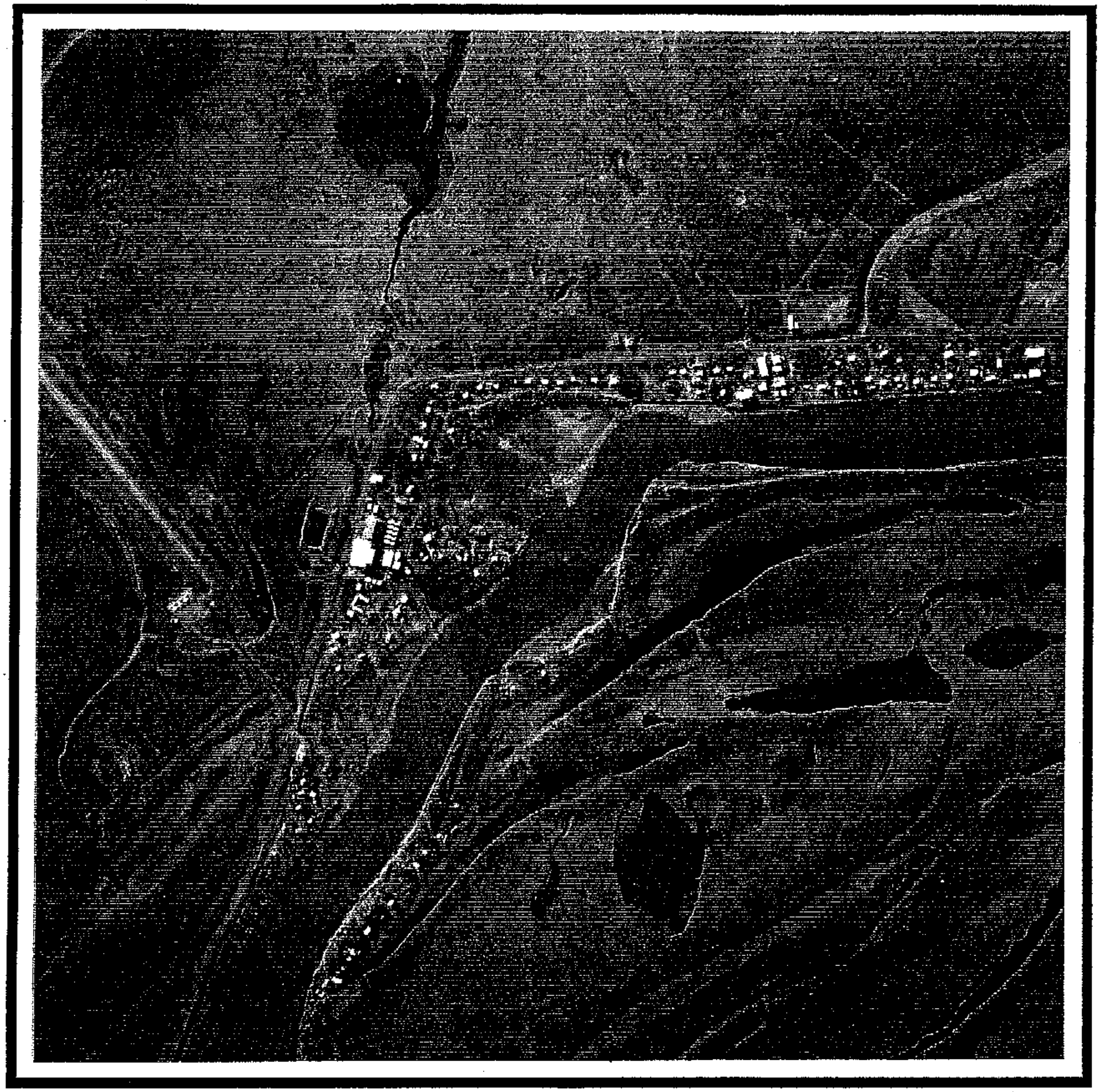
FINAL REPORT
COMMUNITY WATER, SEWER, AND SOLID WASTE MASTER PLAN



FOR THE
CITY OF ALAKANUK
AND
VILLAGE SAFE WATER

MAY 19, 1993

DAMES & MOORE
5600 B STREET, SUITE 100, ANCHORAGE, ALASKA 99518-1641
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May 19, 1993

Mr. Ray Oney
City Manager
City of Alakanuk
P.O. Box 167
Alakanuk, AK 99554

Final Report
Community Water, Sewer, and
Solid Waste Master Plan
Alakanuk, Alaska
D&M Job No. 25654-001-160

Dear Ray:

We are very pleased to submit our final Master Plan. The comments which were received regarding the 95% complete submittal have been reviewed and the appropriate changes made.

If you have any questions or need any additional information, please contact us.

Very truly yours,

DAMES & MOORE

Deborah S. Allen

Deborah S. Allen
Project Engineer

Michael L. Foster, P.E.
Project Manager

MLF/DSA:jj
SFMP-FNL.RPT

cc: Mr. Paul Gabbert, Village Safe Water
Mr. Ladd Folster, U.S. Public Health Service
Mr. Pat McAree, Remote Maintenance Worker

FINAL REPORT
COMMUNITY WATER, SEWER, AND SOLID WASTE MASTER PLAN
FOR
ALAKANUK, ALASKA

Prepared by

DAMES & MOORE
5600 B Street, Suite 100
Anchorage, Alaska 99518

May 19, 1993
D&M Job No. 25654-001-160

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EXECUTIVE SUMMARY

The City of Alakanuk wishes to have upgraded sanitation facilities in order to improve sanitary conditions and the overall quality of life for its residents. To accomplish this goal, the residents of Alakanuk are committed to successfully operating and maintaining their sanitation system throughout its design life. The ultimate goal of the project is to eventually provide a fully piped water treatment and distribution and sewage collection and disposal system. With this objective in mind, we have prepared this Master Plan which outlines the approach which the City will take over the next twenty years to develop, operate, and manage their system.

The development of the ultimate goal of this project will be controlled by the City of Alakanuk, and will be based on funding by government agencies and the City's ability to adapt to successfully managing and operating incremental improvements. **Therefore, there is not a specific time schedule for implementing the various phases of recommended improvements shown in the table on the following page.**

The recommendations presented in this report were based in a variety of information which was collected and analyzed. The most important factors considered during our evaluation were the requirements of the residents as expressed during several public meetings and through interviews and conversations with City personnel and residents. Although initial capital costs were also considered when preparing our recommendations, the ease of operation and management of the various alternatives was of utmost importance because of the difficult conditions often encountered in rural Alaska.

The initial phase of the project will include installing approximately 30 individual holding tank systems for water distribution and sewage collection. This will familiarize the residents with the benefits and responsibilities of a readily available water supply and sewage disposal system. Ultimately, an above-ground circulating water system and combination vacuum, gravity, and force main sewage collection system will be constructed. Sewage treatment will be accomplished by modifying an existing tundra pond to provide a facultative lagoon system south of the AVEC facility. Minor modifications to the solid waste collection and disposal system will be performed in order to improve operation of the system.

Based on our preliminary construction estimates for the recommend options, initial capital costs for construction of the entire system as presented in the Master Plan are expected to approach $13 million. It may be necessary to eliminate or reduce service to some areas such as across Alakanuk Pass and toward the east end of town by the Native Store in order to reduce these capital costs. Eliminating or limiting service to some of the outlying areas will also decrease operation and maintenance costs, particularly if a submarine line is required across Alakanuk Pass.

The following table presents a summary of the proposed phases of the project. The size of the phases were selected based on reasonably sized service areas as shown in Appendix K. Each phase does not necessarily correspond to the construction which will be completed during one year, but rather to the overall development of each service area. For example, although the initial capital costs for construction of the items included in Phase 2 are estimated to be over $2 million, this phase may be completed over two or three years rather than during one construction season. However, some of the work may need to be completed rather quickly, as certain Phases of the project are dependent on one another. For example, before any sort of piped system can be successfully used, the sewage treatment facility and the vacuum plant for sewage collection must be constructed.

Phase	Estimated Initial Capital Costs	Estimated Increase in Annual O&M Costs	Available Funding
Phase 1: - Construct Vacuum Plant Building - Construct Sewage Lagoon - Install Holding Tank Systems (Truck Haul System) - Upgrade Solid Waste Facility	$1,655,000	$10,000 $5,000 $65,000 No Impact	$1.2 million - State of Alaska $0.3 million - HUD-Off-Site
Phase 2: - Install Vacuum Plant Equipment - Construct New Water Intake Structure - Construct Piped System for Service Area 1	$2,254,000	$25,000 $2,000 $10,000	$1 million - EPA Remainder- Unknown
Phase 3: - Construct Piped System for Service Area 2	$2,200,000	$10,000	Unknown
Phase 4: - Construct Piped System for Service Area 3	$1,762,000	$8,000	Unknown
Phase 5: - Construct Piped System for Service Area 4	$1,102,000	$8,000	Unknown
Phase 6: - Construct Piped System for Service Area 5	$2,532,000	$15,000	Unknown
Phase 7: - Construct Piped System for Service Area 6	$1,222,000	$16,000[1]	Unknown
Water Treatment Plant (existing)		$66,000	
System Total (Excludes Haul System)	$12,727,000	$175,000	$2.5 million

[1]This may be significantly higher if a submarine line is constructed.

1.0 INTRODUCTION

Dames & Moore was retained by the City of Alakanuk to prepare a Sanitation Facilities Master Plan. The Master Plan was also prepared under the direction of the Alaska Department of Environmental Conservation (ADEC), Village Safe Water Division (VSW). The primary goal of the project is to improve the quality of life in Alakanuk by providing drinking water, sewage disposal and treatment, and solid waste disposal. The Master Plan presents a twenty year plan for upgrading, constructing, operating, and maintaining improved sanitation facilities.

Prior to the preparation of the Master Plan, Dames & Moore completed several site visits to Alakanuk in order to obtain information and to talk with Alakanuk residents to listen to their ideas and concerns, and to learn what they expect from the Master Plan. During our first and third site visits, public meetings were held to discuss the Project and to answer any questions that the residents may have had regarding the Master Plan, and also to allow the residents to express their opinions. Copies of our site visit reports, to date, are included in Appendix A.

Mr. Paul Gabbert, Project Manager for VSW, also assisted us by providing information, establishing goals for the Master Plan, and reviewing our submittals.

To assist us in preparing the Master Plan, data was collected from various sources around Alaska. Interviews were conducted with residents of Alakanuk, government employees, and other persons familiar with the Alakanuk area, and more particularly with the existing sanitation facilities.

We must stress that a complete commitment to this project by the City and residents of Alakanuk is absolutely necessary if the project is to be successfully completed. Although funding may be available for initial construction of improved sanitation facilities, it is up to the City to operate and maintain the facilities throughout the life of the system. Residents must be willing to pay for these services on an ongoing basis, so that adequate funds will be available to maintain the system. Trained and certified operators must be employed to ensure the City's investment is protected. To accomplish this, water and sewer ordinances must be adopted by the City and the residents. The ordinances will establish the City's and the residents' responsibilities regarding the facilities, provide a basis for establishing and collecting user fees, and define the residents' commitment to pay for the facilities for the life of the system. To assist the City in obtaining these goals, a draft ordinance for a water and sewer system is included in Appendix B.

We understand that the City would prefer to have a piped water distribution and sewage collection system similar to existing systems in other rural Alaskan communities, such as Emmonak. Although a piped system is the primary goal of the twenty year plan, we want to be sure the residents understand that the project will be implemented in phases as construction funding becomes available. In addition, because the availability of funding for the project will prevent construction of the entire system in a short period of time, it is most likely that not all of the residents will receive upgraded services at the same time.

The body of the Master Plan begins in Section 3.0, where a summary of the background data for the Alakanuk area, including location, demographics, and economics is presented. The Master Plan continues with a description of the existing sanitary facilities, and a summary of the City's financial status. Following this preliminary data, alternatives for different types of water treatment and distribution, sewage collection and disposal, and solid waste collection and disposal systems are described. The different types of systems were evaluated based on initial capital costs, operation & maintenance costs, constructibility, and estimated user fees which will be required to successfully operate and maintain the facilities. At the end of the report we have summarized our conclusions and recommendations as to the preferred system, and provide a phased conceptual design and construction schedule. We have also included a list of references which were used during preparation of the Master Plan. Supporting data and previously submitted reports are included in the Appendices.

2.0 SCOPE OF WORK

Dames & Moore's work on this project was performed in general accordance with our proposal titled "Engineering and Planning Services, Sanitation Facilities Master Plan for the Community of Alakanuk and Village Safe Water", dated September 14, 1992. Specifically, our Scope of Work included an assessment of community needs, a review of available data, and preparation of a Sanitation Facilities Master Plan for a twenty year planning period.

The goal of the first task of the project was to establish baseline information to assist us in preparing the Master Plan. A site visit to Alakanuk was performed in order to meet with residents and to determine their expectations and concerns, and to collect available data pertinent to the project. Task 1 included evaluating the community's desires and willingness to construct and maintain improved sanitation facilities. Photographic base maps were prepared to assist in developing the Master Plan and to help during the design phase of the project. Deliverables for Task 1 included the following.

- Initial Site Visit Report
- Detailed Project Development Schedule
- Utility User Assessment and Household Survey Summary Report
- Resident Assessment Summary Report
- Photographic Base Mapping

The goal of the second task was to provide an indication of the City's ability to operate and maintain improved facilities. Historical data pertaining to the financial status of the existing sanitation facilities and the overall City government was reviewed to determine the City's ability to financially manage their existing and potentially upgraded facilities. Existing operation and maintenance practices were reviewed to determine their effectiveness and to establish methods of improving the practices. This task also included a preliminary evaluation of utilizing waste heat from the Alaska Village Electric Cooperative (AVEC) power plant, and a summary of current fuel storage regulations, fuel storage capacity in Alakanuk, and estimated annual fuel usage. Deliverables for Task 2 included the following.

- Site Visit Reports
- Financial Assessment Report
- Operation and Maintenance Practices Review Report

Task 3 consisted of the preparation of the Sanitation Facilities Master Plan. The purpose of the Master Plan is to develop a proposed system which meets the needs of the community and is realistically achievable within a twenty year planning frame. Alternative systems were evaluated, and a recommendation as to the system which best fits the needs of the residents of Alakanuk was determined. After selection of the most appropriate alternative, a conceptual schedule for phased construction of the system was developed. Milestones for Task 3 included the following.

- Conceptual Plan Outline Submittal
- 65% Submittal of a Draft Sanitation Facilities Master Plan
- Public Meeting in Alakanuk to Discuss the 65% Submittal
- Receive Comments from ADEC and the City of Alakanuk on the 65% Submittal
- 95% Submittal of a Draft Sanitation Facilities Master Plan
- Receive Comments from ADEC and the City of Alakanuk on the 95% Submittal
- Present the Final Sanitation Facilities Master Plan at a Public Meeting in Alakanuk

3.0 BACKGROUND INFORMATION

3.1 LOCATION

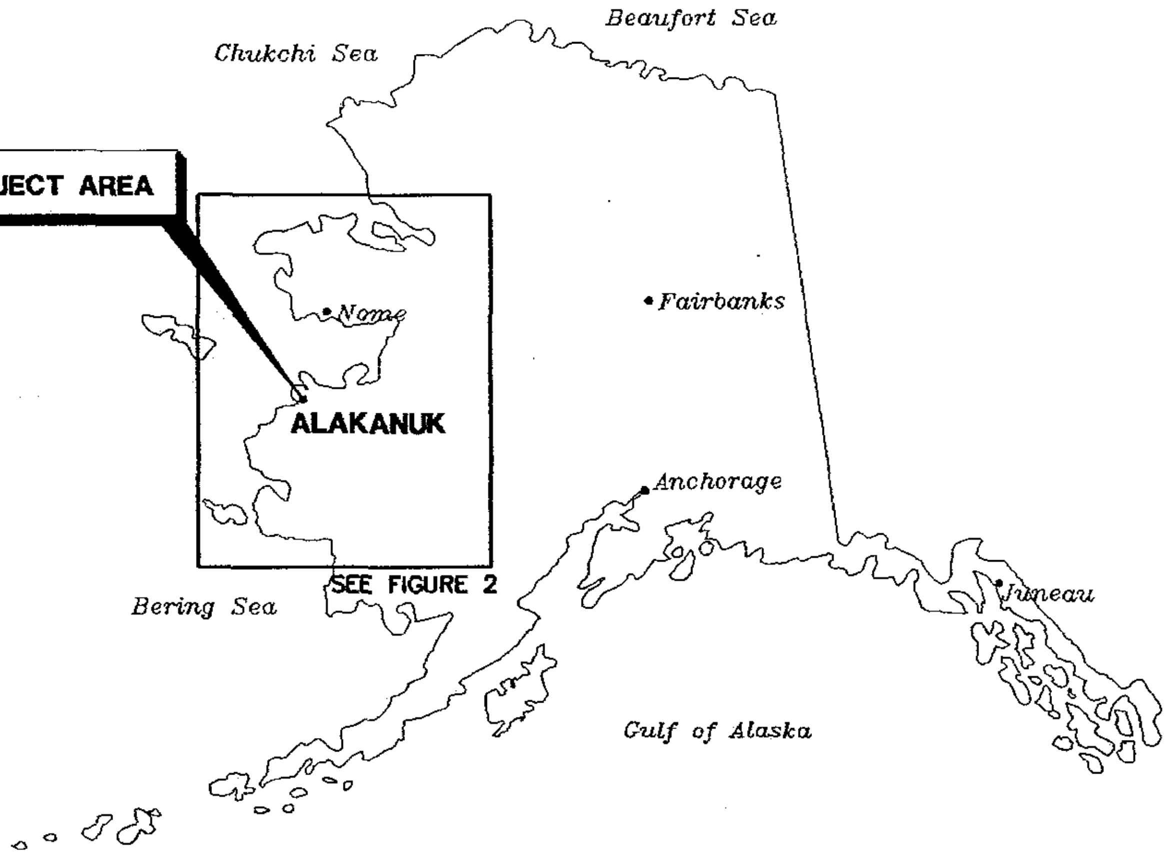
The general project area is located near the mouth of the Yukon River in the northeast portion of the Kwiguk (C6) quadrangle 1:63,360 series as shown on Figures 1 and 2. The following subsections include a general description of the project area, including the physical and geologic setting.

3.1.1 Topography

Alakanuk is situated on the Yukon River Delta at the confluence of Alakanuk Pass and Kwikluak Pass, which is the southernmost branch of the Yukon River. The community is located approximately eight miles upstream of the Bering Sea. The Alakanuk area is relatively flat with very little topographic relief, and consists of low floodplain river delta which is dotted by numerous small lakes, sloughs, and old river channels. Elevations in the area range from two to nine feet above mean sea level.

3.1.2 Climate

According to the *Environmental Atlas of Alaska*, the village of Alakanuk lies within the Transitional Climactic Zone of Alaska. This zone is defined as an area with moderate seasonal temperature variation and less cloudiness, precipitation, and humidity than a maritime climate. The climate is sub-arctic, averaging 18.3 inches of precipitation per year, including 57.6 inches of snow. The Bering Sea influences the climate by keeping summer temperatures cooler and winter temperatures warmer than the Continental Climactic Zone of the interior of Alaska. Site specific historical climatic data was not available for Alakanuk from the Arctic Environmental Information and Data Center; however, data was available for Emmonak which is located approximately six miles northeast of Alakanuk. The mean annual temperature in Emmonak is 28.8° Fahrenheit. The coldest month is February, with an average temperature of 5.6° F, and the warmest month is July, with an average temperature of 53.7° F. The record low temperature of minus 50° F occurred in January of 1980, and the record high temperature of 80° F occurred in August of 1984.



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LOCATION MAP
NOT TO SCALE

DAMES & MOORE

FIGURE 1

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VICINITY MAP

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DAMES & MOORE

FIGURE 2

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The last day of freezing temperatures usually occurs in late May and the first day of freezing temperatures is usually in early September. The freezing index for Alakanuk and other communities on the Yukon Delta is 3,600 degree days and the design freezing index (1 year in 10) is 4,800 degree days.

3.1.3 Regional Geology

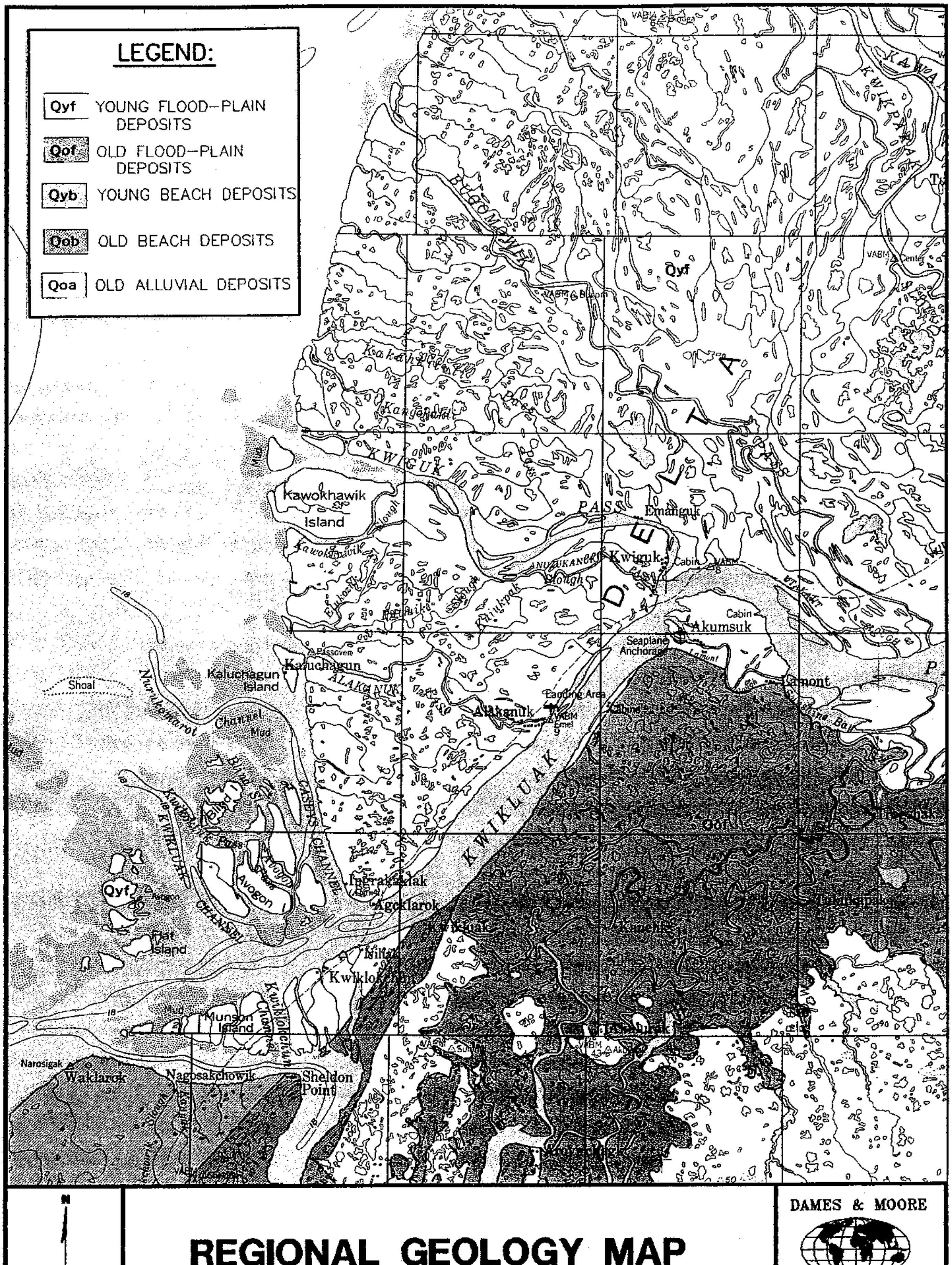
As shown on Figure 3, the geology of the Yukon River Delta, on which Alakanuk is situated, is fairly uniform. The area is composed of large, young floodplain deposits consisting chiefly of silt and sandy silt mixed with substantial amounts of organic material. No mineralized rocks or areas altered by hydrothermal processes were observed during the geologic investigations of the area conducted by Condon and Hoare of the United States Geological Survey (USGS) from 1960 through 1963. The probability of petroleum in the sedimentary rocks in the area is slight, based on the impermeability and extensive deformation of the rocks.

The unconsolidated delta materials were generally deposited by water, and have been extensively reworked by the shifting currents of the Yukon River, its tributaries, and ocean currents and waves. No eolian (wind deposited) soils were observed during the USGS investigations, but it is likely that some eolian systems do exist on the delta. Shallow permafrost is present in most of the deposits of the Yukon Delta. Seasonal surficial thawing has formed numerous small lakes and ponds in the area.

The maximum thickness and age of the deposits is unknown, but Condon and Hoare of the USGS suggest that the soils are no greater than a few hundred feet thick and their age ranges from the Pleistocene epoch to the present (up to 1 million years old). Fossilized mammoth tusks over 10,000 years old have been discovered buried in the upper 20 feet of alluvial material in river banks in the area.

3.1.4 Geotechnical Information

Generally, the soils in the Lower Yukon subregion are described by the *Alaska Regional Profiles, Volume VI, Yukon Region* as poorly drained stratified loams, or silts and sands overlain by a thick mat of peat. Much of the area is underlain by permafrost, except in natural levees bordering major drainages and beneath lakes and ponds. The active layer of soil is almost constantly saturated during thaw. Ice mounds, polygons, and peat deposits in drainages and depressions are common features.



REGIONAL GEOLOGY MAP

ALAKANUK, ALASKA

DAMES & MOORE

FIGURE 3

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The soils of the Yukon River Delta are generally derived from old coastal deposits, marine deposits, or fine grained fluvial deposits. According to a report prepared by the State of Alaska Department of Transportation and Public Facilities (ADOT/PF) in 1988, and a report prepared by Duane Miller and Associates in 1992, the soils under the Village of Alakanuk consist of intermittently frozen silts to predominantly silty sands below the initial layer of surface organics common to the area. The surface organics are generally very wet brown peat to very wet organic silt. Sporadic permafrost was encountered, generally between a depth of three and seven feet, which is indicative of surface frost on top of the thaw bulb of the Yukon River. During the ADOT/PF geotechnical drilling program, ice crystals and lenses up to 1.5 feet thick were encountered in the foundation soils under the existing airstrip. The foundation soils consisted of permanently frozen organics and organic silt. Standard penetration test (SPT) results in the permafrost layer yielded between 12 and 27 blows per foot, which indicates a weak frozen soil. SPT tests in the unfrozen soil yielded between 2 and 20 blows per foot, which indicates a loose soil. Groundwater was encountered below the frozen layer, and the soils were generally saturated below seven feet. The moisture content for the peat and organic silt ranged from 42 to 108%, and the moisture content of the silts ranged from 37.4 to 64.4%. The soils in the Alakanuk area are very frost susceptible, and have the potential for substantial frost heaving.

Possible sources of borrow were identified during the ADOT/PF investigation, but no materials were located that would meet the state specifications for runway base or subbase construction. Seven river bars on the Yukon river and Alakanuk Pass, all within five miles of Alakanuk, were investigated and found to contain sandy silt to silty sand with organics, which may be acceptable for both pipe bedding and trench backfill. The ADOT/PF study indicated that the nearest source of material that was acceptable for airstrip construction purposes was the state owned quarry at the Saint Marys' airport, approximately 75 miles upriver from Alakanuk.

3.1.5 Regional Hydrology

The Yukon Delta lowlands are generally poorly drained wetlands which have permanently ponded water in local depressions. The water table is located very close to the surface, within 3 feet in most areas. Sporadic surface frost and permafrost is present throughout the region, and standing water is common throughout the summer months. No stream discharge data is available for the area, but an average runoff is estimated in *The Alaska Regional Profiles Vol. VI, Yukon Region* at about one cubic foot per second (cfs) per square mile. The annual peak runoff is estimated at no greater than 10 cfs per square mile. Ice jam flooding is common in the spring during breakup due to the climactic differences between the interior and the coast. The village of Alakanuk is in an area rated as a high flood hazard by the U.S. Army Corps of Engineers, Flood Plain Management Branch. By definition this means that at least once every five years the entire village will be flooded; however, conversations with residents indicate that flooding usually occurs at least once each year. Typically, spring floods cover the community to a depth of three to four feet.

Rainwater, rivers, lakes, ice, and snow are the primary sources of water for communities in the region. The use of groundwater wells to supply water is not considered a viable option in this area for reasons discussed in the following subsection. The chemical quality of the river water is dependent upon several factors, including the time of year and upstream wastewater disposal practices. The raw quality of Yukon River water is generally fair, but the water should not be used for drinking unless it is disinfected first. Because of Alakanuk's proximity to the Bering Sea, the waters are somewhat subject to tidal influences. Residents report a salty taste in the water in periods of high tides and high winds blowing in from the sea, although the salty taste is gone not long after the winds subside. The raw water is generally highly turbid during the summer months, and a substantial amount of time must be allowed for the solids to settle out. The waters of lakes and ponds in the area are generally of good quality, except that they are high in iron and organic content, and therefore may have an objectionable taste or color. In the summer, rainwater is commonly collected using roof drains and storage tanks at individual residences. In the winter, ice and snow are collected and melted as a source of drinking water.

3.1.6 Regional Hydrogeology

The groundwater table in the Alakanuk area is shallow and relatively saline due to the influence of the nearby Bering Sea. An experimental well drilled by the Bureau of Indian Affairs in Emmonak in 1963 was saline at a depth of 194 feet, but when the screen was pulled back to a depth of approximately 80 feet, a lens of fresh water was found. The water was sodium bicarbonate type, high in iron, had a foul odor and taste, and was not suitable for drinking. According to the *Alaska Regional Profiles, Vol. VI, Yukon Region*, a well drilled in Alakanuk for the school also yielded saline water. Water for the village of Alakanuk currently comes from the surface water of Alakanuk Pass and is flocculated, filtered, chlorinated, and fluoridated before use by the public.

The Yukon Delta lies on the thaw bulb of the Yukon river, and a three to four foot thick layer of surface frost is present approximately three feet below the ground surface. Since the underlying soils are mostly fine grained silts and silty sands, the permeability of the ground is low. This is evident from the yield of the well drilled in Emmonak which had a peak flow of three gallons per minute (gpm). Since this is an inadequate production rate for a community well, it is reasonable to conclude that groundwater would not be an effective supply of water for villages in the area. Surface water as described in the previous section should be a more reliable source of fresh water.

3.2 DEMOGRAPHICS AND ECONOMICS

3.2.1 Population

The population of Alakanuk has fluctuated, but has generally increased over the last twenty years. Over that period, the population has experienced a modest growth rate of approximately 3% annually to 544 persons according to the 1990 U.S. census. Approximately 96% of the residents of Alakanuk are Yupik Eskimos. A brief summary of the pertinent information found in the 1990 census includes the following.

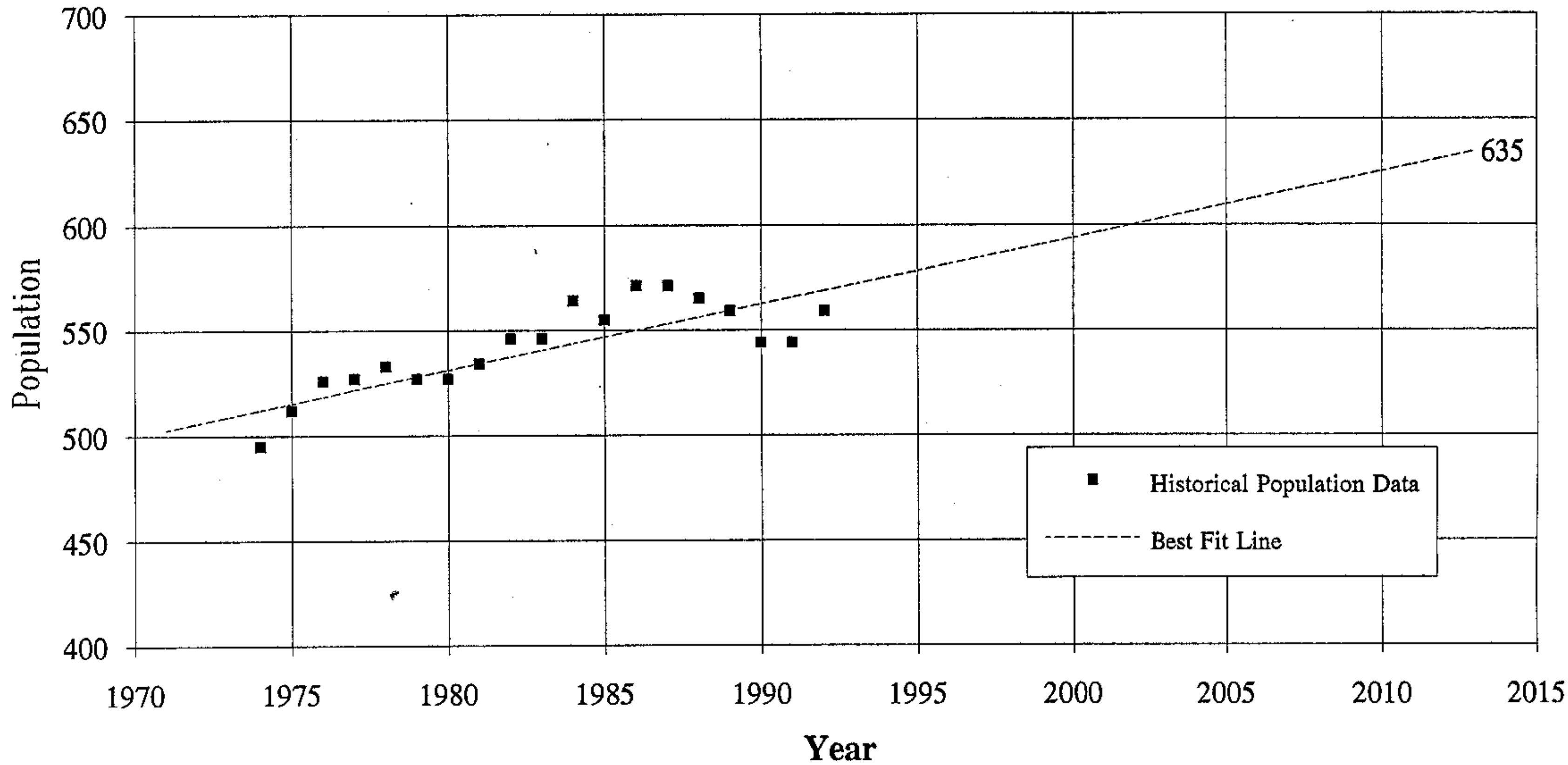
• Median age (years)	19.8
• Total number of households	112
• Average number of persons per household	4.71
• Median income:	
- Per household	$17,708
- Per family	$23,250
- Per capita	$5,462
• Number of persons below poverty level	159 (29.4% of total)
• Number of families below poverty level	29 (30.2% of total)

Based on the historical data shown on Figure 4, and assuming that the growth trend will remain relatively linear, the population should continue to grow at a similar rate and reach a twenty year population of approximately 635 in the year 2013. The population of the entire Wade-Hampton census area in which Alakanuk is located is projected to grow at a rate of 3.1% per year which corresponds favorably to the projected average growth rate for Alakanuk.

