expected every 15 to 20 years, additional health casualties are expected in the future if sanitation technologies more advanced than the honey bucket are not adopted. Improving village sanitation and preventing possible epidemics appear highly difficult today because conventional technologies are very expensive to build and maintain without outside financial assistance. Developing alternative technologies or methods that are more affordable for communities with limited economies is a solution still largely untried by Federal and State sanitation agencies.