The economy of the area is seasonal in nature, such that it is generally more active in the summer than in the winter. This economic instability is one reason for such modest population growth. A limited amount of permanent employment is provided by the government and local businesses. Other primary sources of income include revenue from seasonal commercial fishing and governmental assistance. Villagers also provide for themselves by hunting, fishing, trapping, and making native crafts.

Figure 4

Twenty Year Projected Population



3.2.2 Government

The City of Alakanuk is a member of the Calista Native Corporation, and was incorporated as a second class city in 1969. The city is currently governed by a seven member city council, which consists of a mayor, a vice mayor, a secretary/treasurer, and four council members. The community also has a traditional council whose members are elected to serve terms ranging from two to four years. The day to day operations of the City are supervised by a City Administrator.

3.2.3 Economy

The economy in Alakanuk is primarily subsistence based, including hunting, trapping, fishing, and gathering. Some cash income is generated by commercial fishing in the Yukon River and the Bering Sea during the summer. Only a few full or part time year round jobs are available. Primary employers include the City, the Safewater facility, the school, utilities, and local businesses. Nearly all households are represented at subsistence fish camps during the summer months.

As indicated by the 1990 U.S. Census, the average annual per capita income for the residents of Alakanuk was approximately $5,462, and the average per household income was approximately $17,708. Although the population continues to grow steadily, it is unlikely that many jobs will be created, thereby increasing the unemployment rate.

The City government is primarily funded by the State of Alaska and revenues from the Safewater facility, bingo, and a 3% sales tax. An analysis of the City's annual operating budget, including revenues and expenditures for different categories of government is included in Section 5.0 - Financial Summary.

3.2.4 Land Status

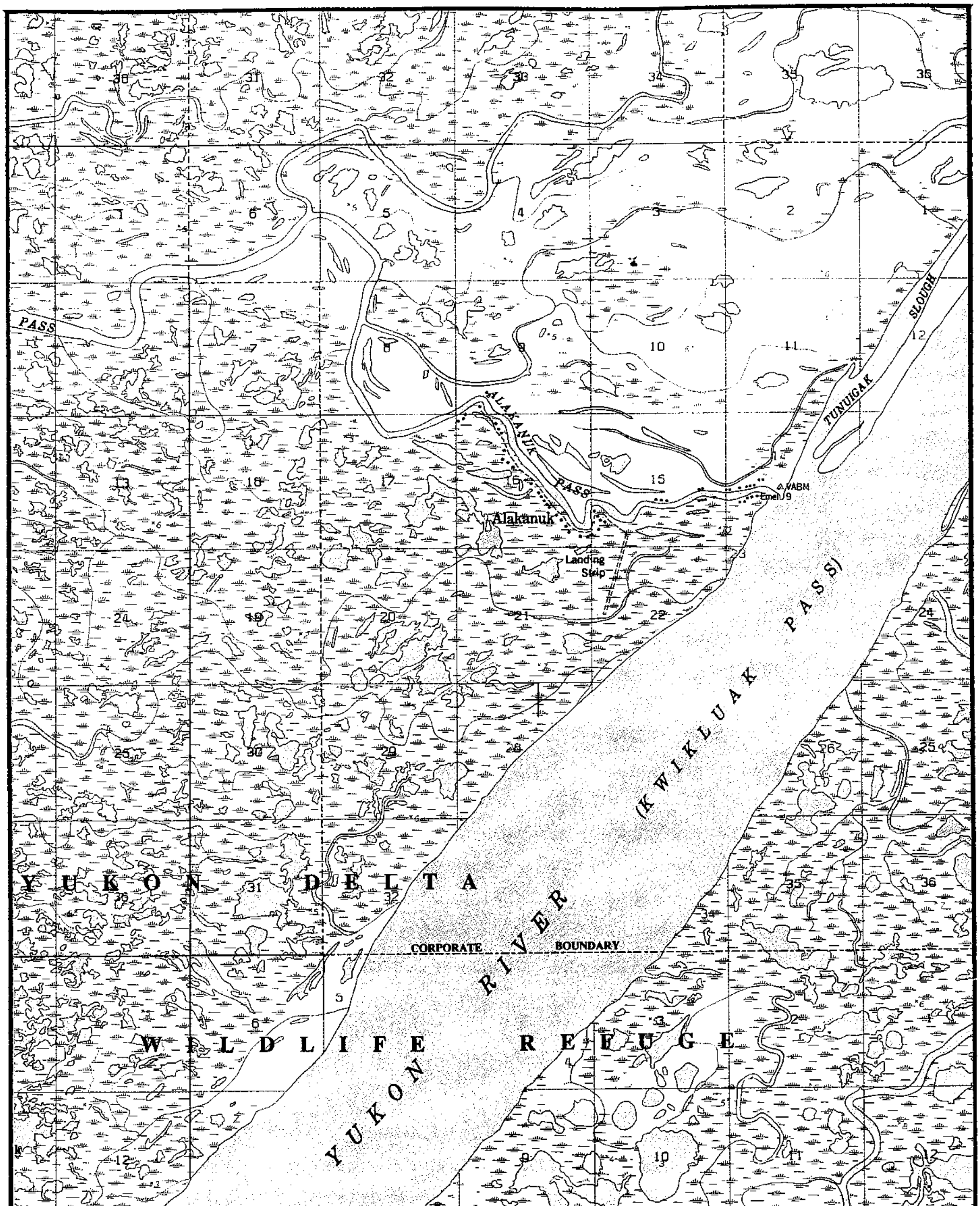
Ownership of lands in the project area is generally divided between private individuals or businesses, the Calista Native Corporation, and government entities. Appendix C contains tables and maps showing land status by property number as derived through research conducted at the Bureau of Land Management (BLM). Appendix D contains copies of the photographic base maps which also correlate to the land status tables. The tables indicate persons or entities to which the land was originally transferred or is in the process of being transferred by the federal government through Section 14(c) of the Alaska Native Claims Settlement Act. Private or public property transfers subsequent to the original transfer from the federal government may not necessarily be recorded with the BLM, and would not have been discovered in our research. A complete title search should be conducted for properties of interest to this project. The title search would indicate current ownership, and would provide descriptions of any easements which may exist.

3.2.5 Growth Areas

The City of Alakanuk is situated along the banks of Alakanuk Pass, from its confluence with the Yukon River and westward approximately 2.5 miles. The majority of the housing units and commercial and industrial properties are located on the southern bank of the Pass, although several residential houses, a store, and the closed cannery are located on the northern bank. Most of the developed areas are north of Anderson Road as shown on the photographic base maps attached in Appendix D.

As indicated in Section 3.2.1 of this report, and assuming the average growth trend over the past twenty years continues, the population of Alakanuk should continue to grow at a modest rate of approximately 3% annually, to an eventual twenty year population of approximately 635 in the year 2013. According to the 1990 U.S. census, there were 139 residential housing units, of which 120 were occupied. Several homes have been moved or are in danger of being destroyed because of erosion problems caused by Alakanuk Pass. The Department of Housing and Urban Development (HUD) plans to construct 21 new housing units on the south side of Anderson Road during the summer of 1993. The proposed location of the new housing is shown on the photographic base maps.

The area surrounding Alakanuk is designated as the Yukon Delta National Wildlife refuge, and is primarily wetlands as shown on Figure 5. There are no adequate sources of construction borrow materials nearby, and any new road construction would probably require importing borrow material from upriver at a significant expense. As shown on the photographic base maps, many of the areas along the existing roads are not currently developed. Because of the expense of constructing new roads, it is expected that any new housing development would be placed along existing roads.



TOPOGRAPHIC MAP

ALAKANUK, ALASKA

DAMES & MOORE

FIGURE 5

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3.2.6 Household Surveys

A household survey of the residents of Alakanuk was conducted by VSW during the fall of 1991. A summary of the results of the survey was prepared by Dames & Moore in conjunction with the Utility User Assessment. A copy of the Utility User Assessment and Household Survey Summary report is included in Appendix E.

According to a summary of the survey results provided to us by VSW, 85 households of a total of 120 households responded to the survey. The survey summary indicates that the residents of Alakanuk are eager to have improved sanitation facilities, and are willing to pay an average of $72 per month for these services. As listed in our survey summary report, significant results of the household survey include the following. Percentages provided below are based on the 85 households which responded to the survey.

- Approximately half of the homes surveyed are equipped with one or more of the following: kitchen sink, bathroom sink, tub/shower.

- Approximately half of the homes are large enough to install a 6 foot by 10 foot bathroom.

- Nearly 60% of the residents are willing to add on to their homes to accommodate a bathroom, if necessary.

- Over 80% of the residents believe the City should help pay for operation and maintenance of a new system.

- Over 40% of the residents would support an increase in the City sales tax to help pay for operation and maintenance of a new system.

4.0 SUMMARY OF EXISTING UTILITIES

This section includes a brief description of the available utilities in Alakanuk, including the sanitation facilities and power, telephone, and cable television. We have attached a copy of our Operation and Maintenance Practices Summary Report in Appendix F. The report includes an evaluation of existing operation and maintenance practices for the sanitation facilities in Alakanuk, as well as a summary of fuel storage capacities and usage, a summary of aboveground fuel storage tank regulations, and an evaluation of the potential for recovering waste heat from the AVEC power plant for use in institutional or residential heating.

4.1 SEWAGE COLLECTION, TREATMENT, AND DISPOSAL

Currently, only the school, washeteria and sauna, clinic, and the teacher's housing have a piped sewage collection system. Exterior piping is generally aboveground and insulated. Sewage from these facilities is collected and piped to a centrally located pump station. The sewage is then pumped by force main to a single cell total retention sewage lagoon which is located across Anderson Road from the school. The sewage lagoon is approximately 125 feet by 265 feet. Provisions for the addition of another cell of similar size were included in the 1983 design. The lagoon was excavated to an elevation of four feet, with the height of the berm above the 15 foot flood level. Based on conversations with local residents, the level of water during the annual spring flooding usually overtops the lagoon.

The capacity of the existing lagoon is adequate to treat the volume of sewage generated by the facilities which are currently served by a piped collection system. However, if another cell of the approximate size of the existing cell were added, the available storage volume would not be adequate to treat the expected volume of sewage for the entire city if a piped system is constructed. The lagoon is located in a fenced area across Anderson Road from the school, in close proximity to residential housing. The location of the facility increases the potential for odors from the lagoon reaching the general population, and also for human contact with the raw sewage. If construction of a new lagoon is required due to upgraded facilities, a location further away from the centrally populated areas should be considered.

Individual households and other facilities which are not served by the piped system currently use a self-haul honeybucket system to collect sewage. During the summer of 1992, VSW conducted a program to install individual bunkers at each house or business. Photographs of typical bunkers are shown on Figure 6, and approximate locations of the bunkers are shown on the photographic base maps in Appendix D. Residents dump their honeybucket waste into the bunkers which are limed periodically. Each resident is responsible for maintaining their own individual bunker. Prior to installation of the bunker system, residents disposed of their sewage on the river ice, in natural depressions, along the river bank, or similar areas. Since the system was installed, residents appear to be successfully maintaining the bunkers, and unsanitary conditions caused by previous disposal practices have been reduced significantly.

INDIVIDUAL PIT PRIVYS

ALAKANUK, ALASKA

DAMES & MOORE

FIGURE 6

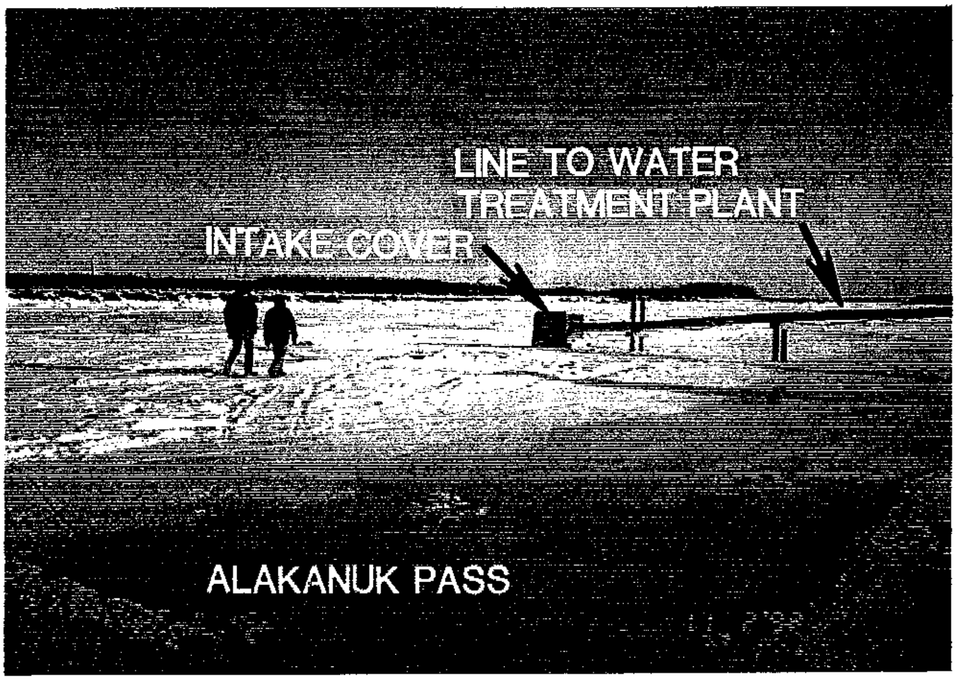
FILENAME: 25654/FIG6.DWG 1=1/2-15-93

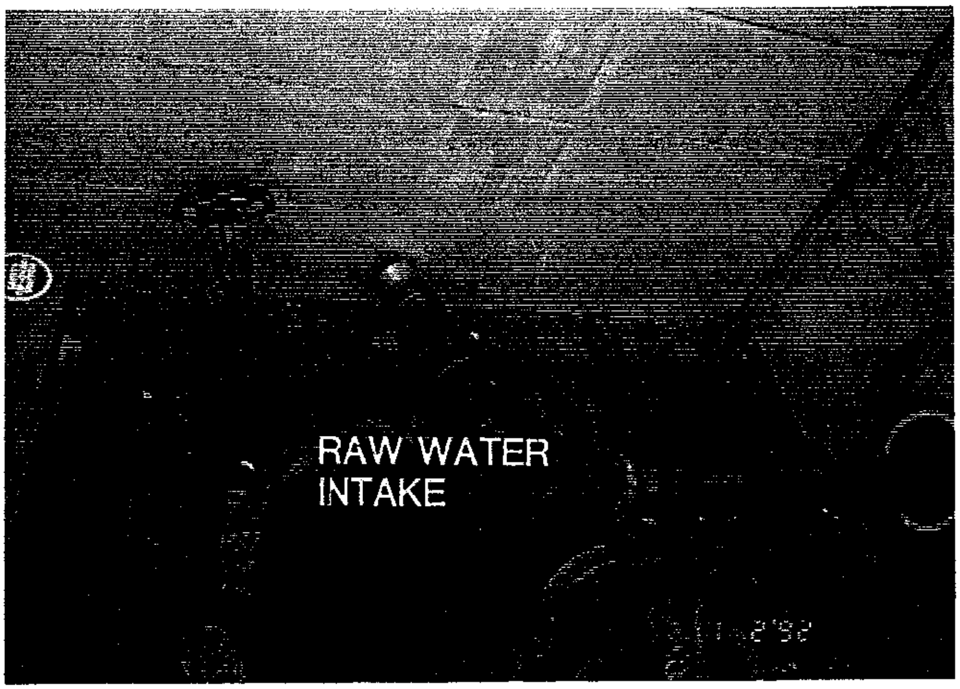
4.2 WATER SUPPLY, TREATMENT, AND DISTRIBUTION

Historically, drinking water in Alakanuk was obtained from rainwater and melted ice or snow. Some residents still use these methods even though treated water is now available. Water for the existing treatment plant is obtained from Alakanuk Pass. The raw water is pumped from the Pass to the water treatment plant through an insulated 3 inch diameter copper pipe. The intake line follows the shortest and most direct route to the water treatment plant, and thereby travels over private property rather than in the streets or other public rights-of-way. During the summer season, the water intake floats on the surface of the water. During the winter season, the intake is placed through a hole in the ice which is covered by an insulated plywood box. Because of this type of intake system, it is often difficult to maintain a constant and reliable water source during spring breakup and fall freezeup. Photographs of the intake and water line are shown on Figure 7. The quality of the raw water is generally fair, although the water is highly turbid during the summer months. Residents report that once or twice per year the treated water tastes salty, usually in conjunction with a high tide and high winds blowing in from the Bering Sea. Reportedly, the salty taste is gone not long after the high winds subside.

The existing water treatment plant was constructed in 1976 under a VSW project. The facility was renovated in 1984, and a flocculation unit with a settling chamber was installed. A schematic diagram of the existing system is shown on Figure 8. As shown on the schematic diagram, raw water first enters the flocculation chamber. Alum is then added to create flocs that will settle by gravity, and Vanfloc is added to increase the size of the flocs and speed up the settling process. The flocculated water then passes through a tank to allow the larger flocs to settle out. The next step includes a graded sand filter which contains anthracite coal, silica sand, and garnet sand to remove the smaller particles. After passing through the filter, the water is disinfected using solid calcium hypochlorite, fluoridated, and the pH adjusted by adding soda ash. The water is stored in a 200,000 gallon insulated holding tank. Photographs of the water treatment system and holding tank are shown on Figure 9.

According to the 1989 Public Health Service (PHS) report titled *Alakanuk, Alaska, Water and Wastewater System Feasibility and Cost Study*, the water treatment plant was designed to treat approximately 35 gpm, which is equivalent to 50,000 gpd. During our first site visit in November of 1992, the operator reported that they were making water approximately 12 hours per day at a rate of 12 gpm. During the second site visit in January of 1993, the operator reported that they were making water approximately 6 to 7 hours per day at a rate of 20 gpm. The washeteria and sauna, school, clinic, and teacher's housing are currently served by a piped water distribution system. The washeteria contains washers and dryers, and the sauna contains





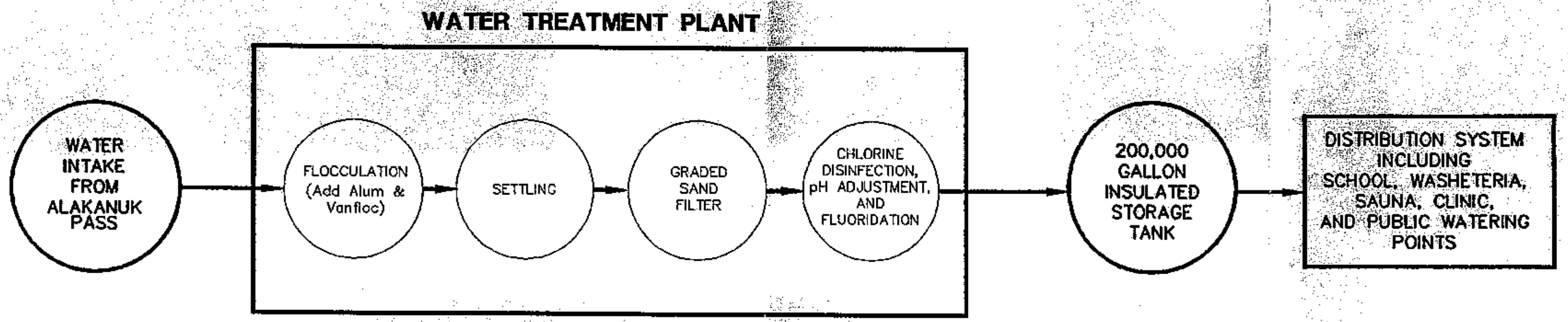
RAW WATER INTAKE

ALAKANUK, ALASKA

DAMES & MOORE

FIGURE 7

FILENAME: 25654/FIG7.DWG/1=1/2-15-93

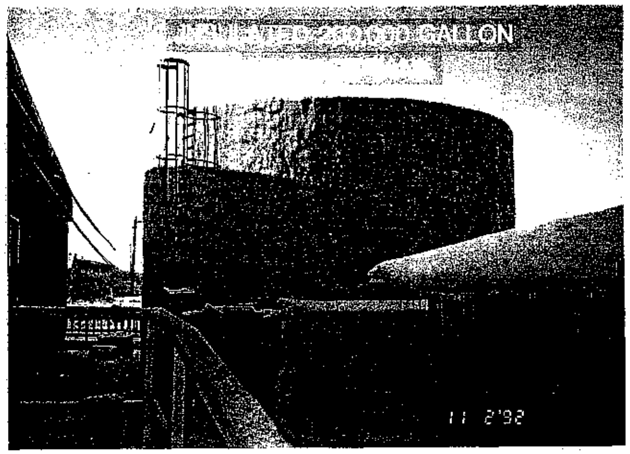


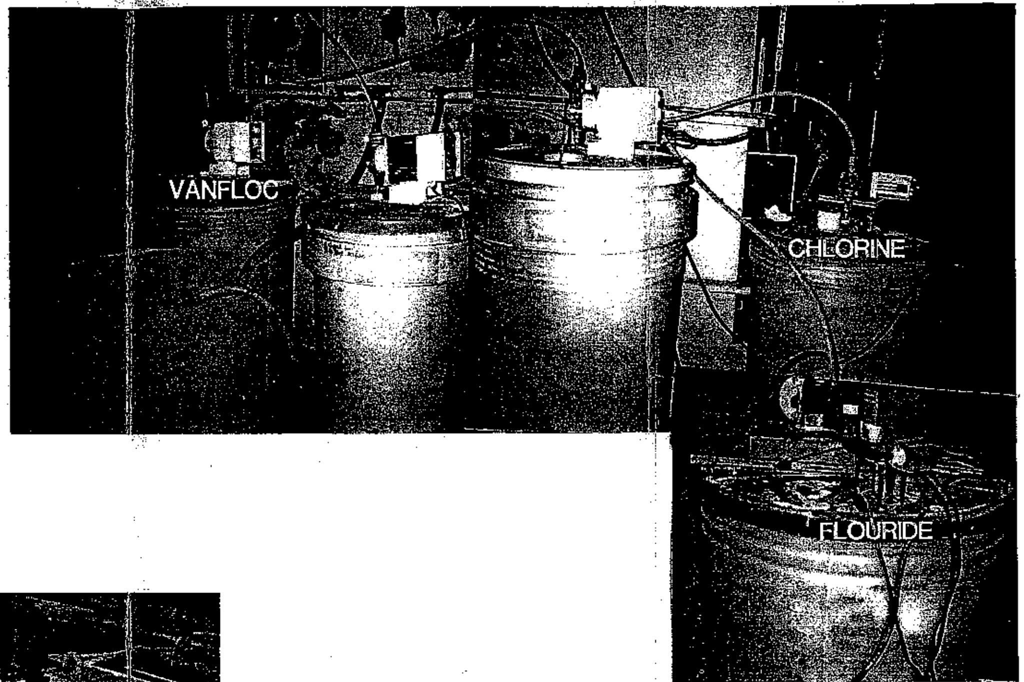
EXISTING WATER TREATMENT SYSTEM SCHEMATIC DIAGRAM
ALAKANUK, ALASKA

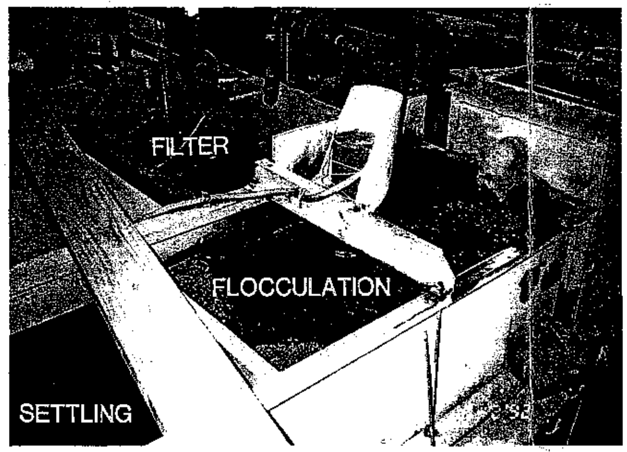
DAMES & MOORE

FIGURE 8

FILENAME: 25654/FIG8.DWG/1=1/02-15-93







WATER TREATMENT SYSTEM AND STORAGE TANK
ALAKANUK, ALASKA

DAMES & MOORE

FIGURE 9

FILENAME: 25654/FIG9.DWG/1=1/02-15-93

public showers, a toilet, and two saunas. Both facilities are attended by a clerk. Residents purchase tokens to operate the available facilities. Cash receipts are deposited at the City office daily. The washeteria is located in a building northwest of the water treatment plant and adjacent to the water storage tank. Both the washeteria and water treatment plant are located partially in Osier Street rather than on private property or within public rights-of-way. The sauna is located in the same building as the water treatment plant.

The washeteria is equipped with a public watering point. Water is sold for $0.10 per gallon. Residents may collect water themselves during the washeteria operating hours or have water delivered to their homes for an additional $2.00 delivery charge. Operation and maintenance personnel use a 400 gallon water truck to deliver water to the residents Monday through Friday. Residents must call one day ahead of time to have the water delivered. The water truck occasionally has difficulty getting to some of the residents due to muddy roads and flooding during the spring and summer.

4.3 SOLID WASTE COLLECTION AND DISPOSAL

The City operates a fenced solid waste disposal site near the airstrip. Residents dispose of their household trash in dumpsters which are scattered around town. City road maintenance personnel are responsible for emptying the dumpsters periodically. According to the current operator, the dumpsters require emptying approximately every two weeks. The city was provided a dump truck when the fenced landfill was constructed under a PHS project in the early 1980s. Normal collection practices include emptying the dumpsters into the dump truck with a front-end loader, and subsequently transporting the waste to the disposal site. The operator estimates that this operation requires two men for seven hours. If the truck is not operating, the dumpsters are individually transported to the solid waste site using the front-end loader.

It appears that the disposal site has not been operated properly in the past. Garbage is generally dumped near the front of the fenced area and then driven over on subsequent trips. Ideally, the site should be filled from the back to prevent potentially unsanitary conditions which could be caused by human contact with the waste.

The City adopted an ordinance requiring each household and business to pay a $10 per month user fee for solid waste collection and disposal. A copy of the ordinance is included in Appendix G. According to City personnel, most of the residents pay the fee regularly.

4.4 FUEL STORAGE CAPACITY AND USAGE

A complete breakdown of fuel storage and usage capacities and practices in Alakanuk and a summary of current aboveground fuel storage regulations is presented in our Operation and Maintenance Practices Summary Report which is included in Appendix F. In summary, there are approximately 391,000 gallons of available fuel storage volume in Alakanuk. Approximately 335,000 gallons of fuel are used annually. Assuming 90% of the total required fuel is used during the winter months (October through May), 301,000 gallons of storage volume is required over the winter. Therefore, there are approximately 90,000 gallons of available fuel storage volume, primarily at the AVEC facility.

The Native Store supplies most of the fuel to residents for home heating and vehicle operation. The store generally runs out of heating fuel each year during the spring, and occasionally runs out of gasoline. Residents of neighboring villages sometimes buy their fuel in Alakanuk because it is cheaper. Both the school and the City have their own fuel storage tanks. The City office usually runs out of fuel each year in the spring. The school also supplies fuel to the Safewater facility. The value of the amount of fuel used by the Safewater facility is deducted from the monthly invoice for water used by the school. Based on the amount of fuel used by the school and Safewater facility annually, and on the volume of the school storage tank, we estimate that there are approximately 13,000 gallons of additional storage volume available at the school facility.

4.5 POWER, TELEPHONE, AND CABLE TELEVISION

Most of the residents of Alakanuk are provided power from AVEC's generating facility which is located near the center of town, on the south side of Anderson Road. The distribution system is aerial, and serves residents on both the north and south side of Alakanuk Pass. Most of the residents heat their homes with either fuel oil, wood, or a combination of both. Heating fuel is currently sold at the Native Store for approximately $1.90 per gallon.

Telephone service is provided to the community by United Utilities, Inc. The distribution system is aerial, and the lines are located on the same poles as AVEC's power lines.

Cable television service via satellite is available to residents. The City took over operation of the cable television system in November of 1992.

5.0 FINANCIAL SUMMARY

5.1 CITY OF ALAKANUK FINANCIAL SUMMARY

Our previously submitted Financial Assessment Report, which is included in Appendix H, presents a summary of our evaluation of the financial data provided by the City for fiscal years 1989, 1990, and 1991. Our evaluation included a summary of the City's financial recording and reporting practices in regard to total City operations, and specifically for the existing sanitation facilities. Based on our review, it appears that during this period, the City kept adequate financial records and complied with regulations regarding financial reporting requirements and appropriation of government funds. In addition, attempts are being made by City personnel to improve daily accounting practices, and to more accurately track revenues and expenditures for the Safewater facility and for general City operations. The annual financial statements and accounting procedures are acceptable from an accounting perspective, according to a 1989 audit performed by the accounting firm of Mikunda, Cottrell, and Co. As indicated by the financial statements for 1989, 1990, and 1991, the City has operated their sanitation facilities at a profit; however, total City government expenditures exceeded revenues in all three years. Improved sanitation facilities will require more detailed tracking of revenues and expenditures, and will require the City to collect user fees regularly.

5.2 UTILITY CONSUMER COST SUMMARY

A complete breakdown of costs for the utilities currently available in Alakanuk is presented in our Utility User Assessment and Household Survey Summary Report which is included in Appendix E. In summary, the typical resident who subscribes to all available utilities including power, telephone, cable television, water delivery, home heating fuel, and mandatory solid waste disposal pays an average of $351 per month. The average monthly fee for telephone service ($150) as provided by United Utilities, Inc. most likely includes businesses and is therefore somewhat high. Considering this, the average estimated utility cost provided by residents during the VSW household survey ($269 per month) compares favorably with our estimated amount. Based on conversations with local residents prior to the preparation of the Utility User Assessment Report, the average resident pays approximately $68 per month to have water delivered from the water treatment plant. After submittal of the report, several residents indicated that this number was probably high. Based on subsequent conversations with residents, we estimate that the average resident probably pays approximately $20 to $30 per month to have water delivered.

The total values presented above and in our Utility User Assessment Report are only applicable to residents who subscribe to all of the available utilities. In reality, most of the residents subscribe to only a few of the utilities; therefore, the average monthly cost would be significantly less for those residents.

5.3 FUNDING SOURCES

There are several different funding sources from which the City of Alakanuk may be eligible for assistance for construction of water and sewer capital improvements. The following subsections present a description of each potential source.

5.3.1 Village Safe Water

The goal of the VSW program is to provide rural Alaskan communities with safe and sanitary water, sewer, and solid waste systems in order to improve the quality of life. The VSW program is operated through ADEC, and funding for particular projects is granted through legislative appropriation. Grants of up to 100% of sanitation project capital costs are available. Approximately 24 million dollars are available for appropriation during fiscal year 1993.

Applications for VSW grants are submitted in September of each year. Each application must include a cover letter and a resolution adopted by the City council stating that the requested improvement is the first priority of the City. Different sections of the application are given point values, and the applications are scored by VSW during their evaluation. Once the applications are scored, they are sent by VSW to the state legislature for consideration. After funding allocations are approved by the legislature, the funds are usually released near the beginning of the following fiscal year.

Once funding is approved and released by the legislature, the projects and funds are administered by the VSW program. The City which receives the funds must prove that they are able to financially and managerially operate and maintain the facilities. To meet these requirements, the City must employ qualified personnel to operate and maintain the facilities. Preferably, personnel should be trained and certified through ADEC. Appropriate training and certification also increases a community's chances of obtaining capital improvement funds. The City must also maintain an 80% collection rate of user fees. Adequate funds to cover the operation and maintenance of the facilities must be generated by the user fees collected from the residents. VSW funds are allocated only for the initial capital costs related to the construction of improved facilities and not for day-to-day operation and maintenance.

5.3.2 Alaska Department of Environmental Conservation

5.3.2.1 Revolving Fund Program

The ADEC Revolving Fund Program subsidizes wastewater projects only. The program provides loans with a 20-year payback period. Interest rates are based on 75% of the current municipal bond rate. Approximately 4 to 6 million dollars are available annually. In order to qualify for these loans, the community must be incorporated as at least a second class city and be able to demonstrate the financial capability to pay back the loan.

ADEC sends out an annual questionnaire to various communities explaining the Revolving Fund Program. Interested communities apply by submitting a completed questionnaire and coordinating with ADEC. Applicants are ranked on a criteria system which was developed by ADEC.

5.3.2.2 Municipal Grants Program

The Municipal Grants Program provides funding for water and wastewater projects. Grants for up to 50% of sanitation project capital costs are available. Approximately 12 million dollars are available annually. To be eligible, the community must be incorporated as at least a second class city. The community must also provide 50% matching of non-federal grant funds.

To quality for the Municipal Grant Program, the applicant must complete a survey sent out by ADEC. The ADEC staff ranks the projects and submits recommendations to the governor and legislature. If the survey is selected, than a formal grant application is completed and evaluated prior to the distribution of funds.

5.3.3 Department of Community and Regional Affairs

5.3.3.1 Rural Development Assistance Program

The Rural Development Assistance Program provides funds for water and wastewater projects. Grants of up to $100,000 are available. Approximately 1 to 7 million dollars are available annually, subject to legislative funding each year. To be eligible for the grants, the community must have a population of less than 2,500 and be a recognized public body.

To obtain a grant through the Rural Development Assistance Program, the community must complete an application. The Department of Community and Regional Affairs (DCRA) reviews the application and provides suggestions for improving the submittal. The application is then revised and resubmitted by the community. Applications are due by December of each year and are reviewed by the state DCRA staff and scored by the grant review committee.

5.3.3.2 Community Development Block Grant Program

The Community Development Block Grant Program provides funds for water, wastewater, and solid waste projects. Grants of up to $200,000 for sanitation capital project costs are available. Approximately 2 million dollars are available annually. The community must be at least incorporated as a second class city, and meet federal low-to-moderate income levels.

To obtain funds through the Community Development Block Grant Program, an application must be completed and returned to DCRA. Applications are due by January of each year, and are reviewed by the state DCRA staff.

5.3.4 U.S. Environmental Protection Agency

In general, the U.S. Environmental Protection Agency (EPA) funds these types of projects through the Indian Set Aside provisions of Section 518 of the Clean Water Act of 1987. However, all of the funds authorized under this act have previously been allocated. The projects funded under this Act are limited to wastewater improvements. Improvements to water or solid waste systems cannot currently be funded through the EPA.

5.3.5 U.S. Public Health Service, Environmental Health and Engineering Branch

5.3.5.1 Regular Funding

The Public Health Service (PHS), Regular Funding provides funds for water, wastewater, and solid waste projects. There are no specific funding limits for sanitation projects. Approximately 6 to 8 million dollars are available annually. The community must be an Alaskan Native Community or American Indian Tribe.

Projects are selected by the PHS based on an annual priority list developed by the PHS using information provided by regional nonprofit Native Health Corporations. In order to receive funding, the community should contact PHS to discuss potential projects.

5.3.5.2 Federal Housing Support Funds

The PHS Federal Housing Support Funds provide subsidies for water and wastewater projects associated with residential housing developments. To qualify for this type of funding, the community must be an Alaskan Native Community or American Indian Tribe. Monies are to be used for non-HUD housing projects.

Sanitation projects are selected by PHS based on need and housing priorities. Projects are completed in conjunction with federal, state, and local housing projects.

5.3.6 U.S. Department of the Interior, Bureau of Indian Affairs

The Bureau of Indian Affairs (BIA) does not currently provide funding for water and sewer capital improvement projects in Alaska. If sufficient upgrades are made to an existing home in conjunction with the water and sewer project, the homeowner may be eligible for sewer as a "new or improved home" under Indian Health Service criteria. Applications for funding under this category must be made to BIA on an individual basis by the homeowner.

5.3.7 Rural Development Administration

5.3.7.1 Loans and Grants for Domestic Water and Wastewater Disposal Systems

The Rural Development Administration (RDA) Loans and Grants for Domestic Water and Wastewater Disposal Systems provides funds, either through a loan or grant, for water and wastewater projects. Grants are approved for up to 75% of eligible facility development costs. Loans are repayable over a period of up to 40 years. Interest percentage rates adjust quarterly depending upon the current market rate, and vary with income levels in the community. The current available interest rates (as of March 10, 1993) are as follows.

- Poverty Level 5%
- Intermediate Level 5-5/8%
- Market Level 6-1/2%

The RDA funds are available for communities with a population of less than 10,000. Funding is customized for each community based on median household income; however, the RDA is considered the lender of last resort.

Communities should complete a pre-application and submit it to the Farmers Home Administration (FmHA) office in Palmer, Alaska. If approved, a formal application should be completed. Projects are ranked by the state FmHA office. Applications may be submitted at any time.

5.3.7.2 Emergency Community Water Assistance Grants

The Emergency Community Water Assistance Grants program provides funds for domestic water projects only. Grants may be available for up to 100% of project costs with a limit of $75,000 to $500,000, depending on the purpose. Approximately 10 million dollars are available nationally. The population of the community must be less than 5,000. The project must correct a sudden problem in quantity or quality of water to be eligible for funds.

Applicants should apply at the FmHA office in Palmer, Alaska. Applicants are ranked and funds requested from the National Office. Grants distributed through this program are designated primarily for emergencies, and are not generally appropriated for capital improvement projects.

5.3.8 Department of Housing and Urban Development

5.3.8.1 Indian Housing Program, Indian Housing Development Funds

The Indian Housing Development Funds program provides financial assistance for water and wastewater projects associated with housing developments. Grants may be available for up to 100% of total project capital costs. Approximately 200 to 300 housing units are constructed each year. The community must be an Alaskan Native Community or American Indian Tribe. Projects must serve housing sponsored by Regional Indian Housing Authorities in Alaska.

Applicants should apply to the appropriate Regional Indian Housing Authority. Projects are ranked on the basis of housing need by Notice of Funding Availability (NOFA) as published in the Federal Register. If the community receives housing funds, the project scope and funding need for utilities is established by cooperation with PHS.

5.3.8.2 Indian Community Development Block Grants

The Indian Community Development Block Grants (CDBG) provides funds for water and wastewater projects. Grants of up to $500,000 are available. There are approximately 8 million dollars available in Alaska annually. To be eligible for this grant, the community must be an Alaskan Native Community or American Indian Tribe.

Potential water and wastewater projects are reviewed by PHS or EPA depending upon the number of people served by the sanitary system. Qualifying entries are notified that the funds are available. To obtain a grant, an application must be submitted to the Department of Housing and Urban Development (HUD) Anchorage office. The projects are ranked by HUD CDBG staff.

5.3.8.3 Public and Indian Housing Programs, Public and Indian Housing Modernization Funding

The Public and Indian Housing Modernization Funding is available for water and wastewater projects associated with existing housing developments. Funds are only available to Alaska Regional Housing Authorities for the purpose of improving the conditions of existing housing developments owned by the housing authority. Modernization funds can be combined with other funding sources to address needs on a community wide basis.

To obtain these funds, the City should apply to the appropriate Alaska Regional Housing Authority. The Housing Authority determines priority use for modernization funds.

5.3.9 Economic Development Association, Public Works and Development Facilities Program

The Economic Development Association (EDA) provides grants for water and wastewater projects. Grants from 50 to 90% of the project cost are available. The size of the grant can range from $200,000 to $1 million. There are approximately 11 to 20 million dollars available annually.

The grants are available only for a public body. The sanitation project must be for industrial or commercial development and not for residential purposes. Matching funds or a grant are required; however, the EDA will assist in looking for matching funds.

To obtain these funds, the City should apply at the EDA office in Anchorage anytime of the year. Projects are ranked by the regional EDA office.

5.3.10 City of Alakanuk

The City of Alakanuk may provide funding for the project through negotiating with local residents to provide labor for construction at reduced rates. For example, if the standard labor rate for a particular job classification is $15.00 per hour, the local laborer may be paid $12.00 per hour. The $3.00 per hour difference would be collected for each hour the laborer works throughout the project, and would be considered part of the City's contribution to project construction costs. If necessary, funding may be provided by the City through conventional loans, such as those provided by FmHA.

5.3.11 Summary

The previous subsections outline potential sources of funding for improving the sanitation facilities in Alakanuk. We suggest that the City review this information and contact each agency from which it is believed funding may be available. Specific information on the application process for each type of grant should be collected. It will be of benefit to the City to assign one or two persons, possibly including a council member, to a committee to coordinate this task. The committee will be responsible for contacting the appropriate agencies, submitting applications, and following through the review process. Assistance in obtaining funding may be provided by the project engineer whenever desired. It seems that with the numerous grants which may be available, it would be advantageous for the City to pursue these opportunities as diligently as possible.

Table 1 presents a summary of the current potentially available funding for the City of Alakanuk. These funds may be used for design and construction of improved sanitation facilities during 1993. The information in the table was provided by Paul Gabbert of VSW.

6.0 DESIGN AND CONSTRUCTION CONSIDERATIONS

6.1 DESIGN CRITERIA

The following list presents design criteria which were considered during the preparation of the Sanitation Facilities Master Plan, and which should be considered throughout the design phases of any facility improvements.

TABLE 1
POTENTIAL SANITATION FACILITIES FUNDING

Source	Potential Funds	Notes
State of Alaska - Village Safe Water		
FY 92	$200,000	Funds remaining from last year's construction
FY 93	$500,000	Includes Master Plan and Design, remaining funds to be used for construction
FY 94	$500,000	These funds were prioritized for Alakanuk, and may be available August 1, pending the Governor's signature
Environmental Protection Agency	$1,000,000	These funds will be available pending approval of the PHS project summary which will be based on the Master Plan
HUD (off-site)	$300,000	These funds will be available pending approval of the PHS project summary which will be based on the Master Plan
HUD (on-site)	Unknown	On-site costs are included in construction costs for each home. It is not clear at this time which items will be provided or what level of funding may be available

- Design Period — 20 Years
- Design Population — 635
- Mean Annual Temperature — 29°F
- Mean Annual Precipitation — 18.3 in. including 57.6 in. of snow
- Freezing Index — 3,600°F-days
- Design Freezing Index (1 year in 10) — 4,800°F-days
- Seasonal Frost Depth — Not greater than 7 feet

6.2 DISTRIBUTION SYSTEMS

6.2.1 Above-ground

Above-ground pipes are exposed to the elements, and the potential for damage to the piping system caused by human contact is higher than for buried systems. Although initial capital costs are generally less for some types of above-ground systems, operation and maintenance costs over the design life of the system may be higher than those of a conventional buried system. The amount of freeze protection required for above-ground systems would also be higher than that required for buried systems. Because of the annual spring flooding in Alakanuk, the potential for damage to the pipe during flooding may be significant, and may require extensive maintenance. This problem may be partially avoided by anchoring the piping to the existing ground at periodic intervals. Above-ground piping systems can be supported in a number of ways including the following.

- Placing the pipe on piles, such as the current sewage force main, is one method. Pile systems provide easy access for maintenance, but are highly visible and must be located out of traffic areas or the pipe must be buried under the road at crossings. In addition, pile systems are generally very expensive to construct.

- Placing the pipe directly on the existing ground is generally a very cost effective method of construction since excavation is not required. These systems provide easy access for maintenance, but may restrict surface drainage. During flooding the pipes may become damaged or float. The potential for vandalism or damage caused by accidental human contact is also increased. It may be possible to place the pipe within the road prism and place native soils over the pipe to create a berm. This will provide some thermal protection, reduce the possibility of vandalism, and decrease the visual impact.

- Placing the pipe on earthen berms has advantages and drawbacks similar to those encountered when placing the pipe directly on the existing ground. A relatively thin layer of non-frost susceptible fill material is placed between the pipe and the existing ground to provide stability and a minimum amount of freeze protection. Since non-frost susceptible materials are not available near Alakanuk, this method would be very expensive to construct.

- Placing the pipe on timber sills provides the same advantages as placing the piles directly on the ground, but provides space below the pipe to allow drainage.

6.2.2 Below-ground

As presented in Section 3.0, the soils in the Alakanuk area are generally silts or silty sands. These types of soils are very susceptible to frost heave. The depth of the annual surface frost in the area is approximately six to seven feet below the existing ground level. Snow cover usually provides some additional thermal protection. However, in areas that are usually plowed or wind blown during the winter, the depth of freeze may be one or two feet deeper than in areas which are not free of snow. Specific construction considerations in these types of soils include the following.

- Non-insulated pipe should be buried at a minimum depth of eight feet unless permafrost is encountered. All pipe buried within permafrost should be insulated.

- Insulated (arctic) pipe should be buried at a minimum depth of five feet.

- These types of soils may not be suitable for use as pipe bedding material. Bedding material may have to be imported at a considerable cost.

- Pipes buried within the active layer (arctic pipe) will be susceptible to seasonal frost heaving.

Because the City is located on the thaw bulb of the Yukon River, permafrost is sporadic. However, the water table in the area is very high, generally less than three to four feet below the existing ground level. Specific construction considerations under these conditions include the following.

- In areas where permafrost exists, the frozen soils should be protected from thawing, preferably by placing arctic pipe or board insulation.

- All areas where the trench is excavated to a depth below the groundwater table will have to be dewatered during construction. Silts and silty sands usually hold a large amount of water and turn to muck when saturated. Since the groundwater table is very shallow in the Alakanuk area, this is expected to be a significant construction expense.

- Contact with groundwater and potentially corrosive soils should be considered when selecting pipe materials. For example, ductile iron pipe is less susceptible to frost heave, but more susceptible to corrosion than High Density Polyethylene (HDPE) or plastic pipe.

In general, below-ground pipe systems have a higher initial construction cost than above-ground systems, but operation and maintenance costs are lower over the life of the system. Because of the soil and groundwater conditions present in the area, and because of the associated construction costs, below-ground piping likely will not be a viable option for Alakanuk.

6.2.3 Utilidors

Utilidor systems consist of several pipes contained in an above-ground or below-ground enclosure. Water distribution and sewage collection pipes can be placed in the same enclosure. Utilidors generally have similar advantages and disadvantages to the other above-ground and below-ground systems. Placing several pipes in a single utilidor may also provide better thermal properties than single pipe above-ground or below-ground systems. Above-ground utilidor systems also provide less visual impact than other above-ground systems, and the utilidor itself protects the pipe from potential vandalism or other damage caused by human contact. Below-ground utilidor systems can be placed such that the top of the utilidor is flush with the ground. The cost to construct the utilidor is generally very high. Placing piping on the existing ground is preferable to constructing costly utilidor whenever practical.

6.2.4 System Comparison

Table 2 presents a comparison of above-ground, below-ground, and utilidor piped systems. The different types of systems were evaluated based on construction requirements, potential for damage due to human contact and flooding, maintenance access, and estimated costs.

TABLE 2
COMPARISON OF ABOVE-GROUND, BELOW-GROUND, AND UTILIDOR PIPED SYSTEMS

Evaluation Criteria	Above-ground	Below-ground	Utilidor
Susceptible to Frost Heave	Low	High	Low
Susceptible to Vandalism or Damage from Human Contact	High	Low	Moderate
Susceptible to Flooding Damage	High	Low	High
Susceptible to Corrosion	Moderate	High	Low
May Settle due to Thawing of Permafrost	Low	Moderate	Low
Visual Impact	High	Low	Moderate
Ease of Construction	Fair	Difficult	Moderate
Excavation Requirement	Low	High	Low
Imported Borrow Materials Required	Low	High	Low
Maintenance Access	Good	Poor	Good
Initial Capital Costs	Low	High	Moderate
Operation & Maintenance Costs	Moderate	Low	Moderate

6.3 REGULATORY REQUIREMENTS

6.3.1 Sewer Systems

Sewage collection, treatment, and disposal systems must be constructed and operated in compliance with the most current version of the State of Alaska Wastewater Disposal

Regulations (18 AAC 72). During design of a system, the applicable regulations should be reviewed by the engineer. Procedures for plan approval are outlined in the ADEC publication *Domestic Wastewater System Plan Review, Guidelines and Procedures*. The document outlines in detail the procedures and submittals required for construction of sewer systems in accordance with State regulations.

The ADEC regulations also define the facility owner's role regarding maintenance of the sewer system. Once the system has been constructed and approved by ADEC, it will be up to the City to ensure compliance with regulatory requirements regarding monitoring, sampling, and record keeping for the sewage collection and treatment system.

EPA regulations require that domestic wastewater receive secondary treatment prior to being discharged to the environment. Secondary treatment usually consists of a biological process which removes organic matter from the sewage. In some cases, this requirement may be waived, and sewage may be discharged after only primary treatment. Primary treatment consists of removing the solid particles from the sewage, generally by allowing the solids to settle out of the fluid over a period of time. Usually, a waiver of the requirement for secondary treatment is granted only to systems which discharge to marine receiving waters such as the Bering Sea, and it is unlikely that a waiver would be granted for Alakanuk.

6.3.2 Water Systems

The Safe Drinking Water Act (SDWA) of 1984 was enacted by the EPA to address the discovery of a variety of contaminants present in many of the drinking water supplies in the United States. The regulations set maximum permissible contaminant levels (MCLs) and established monitoring requirements for selected contaminants in drinking water.

The Surface Water Treatment Rule (SWTR), which went into force on December 30, 1990, requires disinfection, filtration, and monitoring for all public water systems which use surface water as a source. Mandated technology requirements include chemical coagulation, filtration, and disinfection to attain mandated performance requirements. Mandated performance requirements are 99.9 percent removal and/or deactivation of Giardia Lamblia cysts and 99.99 percent removal and/or deactivation of enteric viruses. Sampling and testing is mandatory for total coliforms, fecal coliforms, disinfection residual, temperature, and pH in accordance with the latest edition of *Standard Methods for the Examination of Water and Wastewater*. Additionally, the operator must be qualified and certified in accordance with the requirements of ADEC.

Provisions have been made to allow exemptions from all requirements of the rule with the exception of the mandatory disinfection residual requirement at the point of entry to the distribution system. Waterborne disease outbreaks must be reported to the designated agency within 48 hours. The compliance deadline for the SWTR has been established as June 29, 1993.

Turbidity requirements for filtered systems vary depending upon the type of filtration system employed. Conventional coagulation-flocculation-sedimentation-filtration systems similar to the existing system in Alakanuk must achieve a filtered water turbidity level of less than or equal to 0.5 nephelometry turbidity units (NTU) in 95 percent of the measurements taken each month.

Disinfection residual must be "detectable" in 95 percent of the monthly distribution system samples. Sampling for heterotrophic plate count (HPC) bacteria is allowable in lieu of measuring disinfectant residual. An HPC measurement of less than 500 colonies/ml is considered "detectable residual" by definition. Disinfectant residual is defined as total chlorine, combined chlorine, or chlorine dioxide. The chlorine disinfection system must 1) contain redundant components to provide for continuous disinfection including an alternate power supply with automatic startup and/or connection, and an automatic alarm; or 2) an automatic shutoff of delivery of water to the distribution system whenever the disinfectant residual is less than 0.2 mg/l.

Water treatment systems must be constructed and operated in accordance with the State of Alaska Drinking Water Regulations (18 AAC 80). The Drinking Water Regulations are generally in accordance with the federal SDWA with respect to water treatment systems. A public drinking water system such as the one which currently exists in Alakanuk is classified as a Class "A" system. As with sewage treatment and disposal, the engineer is responsible for reviewing the regulations and providing a design which is in accordance with applicable regulations.

The Drinking Water Regulations also outline the water treatment and distribution system owner's role in monitoring the system. Specific requirements for sampling and monitoring the quality of the treated water, including reporting requirements, are included in the regulations. Properly trained operators and well-defined sampling schedules are the key to maintaining compliance with these regulations.

6.3.3 Solid Waste Disposal

The EPA is responsible for developing and enforcing the regulations pertaining to solid waste management under the Resource Conservation and Recovery Act (RCRA). The Alaska State Legislature has authorized and directed ADEC to request from the EPA the authority, under federal law, to manage solid waste in Alaska. Before EPA will grant ADEC this authority, ADEC must develop its own management program in compliance with 40 CFR Part 256, Guidelines for Development and Implementation of State Solid Waste Management Plans. ADEC is currently revising their existing regulations (18 AAC 60) to reflect federal regulations which were revised in October of 1991. The regulations are tentatively scheduled for submittal to EPA for review and approval in April of 1993.

EPA regulation 40 CFR Part 258 establishes minimum design and performance criteria for municipal solid waste landfills. The regulation applies to all facilities that are accepting wastes as of October 9, 1993. The regulations establish specific methods and implementation deadlines for the construction, operation, monitoring, and closure of municipal landfills. Facilities such as the one in Alakanuk which receive less than 20 tons of waste per day may be eligible for exception to some of these requirements. During the design of expanded or upgraded facilities, applicable regulations should be considered by the engineer, including obtaining waivers of the provisions of 40 CFR Part 258. Maintenance and monitoring requirements should be included in the solid waste management plan for the landfill.

7.0 WASTEWATER COLLECTION, TREATMENT, AND DISPOSAL

7.1 GENERAL

The following subsections present brief descriptions of several options which may be considered viable for wastewater collection, treatment, and disposal in Alakanuk. As outlined previously, the current system consists of self-haul honeybucket disposal in individual bunkers, except for community buildings such as the school and washeteria which are served by a piped collection system and lagoon. We understand that the community wishes to upgrade their existing facilities to provide a higher level of service, preferably a piped system. We also understand that the community is committed to operating and maintaining the system throughout its design life.

7.2 COLLECTION OPTIONS

7.2.1 Composting Toilets

Composting toilets are individual treatment systems which use bacteria to destroy organic material. These types of toilets do not require water, but do require a significant amount of maintenance by the individual homeowner. The system may fail if it receives a large amount of waste in a short period of time. However, recent improvements in design have increased the efficiency and reliability of biological decomposition. Former field testing in individual homes has not been accomplished to date, and validated results are not available to determine the applicability of composting toilets to remote Alaskan communities. Potential concerns include community acceptance and the high energy costs required to maintain these types of systems.

Because tested results of composting toilet systems which have been used in remote Alaskan communities in the past are not available, and because the residents of Alakanuk would prefer to have a system which provides both water and sewer to their homes, preferably from a piped system, composting toilets are not considered an acceptable option. Therefore, composting toilets will not be considered further in this report.

7.2.2 Truck Haul with Individual or Cluster Holding Tanks

This option includes installing below-ground or above-ground holding tanks for sewage at individual homes. A pump truck will be required to periodically empty the tanks for disposal at a treatment facility. Tanks are sized based on the estimated volume of sewage expected to be generated by each household daily. The relatively shallow groundwater table in the Alakanuk area should be a consideration during buried tank design due to the potential for buoyancy or floating of the tanks when empty. Manufacturer's data for plastic storage tanks is included in Appendix I.

Each home served by the system will be plumbed with conventional fixtures, and a service line will connect the house to the holding tank. Alternatively, a tank could be placed such that it would serve several homes at one time. However, agreements between property owners would be necessary, because service lines serving one home may cross over the property of another homeowner. Generally, individual homeowners are responsible for maintaining their own service lines. If the cluster system is selected, operation and maintenance costs would be difficult to divide between the individual homeowners. Fees for pumping the tanks would also be difficult to divide between the homes, because the amount of sewage generated would vary, possibly leading to disputes over who is responsible for paying the fee. If more than one home were plumbed to one sewage tank, it would be difficult to judge at what point the tank would become full, which could possibly lead to a sewage overflow. By placing both water and sewage tanks of similar size at each home, sewage overflow could be prevented. When the water tank is empty, the sewage tank should be full, and it would be required that the sewage tank be pumped before the water tank is refilled. Therefore, we recommend that individual holding tanks be installed for each home, rather than for several homes. Costs related to this service can be distributed to the homeowners through user fees, which can be imposed each time the homeowner's tank is pumped.

7.2.3 Septic Systems

Septic systems are considered a viable option when good soil conditions exist. In order to work properly, a drainfield is required as part of the septic system. Because of the relatively shallow groundwater table and the low permeability of the soils in Alakanuk, septic systems are not considered a feasible option, and will not be considered further in this report.

7.2.4 Piped Collection Systems

Several different types of piped sewage collection systems are described in the following paragraphs. In general, piped systems do not work well under low water use conditions. Therefore, if any type of piped system is installed, it is recommended that a piped water delivery system be installed at the same time.

<u>Gravity Systems</u>

Conventional piped gravity sewage collection systems are used throughout Alaska in areas with and without permafrost. In summary, the sewage flows downhill by gravity, from the individual homes to primary collection pipes, and eventually to the treatment facility. Gravity systems can be constructed with either above-ground or below-ground piping. These types of systems tend not to work too well in areas with relatively little topographic relief such as Alakanuk. Moreover, since the Alakanuk area is very flat, it would be necessary to install pump stations at locations where the piped system becomes too deep for practical construction. A piped system should be designed and the location of the treatment facility selected so as to minimize the number of pump stations required. Pump stations usually require a relatively high amount of operation and maintenance attention.

If the number of pump stations is minimized, the advantages of gravity piped collection systems include generally lower operation and maintenance costs than those for other types of piped systems. Initial capital costs are somewhat higher than those for above-ground piped systems, and are comparable to those for other types of below-ground systems. However, because gravity systems are usually placed below-ground, the soil and groundwater conditions present in Alakanuk may considerably increase the construction costs due to the extensive dewatering which may be necessary and the requirement for imported fill material.

Force Mains

Piped force main systems consist of pressurized lines which collect sewage for transportation to the treatment facility. Sewage may be collected from several individual homes by gravity, transferred to a pump station or tank, and then pumped through the force main to the treatment facility. Alternatively, sewage may be transferred directly from each home to the force main; however, the sewage must be injected into the system at each location because the force main is under pressure. This would require the installation of a sump and grinder pump at each home to collect sewage and inject it into the force main line. Although the grinder pumps may require more maintenance than conventional pumps, large objects which may clog the lines are less likely to enter the collection system. Because the force main piping remains full at all times and the sewage it contains is warm, the potential for freezing of the lines may be less than that of a conventional gravity system depending on the cycle time, quantity of flow, and other factors.

Force main systems can be constructed with either above-ground or below-ground piping. These systems work well in any area regardless of topographic relief, and local areas of frost heaving do not affect the operation of the system. Operation and maintenance costs are generally higher than for conventional gravity systems because of the requirement for numerous pump stations. Construction costs for these types of systems are generally lower than those of other types of piped systems. Force mains may be best used in conjunction with a gravity collection system.

Vacuum Sewer System

A vacuum sewer system is somewhat similar to that of the force main in that the transportation of sewage to the treatment facility is done by mechanical means. The sewage from each individual home travels by gravity to a sump located in the home near the main line. When the sewage in the sump rises to a predetermined level, a vacuum valve opens and the sewage is transported by vacuum through the piping to a central collection point or directly to the treatment facility. A schematic of a typical vacuum treatment system is shown on Figure 10. Manufacturer's data on a typical system and vacuum plumbing fixtures is included in Appendix I.

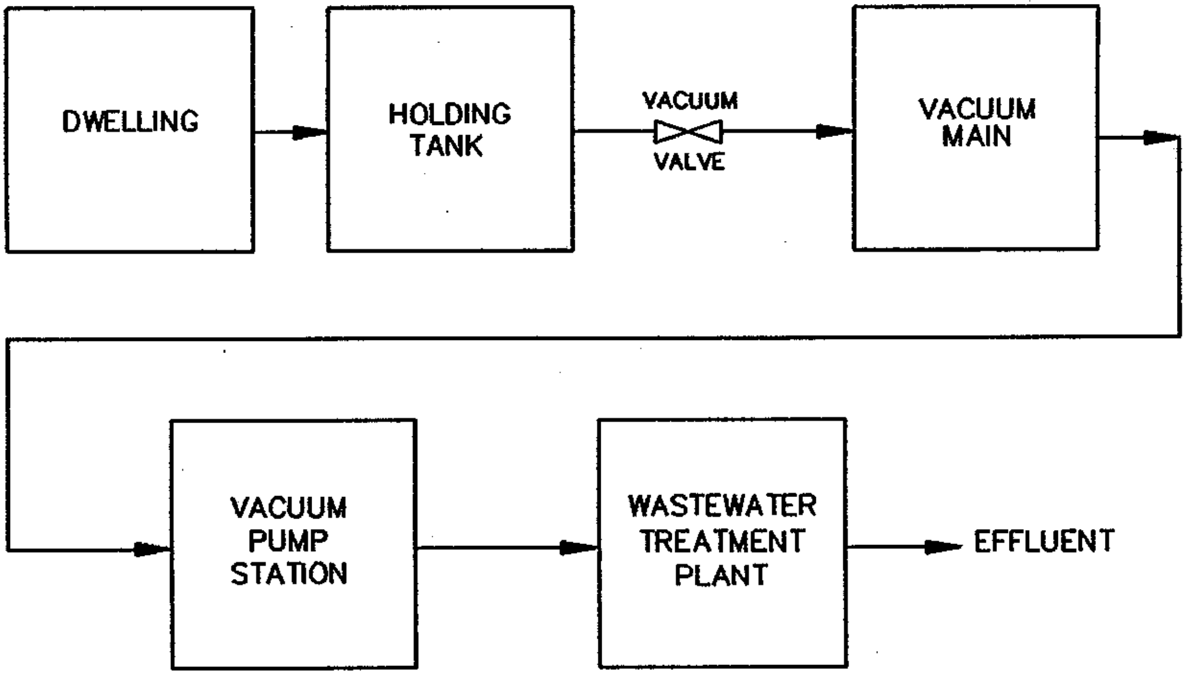
Currently existing systems in Noorvik and Emmonak use vacuum toilets which transport the toilet waste directly to the treatment facility rather than through a gravity line to a sump outside the home. Other graywater wastes generated by tubs, showers, and sinks are collected in a sump as described above. The vacuum toilets are reported to be very noisy.

Vacuum systems are generally comparable in cost to conventional gravity or force main type systems. These types of system are a fairly new technology, and operation and maintenance costs are reported to be high, although recent improvements to vacuum technology are reported to have reduced these costs.

7.3 TREATMENT AND DISPOSAL OPTIONS

According to EPA regulations, all sewage treatment facilities must provide secondary treatment for domestic sewage in accordance with the Clean Water Act. Domestic wastewater is defined as "waterborne human wastes or graywater derived from dwellings, commercial buildings, institutions, or similar structures...". Wastes generated by the cannery in Alakanuk would not be considered domestic waste and would most likely have to be treated more diligently than ordinary domestic sewage.

ADEC allows the discharge of primary treated domestic wastewater in some cases. Generally, waivers of the secondary treatment requirement are granted to facilities which discharge to a marine environment. Because of the unique situation usually encountered in rural Alaskan communities, it may not be practical from an economic and an operation and maintenance standpoint to provide secondary treatment. Therefore, ADEC evaluates each community on a case-by-case basis. However, per conversations with ADEC personnel, it is unlikely that the City of Alakanuk would be able to obtain a waiver of the secondary treatment option. The following subsections present options for sewage treatment which will meet the requirements of ADEC.



SEWAGE AND GRAYWATER IS COLLECTED IN THE HOLDING TANK. WHEN A SUFFICIENT VOLUME OF LIQUID HAS BEEN COLLECTED IN THE HOLDING TANK, A VACUUM VALVE OPENS AUTOMATICALLY, PERMITTING THE LIQUID TO ENTER THE VACUUM SYSTEM. THE VALVE REMAINS OPEN UNTIL THE LIQUID AND A VOLUME OF AIR HAS ENTERED THE VACUUM MAIN. VACUUM PUMPS IN THE VACUUM STATION MAINTAIN A VACUUM IN THE SYSTEM. THE WASTEWATER IS PUMPED TO THE WASTEWATER TREATMENT PLANT WHERE IT IS PROPERLY TREATED AND DISCHARGED.

TYPICAL VACUUM SEWER SYSTEM

ALAKANUK, ALASKA

DAMES & MOORE

FIGURE 10

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7.3.1 Sewage Lagoons

Diked Lagoon

As outlined in Section 5.0, the existing sewage lagoon near the school treats sewage from the facilities which are served by a piped collection system. Although provisions were made during the design of the lagoon to allow for an additional cell of the same approximate size as the existing cell, the lagoon was not designed to handle the volume of sewage which would be generated by the entire City if a piped system was installed.

Since the existing lagoon is located near the school and populated areas of town, odors from the lagoon and from the treated effluent may become bothersome to Alakanuk residents, especially if the facility is expanded to accommodate sewage from the entire community. In addition, the location of the lagoon increases the potential for human contact with raw sewage, especially for curious children. Therefore, expansion of the existing lagoon for use by the entire town is not recommended. It may be possible, as the project progresses, to continue to use the existing lagoon to dispose of a limited amount of haul system waste until a larger treatment facility is constructed.

Because it is not deemed viable to expand the existing school lagoon, the only option is to construct a new lagoon. This option was discussed with residents during the second public meeting. The residents recommended a site east of the airstrip near the landfill, although some concern was expressed regarding potential impacts to small creeks in the area. Since a road already exists to the landfill, road construction to the lagoon site would not be required, which would result in substantial cost savings.

Because of the annual spring flooding, the potential for erosion of lagoon dikes, and the poor quality of fill materials available in the area, fill to construct the lagoon dikes would most likely have to be imported from St. Marys at substantial cost. The lagoon dikes should be designed at an elevation that would be above the level of annual flooding.

Based on a design population of 635, and assuming that 80 gallons/day/person of sewage will be generated by residents once a complete piped water system is installed, we estimate that approximately 50,800 gallons of sewage will be generated daily by the residents of Alakanuk. Since the facility will be frozen during the winter, a new lagoon must be capable of retaining the entire amount of sewage generated from October through May. Based on this volume, we estimate that an approximately four to five acre lagoon (10 foot depth including freeboard) will be required for the design population.

Tundra Ponds

Another option for a new lagoon includes modification of an existing tundra pond. This option includes modifying a natural depression to create a lagoon which will retain the required amount of sewage. Construction of this type of lagoon would cost significantly less than a diked lagoon, because fill material would not have to be imported. Construction of this type of lagoon would require consideration of the potential for annual flooding. Since a tundra pond operates in the same manner as a diked lagoon, the size of the pond will be similar. Treated effluent from the lagoon may be discharged to the surrounding lands during the summer months. The ideal location for a tundra pond would be south of the proposed location of the vacuum plant near the AVEC facility. This location will minimize the length of the outfall to the lagoon. Selection of this location will also protect the community from contact with sewage during spring flooding, because the lagoon will be located downstream of the City.

In some cases, a minimum amount of pretreatment is provided before the sewage is deposited in the lagoon. The pretreatment may include primary settling to remove the large solids or some form of biological treatment such as aeration. Any type of pretreatment facility will require increased operator attention, and may also require sludge disposal. Because of this additional O&M expense, any pretreatment of the sewage is not recommended.

Although the soil conditions in the Alakanuk area are poor, some of the materials which are removed during the excavation of the pond may be used to construct low dikes around the pond. The use of geotextile fabrics may allow higher dikes to be constructed. The dikes will provide some protection from flooding.

If this type of system is allowed by the regulatory agencies, it should be selected as the preferred alternative. If no imported fill materials are required, construction costs will be comparable to other types of treatment systems. More importantly, a tundra pond has the least operation and maintenance requirements of any of the alternatives which are considered feasible. The ADEC publication *Guidance for Designation of Tundra Ponds for Use as Domestic Wastewater Treatment Systems* (ADEC Guideline No. WW-002) will assist the engineer in the design and permitting of this type of facility.

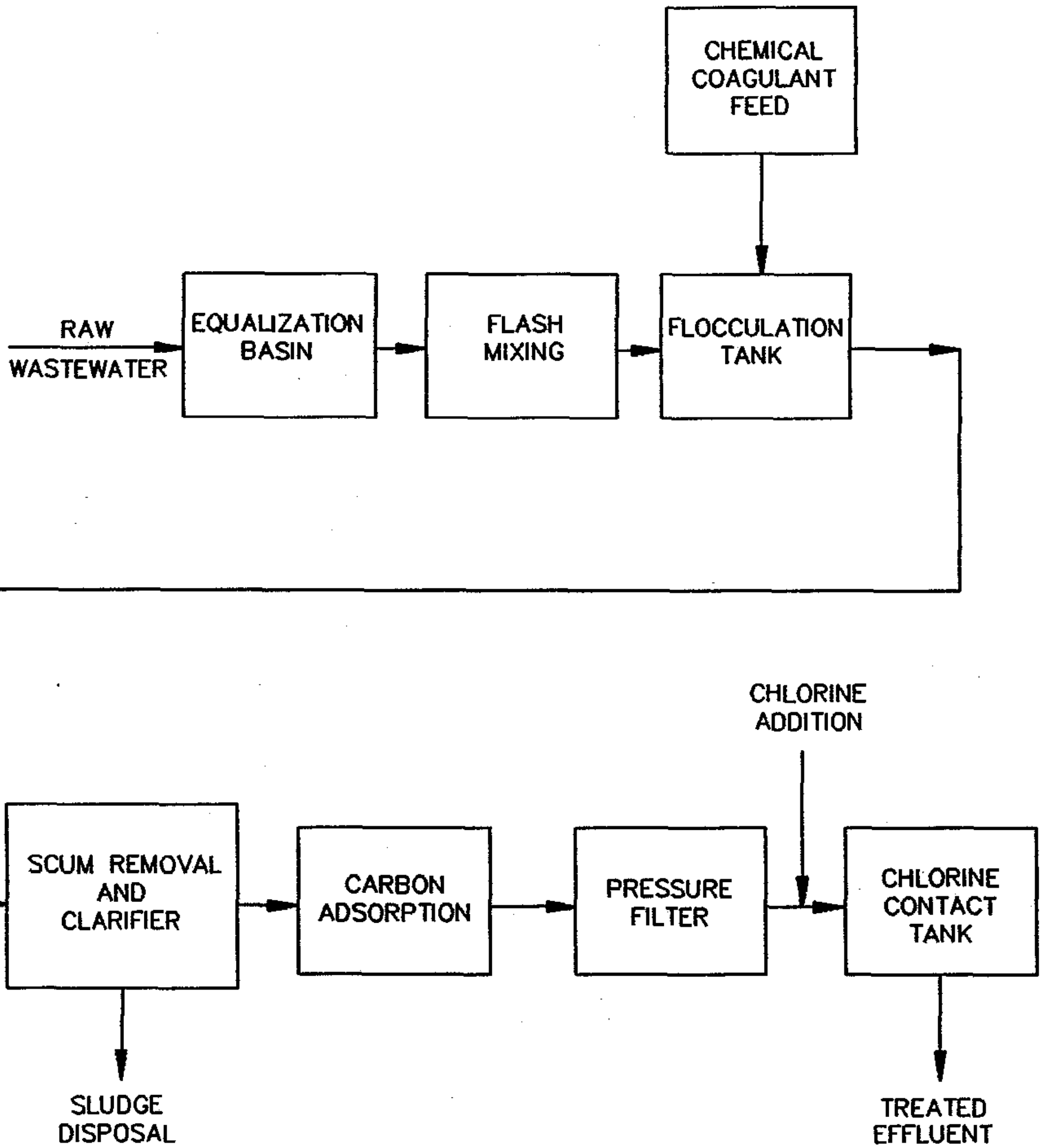
7.3.2 Community Septic System

Community septic systems are another method of providing treatment for domestic sewage. The soils and groundwater conditions in the Alakanuk area present the same problems to a community septic system as to individual household septic systems. An alternative would include constructing a drainfield and a partially aboveground septic tank which would be sized to adequately treat the required amount of sewage. Due to the generally poor soil conditions, and since gravel borrow materials are unavailable in the Alakanuk area, this would be an expensive treatment method. Therefore, a community septic system is not considered a viable option for sewage treatment in Alakanuk.

7.3.3 Physio-Chemical Package Treatment Plant and Freshwater Outfall

Physio-chemical package sewage treatment plants are reliable, factory-built systems which provide secondary wastewater treatment and produce a high quality effluent. These types of systems are skid mounted and are easily installed. A typical system such as the one shown on Figure 11 treats wastewater by providing chemical coagulation, settling, absorption of soluble organics, filtration, and disinfection. Because the physio-chemical treatment process is similar to that of the existing water treatment plant in Alakanuk, operation and maintenance requirements would also be similar. Because of the complexity of the system, operation and maintenance costs are generally higher than for other types of sewage treatment systems, and the reliability of the system depends on effective operation and maintenance practices. Sewage sludge generated by the system may require additional treatment and dewatering prior to periodic disposal. Sludge would be removed from the clarifier, dewatered, and transported to a designated site for disposal. Initial capital costs for this type of system include the package plant, a building, and an equalization basin which is necessary to provide a constant flow into the system. Manufacturer's data on a typical package plant is included in Appendix I.

The quality of the effluent from these types of plants is such that it can be used for toilet flushing or other non-potable water applications. Because of the quality of the effluent, it can be discharged to a freshwater body such as Alakanuk Pass or the Yukon River without impacting downstream water users.



PACKAGE SEWAGE TREATMENT PLANT SCHEMATIC

ALAKANUK, ALASKA

DAMES & MOORE

FIGURE 11

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7.3.4 Activated Sludge or Extended Aeration System

This type of system consists of an aerated tank in which biological treatment of the sewage occurs. Blowers inject air into the tank to enhance the biological activity. The aeration tank is sized to provide adequate retention time to treat the sewage to an acceptable level. The sewage then passes into a clarifier where adequate retention time is allowed for the suspended solids to settle out of the mixed fluid. The settling process creates a sludge at the bottom of the clarifier. A portion of the sludge is returned to the bottom of the aeration tank to increase the population of bacteria, and to speed up the reactions. Excess sludge waste is generated and must be periodically removed and disposed of using a process similar to that described for the physio-chemical package sewage treatment plant. Treated effluent from the clarifier can be discharged to Alakanuk Pass through a freshwater outfall.

Based on conversations with ADEC personnel, this option will provide an acceptable level of treatment for freshwater discharge. Operation and maintenance requirements will be higher than those for a lagoon treatment system, but will also be considerably lower than those for a physio-chemical package sewage treatment plant.

8.0 WATER SUPPLY, TREATMENT, STORAGE, AND DISTRIBUTION

8.1 GENERAL

The following subsections present brief descriptions of several options which may be considered viable for supply, treatment, storage, and distribution of water in Alakanuk. As outlined previously, the current system consists of water delivery by City personnel or self-haul by residents. Community buildings such as the school and washeteria are served by a piped distribution system. We understand that the community wishes to upgrade their existing facilities to provide a higher level of service, preferably a piped system. It is important to understand that different types of distribution systems require varying amounts of water and produce varying amounts of sewage. For example, a system where water is stored in individual home tanks will use much less water and therefore produce less sewage than a system which pipes water to each home. We also understand that the community is committed to operating and maintaining the system throughout its design life.

8.2 WATER SUPPLY

8.2.1 Availability

The current water supply for Alakanuk's existing water treatment plant is obtained from the Alakanuk Pass of the Yukon River. During both the summer and winter months, an adequate volume of water is available to meet the present and future needs of the City of Alakanuk's residents.

As indicated in Section 3.0, the groundwater in Alakanuk is relatively shallow and saline due to the influence of the nearby Bering Sea. Therefore, groundwater is not considered a potential source of raw water in Alakanuk.

The current water intake structure may not provide a reliable source of raw water during certain times of the year. If a piped water delivery system is to be implemented, a reliable method of providing raw water to the treatment plant must be available at all times. As an alternative to the current system, it may be practical to install a shallow well or infiltration gallery on the bank of the pass. This type of intake system would consist of one or more shallow wells to collect raw water.

A small structure containing pumps to deliver the water to the treatment facility would be located over the well or infiltration gallery. The structure should be located so that it would not be damaged by ice during spring breakup. If easements can be obtained for the existing water intake line, it may be most economical to locate the pumphouse and infiltration gallery near the existing intake. If difficulties are encountered in obtaining these easements, it may be more practical to relocate the water line in the existing Third Street right-of-way, and to place the infiltration gallery on the bank of the river near the end of Third Street.

8.2.2 Quality

Although the raw water from Alakanuk Pass is highly turbid during certain times of the year, the treated water quality in Alakanuk is generally good. Residents of the area report that they are pleased with the quality of the treated water, although a salty taste is reported periodically. If this is a significant problem, the salty taste can most likely be eliminated if water is not drawn in for treatment during the highest tides.

Since the current water source is generally of good quality and since the volume of water available is adequate during both the summer and winter months, alternative water sources are not considered further in this report. Finished water samples are generally submitted in accordance with ADEC regulations. During the last two years, coliform bacteria levels exceeded ADEC standards only during July and August of 1992. At all other times, the finished water quality was in compliance with Alaska Drinking Water Regulations. More information regarding finished water quality is included in the O&M Practices Summary Report in Appendix F.

8.3 TREATMENT OPTIONS

8.3.1 Existing System Limitations

According to the 1989 PHS report titled *Alakanuk, Alaska, Water and Wastewater System Feasibility and Cost Study*, the existing water treatment plant was designed to treat 35 gpm or a maximum of 50,000 gallons in a 24 hour day. We estimate that at an average daily consumption rate of 80 gallons/day/capita (*Cold Climate Utilities Manual*), and at a design population of 635, residents of Alakanuk will use an average of approximately 50,800 gallons of treated water daily if a complete piped system is installed. Assuming that the existing system can achieve the 50,000 gpd design flow, the treatment volume is adequate to accommodate nearly all of the average daily flow at the design population. As construction of a piped water distribution system progresses, the demand on the water treatment plant will be increased, and the capability of the existing water treatment plant to meet the increased demand will need to be evaluated.

8.3.2 Expansion of the Existing System

If necessary, expansion of the existing system will likely be the most cost effective alternative for meeting the potentially increased demand of a piped water distribution system. The *Cold Climate Utilities Manual* indicates that peak daily demand should be approximately 2.3 times the average daily demand. Using this peaking factor, the treatment facility in Alakanuk must be able to handle a peak demand of approximately 116,840 gallons per day for the design population.

It appears that the existing system will meet the average daily demand but not the peak demand for a piped system constructed to serve the entire design population. As construction of a piped system progresses, it will be necessary to periodically evaluate the performance of the plant and its ability to meet the increased water demand. Based on these evaluations, upgrades to increase the capacity of the water treatment plant may be required.

If the existing plant is to produce its maximum capacity of 50,000 gpd, it will be necessary to make water 24 hours per day, which will require relatively constant monitoring of the treatment process. If it is desired that the plant only make water approximately 12 hours per day, upgrades to the treatment plant should be made in conjunction with the upgrade to a piped system. The existing system may be expanded or a package system similar to the existing plant can be added to run in parallel with the existing system.

8.4 WATER STORAGE

Treated water is currently stored in a 200,000 gallon insulated steel tank which is located adjacent to and west of the washeteria although the elevation of the overflow in the tank is such that there are only 175,000 gallons of usable storage volume. The tank is founded on piles and was constructed in 1984. Modifications to the tank to allow access for cleaning may be required. Required water storage capacities for a particular community are generally determined based on estimated consumption, frequency of filling, and fire flow requirements. In Alaska, fire protection is a local responsibility. To accommodate potential fire flows, provisions for storage of treated water or bypassing the treatment facility may be included. It is up to the residents of each individual community to establish the level of fire protection desired.

For a piped system, an adequate supply of water must be stored to augment peak demand during pump cycles. Generally, a tank should be sized to store enough water for the average estimated use for one day and to provide adequate chlorine contact time. With the design population of 635 and assuming a usage rate of 80 gallons/day/person, the required average daily storage volume for Alakanuk would be approximately 50,800 gallons, and the peak daily volume would be approximately 116,840 gallons. The existing 200,000 gallon storage tank is adequate to meet these requirements.

8.5 DISTRIBUTION OPTIONS

Options for a piped water distribution system are similar to those presented for a piped sewage collection system in that both above-ground and below-ground options are available. The following sections present brief descriptions of water distribution options for both water delivery and piped systems.

8.5.1 Truck Haul Water with Holding Tanks

This option includes providing insulated and/or heated holding tanks at each individual home. Tanks should be sized to accommodate storage for at least one week of water use. A heated or insulated storage shed adjacent to each home may be the best option for preventing the water

in the tank from freezing. This method will allow the delivery person to fill the tank without entering the house. Distribution lines to each home may require a heat trace to prevent freezing.

A new water delivery will be required to deliver water to each home on demand or in accordance with a set delivery schedule. A larger truck than the existing truck is needed so that water can be delivered to more than one house at a time in order to avoid excessive operation and maintenance costs, although the conditions of the roads in Alakanuk will limit the size of the pump trucks. If possible, each house will be equipped with conventional plumbing to distribute the water to the bathroom and kitchen.

Because the amount of sewage and graywater generated using this system will be greater than that currently generated by the self-haul system, each home will require a method of disposing of these wastes. Individual water holding tanks and piped home distribution can be installed in conjunction with individual sewage collection systems, such as installing individual sewage holding tanks as previously described. The operation of this system will be similar to the currently existing system, although water will have to be delivered to each home more often than it is currently done.

8.5.2 Piped Distribution Systems

A piped system, either above-ground, below-ground, or in a utilidor, will provide the highest level of service to the residents of Alakanuk. Installation of any type of piped system will also necessitate the installation of a piped sewage collection system. Individual water services to each home will require the installation of a small circulating pump and/or heat trace to prevent the service line from freezing. A piped system will also require installation of conventional plumbing fixtures in each home.

If an above-ground system is selected, either exposed or in a utilidor, a circulating main may be required to prevent freezing. Because Alakanuk is spread out over a long distance, more than one circulating loop may be required. This may increase O&M and capital costs. Since more pumping equipment is required for a circulating main, operation and maintenance costs will be increased. Alternatively, if repairs are required to a buried line, excavation will be required to locate and repair damaged areas.

Since excavation is not required for an above-ground system, initial capital construction costs would be less than for the installation of a below-ground system. Piped systems are the most complex of all distribution options, and will therefore require more operator attention than the existing self-haul system. Maintenance of individual service lines and in-home plumbing systems are the responsibility of the individual homeowners.

9.0 SOLID WASTE COLLECTION AND DISPOSAL

9.1 GENERAL

The following subsections present brief descriptions of municipal and residential solid waste disposal options which are available to the residents of Alakanuk. As discussed previously the current method of disposal consists of a dumpster collection system. The dumpsters are emptied approximately every two weeks by a two man crew operating a front-end loader and a dump truck. The solid waste is hauled to a fenced landfill which was constructed by the PHS in the early 1980s.

Generally, solid waste disposal sites are selected on high ground which is located at least half of a mile from residential areas and the community watershed to avoid potential human contact with the waste. According to the *Cold Climate Utilities Manual*, 76% of Alaskan communities use open dumps such as the one in Alakanuk for solid waste disposal. Incineration is another common method of disposal used in the state.

9.2 COLLECTION OPTIONS

The dumpster system of solid waste collection works well for the small quantities of trash generated by the residents of Alakanuk. Another option for collection is the self-haul method where residents haul their own trash to the landfill. However, this is considered to be a regression from the system which is already in place. The centralized dumpsters are more convenient because most residents do not have to go very far to dispose of their trash. Curbside service is not considered an option due to the high expense and the associated potential for unsanitary conditions.

9.3 DISPOSAL OPTIONS

The fenced landfill method of solid waste disposal is the most common and most economical means of dealing with municipal wastes in rural Alaska. Other options such as incineration are not considered viable for Alakanuk due to the operation and maintenance costs and the success of the existing system.

10.0 ALTERNATIVE EVALUATION

10.1 GENERAL

The residents of Alakanuk prefer a piped water distribution and sewage collection system. A piped system represents the highest level of service in terms of water quality, health risks, economics, and improvement of the quality of life. This twenty year plan was prepared with the objective of eventually providing piped service to as many residents of Alakanuk as possible. The residents must understand that construction of improved facilities will be performed over a number of years, and some residents will receive upgraded services earlier than others.

The magnitude of the project mandates that the resulting system be operated and maintained by skilled and committed personnel throughout the life of the system. Similar systems have been constructed in other rural Alaskan communities, and were abandoned within just a few years because the residents were either unwilling or unable to operate and maintain the systems properly. In order to justify the large initial capital expense required to construct a project of this size, funding agencies must be assured that the resources are available in Alakanuk to manage their facilities. As previously stated, once the system is constructed, it is entirely in the hands of the City of Alakanuk.

10.2 COSTS

The following subsections present rough order-of-magnitude capital and operation and maintenance cost estimates for the various alternatives which were determined to be feasible for sewage collection and disposal, water treatment and distribution, and solid waste collection and disposal. Detailed spreadsheets presenting the capital cost estimates for the various options are included in Appendix J. The spreadsheets include general and specific assumptions which were used when preparing the cost estimates. Costs for materials, labor, and freight for the various alternatives are included in the spreadsheets.

Operation and maintenance costs for the various alternatives are also included in this section, as well as estimates of the user fees which will be required to successfully operate the system. A spreadsheet presenting the estimated operation and maintenance costs for the various options are included behind the capital cost estimate spreadsheets in Appendix J.

10.2.1 Assumptions

General assumptions which were used when formulating the conceptual level capital costs, operation and maintenance costs, and required user fees are presented below. Assumptions specific to each alternative are included on the capital cost estimate spreadsheets located in Appendix J.

Capital Cost Estimate General Assumptions

- An experienced superintendent will be hired to run the job and supervise the local labor.
- Adequate labor and heavy equipment is available in Alakanuk to complete the project.
- Labor and equipment will be available at the following rates. Equipment rates are based on those provided by the City for use in last year's bunkers construction project.

	Range ($/hour)		**Range ($/hour)**
Superintendent (Anc)	35-40	Electrician (Anc)	25-35
Foreman	18-22	Loader	60
Operator/Mechanic	14-18	Backhoe	45
Laborer	10-14	Dozer	50
Plumber (Anc)	25-35	Pickup Truck (VSW)	0
Mechanic (Anc)	25-35	Subsistence	10

- Construction materials will be shipped from Anchorage or Fairbanks through Nenana, downriver, using the Yutana Barge Company at the following approximate rates.

Material Type	Rate per 100 Pounds
Lumber, Manholes, Plumbing Fixtures Misc. Construction Materials	$30
Vehicles and heavy Equipment	$40
Tanks	$50
Windows, Doors, Insulation, Etc.	$70
Fill Material	$28 (per cubic yard)

Operation and Maintenance Cost Estimate Assumptions

- Operators will be available in Alakanuk for $15 per hour.
- Five persons per household were considered for haul system estimates.
- Daily water use for haul systems is estimated at approximately 10 gpd per person.
- Daily sewage production for haul systems is estimated at approximately 10 gpd per person.
- Electricity costs are approximately $0.25 per kWh.

User Fee Estimate Assumptions

- Required user fees are based on the design population of 635 and the estimated annual operation and maintenance costs.
- User fees include an additional 10% to financially manage the system.
- An 80% collection rate of user fees will be maintained.

10.2.2 Capital Costs

Table 3 presents capital cost estimates for the various alternatives. As previously mentioned, detailed spreadsheets for each alternative are included in Appendix J. Each cost estimate includes 20% for design and construction management and a 20% contingency, except for the individual holding tank options and solid waste facility upgrade in which these items are reduced to 10%.

TABLE 3
CONCEPTUAL CAPITAL COST ESTIMATES

Alternative	Total Project Cost
Individual Holding Tanks Option 1 - Above-Ground Water and Sewage Tanks	$2,086,000
Individual Holding Tanks Option 2 - Above-Ground Water and Below-Ground Sewage Tanks	$2,218,000
Piped Water & Sewer System Option 1 - Buried Gravity/Force Main Sewer & Pressurized Water	$15,015,000
Piped Water & Sewer System Option 2 - Above-Ground Gravity/Force Main Sewer and Pressurized Water	$11,344,000
Piped Water & Sewer System Option 3 - Above-Ground Vacuum Sewer and Pressurized Water	$11,085,000
Sewage Treatment Facility Option 1 - Construct New Lagoon Near Existing Landfill	$2,517,000
Sewage Treatment Facility Option 2 - Package Sewage Treatment Plant and Freshwater Outfall	$678,000
Sewage Treatment Facility Option 3 - Activated Sludge System	$684,000
Sewage Treatment Facility Option 4 - Construct Tundra Pond South of AVEC Plant	$471,000
Water Treatment Plant Upgrade	$285,000
Construct New Water Intake Structure	$56,000
Upgrade Existing Landfill	$27,000

10.2.3 Operation and Maintenance Costs

The following tables present estimated operation and maintenance costs for the various types of systems which are discussed in previous sections. Detailed spreadsheets of the costs are included behind the capital cost spreadsheets in Appendix J.

Table 4 presents monthly estimated costs per household to operate a truck haul delivery system. As the number of users of this type of system varies, the cost per household will vary inversely.

TABLE 4
MONTHLY OPERATION & MAINTENANCE COSTS
INDIVIDUAL HOLDING TANK SYSTEMS

Home Delivery	Routine O&M	Vehicle Maintenance
$90	$70	$20
Total = $180 per month per household		

Table 5 presents estimated annual operation and maintenance costs for the individual components of the various types of systems which are being considered. Tables 6 presents overall costs for various types of systems. Since construction of a below-ground system is considered impractical due to the excessive costs associated with the poor soil and groundwater conditions in the area, the operation and maintenance costs for buried systems are not presented in Table 6. Because of the large number of possible system alternatives, it is not practical to indicate every possible option in Table 6. However, potential costs for any type of system may be obtained simply by adding the costs for the various system components as presented in Table 5. Please note that the estimated O&M costs presented in Table 6 do not include the washeteria and sauna facilities.

TABLE 5
OPERATION & MAINTENANCE COST SUMMARY
PIPED SYSTEMS
INDIVIDUAL SYSTEM COMPONENTS

System Component	Estimated Annual O&M Cost
Full Buried Pipe System	$20,000
Full Aboveground Pipe System	$18,000
One Lift Station	$3,000
Sewage Lagoon or Tundra Pond	$11,000
Package Sewage Treatment Plant	$68,000
Activated Sludge System	$34,000
Water Treatment Plant	$66,000
Vacuum Plant	$55,000
Residential Lift Station (per household)	$500

TABLE 6
OPERATION & MAINTENANCE COST SUMMARY
ABOVE-GROUND PIPED SYSTEMS

System Component	Option				
	1	2	3	4	5
Lift Station	X(5)	X(4)	X(4)	X(2)	X(3)
Tundra Pond	X				X
Package Sewage Treatment Plant		X	X		
Activated Sludge System				X	
Water Treatment System	X	X	X	X	X
Vacuum Plant			X	X	X
Residential Lift Station	X(156)	X(156)			
Subtotal	$188,000	$242,000	$219,000	$211,000	$159,000
Management Costs (10%)	$18,800	$24,200	$21,900	$21,100	$15,900
Estimated Annual O&M Cost	$207,000	$266,000	$241,000	$232,000	$175,000

10.2.4 User Fees

Based on the operation and maintenance costs for the haul system, we estimate the cost of operating and maintaining the haul system will be approximately $160 to $190 per month per household. This will vary based on the number of times each household has water delivered. We suggest that a flat fee per delivery be charged. Once the actual O&M costs for the haul system are established, the fee can be adjusted. If 30 individual holding tank systems are installed as planned, the annual cost to operate the haul system will be approximately $60,000 to $70,000.

The minimum estimated required user fees for a fully piped system presented in Table 7 were compiled based on the estimated operation and maintenance costs presented in Section 10.2.3. The fees include an additional 10% to cover financial management of the systems. The options shown in Table 7 correspond to those presented in Table 6. These fees include the minimum amount of revenue required to successfully operate and maintain the proposed sanitation facilities. When calculating the user fees, it was assumed that the operations costs would be divided between 125 households (80% collection rate for 156 total households). Since a user fee ordinance for solid waste collection and disposal has previously been adopted by the City, and since the system appears to be operating within its budget, solid waste user fees are not included in this section.

TABLE 7
ESTIMATED USER FEE SUMMARY

Option		Minimum User Fee per Household
Option 1 -	Above-Ground Water and Pressure Sewer, Sewage Lagoon	$140
Option 2 -	Above-Ground Water and Pressure Sewer, Package Sewage Treatment Plant	$175
Option 3 -	Above-Ground Water and Vacuum Sewer, Package Sewage Treatment Plant	$160
Option 4 -	Above-Ground Water and Vacuum Sewer, Activated Sludge System	$150
Option 5 -	Above-Ground Water and Vacuum Sewer, Tundra Pond Sewage Disposal	$115

The residential user fees for a piped system presented above may be reduced by charging commercial users a higher amount because businesses and public facilities often use more water than residential homes. For example, Option 5 will cost a minimum of $115 per month per household. If commercial users are charged higher amounts and if washeteria revenues are considered, we estimate that the $115 per month may be decreased to approximately $100 per month. In addition, once actual operation and maintenance costs are established, the user fee can be raised or lowered as needed to cover the actual costs.

As the project progresses, the cost of operation and maintenance will increase incrementally. The table presented in the Executive Summary at the beginning of this report indicates conceptual increases in O&M costs as the phases of the project are completed.

Because it costs more per household to operate the haul system than the fully piped system, it may be necessary to charge different rates for different types of service. Alternatively, the costs can be divided evenly between users regardless of the type of service. It should be up to the Utility and/or Planning committees as described in Section 11 to make the determination as to the actual user rate schedule. As the project nears completion, less users will require haul service. After completion of Phase 7, most residents should be connected to the piped system, and therefore costs associated with O&M of the haul system will no longer be incurred.

11.0 CONCLUSIONS AND RECOMMENDATIONS

Our conclusions, recommendations, and other information presented in this section are primarily based on our assessment of the City's requirements for their sanitation facilities and their desire for and commitment to operate and manage a fully piped system. In addition, capital construction costs, ease of operation and maintenance, projected user fee requirements, and constructibility of the alternatives were considered. Based on these factors, the following subsections present our recommendations for improved sanitation facilities for the City of Alakanuk. The recommendations were selected to provide a smooth transition from the current limited haul system to a fully piped system by first upgrading some residents to a full service haul system. We have also included our plan for phased construction of the project.

11.1 PREFERRED SYSTEM

Individual Above-Ground Holding Tanks

We recommend that individual holding tank water and sewer systems be installed in approximately 30 to 50 of the households in Alakanuk. Each individual system will consist of 500 gallon water and sewage storage tanks which will be located in a small insulated wood-frame structure adjacent to each home. The individual structures will be skid-mounted so that they can be easily moved to another location as the need arises. Pressurized water will be delivered to the interior of each home by installing a small pump. Sewage will flow from the home by gravity to the sewage storage tank.

In order to utilize this type of system, it will be necessary to provide household plumbing for water delivery and sewage collection. Plumbing fixtures provided by the project may include a service line, plumbing, toilet, lavatory, and kitchen sink, depending on the space available in each home. The homeowner must provide space for the fixtures, and, if desired, a tub or shower and a hot water tank. Measures to prevent freezing of the water and sewage in the tanks will also be required. This may include installation of a small electric heater, heat trace, or an additional loop to the home hydronic (glycol) heating system.

Utilizing this type of system will also require purchasing new water delivery and sewage collection trucks and constructing a garage for the vehicles. The trucks should be of adequate size to be able to service three or four homes in one trip in order to avoid excessive operational costs for the system. Generally, these types of systems are somewhat more expensive to operate and maintain than a community piped system; however, this system will provide the residents a temporary solution to the sanitation problem prior to the installation of a complete piped system.

Use of the individual holding tank systems will familiarize the residents with the benefits and responsibilities of having a readily available in-house water supply and wastewater disposal system. The residents will also become familiar with paying for these services on a regular basis. If, for example, a homeowner refuses to pay for water delivery as the service is provided, the skid-mounted individual holding tank system can easily be moved to another household where the owner is willing to pay for the water system. In addition, once all residents are hooked up to the community piped system, the skid-mounted units can potentially be sold to a nearby community which has yet to receive sanitary facility improvements.

The capacity of the existing water treatment plant is adequate to provide water for this level of service. Because of the relatively low amount of sewage generated by the individual holding tank systems, the sewage can be disposed of in the existing school lagoon until a larger treatment facility is constructed. Sewage from the pump truck may be disposed of in the existing force main pump station. This will limit the possibility of unsanitary conditions which may be encountered if the sewage were dumped directly in the lagoon. Although the school lagoon is not large enough to accommodate the sewage from a fully piped system, it is large enough to handle the limited amount of sewage generated by the haul system until a larger lagoon is constructed. Once the treatment facility is constructed, sewage from the household systems can be collected with the pump truck and deposited directly into the outfall pump station for direct transport to the treatment facility.

<u>Sewage Treatment Plant Construction</u>

The recommended option for sewage treatment for the design population is construction of a tundra pond. The capital construction costs for this type of system are somewhat less than that of most of the other options, and this type of system may not provide effluent of as high quality. The primary consideration for selection of this alternative includes the ease of maintenance of the system.

We propose that the tundra pond be located south of the vacuum plant which will be located adjacent to the existing AVEC facility. A pump station will be located inside the building adjacent to the vacuum plant equipment. These locations will minimize piping lengths and reduce both initial capital and O&M costs. The pump station will be configured such that the operator can dispose of sewage resulting from the truck haul system directly into the pump station. This method will potentially avoid unnecessary human contact with the sewage.

The tundra pond will require construction of a maintenance access road between the vacuum plant facility and the tundra pond. In addition, the entire facility will be fenced to prevent unauthorized access.

Water Treatment Plant and Raw Water Intake

The existing water treatment plant should be capable of meeting the average daily demand for a piped water system at the design population of 635. This assumes that the plant will be operated at maximum capacity (35 gpm) for 24 hours per day. As the project progresses, we recommend a periodic evaluation of the ability of the plant to meet the demand for treated water. If, at any time, it appears that the performance of the treatment plant is not adequate to produce the required amount of treated water, it will be necessary to modify the plant in order to increase its capacity. During the design phase, we recommend that the engineer evaluate the ability of the current water intake structure to meet the increased demands of a piped system. If necessary, an intake system such as an infiltration gallery or shallow well be constructed on the bank of Alakanuk Pass.

We also recommend that easements be obtained for the water intake line and for the washeteria and water storage tank. This will prevent future problems related to the current location of these facilities. If easements are not obtained, it may be necessary to relocate one or all of the facilities in the future.

Piped Water Distribution and Sewage Collection

After analysis of the various available types of piped systems, we recommend implementing a combination above-ground gravity, force main, and vacuum system. Because the city is situated in a lengthy linear fashion along Alakanuk Pass, the length of pipe required may prohibit the use of a vacuum system to serve the entire community. Although we recommend an above-ground vacuum system to serve the core areas of town, it will be more practical to serve the outlying areas such as the native store and the area across Alakanuk Pass using a combination of above-ground gravity and force main sewer. A vacuum system was selected because of initial capital costs and projected O&M requirements. Pressurized, circulating water distribution lines will be installed in conjunction with sewage collection lines.

Construction costs related to potential problems which may be encountered due to the poor soil conditions and high groundwater table in the area prohibit the installation of a buried system.

We recommend that the central vacuum plant be located near the AVEC facility and adjacent to the proposed sewage treatment plant. This location will allow for the use of waste heat at the vacuum plant, and will minimize the length of piping between the vacuum plant and the sewage treatment facility. The vacuum equipment can be located in the same building as the sewage treatment equipment, thereby reducing initial capital costs related to construction of two separate buildings.

Solid Waste Collection and Disposal

Minor modifications to the current solid waste collection and disposal system should be made to increase efficiency. Damaged or missing lids on the dumpsters should be replaced to prevent trash spreading due to the wind or birds and animals. The solid waste disposal site should be regraded and a road built between the gate and the rear of the facility. This will allow the operators to fill the site from the back toward the front as it is intended, and will limit the possibility of trash spreading outside the fenced area as it is now. This will also eliminate the necessity of driving over previously deposited waste, as is currently done since the facility is being filled from the front toward the rear. Permits for operation of the facility should be obtained in accordance with current regulations.

11.2 PHASED APPROACH

11.2.1 Responsibilities of the City

The development of the upgraded sanitation facilities will be phased over a period of years in order to establish the City's ability to operate and maintain the facilities and to assure that adequate funding is available for the project. As stated numerous times, prior to receiving any sort of upgraded facilities, the City must demonstrate their managerial and financial commitment to successfully operate the system.

As the first step of the project, we recommend that a committee consisting of council members or other interested residents be appointed to assure the facilities are operated and maintained appropriately. At a minimum, the responsibilities of the committee will include the following.

- Adopt an operation and management plan to assist the City in developing their managerial skills. The plan will outline procedures by which the City can develop their internal structure and operation and management practices concurrently with the design, construction, and operation of the various phases of the project.

- Adopt ordinances for the operation of the sanitation facilities and for collection of user fees.

- Enforce the water and sewer ordinances. Ensure that user fees are regularly collected from all residents served by the facilities. Assure that disconnections are made to consumers who do not pay their bill.

- Monitor the construction, operation, and maintenance of the sanitation facilities throughout the life of the system.

- Manage all personnel connected to the operation of the facility. This may include hiring and firing, promoting and demoting, laying off, or any other aspect of personnel management.

- Manage and administer the capital improvement budget.

- Prepare annual budgets, capital improvement requests, and recommendations for more efficient operation of the system.

- Assure that detailed financial records for operation and maintenance expenditures and revenues are kept.

- Prepare detailed year end financial reports which outline revenues and expenditures for the sanitation facilities for inclusion in the City's annual financial report.

- Annually evaluate the year end financial reports to determine whether revenues generated from user fees are adequate. Revise ordinances as necessary to raise or lower fees to cover annual operational costs of the system.

- Establish a public information program to assure that residents are aware of their responsibilities for operation of maintenance of the system. Conduct mandatory meetings or classes to teach residents the proper care of their system.

- Assure that any land acquisitions required for construction of facilities are performed correctly. This will include assuring that land transfers, easements, and other pertinent transactions are legally recorded at the appropriate governmental agency.

In general, it will be the responsibility of the Utility Committee to oversee all matters pertaining to the water and sewer utility. The ultimate responsibility for the success of the system will rest on the shoulders of the committee. A sample water and sewer ordinance which establishes the Utility Committee is included in Appendix B. We expect that the ordinance will be accepted and adopted by the City Council prior to submittal of the Final Master Plan.

Another important step required for the success of the project will include ensuring that adequate accounting methods are used to track expenditures and revenues for the facilities on a daily basis. These procedures are currently being developed for the washeteria and sauna. City personnel should be trained in accounting and computer skills to ensure that the resources are available to financially manage the facilities. Each facility should be accounted for separately including water, sewer, solid waste, washeteria, etc. Expenditure and revenue reports should be submitted to the Utility Committee monthly, quarterly, and at year end.

11.2.2 Phased Project Construction

The construction of the project will be accomplished over a period of years. Table 8 presents proposed phases of the project and the total estimated capital construction costs for each phase. Construction of the piped system has been divided into six different service areas. Maps which indicate these service areas are included in Appendix K. A detailed cost estimate for the phased approach to the project is included on Figure 12. Costs from each of the individual alternative cost estimates are incorporated in the project summary spreadsheet.

The service areas as shown on the maps in Appendix K were selected so that the core areas of town would be served first, and the outlying areas such as those near the Native Store and across the river would be served last. Because of the distance between the Native Store area and the rest of town, and because of the river crossing which will be required to serve the area across the Pass, these two areas will be much more expensive to serve per person from both a capital and O&M perspective.

TABLE 8
PROPOSED PROJECT PHASES

Phase	Estimated Cost
Phase 1: Install 30 Above-Ground Individual Skid-Mounted Holding Tank Systems Construct Sewage Treatment and Vacuum Plant Building Construct Tundra Pond and Outfall	$1,654,697
Phase 2: Install Vacuum Plant Equipment Construct New Water Intake Structure Construct Piped System for Service Area 1	$2,253,557
Phase 3: Construct Piped System for Service Area 2	$2,200,032
Phase 4: Construct Piped System for Service Area 3	$1,761,696
Phase 5: Construct Piped System for Service Area 4	$1,990,080
Phase 6: Construct Piped System for Service Area 5	$1,102,464
Phase 7: Construct Piped System for Service Area 6	$1,758,960
PROJECT TOTAL	$12,721,000

Figure 12
Capital Cost Estimate - Preferred System

City of Alakanuk - Sanitation Facilities Master Plan **5/18/93 13:00**
Conceptual Construction Cost Estimates
Water Distribution and Sewage Collection System Recommended Option - Combination System

The following spreadsheet presents an order of magnitude cost estimate for the recommended option for improved water and sewer facilities for the city of Alakanuk. Because the City of Alakanuk is very narrow and spread out along Alakanuk Pass, we recommend implementing a system consisting of aboveground pressurized water distribution and a combination of aboveground vacuum, gravity, and force main sewage collection. Cost information from the estimatees for the individual options has been incorporated into this spreadsheet.

Assumptions:

1. The project will be constructed in phases over the next several years (Based on 40 hours per week). Service areas to be constructed during each phase are shown on the service area maps located in Appendix I. We assume the following items will be included in each service area.

Service Area	Water Main (lf)	Water Services (lf)	Gravity Sewer Main (lf)	Force Main Sewer (lf)	Vacuum Sewer Main (lf)	Sewer Services (lf)	Number of Lift Stations
1	3500	2500	0	0	3500	2500	0
2	3500	3300	0	0	3500	3300	0
3	3100	2300	0	0	3100	2300	0
4	2700	900	0	0	2700	900	0
5	5750	2010	1700	2550	1500	2010	1
6	2450	990	1800	650	0	990	1
Total	21000	12000	3500	3200	14300	12000	2

The phases of the project will consist of the following tasks.

Phase 1.	Construct Vacuum Plant Building
	Construct Tundra Pond South of the AVEC Plant
	Install 30 Aboveground Individual Holding Tank Systems
	Upgrade Solid Waste Disposal Facility
Phase 2:	Install Vacuum Plant Equipment in Plant Building
	Construct New Water Intake Structure
	Construct Piped System for Service Area 1
Phase 3:	Construct Piped System for Service Area 2
Phase 4:	Construct Piped System for Service Area 3
Phase 5:	Construct Piped System for Service Area 4
Phase 6:	Construct Piped System for Service Area 5
Phase 7:	Construct Piped System for Service Area 6

2. An experienced superintendant will be hired to run the job and supervise the local labor.
3. Adequate labor and heavy equipment is available in Alakanuk to complete the project.
4. Labor and equipment will be available at the following rates.

	Range ($ per hr)		Range ($ per hr)
Superintendant (Anc)	35-40	Electrician (Anc)	25-35
Foreman	18-22	Loader	60
Operator/Mechanic	14-18	Backhoe	45
Laborer	10-14	Dozer	50
Plumber (Anc)	25-35	Pickup Truck (VSW)	0
Mechanic (Anc)	25-35		

5. Construction materials will be shipped from Anchorage or Fairbanks through Nenana downriver, using the Yutana Barge Company at the following approximate rates.

Material Type:		Rate per 100 Pounds	
	Lumber, Manholes, Plumbing Fixtures, Miscellaneous Construction Materials. etc.	$30	(Type 1)
	Vehicles and Heavy Equipment	$40	(Type 2)
	Tanks	$50	(Type 3)
	Windows, Doors, Insulation, Prefab Roofs, etc.	$70	(Type 4)
	Fill Material	$28 (per cy)	(Type 5)

6. The vacuum plant equipment will be placed in a 2,000 sf building located adjacent to the AVEC plant.
7. No fill will be imported for construction of the tundra pond. Fill will be imported for construction of a service road between the vacuum plant and the lagoon. The depth of the fill will be two feet.
8. The length of the service road will be 300 feet. The width of the service road will be 10 feet.
9. The size of the lagoon is based on the data presented in the individual cost spreadsheet for the Tundra Pond in Appendix J.

Figure 12 (con't)

10. The force main to the lagoon will be aboveground.
11. Aboveground plastic or fiberglass 500 gallon tanks will be used for both water storage and sewage collection for the individual holding tank systems.
12. Both water and sewage holding tanks will be placed in the same 6 foot by 10 foot enclosure adjacent to each home.
13. Both the bathroom and kitchen of each home will be plumbed using low water use fixtures.
14. Relocation or expansion of the existing water treatment plant will not be necessary.
15. The existing water treatment plant will be evaluated periodically to determine its ability to meet the increased demand of a piped water distribution system.
16. Approximately 21,000 lf of water and sewer main and 12,000 lf of water and sewer service connections will be installed.
17. All pipe will be aboveground on wood sills which will be placed directly on the existing ground except at road crossings.
18. Gravity and force main sewer pipe and all water pipe will be insulated and heat traced.
19. Vacuum pipe will be insulated.
20. Fill material will be imported only for road crossings.
21. Fifteen of the individual holding tank systems will be installed in Service Area 1 and 15 will be installed in Service Area 2. When these homes are upgraded to a vacuum system, plumbing modifications to the home will cost $2,000.
22. The engineer's investigation will indicate that construction of a more reliable intake structure will be required.
23. The new intake structure will consist of a large, vertical, shallow well.
24. A small insulated wooden pump house will be constructed over the well.
25. The material from the well will be mixed 1 to 1 with granualr fill material imported from St. Marys.
26. Power for the intake structure is available nearby.
27. The infiltration gallery will be located near the existing intake structure. Relocation of the intake line will not be required.

Phase 1

Construct Vacuum Plant Building (2,000 sf @ $200 per sf)	$400,000	
Construct Tundra Pond and Outfall	$327,173	
Sewage Pumping and Water Delivery truck	$150,000	
Subtotal	**$877,173**	
Design and Construction Management (20%)	**$175,435**	
Contingency (20%)	**$210,521**	
Upgrade Solid Waste Disposal Facility	$21,240	
Install 30 Aboveground Individual Holding Tank Systems in Service Areas 1 and 2.	$288,300	
Design and Construction Management (10%)	**$30,954**	
Contingency (15%)	**$51,074**	
	Phase 1 Total	**$1,654,697**

Phase 2

Install Vacuum Plant Equipment			$250,000	
Construct New Water Intake			$38,970	
Service Area 1:	**Quantity**	**Unit Cost**	**Extended Cost**	
Water & Gravity Sewer Main	0 lf	$206 lf	$0	
Water & Force Main Sewer	0 lf	$206 lf	$0	
Water & Vacuum Sewer	3500 lf	$196 lf	$686,000	
Water & Gravity Sewer Services	0 lf	$206 lf	$0	
Water & Vacuum Sewer Services	2500 lf	$196 lf	$490,000	
Lift Stations	0	$75,000 each	$0	
New Home Plumbing	14	$5,000 each	$70,000	
Upgrade Home Plumbing	15	$2,000 each	$30,000	
		Subtotal	**$1,564,970**	
		Design and Construction Management (20%)	**$312,994**	
		Contingency (20%)	**$375,593**	
			Phase 2 Total	**$2,253,557**

Phase 3

Service Area 2:	**Quantity**	**Unit Cost**	**Extended Cost**	
Water & Gravity Sewer Main	0 lf	$206 lf	$0	
Water & Force Main Sewer	0 lf	$206 lf	$0	
Water & Vacuum Sewer	3500 lf	$196 lf	$686,000	
Water & Gravity Sewer Services	0 lf	$206 lf	$0	
Water & Vacuum Sewer Services	3300 lf	$196 lf	$646,800	
Lift Stations	0	$75,000 each	$0	
New Home Plumbing	33	$5,000 each	$165,000	
Upgrade Home Plumbing	15	$2,000 each	$30,000	
		Subtotal	**$1,527,800**	
		Design and Construction Management (20%)	**$305,560**	
		Contingency (20%)	**$366,672**	
			Phase 3 Total	**$2,200,032**

Figure 12 (con't)

Phase 4

Service Area 3:	Quantity	Unit Cost	Extended Cost
Water & Gravity Sewer Main	0 lf	$206 lf	$0
Water & Force Main Sewer	0 lf	$206 lf	$0
Water & Vacuum Sewer	3100 lf	$196 lf	$607,600
Water & Gravity Sewer Services	0 lf	$206 lf	$0
Water & Vacuum Sewer Services	2300 lf	$196 lf	$450,800
Lift Stations	0	$75,000 each	$0
New Home Plumbing	33	$5,000 each	$165,000
		Subtotal	**$1,223,400**
		Design and Construction Management (20%)	**$244,680**
		Contingency (20%)	**$293,616**

Phase 4 Total $1,761,696

Phase 5

Service Area 4:	Quantity	Unit Cost	Extended Cost
Water & Gravity Sewer Main	0 lf	$206 lf	$0
Water & Force Main Sewer	0 lf	$206 lf	$0
Water & Vacuum Sewer	2700 lf	$196 lf	$529,200
Water & Gravity Sewer Services	0 lf	$206 lf	$0
Water & Vacuum Sewer Services	900 lf	$196 lf	$176,400
Lift Stations	0	$75,000 each	$0
New Home Plumbing	12	$5,000 each	$60,000
		Subtotal	**$765,600**
		Design and Construction Management (20%)	**$153,120**
		Contingency (20%)	**$183,744**

Phase 5 Total $1,102,464

Phase 6

Service Area 5:	Quantity	Unit Cost	Extended Cost
Water & Gravity Sewer Main	1700 lf	$206 lf	$350,200
Water & Force Main Sewer	2550 lf	$206 lf	$525,300
Water & Vacuum Sewer	1500 lf	$196 lf	$294,000
Water & Gravity Sewer Services	1000 lf	$206 lf	$206,000
Water & Vacuum Sewer Services	1010 lf	$196 lf	$197,960
Lift Stations	1	$75,000 each	$75,000
New Home Plumbing	22	$5,000 each	$110,000
		Subtotal	**$1,758,460**
		Design and Construction Management (20%)	**$351,692**
		Contingency (20%)	**$422,030**

Phase 6 Total $2,532,182

Phase 7

Service Area 6:	Quantity	Unit Cost	Extended Cost
Water & Gravity Sewer Main	1800 lf	$206 lf	$370,800
Water & Force Main Sewer	650 lf	$206 lf	$133,900
Water & Vacuum Sewer	0 lf	$196 lf	$0
Water & Gravity Sewer Services	990 lf	$206 lf	$203,940
Water & Vacuum Sewer Services	0 lf	$196 lf	$0
Lift Stations	1	$75 000 each	$75,000
New Home Plumbing	13	$5,000 each	$65,000
		Subtotal	**$848,640**
		Design and Construction Management (20%)	**$169,728**
		Contingency (20%)	**$203,674**

Phase 7 Total $1,222,042

Project Total $12,727,000

The decisions regarding which residents will be served first and which residents will not be served at all are sometimes difficult to make. Both the benefit to the community and the cost of the service must be considered. However, these decisions are the responsibility of the community, and are an important part of the planning and design process.

The City may wish to establish a planning committee to help in making these types of decisions. The committee will be responsible for determining the criteria on which each resident receives service. For example, the committee would decide which 30 residences in Service Areas 1 and 2 will initially receive the individual holding tank systems. The committee will be responsible for assuring that each homeowner signs an agreement which indicates their willingness to care and pay for the system.

The committee will also be responsible for determining which residents receive piped service and in what order. Based on the availability of funding, it may be necessary to exclude some residents from service because of the excessive capital or O&M costs which may be encountered when attempting to service the outlying areas of town.

In general, it will be the responsibility of the Planning Committee to coordinate with the residents, the designer, and the funding agencies to assure that the project is completed to the community's satisfaction. The committee should adopt an operation and maintenance plan which will establish the City's goals for effectively managing their system. The plan should outline procedures for training personnel and homeowners, procedures for adopting user and rate ordinances, and procedures for operation and maintenance including a conceptual O&M manual outline. The overall objective of the O&M plan will be to develop an effective operation and management organization. For example, some of the items outlined in the plan may include mandatory training for each operator and homeowner, and the requirement that each homeowner sign a written agreement which states that they will care for the portion of the system which is on their property. The efforts of the Planning Committee and adoption of the O&M plan will be crucial to the smooth transition from the existing system to individual systems and eventually to the fully piped system.

The project as outlined in Table 8 corresponds to Option 5 as presented on Tables 6 and 7. Therefore, we estimate that annual operation and maintenance costs for the system will total approximately $72,000. This will result in a required user fee of $55 per month per household. However, if commercial users such as the school are charged a higher amount than residential users, and if potential revenues from the washeteria are considered, it may be possible to reduce the fee to approximately $50 per month.

The recommended option represents the most balanced level of capital and operation and maintenance costs. Although other systems may be operated for somewhat less than the preferred system, initial construction costs are very high, primarily due to the lack of suitable fill material in the Alakanuk area.

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APPENDIX A
SITE VISIT REPORTS

DAMES & MOORE

5600 B STREET, SUITE 100, ANCHORAGE, ALASKA 99518-1641
(907) 562-3366 FAX: (907) 562-1297

November 17, 1992

Mr. Ray Oney
City Administrator
City of Alakanuk
Post Office Box 167
Alakanuk, AK 99554

Initial Site Visit Report
Sanitation Facilities Master Plan
Job No. 25654-001-160

Dear Mr. Oney:

Presented below is a summary of our initial site visit to Alakanuk on November 2 and 3, 1992. The initial site visit was necessary in order to become familar with the community, to hold a public meeting to discuss the project, and to observe and collect information on the existing sanitation facilities.

Site Visit Objectives

1. Meet with City Personnel
2. Conduct a Public Meeting
3. Observe Existing Sanitation Facilities
4. Collect Available Data

Primary Contacts Made During Site Visit

1. Mr. Ray Oney, City Administrator
2. Mr. Francis Damian, Mayor
3. Ms. Zita Chikigak, Council Member
4. Mr. Paul Phillip, Council Member
5. Mr. Tony Simmons, Council Member
6. Mr. Paul Ayunerak, Water Treatment Plant Operator

7. Mr. Peter Black, Former Mayor
8. Mr. John "Doc" Kieckbusch, Alakanuk School Principal

Dames & Moore Personnel

1. Mr. Michael Foster, Project Manager
2. Ms. Deborah Allen, Project Engineer

Site Visit Summary

November 2, 1992 (Monday)

1130 to 1400 hrs: A tour was made of the existing sanitation facilities, including the water treatment plant, the sewage lagoon, and the dump. The water treatment plant appeared to be in good shape and well operated and maintained. The sewage lagoon also appeared to be in good shape, although the lagoon reportedly floods in the spring. The dump does not appear to be operated correctly. Garbage is placed near the front and driven over as more garbage is dropped off, rather than working from the back towards the front.

1430 to 1530 hrs: Met with Mayor Damian, Council Members Chikigak, Phillip, and Simmons, and City Administrator Ray Oney to discuss the evenings public meeting. Items discussed included sewage disposal options, water supply options, and landfill needs.

1600 to 1700 hrs: Interviewed Mr. Oney and collected available data including financial information, maps, utility data, city ordinances, and other relevant information.

2000 to 2130 hrs: Held a public meeting where approximately 44 Alakanuk residents attended. The meeting was originally scheduled for 1900 hrs; however, schedule conflicts with church services postponed the meeting until 2000 hrs. Mr. Foster conducted the meeting with the aid of an interpreter, Peter Phillip. Mr. Foster explained that Dames & Moore has been retained to prepare a 20 year Sanitation Facilities Master Plan which will address community needs, evaluate options, and provide recommendations to handle current and future needs.

Several options for sewage treatment and disposal were discussed. One option included construction of a lagoon similar to the one currently in use. Lagoons are generally easy to construct and maintain, although a lagoon would be susceptible to flooding in the spring. Another option included construction of a Yukon River outfall. Permitting requirements would need to be evaluated for this option; however, due to the size of the Yukon River in this area and Alakanuk's proximity to the Bering Sea it is possible that minimal treatment would be required.

Next, different types of sewer facilities were described, including individual holding tanks, holding tanks serving multiple houses, gravity sewers, force main sewers, and vacuum sewers similar to the system in Emmonak. The advantages and disadvantages of above ground and below ground utilities were discussed in detail. It was also noted that if individual holding tanks were feasible then the new HUD houses could be plumbed and hooked up this summer. All that would be needed to serve these units would be a pump truck. Individual holding tanks could also be installed throughout the community and a community haul system (pump truck) similar to the water haul system could be used to remove the sewage. The individual holding tanks could then later be hooked up to a central below ground sewer, if feasible.

Next, water supply needs and a community water system were discussed. It was explained that the water supply system generally depended upon the type of sewer system chosen, ie. above ground or below ground. The water treatment plant would probably have to be expanded to handle increased demands.

Next, the landfill (dump) was discussed. It was suggested that the dump be operated differently so that users are not driving over the solid waste (garbage). Garbage should be placed near the back and periodically covered. The dump should be filled from the rear forward.

It was explained that since the community is so spread out, it may be difficult and costly for all of the residents, especially those who live on the other side of Alakanuk Pass, to receive piped facilities. As funding becomes available, it is expected that a core area which is relatively densely populated would probably receive services first. Then, as more funding became available, the facilities would be expanded to serve more areas.

The meeting was then opened for questions and discussion. There was quite a bit of discussion on above ground and below ground utilities and on different types of piped sewer systems. The residents indicated that the system chosen should be easy to maintain, last a long time, and be relatively inexpensive to operate (low monthly user fees). In general, the residents appeared to like the options presented. Most residents favored initially installing individual holding tanks with a truck haul system, and eventually hooking up to a piped system. It was stressed that the options discussed are only preliminary, and that further study and analysis would be required before a final recommendation could be made. The residents were encouraged to call us with questions or comments.

A brief outline of the project schedule was presented. The next meeting would be in mid-December. The meeting was then adjourned.

November 3, 1992 (Tuesday)

0830 to 1030 hrs: A tour of the water treatment plant was performed, including an interview with plant operator Paul Ayunerak. Mr. Ayunerak provided a description of the water treatment process. Plant data including metering data, laboratory analysis results, an operation and maintenance manual, and other information was provided to us. Mr. Ayunerak stated that the City was placed on a "Boil Water" notice in August of 1992, although he did not have a copy of the notice.

1130 to 1430 hrs: The remainder of the day was spent in the City office. Additional data was collected and reviewed during this time. Elections were being held in the City office, which gave us an opportunity to meet with and talk to many of Alakanuk's residents individually.

It was a pleasure to meet with many of the residents of Alakanuk. We believe the site visit went well, and that we further understand the City's needs and expectations. If you have any questions or comments, please call at any time.

Very truly yours,

Dames & Moore

Deborah S. Allen

Deborah S. Allen
Project Engineer

Michael L. Foster
Project Manager

MLF/DSA:jj
VISIT1.LTR

cc: Mr. Paul Gabbert, Village Safe Water

DAMES & MOORE

5600 B STREET, SUITE 100, ANCHORAGE, ALASKA 99518-1641
(907) 562-3366 FAX: (907) 562-1297

January 28, 1993

Mr. Ray Oney
City Administrator
City of Alakanuk
Post Office Box 167
Alakanuk, AK 99554

Site Visit Report No. 2
Sanitation Facilities Master Plan
D&M Job No. 25654-001-160

Dear Mr. Oney:

Presented below is a summary of our second site visit to Alakanuk. The site visit was originally scheduled for December 15 and 16, 1992, but the flight was cancelled due to weather conditions. A second attempt was made on December 29th; however, we were unable to make it to Alakanuk because of weather and had to overnight in St. Marys. With flights into Alakanuk still cancelled, we returned to Anchorage on December 30th. Due to poor weather conditions for the next two weeks, we were unable to complete the site visit until January 18 and 19, 1993.

The second site visit was conducted in order to collect additional information to assist us in the preparation of the sanitation facilities master plan, and to meet with City personnel regarding the project.

Site Visit Objectives

1. Meet with City Personnel
2. Collect Additional Financial and Operation and Maintenance Data

Primary Contacts Made During the Site Visit

1. Mr. Ray Oney, City Administrator
2. Mr. Peter Phillip, Dames & Moore Subcontractor
3. Ms. Juanita Phillip, City Clerk
4. Mr. Paul Ayunerak, Water Treatment Plant Operator

Dames & Moore Personnel

1. Ms. Deborah Allen, Project Engineer

Site Visit Summary

January 18, 1993 (Monday)

1400 to 1600 hrs: Met with Peter Phillip in the Alakanuk city office to discuss information which is required to complete Task 2 of our Scope of Work, including additional financial information specifically regarding the water treatment plant and washeteria/sauna. During the meeting, Mr. Phillip was formally hired to assist us throughout the project. A tentative schedule to meet with city personnel including Ray Oney, Juanita Phillip, and Paul Ayunerak was arranged. Mr. Pat McAree of St. Marys had planned to be in Alakanuk on this date and had arranged to meet with Ms. Allen of Dames & Moore. However, due to circumstances beyond his control, he was called to another location and was unable to complete the trip to Alakanuk.

January 19, 1993 (Tuesday)

0900 to 1030 hrs: Met Peter Phillip at the Alakanuk city office to coordinate the schedule for the day. Conducted an interview with Juanita Phillip. Ms. Phillip provided specific financial data pertaining to the washeteria and sauna, and discussed general City recordkeeping practices. Data collected included washeteria daily logs, annual cable TV revenue summaries, annual solid waste revenue summaries, grant applications, and other miscellaneous information.

1030 to 1200 hrs: Discussed fuel storage capacity and usage in Alakanuk with Peter Phillip. Locations of fuel storage (excluding residential) were visited and photographs taken.

1300 to 1430 hrs: Met with Paul Ayunerak at the water treatment plant to discuss operation and maintenance practices and to collect additional available data. Mr. Ayunerak stated that the only

O&M data available consisted of the O&M manual already provided to Dames & Moore. Therefore, no additional data was collected; however, Mr. Ayunerak was interviewed regarding O&M practices.

1430 to 1600 hrs: Met with Ray Oney at the City office to discuss previous project submittals and to answer any questions which he or the City Council may have. Mr. Oney also provided additional financial data from previous years.

1600 to 1700 hrs: Met with Peter Phillip to summarize the site visit. Discussed additional information which will be obtained by Mr. Phillip, including data regarding fuel storage capacity within Alakanuk.

If you have any questions or comments, please call at any time. It was a pleasure to visit the community again and we look forward to our next trip.

Very truly yours,

DAMES & MOORE

Deborah S. Allen

Deborah S. Allen
Project Engineer

Michael L. Foster

Michael L. Foster, P.E.
Project Manager

MLF/DSA:jj
VISIT2.LTR

cc: Mr. Paul Gabbert, Village Safe Water

DAMES & MOORE

5600 B STREET, SUITE 100, ANCHORAGE, ALASKA 99518-1641
(907) 562-3366 FAX: (907) 562-1297

March 19, 1993

Mr. Ray Oney
City Administrator
City of Alakanuk
Post Office Box 167
Alakanuk, AK 99554

Site Visit Report No. 3
Sanitation Facilities Master Plan
D&M Job No. 25654-001-160

Dear Mr. Oney:

Presented below is a summary of our third site visit to Alakanuk. The third site visit was conducted on March 16 and 17, 1993 in order to meet with City personnel and residents to discuss the 65% submittal of the Community Water, Sewer, and Solid Waste Master Plan.

Site Visit Objectives

1. Meet with City Personnel
2. Conduct Public Meeting

Primary Contacts Made During the Site Visit

1. Mr. Ray Oney, City Administrator
2. Mr. Peter Phillip, Dames & Moore Subcontractor

Dames & Moore Personnel

1. Mr. Michael Foster, Project Manager
2. Ms. Deborah Allen, Project Engineer

Site Visit Summary

March 16, 1993 (Tuesday)

1600 to 1630 hrs: Met with Ray Oney and Peter Phillip in the Alakanuk city office to discuss the 65% Master Plan Submittal. In general, Mr. Oney and Mr. Phillip were pleased with the plan. It was established that their questions regarding the plan would be addressed at the public meeting.

1630 to 1730 hrs: Potential locations for a sewage lagoon were visited. Locations near the airstrip and along the south side of Anderson Road were considered.

1900 to 2100 hrs: A public meeting was held in the conference room at the City office in order to discuss the plan with the residents and to present our preliminary recommendations for improved water and sewer facilities. Thirty-two Alakanuk residents attended the meeting, including four of six City council members. Peter Phillip, Dames & Moore's local project hire, interpreted during the meeting. A brief summary of the topics discussed includes the following.

Mr. Foster of Dames & Moore opened the meeting with a brief discussion of the 65% Master Plan submittal. The possibility of installing individual water and sewage holding tanks at some of the homes was discussed as a temporary solution to substantially improving sanitary practices. If the tanks are constructed, it will also be necessary to provide a sewage pumping truck and a larger water truck. Phase I would include installing the water and sewage holding tanks at approximately 50 homes, a new sewage lagoon of adequate size to handle the design volume of sewage, and an expansion of the water treatment plant to meet the projected 20 year water demand.

The tentative plan for subsequent years includes beginning to construct a piped system. Initially the piped system would serve a core area, and would be expanded outward over the years as funding becomes available. As the system expands, the individual holding tanks can be moved to other areas which will receive service at a later date. In this manner, most residents will have access to some level of improved service within the next couple of years. These topics were then opened for discussion. The residents indicated that they thought that the individual holding tanks were a good idea. There was some concern that a larger lagoon may impact waterways around the community, and it was stressed by Mr. Foster that the lagoon would be designed such that the waterways would not be impacted. There was also concern that two children had drowned in another village's lagoon. It was stated that the entire area would be fenced, but that there is really no feasible way to prevent a person from entering the facility if they are determined to get in. The residents were asked if they had suggestions for the location of a new lagoon. Many residents suggested east of the airstrip near the existing landfill.

Options for a piped water and sewer system were then discussed. Mr. Foster indicated that at this point we were leaning towards an aboveground system. It is believed that the construction problems which would be associated with an underground system related to the types of soils and high groundwater table in the area would be cost prohibitive. We expect at this point, that an aboveground vacuum system will provide the best service for the conditions present in Alakanuk. However, it was stressed that our cost analysis is not yet complete, and the recommendations presented at the meeting are preliminary.

The meeting was again opened for discussion. The residents were pleased with this plan, and agreed that an aboveground system would better suit their needs than an underground system, primarily because the pipes would be more accessible.

Mr. Foster then summarized the work which remains to be done by Dames & Moore to complete the Master Plan. We expect to have the 95% draft to the community in two to three weeks for their review. The community agreed with the preliminary recommendations presented at the meeting, and we will complete the plan with these recommendations as the final goal.

The residents asked if funds would be available to upgrade their existing heavy equipment. Mr. Foster responded that if we spend all the money on equipment, insufficient funds may not be available to complete the project. The project will be done by force account, which means the City will provide labor and equipment. The equipment will be rented from the City, which should generate some income to repair their equipment. Generally, equipment upkeep is an owner's responsibility.

The next meeting will be held after final approval of the Master Plan. The meeting was then adjourned at approximately 2040 hrs.

March 17, 1993 (Wednesday)

0900 to 1100 hrs: Met Peter Phillip at the City office to obtain his written comments on the Master Plan and his final review comments on the photographic base maps. We intended to meet with Mr. Oney to obtain his written comments, but he was not present in the office that morning.

If you have any questions or comments, please call at any time. It was a pleasure to visit the community again and we look forward to our next trip.

Very truly yours,

DAMES & MOORE

Deborah S. Allen

Deborah S. Allen
Project Engineer

Michael L. Foster, P.E.
Project Manager

MLF/DSA:jj
VISIT3.LTR

cc: Mr. Paul Gabbert, Village Safe Water

DAMES & MOORE

April 30, 1993

Mr. Ray Oney
City Administrator
City of Alakanuk
Post Office Box 167
Alakanuk, AK 99554

Site Visit Report No. 4
Sanitation Facilities Master Plan
D&M Job No. 25654-001-160

Dear Mr. Oney:

Presented below is a summary of our fourth site visit to Alakanuk. The fourth site visit was conducted on April 28 and 29, 1993 in order to meet with City personnel and residents to discuss the 95% submittal of the Community Water, Sewer, and Solid Waste Master Plan.

Site Visit Objectives

1. Meet with City Personnel
2. Conduct Informal Public Meeting

Primary Contacts Made During the Site Visit

1. Mr. Ray Oney, City Administrator
2. Mr. Peter Phillip, Dames & Moore Subcontractor

Dames & Moore Personnel

1. Ms. Deborah Allen, Project Engineer

Other Personnel

1. Mr. Paul Gabbert, Village Safe Water
2. Mr. Ladd Folster, Public Health Service

Site Visit Summary

April 28, 1993 (Wednesday)

1530 to 1900 hrs: Conducted an informal public meeting at the City office to discuss the 95% submittal of the Sanitation Facilities Master Plan. Thirteen Alakanuk residents were present, including four City Council members. Ms. Allen began the meeting by briefly discussing the project as outlined in the 95% Master Plan. A project summary which indicated the phases and estimated construction costs of the project was passed out to the residents. The project consists of seven phases which are to be constructed over the next several years. Conceptual level construction costs for the entire project are estimated to be approximately $13 million. The project would begin with the installation of approximately 30 individual holding tank systems as discussed at the last public meeting. In the following years, a piped water and sewer system will be installed to serve most of the central areas of the community. Based on the estimated operation and maintenance costs, it is estimated that the piped system can be successfully operated if a user fee of approximately $50 is collected from residential users. The user fee required for operation of the truck haul water and sewer system will be somewhat higher. Questions from the residents were then answer by Ms. Allen with the Assistance of Mr. Gabbert.

The meeting was then turned over to Mr. Gabbert. Mr. Gabbert began by presenting the four components of a project of this type, and the participant primarily responsible for each part of the project. These components include the following.

- Planning (City)
- Design (Designer/VSW/City/Regulator)
- Construction (City/VSW/Regulator)
- Operating and Managing (O&M) (City)

It was also stressed that O&M costs are nearly half of the total life costs of the project. It is therefore extremely important that the facility is operated efficiently and economically throughout its life.

Mr. Gabbert then indicated that he would like to ask several questions important to completion of the Master Plan. Residents were encouraged to voice their opinions. The questions asked by Mr. Gabbert, along with many of the responses which resulted from the discussion are presented below.

Question 1: Which residents will receive service and in what order?

- Form a planning committee to assist in coordinating with residents and establishing criteria for determining who gets service.
- Individual holding tank systems should be placed in a compact area, not all over town. This would save on O&M costs for water delivery and sewage pumping. Perhaps we should focus only on one or two service areas at a time.
- The planning committee should establish an accepted policy for determining who gets service.
- How will we select planning committee members? Members should be from different areas of the City. For example a three person committee may consist of a plant operator, a traditional council member, and a city council member.

Question 2: How will we dispose of sewage?

- Direct land discharge similar to the system in Emmonak (tundra pond).
- Is direct discharge safe - Can we permit this type of facility?
- A diked lagoon constructed with imported materials as discussed at the last meeting was determined to be too expensive for construction.
- Can build some low dikes with the materials from the excavation of the tundra pond.
- The area behind (south of) the city is low and will flood. Solids settle to bottom of the pond. During flooding, only the fluid on top of the lagoon should be affected.
- The community likes the site at the dump. However, this will cost more than a facility near the AVEC plant for both construction and O&M. Also, locating the facility near the AVEC plant will allow us to use waste heat from the plant to heat the facility. If the site near AVEC becomes a health hazard in the future, we can then move the site, if necessary.

- Do we need a primary treatment plant before the tundra pond?
- Potential odors from the tundra pond should be considered when selecting an exact location.

After the above questions and comments were discussed, Mr. Gabbert stated that he would like to collect everyone's written comments so that he can review them and give them to Dames & Moore so that the Master Plan can be finalized as soon as possible. Although we don't want to rush anyone, timing is becoming a factor in the project. The importance of forming an active planning committee was stressed, as well as the importance of the efficient and successful operation and management of the project once the construction phases are complete.

April 29, 1993 (Thursday)

0830 to 0930 hrs: Met Peter Phillip at the city office to discuss his comments on the Master Plan, and to discuss the formation of the planning committee. It was suggested that Mr. Phillip be selected as the chairman of the committee since he has experience on these types of projects. Mr. Gabbert will contact Mr. Phillip later next week to begin setting up the committee.

0900 to 1030 hours: Met with Ray Oney and Paul Ayunerak to discuss the Master Plan and outline the next phases of the project. It was suggested than Mr. Ayunerak be a member of the planning committee since he is most familiar with the existing sanitation facilities. Final written comments on the Master Plan were requested so that it could be finalized as soon as possible.

Water and sewer ordinances need to be passed as soon as possible. Mike Foster of Dames & Moore is working on the ordinances and will have them completed next week. The city must also pass a resolution which will adopt the Master Plan as its goal for the next twenty years. Mr. Oney suggested the possibility of having joint ordinances for utilities. These ordinances would cover electricity, telephone, and cable television, as well as water and sewer. Mr. Gabbert stated that VSW would not be able to help prepare ordinances for the other utilities, but the City may revise the water and sewer ordinance provided by VSW to include the other utilities. Mr. Oney stated that DCRA may be able to help them. Mr. Gabbert hopes to send a copy of the draft ordinances along with his trip report which should be completed some time next week.

The city clerk stated that she has recently received training from John Walton of St. Marys. Mr. Walton has been helping the clerk become familiar with computer operations, and has provided information regarding utility management systems which have been used in other small communities. Mr. Walton is scheduled to provide more training next week. The clerk felt that the training she has received so far has been very helpful. Mr. Gabbert suggested that we try to keep Mr. Walton involved in the project, to train management personnel and ensure the successful management of the sanitation facilities.

If you have any questions or comments regarding the enclosed, or if you would like additional information in regards to the Master Plan, please contact us at any time.

Very truly yours,

DAMES & MOORE

Deborah S. Allen

Deborah S. Allen
Project Engineer

Michael L. Foster

Michael L. Foster, P.E.
Project Manager

MLF/DSA:jj
VISIT4.LTR

cc: Mr. Paul Gabbert, Village Safe Water

APPENDIX B
WATER AND SEWER ORDINANCE

CITY OF ALAKANUK

DRAFT

Ordinance Establishing an Alakanuk Utility Board

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Section 1. Background. The City of Alakanuk ("Alakanuk") in order to better provide for health and welfare of the residents of Alakanuk and to more effectively provide for water, sewer, and solid waste services has acted to establish the Alakanuk Utility Board ("Board") to oversee and manage Alakanuk's water, sewer and solid waste systems.

Section 2. Establishment. There is hereby created a Board to be called the Alakanuk Utility Board to operate, maintain, construct and replace the City of Alakanuk water, sewer and solid waste systems in accordance with the following provisions:

Section 3. City of Alakanuk Powers and Immunities.

A. The City of Alakanuk reserves unto itself the power and authority to approve or disapprove all budgets and utility rates. It also reserves to itself the power to approve the acquisitions or disposal of personal property and personal service contracts with a value in excess of $10,000 and the acquisitions of all real property related to the ownership, construction, operation, maintenance or replacement of the City of Alakanuk water and sewer systems. Unless otherwise specifically resolved by the City of Alakanuk, title to all real and personal property related to the ownership, construction, operation, maintenance or replacement of the City of Alakanuk water, sewer and solid waste systems shall be in the name of the City of Alakanuk.

B. Except as specifically provided in Sections 3.C. and 9.D. of this ordinance, nothing in this ordinance or actions (including promulgation of rules and regulations) of the Utility Board shall be considered consent by the City of Alakanuk to the sale, disposition, lease or encumbrance of any lands, interests in lands or other assets of the City of Alakanuk.

C. The consent requirements of Section 16 of the Federal Indian Reorganization Act of 1934, as amended, and waiver of any other immunity (including sovereign immunity) are specifically reserved to the City of Alakanuk with respect to the disposition or encumbrance of grant or other funds specifically appropriated and identified to the functions of the Alakanuk Utility Board or the ownership, operation, maintenance, construction or replacement of the Alakanuk water, sewer and solid waste systems.

D. The power to consent to the sale or purchase, disposition, lease or encumbrance of any land, interests in land or other assets, except specifically appropriated and identified funds as described in this Section 3, is specifically reserved to the membership of the City Council.

E. Should no Utility Board be appointed, the City Council shall act as the Utility Board.

Section 4. Powers and Duties of Board. The Board Shall:

A. Operate, manage, maintain, construct or replace the water, sewer and solid waste systems.

B. Appoint, train, hire, promote, layoff, suspend, demote or remove all employees for the water, sewer, and solid waste systems.

C. Administer the water, sewer and solid waste system budgets and capital improvement programs as enacted by the City of Alakanuk.

D. Prepare and submit to the City of Alakanuk by January 1 of each year annual budgets, capital improvement requests, and make recommendations thereon for the efficient and economical operation of the systems.

E. Prepare and submit to the City of Alakanuk at the end of each fiscal year a report on the finances and administrative activities of the water, sewer and solid waste systems; and prepare and make available for public distribution an annual report on the water, sewer and solid waste systems finances.

F. Formulate and enforce the general rules and policies pertaining to water, sewer and solid waste system operation practices within the City and generally have full and complete surveillance of all the systems and their operations and fiscal affairs, including the maintenance, operation, expansion, extension and improvement of the public utilities.

G. Study and make recommendations generally on public utility matters such as, but not limited to, rates, fiscal matters, personnel staffing, labor relations, expansion or extension of services and public relations.

H. Purchase personal property whose volume individually or in the aggregate does not exceed $10,000 in any single calendar year.

I. Assume such other authority and perform such other duties as may be lawfully prescribed by the City of Alakanuk.

Section 5. Membership, Officers, Qualifications, Term and Vacancies on the Board.

A. Membership on the Board shall consist of five members. Board Members shall be appointed by the Mayor of the City of Alakanuk with the approval of a majority vote of the City Council. The Board shall annually elect a Chairman, Vice-Chairman, and Secretary. The city treasurer shall be the treasurer for the Board and Utility but will not be a Member of the Board. Membership of the Board shall always include at least one City Council member, one traditional council member, and one utility operator/manager.

B. Any qualified voter over the age of 21 years is eligible to be a Utility Board Member.

C. Term of office will be three years. Board Members may be reappointed without limitation based upon prior service on the Board. For the initial terms, the Mayor will designate two members to three year terms, two members to two year terms, and one member to a one year term. Board Members may be removed for malfeasance or nonfeasance upon the recommendation of the Mayor and by a 2/3 vote of the City Council.

D. A new board member to serve the remainder of the term shall be appointed by the Mayor, with the approval of a majority of the City Council.

Section 6. Compensation. Members of the Utility Board shall receive monthly or special meeting fees set up by the Board with approval of the City Council. Adjustment of monthly or special meeting fees shall not be made without the approval of the Board. The amount of the fees will be published in a separate "Schedule 1". Schedule 1 will be established by the board and approved by the City Council on a periodic basis. Active participation in Board activities is required for any member of the Board to receive fees. By recommendation of the Mayor and a majority vote of the City Council monthly or special meeting fees may not be paid to inactive members.

Section 7. Meetings.

A. A majority of membership of the Board shall constitute a quorum for the transaction of all businesses, and the Chairman of the Board shall have a vote on all matters. The affirmative vote of a majority of the Board shall be sufficient to pass upon all matters coming before it. Meetings shall be conducted in a manner and format similar to that used by the City Council of Alakanuk.

B. The Board shall meet no less than once per month at a regular scheduled time or special meeting as needed at a location designated by the City Council. The regular meeting shall be before any general meeting of the City Council in order that the Committee may report to the City Council at the general meeting. All meetings of the Board shall be open to the public except that executive sessions may be called by the Chairman, upon the recommendation of the City Attorney, to discuss issues which deal with personnel or which may adversely affect the legal position of the City. The Secretary shall draft the minutes of all regular and special meetings in a manner accurately reflecting the actions of the Board, and shall maintain the minutes as public records.

Section 8. Audit.

A. The City of Alakanuk may provide for an annual independent audit of the accounts and financial transactions of the water, sewer and solid waste Utility. Copies of the audit shall be available to the public upon request.

Section 9. Separation of Funds.

A. The water, sewer and solid waste systems owned by the City of Alakanuk and managed by the Board shall be operated from a fund or funds separate from the general fund of the City of Alakanuk. Separate books, records and accounts shall be maintained by the Board to reflect the financial conditions of the utilities, the income and the expenses.

B. None of the income, money or property of the Utility Board shall be placed in the general fund of the City of Alakanuk or be used for the benefit of anything outside the fund to which it belongs without due value received in return.

C. The City of Alakanuk shall pay for the use of utility services at the standard rates.

D. Except to the extent specifically appropriated and identified by the City of Alakanuk to the ownership, maintenance, construction or replacement of the Alakanuk water, sewer and solid waste systems, the general revenues or other funds of the City of Alakanuk shall not be available to meet any obligation of the Utility Board or to satisfy any claims arising out of the ownership, operation, maintenance, construction or replacement of the Alakanuk water, sewer or solid waste systems.

E. The city clerk and Utility Board shall develop a written quarterly report for the city council. This report shall itemize all income sources and disbursements for the operation and maintenance of the utility system. This report shall be approved and filed in the city records.

Section 10. Rules and Regulations.

A. The Board shall adopt rules and regulations for the orderly and efficient operation of the water , sewer and solid waste systems.

B. The Board may establish rules and regulations imposing fines or penalties for violations, provided such rules or regulations are promulgated in accordance with the procedures set forth in Subsection C.

C. All proposed rules or regulations, including additions, deletions, amendments and modification of existing rules or regulations shall be considered only after public notice and public hearing. Public notice shall be accomplished by posting prominently in the Alakanuk Post Office a descriptive summary of the proposed rules or regulations, including the date and time of public hearing by the Board, and a statement that the full text of the proposed rules or regulations is available for public inspection at the office of the City of Alakanuk. After Public Hearing and consequent Board action the proposed rules shall be submitted to the City Council. The rules and regulations, including additions, deletions, amendments, and modifications of existing rules or regulations shall become effective 45 days after submittal to the City Council unless disapproved by the City Council. The City Council upon the recommendation of Board, may provide for an earlier effective date.

SCHEDULE 1

Utility Board Fee Rates

Regular Fee:

President	$______/month
Vice President	$______/month
Secretary	$______/month
Regular member	$______/month

Other Fees:

Special Meeting	$______/meeting

Expenses will be reimbursed for the actual amount of the expenditure. Receipts must be provided prior to issuing payment for any expense.

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CITY OF ALAKANUK

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Rules & Regulations for Water and Sewer Services

Section 1.01.010. Definitions

CITY: Wherever the word "City" is used it means the City of Alakanuk, Alaska.

APPLICANT: Whenever the word "applicant" is used, it means the person or persons, firm or corporation making application for utility service from the City of Alakanuk under the terms of these regulations.

CUSTOMER or USER: Whenever the word "customer" or "user" is used, it means an applicant or the applicant's heir or successor in property interest, who has been accepted and who receives utility services from the City. By being accepted and receiving services, a customer or user thereby agrees to abide by the terms set forth in these regulations.

UTILITY BOARD: Whenever the word "Utility Board" or "Board" is used in these regulations, it means the Utility Board established by the City to carry out the designated duties.

CUSTOMER SERVICE LINE: The customer service line shall be that part of the piping located on the customer's property.

Section 1.01.020. Service Areas

The water and sewer service area shall be the area within 200 feet of the water and sewer main in the City of Alakanuk, Alaska.

Section 1.01.030. Description of Service

(a) Supply: Water and sewer services shall be provided by the Utility Board. The Board will exercise reasonable diligence and care to deliver a continuous and sufficient supply of water to customers at adequate pressure and to take reasonable measures to avoid shortage or interruption of service.

Neither the City nor the Board shall be liable for damage resulting from interruption in service for improvements, repairs, shortages of supply, or unforeseen circumstances. Whenever possible, and whenever time permits, all customers to be potentially affected by an interruption in service will be notified prior to shutdown through local notice posted in the Post Office or over CB radio.

(b) Quality: The Board will exercise reasonable care and diligence to supply safe and potable water at all times.

(c) Ownership of Water and Sewer System: All water and sewer mains, valves, fittings, hydrants, and other appurtenances except customers' service lines as defined by Section 1.01.010, herein, are the property of the City.

(d) Resale of Water: Resale of water by a customer is expressly prohibited except through special contract, in writing, between the Board and the user desiring to resell the water. The City may directly sell water to individuals or businesses, but only in those cases where application is made to the Board prior to the sale, and is not done at the expense of other users.

(e) Service Preference: In the case of shortage of supply, or in the case of excessive water demands being made upon the system, the Board has the right to give preferences (including the potential interruption of service) in the matter of furnishing services to customers and interests as public convenience and necessity requires. The order of superior preference is as follows:

1. Schools and Health Facilities
2. Private residences
3. Businesses
4. Other Transient users and special contract users

(f) Classes of Service: The Classes of Service shall be as follows:

1. Residential Service: Residential Service shall consist of all services for domestic purposes supplied to a single family dwelling unit.

2. School Service: School service shall consist of services provided to the school and its administrative offices. School owned or operated facilities used as single family dwelling units are not included and are subject to the regulations and rates governing residential service.

3. Commercial Services: Commercial services shall consist of all services where water and sewer service is supplied for commercial or business establishments, or for multiple family dwelling units.

   If water is supplied to a customer for use in both a single family dwelling unit and a business establishment, the commercial rate shall apply for the combined users.

4. Contract Services: Contract services shall consist of those services for industrial or independent water and sewer users under contracts authorized by the Utility Board.

5. Stand-by Service: The Board may also charge a stand-by rate not to exceed 50% of the applicable water and sewer rate for any account that will have suspended use of the service for 30 days or more. To establish a stand-by rate, the customer must make a request in advance to the Board. The stand-by rate, if established, shall apply to all non-occupied dwellings. The stand-by rates shall be set by Schedule A.

   Where the requirement for water and/or sewer services are large or unusual, or necessitate special services, equipment, or capacity, the Board reserves the right to make a special contract, the provisions of which are different from the regularly published water and sewer rates and regulations. The Chairman of the Utility Board is empowered to negotiate special contracts. All special contracts shall be in writing signed by the applicants, and are subject to approval by the Board. Even where a special contract exists, the water preferences stated in Section 1.01.040(e), above, shall apply should the need to restrict water usage arise.

Section 1.01.040. Application for Service

(a) Application form: Each applicant for water and sewer service shall sign an application form provided by the Board. The applicant must be the owner of the property or someone legally empowered to act on the owner's behalf and to bind the owner to the owner's maintenance responsibilities. In signing this form, the customer/property-owner agrees to abide by the rules and regulations currently in effect and as may be subsequently adopted. The application is a request for service, and does not bind the Board to furnish the service.

Each application for water and sewer service connection shall be in writing and shall include the following:

1. Legal name and address of the applicant;
2. Legal description and sketch of the property and building for which the sewer service is required;
3. The name and address of the person who will install the service line from the building to be served to the city sewer systems;
4. A description of the fixtures to be used in the structure or building;
5. An agreement to be responsible for and pay promptly all charges for the service in accordance with this ordinance;
6. Proof of land ownership;
7. Permission to allow the city to make the connection; and
8. Such additional information as the city council may require to demonstrate that the proposed connection complies with this ordinance and any applicable regulations adopted by the city council.

b. If the city is satisfied that the application and the proposed connection complies with this ordinance and applicable regulations hereunder relating to the utilization of the community water and sewer system, it shall approve the application and provide for the connection, upon receipt of the established fees.

c. Any person whose application for connection has been denied or conditionally approved may appeal to the City Council.

Section 1.01.050. Deposits, Establishment of Credit, and Amendments to the Service Application

(a) Deposits and establishment of credit: At the time of application for service the applicant shall establish his credit with the Utility. Credit will be deemed to be established if the applicant makes a deposit equivalent to the estimated bill for two months of service, plus an estimate of the cost for service installation. In no case will this be less than $______. Should the cost of service installation exceed $______, billed at the prevailing rates for operators and equipment, the applicant will make an additional deposit to maintain a $______ cash balance within two weeks following notification of the amount by the Utility. Deposits received by the Utility will be treated as operating revenue at the time they are received and no separate account will be established. The amount on deposit represents an obligation of the Utility to the customer.

Unless the deposit is owed to the Utility as described below, the Utility can discharge its obligation to the customer by returning the portion of the deposit which is not owed to the Utility.

(b) Forfeiture of Deposit: If an account becomes delinquent, or if the customer has not properly maintained the customer service line, or if a customer violates any of the provisions of this ordinance or the regulations adopted hereunder, the Board may turn-off the service and the deposit amount shall be applied to the unpaid balance of the account or to the cost of any action taken by the Board to protect the systems and public health, including repairs and the cost of disconnection. Water and sewer service to that account will not be restored to the premises until such time as the cash deposit is replaced, along with all delinquent bills due, and until payment for labor and materials expended by the Board for the service disconnect/reconnect is made. The Board retains all other rights for recovering money owed to it which arise as a result of the customers failure to abide by this ordinance and the regulations established thereunder.

(c) Amendment of Service Application: Customers desiring a material change in the size, type, character, or extent of equipment or operation which would result in a material change in the amount of water used, shall give the Board notice of such change prior to the change taking place. An application as provided above will be filed with the Board, and any changes to the rate or deposit amount will occur prior to the change in service. All customers desiring a change in the size, location, or the number of services shall fill out an amended application. The request for amended service may be denied should the applicant have an outstanding bill due to the Board.

Section 1.01.060. Main Extensions

(a) Within the Service Area: Water or sewer extensions to areas or houses not currently being served with water and sewer shall be installed only after application to and authorization by the Board. Extensions of water and sewer services require advance payment by the applicant or a group of applicants of the cost of the extension before they can be provided by the Board.

(b) Locations of Extensions, Easements, and Titles: The Board will make or allow water and sewer main extensions only on rights-of-way, easements, or publicly owned property. Easements or permits secured for main extensions across property not owned by the City shall be obtained in the name of the City along with all rights and title to the main at the time of installation.

Section 1.01.070. Services

(a) The property owner shall pay for and the Board shall install the service line from the main to the facility to be served. The City shall own the mains and service line to the limit of the Easement, Right-of-Way, permitted area, or property line. The Board shall maintain and operate the mains and service lines from the mains to the facility served. The property owner shall own the customer service line, however, the Board shall maintain the customer service line and the property owner shall pay for any maintenance performed by the Board on the customer service line.

(b) Service Connection Charge: At the time the applicant files for service, where no existing service previously existed, or if the applicant is filing for a change in service size or location, or applying for a re-connection of an existing service, the applicant shall submit with the application a service connection charge that is based on the actual cost of the connection to the Utility, plus a 10% administrative fee. In the case of the new service, this fee will include all costs from the vacuum valve basin to the facility to be served.

(c) Service installation procedures; All connections to the Alakanuk water and sewer system shall be made at the expense of the customer. Costs of the connection and the terms of the work order governing the installation, including the use of self-help and use of City equipment, shall be established by the Chairman of the Utility Board. The Board reserves the right to determine if the customer is capable of self-installation, and the Board reserves the right to bill the customer for additional work incurred by the Board to correct inappropriate, deficient, or inadequate connections.

(d) Service Installation Codes: All connections, repairs, modifications and fixtures attached to the water and sewer system shall conform to the requirements of the Uniform Plumbing Code currently in effect within the State of Alaska, as well as any further regulations enacted by the Board. The customer may be required to make changes to the system if required by modification of important provisions of the code or because of regulations adopted for the health and safety of the users of the system.

(e) Customer Plumbing:

1. The customer's plumbing, which shall include the customer service line and all plumbing, piping, fixtures, and other appurtenances intended to carry water, sewage, waste water, and drainage, shall comply with the latest edition of the Uniform Plumbing Code, adopted by the State of Alaska.

2. Customer freeze-ups or other leaks that affect the efficiency of the water or sewer system or the public health, are to be immediately repaired by the customer. The Board reserves the right to make the repairs and bill the customer for repairs and any excess water usage that might have resulted from the situation, should the customer be unable to make the repairs; or should the customer have abandoned the service location without proper notification to the Board; or be away form the service location temporarily. It is the responsibility of the customer to notify the Board immediately of any problem with the customers' plumbing or sewer operation that could have an adverse affect upon the Alakanuk system. No person shall use the water or sewer system, when such system is not operational.

3. It shall be a violation of these rules and regulations for customers to operate, cause, or permit unauthorized operations or appurtenances on the service connections.

4. It shall be a violation of these rules and regulations for any customer to make, or remake a service connection without the prior knowledge and approval of the Board as detailed by this ordinance.

5. It shall be a violation of these rules and regulations for any individual to secure bulk water from the Utility without prior arrangements having been made.

Section 1.01.080. Commercial Meters

(a) Meter Requirement: The Board is authorized to require installation of a water meter at the expense of any commercial, industrial, or school user upon the customer's line and to charge for such service at an established meter rate as set forth in Schedule A.

(b) Location of Meters: Meters shall be placed either inside or under a heated building at such suitable places as are most convenient and are approved by the Board. The meter will not be placed where damage to the meter or its related parts may occur; or in such a place where damage to the meter could result in a loss of water from the system.

(c) Joint Use of Meters: The joining of several customers to take advantage of single minimum charges and/or large quantity rates is prohibited except under special contract, in writing, with the Board.

Section 1.01.090. Rates

Water and sewer rates to be charged for the various classification of services will be published in a separate "Schedule A". Schedule A will be established by the Board and approved by the City Council on a periodic basis.

Section 1.01.100. Notices

(a) Notices to Customers: Notices to customers from the Board will normally be given in writing and either mailed or delivered to the customer at his last known address. Where conditions warrant, and in emergencies, the Board may notify either by telephone, messenger, or radio.

(b) Notices from Customers: Notices from the customer to the Board may be given in writing, or verbally by the customer to authorized representatives of the Utility Board. The Chairman of the Utility Board shall designate authorized representatives. However, notices that result in a change in service or in work being performed by the Board for the Customer must be accompanied by a signed repair order or work order.

Section 1.01.110. Billing and Payment

(a) Monthly Bills: All bills will be mailed on or before the end of each month. The bill will contain a statement of present charges due including the billing for the present month. All bills are due and payable prior to the 20th of the following month.

(b) Delinquent Bills: All bills not paid prior to the due date will be considered delinquent. The Board reserves the right to add interest to delinquent bills as may be provided by regulation.

(c) Delinquent Notice: At the discretion of the Board a notice of delinquency shall be mailed to each delinquent account on or after ten days from the date the account becomes delinquent.

(d) Turn-off Notice: After a bill has reached an amount equivalent to three months of service, or $______, whichever occurs first, the Board shall send a notice of customer turn-off, stating the date and time at which the service may be terminated. The notice shall be sent to the customer by certified or registered mail, return receipt requested. If the receipt has not been received in the Board office within ten days of mailing, notice shall be made by a Utility Board employee or agent delivering or posting notice, at the customer's residence or place of business, as the case may be. The Board may terminate the service at any time after the date and time indicated in the turn-off notice, without further notification, unless written payment arrangements are made by the customer. The City reserves the right to reject offers of payment that are for less than the full amount due.

(e) Deposit for Re-connection: In all cases of service disconnects due to delinquency, the customer must again meet the deposit requirements as set forth in Section 1.01.050.

(f) Responsibility for payment of Monthly Bills and/or Repair or Service charges for rented or leased properties: In all cases the lessor is responsible for the utility bills of tenants. All persons who own, operate, or maintain a structure or any part of a structure for the purpose of providing space on a lease or rental basis shall be responsible for water and sewer services provided to the rented or leased structure.

Section 1.01.120. Pre-Existing Accounts

(a) Delinquency Status of Existing Accounts:

1. For those residential customers presently having a service with the Utility without a signed agreement or service application on file with the Utility, their service will continue as it exists without a signed agreement with the Board, unless their account becomes delinquent. However, all existing accounts, delinquent or not, are subject to the remaining provisions of these rules and regulations, unless the customer requests termination of service within 10 days following notice of adoption of these rules.

2. All existing residential accounts that are delinquent by three months or $______, which ever comes first, will be allowed 60 days to bring their accounts current.

They will be given written notice within 10 days following the adoption of these rules and regulations, with the 60 day period commencing from the date of mailing.

(b) All existing commercial, industrial, or school accounts, delinquent or not, must sign an application/agreement with the City within 60 days following adoption of these rules and regulations.

Section 1.01.130. Administration and Enforcement

(a) These rules and regulations shall be administered and enforced by the Board. The Board, with the consent of the City shall have the authority to establish and regulate rates for the water and sewer system for all customers, but no person shall be bound by any such rate unless it shall have been posted for public inspection for five consecutive days after its adoption at the City Office, the Post Office, the Native Store, and the Clinic, all within the community of Alakanuk, Alaska.

(b) A current file of all rates adopted by the Board under these regulations shall be available for public inspection during regular hours during the regular business hours at the City office.

(c) All moneys collected for water and sewer services will be used strictly for maintenance, extension, repair, capital improvement, and operation of the water and sewer system. Moneys will be accounted for separately by the Board.

(d) The City of Alakanuk or the Utility Board may adopt such additional regulations, provisions, and procedures pertaining to water and sewer services as they deem proper.

Section 1.01.140. Discontinuance

(a) Discontinuance by Customer Order: Each customer about to vacate any premises supplied with water and/or sewer services by the Board shall give at least one week written notice of his intentions specifying the date the service is to be discontinued. Otherwise, a customer will be responsible for all water supplied to such premises until a written notice is received.

Within one week of the time specified in the notice to discontinue service, a total bill (including the costs of disconnect, and minus any deposits due to the customer) will be rendered which is due and payable immediately. The amount of the bill for the current billing period will be determined by prorating the number of days of service received in the given month (including the date of disconnect) divided by the total number of days in the month, times the usual monthly charge for the customer. In those cases where the disconnect cannot be done due to weather or ground conditions, the actual charges for the labor and materials for the disconnect will be billed separately at the time of disconnect.

(b) Discontinuance for Non-payment of Bills: A customer's water and sewer service may be discontinued if the water and/or sewer bill is not paid in accordance with the procedures listed in Section 1.01.120 and 130.

(c) Discontinuance for Improper Customer Facilities:

1. Unsafe facilities or unsanitary facilities: The Board may discontinue services to any premises without prior notice where plumbing facilities, appliances, or equipment using water or discharging wastewater are dangerous, unsafe, or not in conformity with the plumbing code of the City.

2. Cross Connections: A cross connection is defined as any physical connection between the water or sewer system and another water source. Such cross connections are unlawful. The Board will discontinue service to any persons or premises where a cross connection exists. Service will not be restored until the cross connection is eliminated.

(d) Discontinuance for water waste: Where water is wastefully or negligently used on a customer's premises so that it seriously affects the general service, the Board may discontinue service if such conditions are not corrected after notice by the Board. Allowing water to run continuously rather than provide reasonable and proper insulation is considered wasting water. At the option of the Board, a customer may be allowed to continue service if they have installed at their expense a meter (as prescribed in 1.01.080) and pay instead a rate based upon consumption.

(e) Discontinuance for Service Detrimental to others: The Board may refuse to furnish water, restrict water service, or immediately terminate service to any premises where excessive demands by a customer will result, or have resulted, in inadequate service to another customer(s). The determination of excessive demand may vary depending on current City water resources and water and sewer system equipment conditions.

(f) Discontinuance for Fraud or Abuse: The Board will refuse or discontinue service to any customer or premises where it is deemed necessary to protect the Board or the City from fraud or abuse of service. Discontinuance of service for one or both of these causes will be made immediately upon receipt of knowledge by the Board that such condition or conditions exist.

(g) Discontinuance for Unauthorized turn-on: Where water service has been discontinued for any reason and the water is turned on by the customer or another unauthorized person, the water may then be turned off at the main, without notice to the customer. The charges for shut-off at the main will be billed at the actual cost for labor and materials plus 50%, billed to the offending customer or premises. The charges for water consumed through such illegal connection will be at the regular rate plus 50% for the Board estimate for the time interval that such illegal or unauthorized connection existed. The Board may seek additional legal remedies in such cases.

(h) Discontinuance for non-compliance: Unless otherwise specified by specific sections of these rules and regulations, a customer may have service discontinued for violation of any provision of these rules and regulations following five days notification of such impending termination of service. Proper notice is specified in Section 1.01.110 of these regulations.

Section 1.01.150. Restoration of Services

Restoration of Service following discontinuance for non-payment of bill shall be made only after payment of current and past due charges, the restoration charge(s), and posting a deposit as herein provided.

Restoration following discontinuance for unsafe facilities, water waste, fraud, abuse, or non-compliance with these rules and regulations will be made only after: the irregularity has been corrected; any associated charges for disconnection or repairs undertaken by the Board have been paid; and, the Board has been assured that the irregularity will not occur again.

Section 1.01.160. Unusual Demands

Whenever an abnormally large quantity of water is desired for filling a water storage tank, or any other purpose, arrangements must be made with the Board prior to taking the water. Permission to take water in large quantities will be given only if other customers are not inconvenienced. Purchases of large quantities of water, even if to an existing customer, may be billed under a separate category and for a separate amount from the customer's usual rate.

Section 1.01.170. Access to Property

All duly appointed employees or agents of the Board shall have free access at all reasonable hours of the day to any and all parts of structures and premises in which water is or may be delivered for purposes of reading meters, inspection of connections, piping and fixtures, and the manner and extent to which the water and sewer service is being used. Neither the City nor the Board assume the duty of inspecting the customer's line, plumbing, or equipment and shall not be responsible for deficiencies therein.

Section 1.01.180. Responsibility for Equipment

(a) Responsibility for customer equipment: Neither the City nor the Board shall be liable for any loss or damage of any nature whatsoever caused by any defect in the customer's service line, plumbing, or equipment, nor shall the City or the Board be liable for loss or damage due to interruption of service or temporary changes in pressure.

(b) The customer shall be responsible for valves on his premises being turned-off when water service is turned on. The customer shall be responsible for maintaining proper heat within his property to insure that pipes do not freeze-up, causing harm or damage to the Alakanuk water or sewer system as well as to the customer's premises. The customer shall be liable for any damage or loss to the City or the Board caused by customer freeze-up.

Section 1.01.190. Service Connections, Service Boxes and Water or Sewer Lines

(a) Operation: No person or persons other than those designated and authorized by the Board shall place any substance including but not limited to animal and fish carcasses, refuse or trash, rocks or gravel, or honeybucket wastes in any City service connection, service box, or water or sewer main. Any violation of this regulation will be prosecuted according to the law.

Section 1.01.200. Penalties

Any person violating sections of these rules and regulations shall, upon adjudication by the Board after notice and opportunity for a hearing, be subject to a civil penalty not to exceed $_____. Each separate incidence and each separate day upon which an offense occurs shall be a separate offense.

Section 1.01.210. Suspension of Rules

No employee of the Board or the City is authorized to suspend or alter any of the provisions herein without specific approval or direction of the City, except in cases of emergency involving loss of life or property or which would put the water and sewer system operation in jeopardy.

Section 1.01.220. Easements

Each applicant and customer gives and grants to the City of Alakanuk and the Utility Board an easement and right of way on and across his property for inspection and installation and replacement of water and sewer service lines, and all necessary valves, equipment and attachments associated therewith.

Section 1.01.230. Immunities Preserved

Nothing in these rules and regulations nor any actions taken or arising under them shall constitute consents by the City of Alakanuk to the sale, disposition, lease or encumbrance of the lands, interest in lands or the other assets (including cash and cash equivalents) of the City of Alakanuk.

Section 1.01.240. Constitutionality and Saving Clause

If any clause, sentence, paragraph, section, or portion of these rules and regulations for any reason is adjudged to be invalid by a court of competent jurisdiction, such judgement shall not affect, impair, or invalidate the remainder of this document but shall be confined in its operation to the clause, sentence, paragraph, or portion of these rules and regulations directly involved in the controversy in which the judgement is rendered.

SCHEDULE A

Water and Sewer Utility Service Rates

Domestic Flat Rate:	
Single family dwelling (community system)	$______/Month
Apartments - per unit (community system)	$______/Month
Domestic Flat Rate:	
Single family dwelling (on-site system)	$______/Month
Apartments - per unit (on-site system)	$______/Month
Commercial/Public Buildings Flat Rate:	
Restaurant	$______/Month
Garage	$______/Month
Lodge	$______/Month
Store	$______/Month
School	$______/Month
Community Building	$______/Month
Church	$______/Month
Commercial/Public Buildings Metered Rates:	
Restaurant	$______/Gallon
Garage	$______/Gallon
Lodge	$______/Gallon
Store	$______/Gallon
School	$______/Gallon
Community Building	$______/Gallon
Church	$______/Gallon
Labor and Equipment for Repairs	
Foreman	$______/hour
Operator	$______/hour
Laborer	$______/hour
Backhoe	$______/hour
Dozer	$______/hour
Loader	$______/hour
Truck	$______/hour

Materials: Cost plus 10%

CITY OF ALAKANUK

DRAFT
Water and Sewer Ordinances

Sections:

Section 1. Administration and Enforcement. This ordinance shall be administered and enforced by the City Council with special duties delegated to the Utility Board.

Section 2. Disposal of Sewage and Liquid Waste. It shall be unlawful for any person to dispose of sewage, liquid wastes from human bathing and food preparation, or human excreta from any building located within the city by any method other than through the utilization of the city sewage disposal system. All buildings within 200 feet of any community sewer line must connect to the city sewerage system. All others within the city must submit an application for an individual sewage system to the Utility Board for approval.

A. An application for a permit for the construction, alteration, or extension of an individual water supply system or sewage disposal system shall be made in writing to the city and shall include the following:

   1. Legal name and address of the applicant;
   2. Legal description and sketch of the property on which the construction, alteration or extension is proposed;
   3. Proof of land ownership; and

4. A sketch of the proposed disposal facility and such additional information as the City may deem necessary to demonstrate that the proposed disposal facility shall comply with this ordinance and the standards set forth by the Alaska Department of Environmental Conservation.

B. If the Utility Board is satisfied that the proposed facility will comply with this ordinance and with State health regulations, it shall approve the application and issue a permit for the work.

C. Any person whose application for a permit has been denied may appeal to the next regular meeting of the City Council.

Section 3. Operation of Individual Systems. It shall be unlawful for any person or entity to operate or maintain an individual sewage disposal system that may contaminate any source of drinking or domestic water supply. Such systems shall comply with the applicable standards of the Alaska Department of Environmental Conservation.

Section 4. Illegal Discharges. After the installation of piped facilities, it shall be unlawful for any person to discharge sewage or other domestic wastes on the surface of the ground or in pits within the City.

Section 5. Alterations of Individual Systems. It shall be unlawful for any person to construct, alter or extend an individual sewage disposal system except by permission from the Utility Board.

Section 6. Misuse and Damage of Water and Sewer Facilities and Penalties. Dumping refuse, chemicals, or trash into sewer lines: Any person who damages a sewer main or interrupts sewer service through placing trash, refuse, animal carcasses, rocks or other matter not intended to be placed in a sewer will be responsible for all damages and repairs to the sewer lines, lift stations, and treatment works that are a consequence of their act.

Damage to Service Connects, Service Boxes, and Water and Sewer Mains: Any person who damages a service connect, service box, water or sewer main, or any of the attachments or appurtenances thereof, shall be responsible for the cost of its complete repair and return to service.

Fire Hydrant Operation: No person or persons other than those designated and authorized by the City or the Utility Board shall attempt to draw water from a hydrant belonging to the City or in any manner damage or tamper with the hydrant. Any violation of this regulation will be prosecuted according to the law. No tool other than the special hydrant wrenches shall be used to operate a hydrant valve. In cases where temporary service has been granted, an auxiliary external valve will be used to control the flow of water.

Damage to Fire Hydrants: Any person who damages a fire hydrant shall be responsible for the cost of its complete repair and return to service.

Any person violating sections of these rules and regulations enacted by the Utility Board shall, upon adjudication by the Utility Board after notice and opportunity for a hearing, may in addition to the penalties provided herein, be subject to a civil penalty of an amount to be recommended by the Utility Board and approved by a majority vote of the City Council. Each separate incidence and each separate day upon which an offense occurs shall be a separate offense.

Section 7. Authorized Inspection. The City, through its designated representative or representatives is hereby authorized to make inspections at reasonable times during daylight hours to determine satisfactory compliance with this ordinance and regulations promulgated hereunder.

Section 8. Additional Regulations and Penalties. The Utility Board shall adopt, as provided by ordinance, such additional regulations, provisions, and procedures for the violations pertaining to the water supply and wastewater disposal system.

APPENDIX C
LAND STATUS TABLES

APPENDIX C

LAND STATUS TABLES

NOTES

1. Appendix C indicates persons or entities to which the land was originally transferred to or is in the process of being transferred from the federal government through Section 14(c) of the Alaska Native Claims Settlement Act. Private or public property transfers subsequent to the original transfer from the federal government may not necessarily be recorded with the Bureau of Land Management (BLM), and would not have been discovered in our research. A complete title search should be conducted for properties of interest to this project. The title search would indicate current ownership, and would provide descriptions of any easements which may exist.

2. Information displayed in Appendix C, pages C-1 to C-16, conjoins with the land status maps, Figures C1 and C2 (attached in Appendix C behind page C-16), and photographic base maps located in Appendix D.

3. Symbols used in Tables:

   VL = Vacant Lot

   NS = Not Subdivided

   W, A, B, C, D, F, E, H, L, M, X, I, J, K, O, P designate community buildings

4. Deed type information for Tract "B", Blocks 13, 14, 15, 16, 17 and 18 were not available at BLM.

5. Deed Types:

   03/03/91 = Original Trustee Deed

   05/25/26 = Native Ownership only (Restricted Deed)

   02/26/48 = Native Transfer to Individual (Unrestricted)

LAND STATUS TABLES
(Continued)

DEED TYPE	LOT NUMBER	PROPERTY OWNER (OCCUPANT)	HOUSE NUMBER
		TRACT "A", BLOCK 1	
03/03/91	1	City of Alakanuk	VL
05/25/26	2	Clement E. & Margaret Joseph (Alstrom's Store)	W
03/03/91	3	City of Alakanuk (Frank Alstrom, Jr.)	105
03/03/91	4	City of Alakanuk (Ragner Alstrom)	106
05/25/26	5	Clement E. & Margaret Joseph	VL
03/03/91	6	City of Alakanuk (Frank Alstrom, Sr.)	107
03/03/91	7	City of Alakanuk	VL
03/03/91	8	City of Alakanuk Municipal Reserve (Emmanuel Stanislaus) (Gordon, Melvin Joseph) (Willie Hanson) (Robert Alstrom)	 109 110 113 108
		TRACT "A", BLOCK 2	
03/03/91	1	City of Alakanuk	VL
03/03/91	2	City of Alakanuk	VL
03/03/91	3	City of Alakanuk	VL
05/25/26	4	James & Sally Leopold	VL
03/03/91	5	City of Alakanuk Municipal Reserve	VL

LAND STATUS TABLES
(Continued)

DEED TYPE	LOT NUMBER	PROPERTY OWNER (OCCUPANT)	HOUSE NUMBER
		TRACT "A", BLOCK 3	
03/03/91	1	City of Alakanuk	VL
03/03/91	2	City of Alakanuk (John Lamont, Joseph Francis)	122
03/03/91	3	City of Alakanuk	VL
03/03/91	4	City of Alakanuk	VL
03/03/91	5	City of Alakanuk	VL
03/03/91	6	City of Alakanuk	VL
03/03/91	7	City of Alakanuk	VL
03/03/91	8	City of Alakanuk	VL
03/03/91	9	City of Alakanuk	VL
03/03/91	10	City of Alakanuk Municipal Reserve	VL
		TRACT "A", BLOCK 4	
03/03/91	None	City of Alakanuak Municipal Reserve (Charlie Hanson) (Curt Konst) (Willie Hanson)	 NS 111 112 113
		TRACT "A", BLOCK 5	
03/03/91	1	City of Alakanuk	VL
03/03/91	2	City of Alakanuk	VL
03/03/91	3	City of Alakanuk	VL
03/03/91	4	City of Alakanuk	VL
03/03/91	5	City of Alakanuk	VL
03/03/91	6	City of Alakanuk	VL

LAND STATUS TABLES
(Continued)

DEED TYPE	LOT NUMBER	PROPERTY OWNER (OCCUPANT)	HOUSE NUMBER
TRACT "B", BLOCK 1			
03/03/91	1	City of Alakanuk	VL
03/03/91	2	City of Alakanuk	VL
03/03/91	3	City of Alakanuk (Marvin Paul)	98
TRACT "B", BLOCK 2			
03/03/91	1	City of Alakanuk (Frank Johnson)	94
03/03/91	2	City of Alakanuk (Phillip Phillip)	95
03/03/91	3	City of Alakanuk (George Strongheart)	96
03/03/91	4	City of Alakanuk (Ernie Hanson)	97
03/03/91	5	City of Alakanuk (Mary Theresa Augustinie)	93
03/03/91	6	City of Alakanuk (Charles Harry, Sr.)	92
03/03/91	7	State of Alaska Division of Aviation (Denis Sheldon)	91
03/03/91	8	State of Alaska Division of Aviation (Airport Equipment Garage)	S
03/03/91	9	State of Alaska Division of Aviation	VL
03/03/91	10	State of Alaska Division of Aviation	VL
03/03/91	11	State of Alaska Division of Aviation	VL

LAND STATUS TABLES
(Continued)

DEED TYPE	LOT NUMBER	PROPERTY OWNER (OCCUPANT)	HOUSE NUMBER
		TRACT "B", BLOCK 2 (cont.)	
03/03/91	12	State of Alaska Division of Aviation	VL
03/03/91	13	State of Alaska Division of Aviation	VL
03/03/91	14	State of Alaska Division of Aviation	VL
03/03/91	15	City of Alakanuk	VL
03/03/91	16	City of Alakanuk (Edward Post) (Regis Augline, Sr.)	 14 13
03/03/91	17	City of Alakanuk (Curtis Augline)	11
03/03/91	18	City of Alakanuk (Jacob Murphy)	12
03/03/91	19	Municipal Reserve State of Alaska Division of Aviation	VL
		TRACT "B", BLOCK 3	
03/03/91	1	Department of Education State of Alaska (School Complex)	A
03/03/91	2	Department of Education State of Alaska (School Complex)	A
03/03/91	3	Department of Education State of Alaska (School Complex)	A
03/03/91	4	Department of Education State of Alaska (School Complex)	A

LAND STATUS TABLES
(Continued)

DEED TYPE	LOT NUMBER	PROPERTY OWNER (OCCUPANT)	HOUSE NUMBER
TRACT "B", BLOCK 3 (cont.)			
03/03/91	5	Department of Education State of Alaska (School Complex)	A
03/03/91	6	Department of Education State of Alaska (School Complex)	A
03/03/91	7	Department of Education State of Alaska (School Complex)	A
03/03/91	8	Department of Education State of Alaska (School Complex)	A
TRACT "B", BLOCK 4			
03/03/91	1	City of Alakanuk	B
03/03/91	2	City of Alakanuk (Richard Weaver, Sr.) (Richard Weaver, Jr.)	9 10
03/03/91	3	City of Alakanuk (Rita Joseph)	8
03/03/91	4	City of Alakanuk	VL
03/03/91	5	City of Alakanuk	VL
03/03/91	6	City of Alakanuk	VL
03/03/91	7	City of Alakanuk	VL
03/03/91	8	City of Alakanuk	VL
03/03/91	9	City of Alakanuk Municipal Reserve	VL

LAND STATUS TABLES
(Continued)

DEED TYPE	LOT NUMBER	PROPERTY OWNER (OCCUPANT)	HOUSE NUMBER
TRACT "B", BLOCK 5			
03/03/91	1	City of Alakanuk (Peter Black)	1
03/03/91	2	City of Alakanuk (Tony Simmons)	3
03/03/91	3	City of Alakanuk	VL
03/03/91	4	City of Alakanuk	VL
03/03/91	5	City of Alakanuk (Paul Stanislaus)	6
03/03/91	6	City of Alakanuk	VL
03/03/91	7	City of Alakanuk	VL
03/03/91	8	City of Alakanuk	VL
03/03/91	8A	City of Alakanuk	VL
05/25/26	9	Winifred M. Canoe	VL
05/25/26	10	Thomas & Cecille Chikigak	VL
03/03/91	11	City of Alakanuk (Arthur Chikigak)	7
03/03/91	12	City of Alakanuk (John Aloysius)	5
03/03/91	13	City of Alakanuk (Austin Kakorutak)	4
03/03/91	14	City of Alakanuk	VL
03/03/91	15	City of Alakanuk (Paul Ayunerak, Sr.)	2
TRACT "B", BLOCK 6			
03/03/91	1	Department of Education State of Alaska (WTP, Sauna, Laundry)	C

LAND STATUS TABLES
(Continued)

DEED TYPE	LOT NUMBER	PROPERTY OWNER (OCCUPANT)	HOUSE NUMBER
TRACT "B", BLOCK 6 (cont.)			
03/03/91	2	Department of Education State of Alaska (WTP, Sauna, Laundry)	C
03/03/91	3	Department of Education State of Alaska (WTP, Sauna, Laundry)	C
03/03/91	4	Department of Education State of Alaska (Head Start)	D
05/25/26	5	John L. Chikigak (John L. Chikigak)	15
05/25/26	6	John L. Chikigak	VL
05/25/26	7	Bernard & Josephine George (Bernard George)	17
03/03/91	8	USA c/o Corps of Engineers Alaska District (Armory)	F
05/25/26	9	Joseph & Josephine James (Josephe James, Sr.)	18
05/25/26	10	Felix & Rose Edmund (Rose Edmund)	19
03/03/91	11	City of Alakanuk	VL
03/03/91	12	City of Alakanuk	VL
03/03/91	13	City of Alakanuk	VL
03/03/91	14	City of Alakanuk	VL
03/03/91	15	City of Alakanuk	VL
03/03/91	16	City of Alakanuk	VL
03/03/91	17	City of Alakanuk	VL

LAND STATUS TABLES
(Continued)

DEED TYPE	LOT NUMBER	PROPERTY OWNER (OCCUPANT)	HOUSE NUMBER
		TRACT "B", BLOCK 6 (CONT.)	
03/03/91	18	City of Alakanuk (Fred Augustine) (New City Clinic)	 16 E
03/03/91	19	Department of Education State of Alaska (School Complex)	 A
03/03/91	20	Department of Education State of Alaska (United Utilities)	 B
03/03/91	21	Department of Education State of Alaska (School Complex)	 A
03/03/91	22	Department of Education State of Alaska (School Complex)	 A
		TRACT "B", BLOCK 7	
05/25/26	1	Ignatius George (Teresa George)	 21
05/25/26	2	Curtis Augline (Nancy James)	 22
05/25/26	3	John Ayunerak (John Ayunerak) (Jimmy Ayunerak)	 23 23A
05/25/26	4	Thomas Augustine	VL
05/25/26	5	Maria Augustine (Donald Augustine)	 24
05/25/26	6	Billy Buster (Gabriel Buster)	 25
05/25/26	7	John J. & Sara M. Buster John Buster	 26

LAND STATUS TABLES
(Continued)

DEED TYPE	LOT NUMBER	PROPERTY OWNER (OCCUPANT)	HOUSE NUMBER
TRACT "B", BLOCK 7 (cont.)			
05/25/26	8	Paul & Mary Ayunerak (Joseph Ayunerak)	27
05/25/26	9	Morris & Bridget Kilbuck (John & Agnes Kilbuck)	28
05/25/26	10	Zachius & Mary Agnes Paul (Zacheys Paul)	29
03/03/91	11	City of Alakanuk	VL
03/03/91	12	City of Alakanuk Municipal Reserve	VL
TRACT "B", BLOCK 8			
03/03/91	1	Alaska Village Electric Corp., Inc.	VL
03/03/91	2	Alaska Village Electric Corp., Inc.	VL
05/25/26	3	Frank J. Johnson	VL
05/25/26	4	Frank J. Johnson	VL
05/25/26	5	Johnson Katchakoak (Johnson Katchakoak)	34
03/03/91	6	Catholic Bishop of Northern Alaska (Catholic Church) (Monica Murphy)	H 39
03/03/91	7	City of Alakanuk (Frederick Joseph/Roger Lowe)	40
03/03/91	8	City of Alakanuk (Old Community Hall) (New Public Safety Building) (Fire Department)	L M X

LAND STATUS TABLES
(Continued)

DEED TYPE	LOT NUMBER	PROPERTY OWNER (OCCUPANT)	HOUSE NUMBER
		TRACT "B", BLOCK 8 (cont.)	
03/03/91	9	City of Alakanuk (New City Shop) (Old City Office)	 J K
03/03/91	10	City of Alakanuk (Community Ctr./City Office)	 I
05/25/26	11	Charles & Emily Harry, Sr. (Charles Harry, Jr.) (Martin Harry)	 37 38
05/25/26	12	Henry & Angela Philipp (Pricilla Philipp)	 36
05/25/26	13	Agnes S. Sheldon (Agnes Sheldon)	 35
05/25/26	14	John B. James (Michael James) (John B. James)	 33 32
05/25/26	15	Ethel Stern (Paul Stern)	 31
05/25/26 02/26/48	16	Andrew & Caroline White (Ray Oney)	 30
03/03/26	17	City of Alakanuk	VL
03/03/26	18	City of Alakanuk	VL
		TRACT "B", BLOCK 9	
05/25/26	1	Angela Andrews (Edgar Andrews)	 41
05/25/26	2	Angela Andrews (Mary Andrews)	 42
05/25/26	3	John & Rose Kameroff (John Kameroff, Sr.)	 43
05/25/26	4	Rita A. Joseph (Alma Hanson)	 46

LAND STATUS TABLES
(Continued)

DEED TYPE	LOT NUMBER	PROPERTY OWNER (OCCUPANT)	HOUSE NUMBER
		TRACT "B", BLOCK 9 (cont.)	
05/25/26	5	Paul M. & Christine A. Phillip (Paul Phillip, Sr.)	47
05/25/26	6	Placid C. & Lucy H. Joseph (Placid Joseph, Sr.)	49
05/25/26	7	Joe & Martina Phillip (Joe Phillip)	50
05/25/26	8	Paul Duny (Paul Tony)	52
05/25/26	9	Bernard Stanislaus (Bernard Stanislaus)	54
05/25/26	10	John L. & Mary R. Williams (John Williams)	55
03/03/91	11	City of Alakanuk (Clifford Damian)	56
05/25/26	12	William R. & Ida S. Duny	VL
05/25/26	13	William R. & Ida S. Duny (William Duny)	53
03/03/91	14	City of Alakanuk (Patrick Philipp)	51
03/03/91	15	City of Alakanuk John Kameroff	48
03/03/91	16	City of Alakanuk	VL
05/25/26	17	Alexie & Angela Patrick (Francis Patrick)	45
05/25/26 02/26/48	18	Charles & Laura Patrick (Charlie Patrick)	44
05/25/26	19	Theresa E. Cook	VL
05/25/26	20	Theresa E. Cook	VL

LAND STATUS TABLES
(Continued)

DEED TYPE	LOT NUMBER	PROPERTY OWNER (OCCUPANT)	HOUSE NUMBER
		TRACT "B", BLOCK 10	
05/25/26	1	Laurence T. & Adeline Edmund (Laurence Edmund)	57
03/03/91	2	US Postal Service (Post Office)	O
05/25/26	3	David F. & Ruth N. Jorgenson (David Jorgenson)	59
05/25/26	4	David F. & Ruth N. Jorgenson (Ramona Jorgenson)	60
05/25/26	5	David F. & Ruth N. Jorgenson (Jorgenson Store)	P
05/25/26	6	David F. & Ruth N. Jorgenson	VL
05/25/26	7	David F. & Ruth N. Jorgenson	VL
05/25/26	8	Camille & Sophie Joseph (Camille Joseph)	62
05/25/26	9	Joe & Judith Joseph (Joe Joseph)	63
05/25/26	10	Joseph & Katherine C. Agayar (Joe Agayar)	64
03/03/91	11	City of Alakanuk (Laura Patrick)	65
03/03/91	12	Cit of Alakanuk (Rose Rene)	66
03/03/91	13	City of Alakanuk (Thomas Chikigak)	61
05/25/26	14	David F. & Ruth N. Jorgenson	VL
05/25/26	15	David F. & Ruth N. Jorgenson	VL
05/25/26	17	David F. & Ruth N. Jorgenson (Jorgenson Store)	P

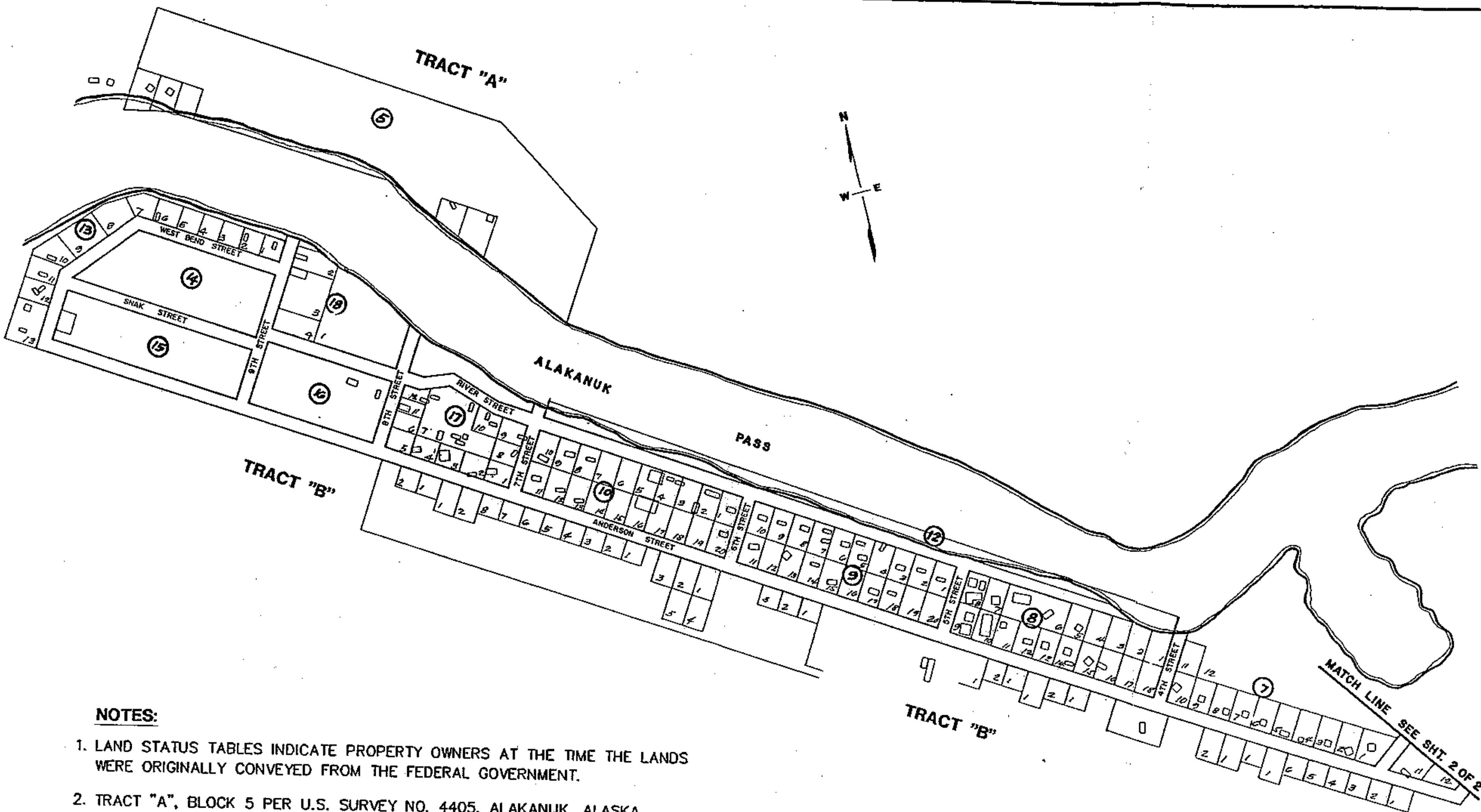
LAND STATUS TABLES
(Continued)

DEED TYPE	LOT NUMBER	PROPERTY OWNER (OCCUPANT)	HOUSE NUMBER
		TRACT "B", BLOCK 10 (cont.)	
05/25/26	18	David F. & Ruth N. Jorgenson	VL
05/25/26	19	David F. & Ruth N. Jorgenson	VL
05/25/26	20	Henry E. & Sophie Bob (Brendon Bob)	58
		TRACT "B", BLOCK 11	
	ALL	SUBDIVIDIDED INTO BLOCKS 13 TO 18	
		TRACT "B", BLOCK 12	
03/03/91	NONE	City of Alakanuk Municipal Reserve	NS
		TRACT "B", BLOCK 13	
	1	City of Alakanuk (Manual Isidore)	82
	2	City of Alakanuk (Anges Xavier)	83
	3	City of Alakanuk	VL
	4	City of Alakanuk	VL
	5	City of Alakanuk	VL
	6	City of Alakanuk (Ray Joseph)	84
	7	City of Alakanuk	VL
	8	City of Alakanuk	VL
	9	City of Alakanuk	VL
	10	City of Alakanuk (Mary Auglise)	85

DEED TYPE	LOT NUMBER	PROPERTY OWNER (OCCUPANT)	HOUSE NUMBER
TRACT "B", BLOCK 13 (cont.)			
	11	City of Alakanuk (Moses James)	 86
	12	City of Alakanuk (Camille O'Malley) (John O'Malley)	 87 90
	13	City of Alakanuk (Noal Tyson) (Tim Sergie)	 88 89
TRACT "B", BLOCK 14			
	NONE	City of Alakanuk	NS
TRACT "B", BLOCK 15			
	1	City of Alakanuk	VL
	2	City of Alakanuk	VL
TRACT "B", BLOCK 16			
	NONE	City of Alakanuk (Frames Damian) (Cyprian Augline)	NS 120A 76
TRACT "B", BLOCK 17			
	1	City of Alakanuk (Harry Stanislaus)	 69
	2	City of Alakanuk (Hilary Leopold)	 70
	3	City of Alakanuk (Barbara Joe)	 71
	4	City of Alakanuk (Louie Shelton)	72
	5	City of Alakanuk	VL
	6	City of Alakanuk	VL

LAND STATUS TABLES
(Continued)

DEED TYPE	LOT NUMBER	PROPERTY OWNER (OCCUPANT)	HOUSE NUMBER
TRACT "B", BLOCK 17 (cont.)			
	7	City of Alakanuk (Martha Keyes) (Nick Sugar) (Joe Joseph, Jr.) (David Augline)	 74 77 78 79
	8	City of Alakanuk (Ramona Jorgenson)	 60
	9	City of Alakanuk (Louie Chikagak)	 67
	10	City of Alakanuk (Paul Buster) (Paul Phillip, Jr.)	 75 80
	11	City of Alakanuk (Ben Phillip)	 73
	12	City of Alakanuk	VL
TRACT "B", BLOCK 18			
	1	City of Alakanuk	VL
	2	City of Alakanuk (Xavier Joseph)	 81
	3	City of Alakanuk (Assembly of God)	 R
	4	City of Alakanuk	VL



NOTES:

1. LAND STATUS TABLES INDICATE PROPERTY OWNERS AT THE TIME THE LANDS WERE ORIGINALLY CONVEYED FROM THE FEDERAL GOVERNMENT.
2. TRACT "A", BLOCK 5 PER U.S. SURVEY NO. 4405, ALAKANUK, ALASKA, DATED 10-26-92.
3. TRACT "B", BLOCKS 7, 8, 9, 10, 12 PER U.S. SURVEY NO. 4405, ALAKANUK, ALASKA, DATED 10-17-68.
4. BLOCK 11 WAS SUBDIVIDED INTO BLOCKS 13 TO 18, PER U.S. SURVEY #4405, ALASKA, ALAKANUK TOWNSITE, DATED 10-26-92.

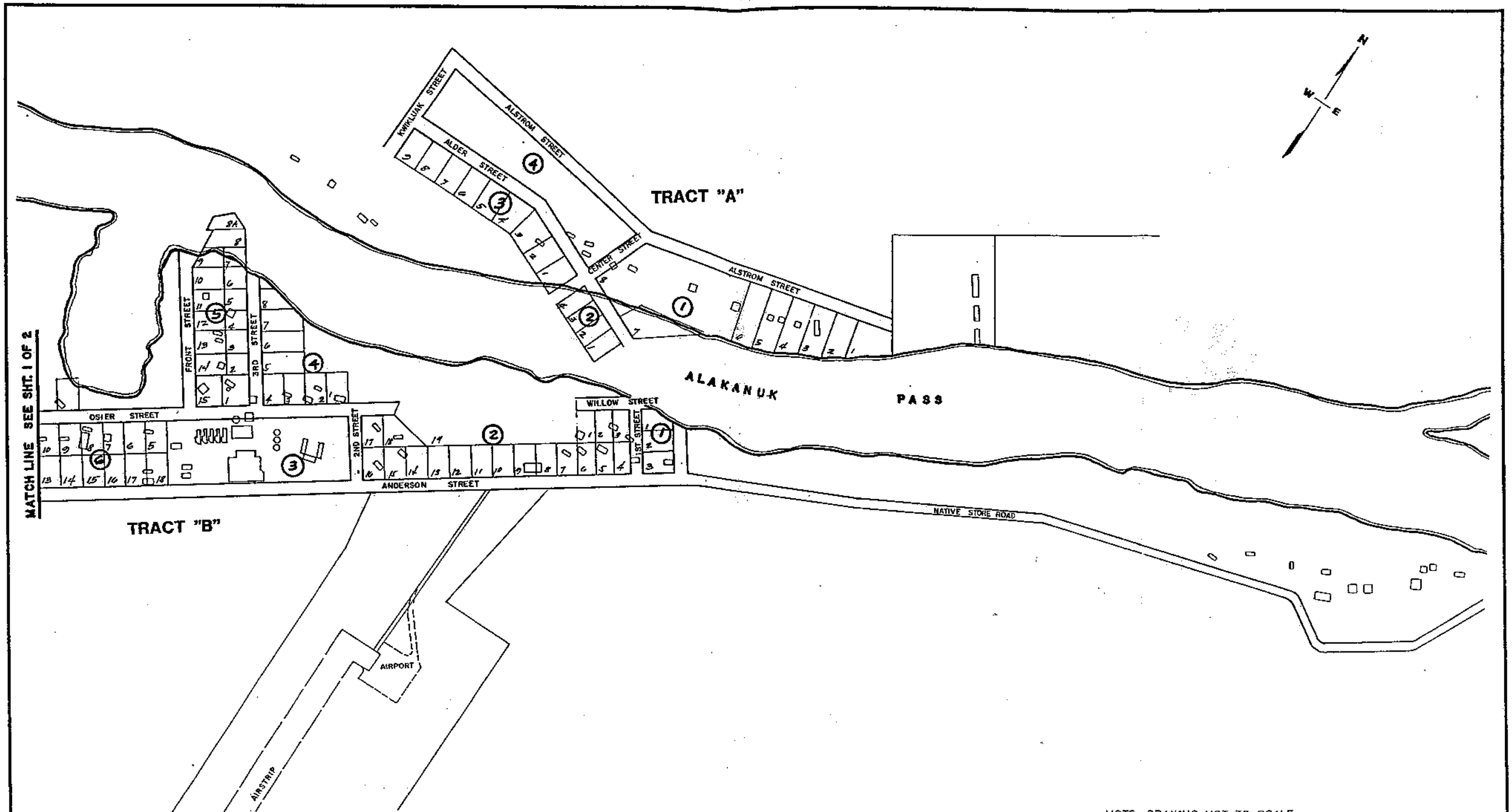
NOTE: DRAWING NOT TO SCALE.

CITY OF ALAKANUK

LAND STATUS MAP
ALAKANUK, ALASKA

DAMES & MOORE

JOB NO.	25554-001-150	DRAWN BY: VYS	**FIGURE C1**
DATE:	05 APRIL 1993	FILE NAME: 001BASE.DWG	



NOTE: DRAWING NOT TO SCALE.

NOTES:

1. LAND STATUS TABLES INDICATE PROPERTY OWNERS AT THE TIME THE LANDS WERE ORIGINALLY CONVEYED FROM THE FEDERAL GOVERNMENT.
2. TRACT "A", BLOCKS 1, 2, 3, 4 AND TRACT "B", BLOCKS 1, 2, 3, 4, 5, 6, PER U.S. SURVEY NO. 4405, ALAKANUK, ALASKA, DATED 10-17-68.

CITY OF ALAKANUK

LAND STATUS MAP
ALAKANUK, ALASKA

DAMES & MOORE

JOB NO.	25654-001-150	DRAWN BY:	VYS
DATE:	05 APRIL 1993	FILE NAME:	001BASE.DWG

FIGURE C2

APPENDIX D
PHOTOGRAPHIC BASE MAPS

Base Maps Too Large To Scan

APPENDIX E
UTILITY USER ASSESSMENT AND HOUSEHOLD SURVEY SUMMARY REPORT

Utility Name	Service	Number of Residential Subscribers	Average Cost Per Month ($)	Range of Costs Per Month ($)	Percentage of Community Subscribed
Alaska Village Electric Cooperative	Electricity	111	46	19-650	95
Unicom	Telephone	82	150(1)	21-500(1)	70
City of Alakanuk	Water	64(2)	68(3)	20-100(4)	55
City of Alakanuk	Cable TV	44	46	-	38
N/A	Fuel Oil	50%(5)	77(6)	40-150(4)	100
City of Alakanuk	Solid Waste	All	10	-	100

Notes:
(1) Probably includes public and commercial--may be somewhat high for residential.
(2) Includes only homes which use city supplied water. Other residents use rainwater, melted ice, etc. Homes or businesses which have piped water and sewer are not included.
(3) Includes average of 20 gal/day/home (from VSW survey) at $0.10/gal plus $2 delivery charge once per week. Twenty gal/day/home may be somewhat high. During our site visit, Ray Oney stated that the City delivers approximately 200-300 gal/month to each home which uses treated water.
(4) Estimated.
(5) Estimated based on VSW survey. Some residents heat their homes with wood, a combination of an oil system and wood, or other methods.
(6) Estimated based on conversations with Alakanuk residents and assuming diesel fuel is available for $1.40 per gallon. Amount of fuel used may vary based on the type of heating system used in each home.

Based on the above table, it appears that the average household in Alakanuk spends approximately $397 per month on utilities, assuming that the average household subscribes to all of the utilities. If cable television is excluded, the average monthly cost for utilities is approximately $351. Conversations with residents indicated that the average monthly phone bill is approximately $50. The value provided by Unicom probably includes public and business offices and is probably somewhat elevated. Considering this, the estimated utility costs compare favorably with the amount ($269 per month) found in the 1991 VSW community survey.

The results of the community survey indicate that the average resident would be willing to pay approximately $72 per month for improved water and sewer facilities. As shown in the above table, the average resident who now uses water from the water treatment plant pays approximately $68 per month. However, this estimate may be somewhat high based on conversations with residents. If water and sewer services can be provided for approximately $70 per month, there should be little financial impact on these residents. Obviously, residents who currently use rainwater or melt ice for water will be impacted more significantly.

The survey indicates that most residents are eager to have improved sanitation facilities, and would prefer to have running water and piped sewer. As shown above, most of the residents are willing to pay a reasonable amount for these services. Other important points which were addressed in the VSW household survey include the following. The percentages below are based on the 85 households which responded to the survey.

- Approximately half of the homes surveyed are equipped with one or more of the following: kitchen sink, bathroom sink, tub/shower.

- Approximately half of the homes are large enough to install a 6 foot by 10 foot bathroom.

- Nearly 60% of the residents are willing to add on to their homes to accommodate a bathroom.

- Over 80% of the residents believe the city should help pay for operation and maintenance of a new system.

- Over 40% of the residents would support an increase in the city sales tax to help pay for operation and maintenance of a new system.

If you have any questions or comments regarding the enclosed, or need any additional information, please feel free to call at any time.

Very truly yours,

DAMES & MOORE

Deborah S. Allen

Deborah S. Allen
Project Engineer

Michael L. Foster by DSA.

Michael L. Foster, P.E.
Project Manager

MLF/DSA:jj
ALAK1210.LTR

cc: Mr. Paul Gabbert, Village Safe Water

Fall, 1991

ALAKANUK, ALASKA
COMMUNITY SURVEY

This survey is to help the Alakanuk City Council to plan and implement water, wastewater, and solid waste improvements for Alakanuk. Presently, the City of Alakanuk is planning to implement a construction grant from the State of Alaska to upgrade a honeybucket haul system. This is the first step recommended in a feasibility and cost study prepared by the U.S. Public Health Service for the City.

While the PHS study outlines the technical and cost details of accomplishing sanitation and environmental improvements, a clearer understanding of what Alakanuk residents want as a whole is needed. In order to better understand the desires of Alakanuk residents regarding sanitation facilities, we ask that you take a little time to answer the questions on this survey form. We will summarize your answers with those of other residents in order to help us plan the types of facilities and the proper sequence of construction activities that are most appropriate for Alakanuk. Thank you for your time!

Household\Building name ____________________
(and number) ________ 120 Households / 85 responses {22 Public/business}
- Please locate and mark your home on the City layout map.

1. Where do you presently dispose of human wastes?

a.	Pits by home	46	e.	Bunker	1
b.	Outhouse	~~0~~	f.	Slough	16
c.	VSW wastewater Facility	2	g.	On ground near home	17
d.	solid waste site	1	h.	Other (specify) (ponds)	3

2. Where do you presently get your drinking water? How much do you collect each day?

a.	Washeteria watering point	29	d.	Water delivery	35
b.	Slough	2	e.	~~Rainwater~~ ice	18
c.	Rainwater	53	f.	Other	9

A. 5 gal.	18	C. 10 gal.	12	E. 15 gal.	10
B. 20 gal.	4	D. 30 gal.	30	F. Other	8

Total ≈ 1620 gal/day : 20 gal/day/house Avg.

3. If you don't use the existing water supply, please indicate why.

a.	Traditional source more convenient	11
b.	Water supply too expensive	8
c.	Water supply tastes bad	18
d.	Consider water supply unhealthy	6
e.	Water supply is unreliable	2
f.	Supply point is too far from home	20
g.	Other	9

N.A. 36

Post-It™ brand fax transmittal memo 7671	# of pages ▸ 3
To Greg Capito	From Paul Gebbert
Co.	Co.
Dept.	Phone #
Fax #	Fax #

- Survey results ; Alakanuk

4. Do you think that water and sewer improvements are needed?

YES 83 NO 2

5. Do you feel that present water sources and waste disposal practices adequately protect the health of local residents?

YES 22 NO 61 N.A. 2

6. The existing State grant is for Honey Bucket Haul System upgrades. This is to solve immediate disposal problems only. Do you have any suggestions how to best implement this so that it will work for you?

EXISTING GRANT PROVIDES FOR:
purchase 4WD honey bucket haul truck
modify (minor) existing lagoon
garage for haul vehicles

- Expect to pay for haul 2
- Take care of maintenance 2
- Centralized dumping better 2
- Hope people can/will pay 1
- Hauling would be ok for awhile, if not overcharged 2
- more trash bins 1
- Build Safely 1
- W&S to homes close to School 1

YOUR SUGGESTIONS:
- Improvement over present 20
- N.A. 25
- Keep roads clear 8
- running W&S only 8
- Make sure schedule is kept 7
- OK as is now 2
- provide jobs for young people 2
- Move lagoon out of town
- hauling will spread disease
- Provide Holding tank to public bldgs or
- Pig Pits for homes

7. From the previous sanitation survey, most residents desired piped water and sewer system as a solution to existing water and sewer problems. This desire may be feasible for the more centralized part of the City. In order to accomplish piped water and sewer facilities as soon as possible, some sections of the City will have to be serviced by different sanitation systems. Do you understand that the City may only be able to provide piped water and sewer to the densest and most centralized sections of the City?

YES 69 NO 12 N.A. 4

7a. If you do not live in the densest and most centralized section of the City, could you give some comments about what you think about not getting piped water and sewer while some other households will.

- N.A. 26
- City would not be fair 25
- If other services provided 13
- Would not mind 8
- Disappointed 2
- Understand why City can't provide piped W&S to outlying areas 3
- If paying for services is required; forget it 1
- can wait for services 3
- Does not know why technology cannot solve problems 2

8. The next phase of improvements is likely to involve upgrading the water supply system and start constructing all weather winter watering points in segments. Would you use an all-weather coin operated watering point?

YES 56 NO 26 N.A. 3

8a. Please give some comments or suggestions on what you think the next phase of improvements should be.

- N.A. 40
- Running water & Sewer 12
- Watering points 11
- Satisfied with Others recommendations 2
- Watering points should be free 1
- Wastewater disposal 10
- Watering points will not work 4
- better quality water 4

9. Which bathroom fixtures are installed in your home?

a. Kitchen sink 52
b. Toilet 5
c. Bathroom sink 45
d. Water Heater 4
e. Tub/shower 44
f. Nothing 27

10. Is your house large enough to install a 6 foot by 10 foot bathroom?
YES 42 NO 32 N.A. 4

11. Would you be willing to add on to your home for a bathroom?
YES 50 NO 29 NA 6

12. How many people live in your home? AVG - 5.0/home
N.A. 3

13. How many months during the year is your whole family away from your house?
N.A. 10 AVG. .6 months

14. How do you heat your house?

a. Oil - forced air 46
b. - hydronic 1
c. Wood 43
d. Other 21

15. How much do you currently spend for utilities (electricity, fuel oil, etc)?
$0-150 18 $300-600 20 N.A. 6 AVG $ 262 per month
$150-300 42

16. All sanitation facility improvements cost money to operate and maintain in a dependable manner. How much could you afford to spend to help operate and maintain sanitation facilities in Alakanuk?
$0-50 33 $100-175 10 N.A. 9 AVG $ 72 per month
$50-100 31 >$175 2

17. Should the City of Alakanuk help to pay to operate and maintain sanitation facilities?
YES 70 NO 13 N.A 2

18. Would you support an increase in the City sales tax to help pay for the operation and maintenance of sanitation facilities?
YES 37 NO 15 UNSURE 30
N.A. 3

19. Where do you dispose of your trash?

a. Fenced Solid Waste Site 4
b. Dumpsters 68
c. Along River Banks 3
d. Other Tundra 4
Burner 8

20. Please add any other problems or suggestions you have concerning sanitation facilities in Alakanuk.

- Running W&S would be good 6
- Glad that City is working to improve W&S 2
- Happy with any improvement over present condition 5
- Haul System will not work in winter 3
- City dump is a disaster 2
- Lagoon is too close to school 2
- Protect piping from floods and Snowmachines 2
- No place to dump H.B. in winter
- If haul System is implemented, great care should be made to operate it correctly
- Can pay for services only when seasonal money is available.
- Would use haul services if they cost less than piped
- Service public buildings first
- Keep all weather watering points from freezing
- Some kind of services need to be offered to homes across the River; they never get services.
- Have a community meeting to discuss this
- Don't do anything

		Copy TV Ads	Aiport	Sale of City Property	Lodge	Refuse	Resale	Suic. Prev.	Loans	Revenue Share	Disaster		Misc.
1	1	450				20 —		3181 25					Fuel 200 —
	2	1.50				50 —							
	3	150				1.0 —							
	4	1.50											
	8					110 —							
	9	1.00				120 —							
	10					11 —							
	11					65 —							
	12	200				190 —							
	15		3250 —			80 —							
	16												
	17	250											
	18	1.00				20 —							
	22					1.0 —							
	23					1.45 —							
	24					20 —			106849				
	25					50 —							
	29	1 —				65 —							
	30	1. —				1.0 —							
	31	7 —				50 —							
otals						[illegible]		3181 25	106849				200 —

Date		Taxes	Bingo	Clinic Lease	AVEC	Adfee	ASWF	ASWF School	Regist	Fines	EQ Rental	Sand gravel	Bldg Rent
ul	1	7839											
	2		259.—										
	3		44450								10--		50-
	4		60210				262810		10—		110--		
	8		117570										250-
	9												
	10		44165				218145						
	11		55560	347480			40915						
	12	482046						436317					
	15		15720										
	16		38370										10-
	17												
	18		27055										
	22		58105				351670						
	23	29587	56915		119520	23901					65250		
	24												
	25		31725				71990						
	26						38520						
	29		148315		179040	43224	70620						
	30												
	31		74590				49945						
Totals		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

9 1	8—											
2												
5					10—							
6					10—				39376—			Telephone
7												424 0
8	7—				30—							
9												
12	1—											
13					20—							
14					30—							
15					20—							
16	1 50				20—							
19	17—				10—							
20	1—				10—							
21	2—				60—							
22					10—							
23												
26	5—				10—							
27				2030—	35—					32104—		
28	1—											
29	4—				20—							
30					80—							
Totals for August	4750			2030—	375—				39376—	32104—		424 0
YTD	72—	3250—	-0-	2030—	1401—	Ø	3181 25	1068 49	39376—	32104—	-0-	624 0

PRODUCT 573 NEBS Groton, Mass. 01471 / Midland, Ont. L4R 4V9

1												
2												
5		131410										
6	252610					181955						300—
7						33115						
8		19885										
9												
12		92390		408480	81696		145164					
13						170585						
14												
15		47645										
16												
19	17758											
20		47415				71480						
21												10—
22		41375										
23												
26										40—		
27		96360	347480	216190	54050	307760				305—		
28												
29		30860										
30		45010										
tals or ugust	270368	552380	347480	624670	135746	764895	145164			345—		310—
TD	790140	1351030	694960	923230	202874	1869510	581481	10—	-0-	111750	-0-	620—

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Sept 2												
3	6—				120—							
4					120—							
5					70—							100—
6					30—							
9	150											
10	150				20—							
11					10—							
12	9—				70—							
13	2—				70—							
16					40—							
17					100—							
18	4—				10—							
19			10—		10—							
20	2—				30—							35—
23												
24												
25												
26	750											
27												
30					40—							
Totals for Sept.	3350		1.0—		740—							135
YTD	10550	3250—	1.0—	2030—	2141—	Ø	3181 25	1068 49	39376—	32104—	-0-	759

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2												
3	425925			624 —	14880	197515				25 —		
4		46840				35665						
5		32970										50 —
6												
9												500 —
10		46645										10 —
11												
12		18260										
13		21950				285695						
16							239736					
17									20 —			
18		64850							20 —			10 —
19		31675							1.00 —			
20			347480						20 —			375 —
23												125 —
24		70925										
25		26990		298560	59712							10 —
26		46810				294825			20 —			
27		30040		152640	38160							
30									9.5 —			
tals												
r	425925	437955	347480	5136 —	112752	8137 —	239736		275 —	25 —		1080 —
pt.												
TD	1216066	1788985	1042440	1436830	3153326	2683210	821217	110 —	275 —	114250	Ø	1700 —

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Oct 1												
2	1—				50—							
3	1—				145—							
4					25—							
7					10—							
8					20—							
9					10—							
10	11—		100—		10—							
11					10—							
14												
15												
16	150				50—							
17												
18					10—							
21												
22					160—							
23					50—							
24												
25					10—							
28					60—							
29	5—											
30	8—											
31												
Totals for October	2750		100—		620—							
	133—	3250—	110—	2030—	2761—	Ø	3181 25	1068 49	39376—	32104—	Ø	7590

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Oct	1									100—			250—
	2									20—			
	3	16057	60010		337920	67584	117720			40—	55—		250—
	4		57605										
	7		51110										
	8												
	9		52635										50—
	10		57235							120—	10—		20—
	11		48870				306605						10—
	14									55—	105—		
	15	17286	53160		385920	77184				145—			
	16										110—		10—
	17		45845								45—		
	18		49765								65—		
	21												
	22		25915								15—		
	23												
	24												
	25		31490		201320	40264	405060						
	28	30582											
	29		29385										
	30												
	31												
Totals for October		63925	563025		925160	185032	829385			480—	405—		590—
		1279990	2352010	1042440	2361990	500358	3612595	821217	10—	755—	154750	Ø	2290—

Jov 1												
4					275 —							282
5					20 —							
6					20 —							
7												
8												
11												
12	32 —		100 —		40 —							
13					10 —							
14					10 —							
15	2 —											
18	1 —				45 —							
19	1 —				10 —							
20												
21												
22					10 —							
25	1 —				10 —							
26					30 —			196 —				
27												590
28												
29	1 —											
Totals for bvember	38 —		100 —		480 —			196 —				872
YTD	171 —	3250 —	210 —	2030 —	3241 —	Ø	3181 25	1264 49	39376 —	32104 —	Ø	163

ov 1												
										40—		780—
4	2523.77	409.15										
5												
6									100—			
7		1104.05										
8		1451.95				4564.20						
11												50—
12	9004.30		9522.60									
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14		468.15										
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18												
19		850.25							100—			
20												
21												
22		569.65				3795.10						
									120—			
25						2935.95			100—			
26		301.80										
27	150.43											
28		713.05										
29												
Totals For Jovember	11678.50	5868.05	9522.60			11295.25			420—	40—		830—
YTD	24478.40	29388.15	19947—	23619.90	5003.58	16421.20	8212.17	10—	1175—	1587.50	Ø	3120—

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ec 2					110—							
3					20—							
4					10—							
5					100—							
6												
9	1—											
10					150—		1600—					
11												
12												
13					30—							
16					180—							
17					75—							
18					70—							
19												
20	1—				40—							
23					10—							
24					195—							
25												
26												
27												
30					25—							
31												
otals for cember	2—				1015—		1600—					
YTD	173—	3250—	210—	2030—	4256—	Ø.	4781 25	1264 49	39376—	32104—	Ø	1631 62

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ec 2												
3												
4		701 25										
5						3471 05						
6												
9	65 31											250—
10	272 34		3474 80	1795—	359—							
11		1177 10										
12												
13						3117 80						
16												50—
17		658 80				1546 65	8101 01	20—	100—			
18												750—
19												
20												
23												
24	153 04					1746 55	13977 46					500—
25												
26	50—											
27										10—		
30				1580—	316—							
31						3149 45						
otals or cember	540 69	2537 15	3474 80	3375—	675—	13031 50	22078 47	20—	100—	10—		1550—
YTD	25019 09	31925 30	23421 80	26994 60	5678 58	59452 70	30290 64	30—	1275—	1597 50	Ø	4670—

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n 1												
2												
3					10—							
6	3—				20—							
7	1.50											
8					90—							
9	6—				10—			300—				
10												
13	1—				140—							
14					10—							
15					40—							3525
16					10—							
17					10—							
20					130—							
21					60—							
22					190—							
23	2—											
24					100—							
27	8—				100—			220—				
28					30—							
29												
30												
31												
Totals for inuary	21.50				950—			520—				35
YTD	194.50	3250—	210—	2030—	5206—	Ø	4781.25	1784.49	393.76—	331.04—	Ø	1666

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Jan 1												
2												
3									400—			
6						129490						300
7												
8						61760						
9						55395			100—			
10						51080		850—				
13						160850						
14												
15	805556					408—						
16						23190						
17						38375						
20						139110						
21	12627		347480									
22						42685						
23						24175						
24						26225	1397746					
27						114515						
28									50—			
29						265—						
30						34480						
31						33625						
Totals for January	8181.83	-0-	347480	-0-	-0-	1002255		850—	550—			300
YTD	3320092	3192530	3689660	2699460	567858	6947535	426810.	880—	1825—	159750	Ø	4970

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Feb 3					10—							
4												
5					40—							
6												
7												
10	1—				30—							
11					30—							
12												
13					20—							
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17												
18					20—							Refund
19											42672—	701—
20					50—							
21												
24												
25					70—							
26												
27					10—							
28					10—	3143—						
Totals for February	1—				290—	3143—					42672—	701—
YTD	19550	3250—	210—	2030—	5496—	3143—	4781 25	1784 49	39376—	32104—	42672—	23678

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Feb 3												
4	1366—			1655—	331—	556.20						
5						422.60			100—			
6						419.85						
7						442.15						
10						1522.60			100—	10—		300—
11												
12						400.05						
13						373.45			200—			
14						309.05						
17						992.35						
18												
19	172.32					307.40		20—	168—			
20			3474.80			306.30			170—	10—		
21						289.05						
24	30—					1300.85						
25												
26						246.55	11607.38					
27		689.30				129.85						
28		510.25				165.25						
Totals for February	1568.32	1199.55	3474.80	1655—	331—	8183.55	11607.38	20—	738—	20—		300—
YTD	34769.24	33124.85	40371.40	286496.0	60095.8	776589.0	558754.8	900—	2563—	1617.50	Ø	5570

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PRODUCT 573 NEBS Groton, Mass. 01471 / Midland, Ont. L4R 4Y9

r 2					160—							
3	3—				540—							
4					40—							
5	1—				50—							
6	1—											
9					30—							
10					20—							
11					20—							
12					30—							
13					170—							
16					230—							
17					10—							
18	4—				60—							
19	5—				50—							
20												
23	2—				45—							
24												
25					115—							
26				35—	10—							
27												
30												
31	9—				60—							
otals for larch	25—			35—	1640—							
	22050	3250—	210—	2065—	7136—	3143—	4781 25	1784 49	39376—	32104—	42672—	236787

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PRODUCT 573 NEBS Groton, Mass. 01471 / Midland, Ont. L4R 4Y9

Mar 2		21550				140540			40—			
3				320—	64—				100—			500—
4		25980				49515						
5						44625						
6		27160				52790						
9		20015				1032—						
10		36275										
11						31995			10—			
12						31140						550—
13	656734	348.75				22990						
16						106570			20—	10—		250—
17		15355										
18	17421		3474.80	1380—	276—	34770						
19	30—	159—				30225						
20						24980						
23				1580—	316—	105020						
24		181—										
25		16135				41035			202—			
26						32265						
27						30440	8155.10		100—			
30						93530						
31	30—	70—										
Totals for March	679855	238345	3474.80	3280—	656—	975630	815510		472—	10—		1300—
	415677.79	3550830	43846.20	3192960	666558	8741520	6403058	900—	3035—	162750	Ø	6570—

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PRODUCT 573 NEBS Groton, Mass. 01471 / Midland, Ont. L4R 4Y9

r 1	6—			1.05—	25—							8644
2					70—							
3					10—							
6					60—							
7	1050				20—							
8					40—			1.00—				
9					50—							
10	6—				20—							
13	4—											
14	9—				10—							
15	1650				20—			1.06—				
16												
17												
20	1—											
21	1—											
22					10—							
23	2—				20—							
24					115—							
27					90—							
28	10—											
29												
30					10—							
otals for pril	66—			1.05—	570—			206—				8694
	28650	3250—	210—	2170—	7706—	3143—	4781.25	1990.49	393.76—		426.72—	2454.81

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Apr 1				1965—	393—	364.25				187.50		
2		353.60				286.35						
3		380—				323.30						500—
6		364.95				1301.45						
7												250—
8						569.10						
9		186.90				379.45						50—
10						295.75						
13		137.15				914.60						
14	197.41											
15				680—	136—	398.15				10—		
16		526.55				345.85						
17	170.72											
20	45.57		3474.80			405.35						
21												
22						575.80						
23		247.50				296—						250—
24						191.55	5720.44		100—			
27		397.70				896.25						
28	15—											
29						418—						
30		334.80				307.15						
Totals for April	428.70	2929.15	3474.80	2645—	529—	8268.35	5720.44		100—	197.50		1050—
	41996.49	38437.45	47321—	34574.60	7194.58	95683.55	69751.02	900—	3135—	1825—	Ø	7620—

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PRODUCT 573 NEBS Groton, Mass. 01471/Midland, Ont. L4R 4V9

May 1												
4					30 —			420 —				
5	3 —				10 —			300 —				
6					20 —							
7												
8	4 —											
11				35 —	180 —							
12					140 —							
13					70 —							
14												
15	19 —											
18	1 —				70 —							
19												
20					40 —							
21	1 —											
22					30 —							
25												
26	8 —				70 —							
27	2 —				40 —							
28	1 —											
29												
Totals for May	39 —			35 —	700 —			420 —				
YTD	325 50	3250 —	210 —	2205 —	8406 —	3143 —	4781 25	2410 49	39376 —	32104 —	42672 —	24548 1

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PRODUCT 573 Groton Mass 01471 / Midland, Ont. L4R 4V9

ay 1						243 95						
4						1362 95						50 —
5												
6						466 30			20 —			
7		569 10				443 40						
8						473 05						
11	7347 76	475 75		1955 —	391 —	1263 20						250 —
12												
13						420 40						
14		284 25				274 90						
15						231 50			200 —			
18		531 25				1056 30			50 —			10 —
19												
20		384 —	3474 80			377 75						
21						427 50						
22						269 75						
25		465 70				1106 65						
26				1575 —	315 —							250 —
27						335 25						
28						257 55		340 —				
29	4221 49					297 80						
Totals for May	11569 25	2710 05	3474 80	3530 —	706 —	9308 20		340 —	270 —			560 —
YTD	53565 74	41147 50	50795 80	38104 60	7900 58	104991 75	69751 02	1240 —	3405 —	1825 —	Ø	8180 —

	Ad	Arp	ty Sale	od	m	R e	Pre	Lo	Sh	Vie	n	W
1					120—							
2	9.50				115—							
3												
4												
5					20—							
8	3—				60—							
9	1.50				10—							
10	3—				60—							
11	8—				80—			100—				
12	4—											
15												
16												NSF 50—
17												
18	4—											
19	1—											
22					290—			100—				
23	1—				130—							
24					50—							
25	2—				70—							
26	1.50											
												W.R. 618.55
29					160—							
30	5—				170—	781—						
Totals For June	43.50				1235—	781—		200—				668.55
YTD	369—	3250—	210—	2205—	9641—	3924—	4781.25	2610.49	39376—	32104—	42672—	3123.36

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PRODUCT 573 NEBS Groton, Mass. 01471 / Midland, Ont. L4R 4Y9

		Taxes	Bingo	Clinic Lease	AVEC	AaTee	ASWF	School	Regist.	Fines	EQ Rental	Sand	Bldg Re
Jun	1						1247 35						
	2	4287 85								20 —			
	3						745 35						
	4												
	5												
	8				560 —	112 —	1321 95						250
	9												375
	10						457 25						
	11		236 60				301 75						
	12						224 75						
	15		822 —				1129 45			100 —	40 —		250
	16												
	17			3474 80			440 95						
	18		297 50				160 90						
	19						245 25	8522 36					
	22	159 59	949 55				1109 55						
	23												
	24						570 30			20 —			
	25		313 80				628 10				15 —		
	26						427 20						
	29	355 83	943 85										
	30	280 29	600 —				1335 90						
Totals for June		5083 56	4163 30	3474 80	560 —	112 —	10346 05	8522 36		140 —	55 —		875 —
YTD		58649 30	45638 80	54270 60	38664 60	8012 58	115337 80	78273 38	1240 —	3545 —	1880 —	Ø	9055 —

APPENDIX E
SOLID WASTE COLLECTION PAYMENT

RECORD - 1993

City Could not locate 1992 records at the time of the site visit -

REFUSE COLLECTION AND DISPOSAL

NAME	BOX #	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV
Agayar, Joe		Pd	Pd.							Pd.		
Agayar, Diane												
Aloysius, John												
Andrews, Edgar												
Andrews, Edward 240												
Andrews, Mary												
Augline Curtis												
Augline, Cyprian		1-4										
Augline, David		1-4										
Augline, Matthew												
Augline, Regis												
Augustine Donald												
Augustine, Mary T.	110											
Ayunerak, James												
Ayunerak, Joe 210												
Ayunerak, John												
Ayunerak, Paul + Mary	110											
Black, Peter		1-11										
Bob, Brendon												
Buster, Agnes + Joe												
uster, Gabriel												
Buster, John												
uster, Paul												
Charlie, Mary Jo.												
hikigak, Arthur												
Chikigak, Isaac		X										
ikigak, John		1-5										
hikigak, Louie												
ikigak, Thomas												
ook, Robert												
ook, Theresa												

REFUSE COLLECTION AND DISPOSAL

NAME	BOX #	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV
Damian, Clifford .20												
Damian, Francis L.												
Duny, Ida												
Edmund, A. Rose												
Edmund, Adeline		1-5										
George, Bernard												
George, Theresa 10												
Hanson, Alma												
Hanson, Charles												
Hanson, John												
Harry, Charles II												
Harry, Charles Sr. II .80												
Isidore, Marcel												
James, Michael												
James, John												
James, Joseph												
Joe, David		1-5										
Joe, Barbara												
Johnson, Frank												
Jorgensen, Dave												
Jorgensen, Ramona												
Joseph, Camille		Pd.										
Joseph, Fredrick												
Joseph, Joe Jr.												
Joseph, Joe Sr.												
Joseph, Melvin												
Joseph, Ray & Sylvia												
Joseph, Rita												
Joseph, Xavier												
Kakutak, Austin		1-5										
Kameroff, Ignatius												

REFUSE COLLECTION AND DISPOSAL

NAME	BOX #	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV
Kameroff, John Jr.												
Kameroff, John Sr.												
Katchkoar, Johnson		Pd.										
Keyes, Martha												
Leopold, Halaria												
Lowe, Roger												
Murphy, Jacob												
O'malley, Camille												
O'malley, Longinus												
Oney, Raymond												
Patrick, Charles												
Patrick, Francis 210												
Paul, Zacheus												
Phillip, Benjamin												
Phillip, Joe		1-5										
Phillip, Patrick												
Phillip, Paul Jr.												
Phillip, Paul Sr.		1-5										
Phillip, Priscilla												
Post, Edward												
Shelden, Denis 240												
Shelton, Agnes 240												
Shelton, Louis 40												
Simmons, Tony												
Smith, Charles												
Stanislaus, Bernard												
Stanislaus, Paul												
Strongheart, George												
Sugar, Nick												
Tony, Paul.												
Tyson, Noah												

REFUSE COLLECTION AND DISPOSAL

NAME	BOX #	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.I
Williams, John												
Xavier, Agnes												
Joseph, Lucy		1-5										
Stern, Josie .40												

APPENDIX F
TYPICAL MONTHLY WATER INVOICE TO ALAKANUK SCHOOL

COPY
STATEMENT

ALAKANUK SAFEWATER FACILITIES
P.O. Box 55
ALAKANUK, ALASKA 99554

(907) 238-3511

DATE 1-4-93
NUMBER

R.E.A.A.
P.O. Box 200
Mtn Village, Alaska 99632

TERMS:

PLEASE DETACH AND RETURN WITH YOUR REMITTANCE $ 6,066.53

DATE	CHARGES AND CREDITS	BALANCE	
	BALANCE FORWARD		
	Jan 4th 93 11132070		
	Dec 1, 92 11009650		
	122420 gallons		
	City 5,000		
	Clinic 979		
	Contract 50,000 gals x 0.09 =	$4,500	00
	66,441 gals x 0.07 =	4,650	87
		$9,150	87
	fuel used for Dec 92		
	2,994.5 x 1.03 =	-3,084	34
	Total Charge	$6,066	53
	John Kuckluk		

ALAKANUK SAFEWATER FACILITIES Thank You PAY LAST AMOUNT IN THIS COLUMN

APPENDIX G
ALAKANUK SAFEWATER FACILITY
DECEMBER 1992 LEDGER PAGE

National 45-512 [illegible]

Made in USA

December 1992

COPY

	5	6	7	8	9	10	11	12
	Washers	Dryers	Extractor	Water	Pop Misc	Sauna	Candy Soda Pop	Misc
1	1,06.00	63.00	9.75	21.00	19.00	88.50	46.00	21.75
2	129.00	76.00	12.50	38.65 5.00	31.00	129.00	45.00	9.50
3	140.00	116.00	12.75	4.00	26.00	88.50	43.00	5.25
4	116.00	71.00	11.75	14.90	15.50	94.50	41.00	6.25
5	140.00	99.00	13.75	20.60	9.00	162.00	66.50	1.25
6	150.00	109.00	11.25	32.60	28.50	187.50	95.00	.75
7	63.00	58.00	8.25	23.50	6.50	70.50	38.00	22.50
8	99.00	70.00	9.25	20.00		193 —	51 —	.25
9	96.00	71.00	8.50	17.30	9.00	144 —	57 —	2 —
10	87.00	56.00	8.50	15.40	5.00	130.50	55 —	.75
11	48.00	43.00	5.25	54.60 9.00	9.00	114.00	57.75	0
12	92.00	70.00	6.75	7.90	14.00	124 —	35 —	
13	132.00	93.00	12.25	12.80	27.00	174 —	58 —	11.50
14	32 —	24 —	2.50	37.30 + 9.30	16.25	105 —	38 —	3.75
15	108 —	70 —	8.75	12.50	40.00	90.00	19.00	5.75
16	50 —	33 —	4.75	14.20	23.50	123.00	43.00	7.25
17	52 —	42 —	6.25	28.10	27.75	82.50	21.00	9.00 + 32.00
18	75.00	57.00	9.00	18.00	38.75	153.00	51.00	24.75
19	153 —	103 —	15.50	23.70	40.00	136.50	46.00	14.50
20	149 —	102 —	14.50	14.50	46.50	195.00	62.50	0
21	61.00	47.00	6.00	94.60 8.60	17.75	115.50	34.00	8.50
22	54.00	35.00	5.25	34.60	17.00	99.00	36.00	10.75
23	145.00	97.00	13.75	64.81 16.90	26.05	114.00	48.50	1.50
24	107.00	92.00	10.50	19.70	32.50	172.50	51.25	.75
25	Christmas day				Closed			
26	85.00	65.00	8.25	8.50		229.50	68.75	.50
27	143.00	88.00	16.00	14.50	5.50 soap 38.75	163.50	71.00	1.00
28	69.00	70.00	6.25	30.00 9.30	1.50 soap 13.50	120.00	99.50	
29	72.00	50.00	7.00	27.90	9.60	121.50	50.25	1.75
30	70.00	58.00	8.00	26.20	17.75	135.00	43.50	15.00
31	66.00	40.00	5.00	62.53 12.20	2.25	91.50	31.50	.25
	2889.00	2063.00	278.25	893.14	613.80	3847.00	1503.00	219.75

MONTH Dec 19 92

INCOME

WASHERS	$ 2889.00	VSF & LYSD TOTAL FOR THE MONTH	
DRYERS	$ 2063.00	VSF	$ 12,306.94
EXTRACTOR	$ 278.25	LYSD	$ 6,066.53
SAUNA	$ 3847.00	TOTAL	$ 18,373.47
WATER TRUCK	$ 893.14		
POP	$ 2116.80		
MISC	$ 219.75		
TOTAL INCOME	$ 12,306.94		

L.Y.S.D. SCHOOL

MONTH Jan 4th, 1993 METER READING 11132070 GALS

LAST MONTH Dec 1, 1992 METER READING 11009650 GALS

TOTAL GALLONS 122,420

CITY LEAGUE − 5,000

CLINIC 979

LYSD CONTRACT 50,000 X 0.09 = $4,500.00

66,441 X 0.07 = 4650.87

9,150.87

FUEL USED 2,994.5 X 1.63 = $ 3084.34

− 3,084.34

VSF LYSD

Total Chg $ 6,066.53

APPENDIX F
OPERATION AND MAINTENANCE PRACTICES SUMMARY REPORT

DAMES & MOORE

5600 B STREET, SUITE 100, ANCHORAGE, ALASKA 99518-1641
(907) 562-3366 FAX: (907) 562-1297

March 23, 1993

Mr. Ray Oney
City Manager
City of Alakanuk
Post Office Box 167
Alakanuk, AK 99554

Summary Report - Current
Operation & Maintenances Practices
Sanitation Facilities Master Plan
D&M Job No. 25654-001-160

Dear Mr. Oney:

Presented in this letter is a summary of our review of the current operation & maintenance (O&M) practices for the existing sanitation facilities in Alakanuk. As part of our first two site visits, we collected information on the O&M of the existing sanitation facilities which included the water treatment plant, the washeteria and sauna, the sewage collection and treatment facilities, and the solid waste collection and disposal system. The data collected included O&M manuals and miscellaneous drawings. This information, in conjunction with applicable regulations and interviews with City personnel including Safewater facility operator Paul Ayunerak, represent the basis of this Report. As part of this Report, we have also included a brief evaluation of the potential for recovering waste heat from Alaska Village Electric Cooperative's (AVEC) generating facility, and a summary of current fuel storage capacity and usage for existing facilities.

Existing System

The current water treatment system consists of flocculation, sedimentation, filtration, fluoridation, and chlorine disinfection. Surface water from the Yukon River is the source for the water treatment plant. After treatment, the water is stored in a 200,000 gallon tank which is located adjacent to the water treatment plant. The treated water is then piped to the washeteria, sauna, school, clinic, and teacher's housing. The remaining residents either haul their own water or have water delivered by city personnel.

A limited piped sewage collection system exists which consists of aboveground collectors with a force main to a nearby lagoon. The system serves only the washeteria, sauna, school, clinic, and teacher's housing. The sewage collection system should require little operator time except for potential maintenance of the force main pumps. Therefore, we have assumed that the treatment plant operator's time is spent primarily operating and maintaining the water treatment plant equipment and the washeteria operations. Individual homes are served by pit privys which were installed during the summer of 1992. Each pit privy is maintained by the homeowner or resident of the property.

The current solid waste disposal system consists of dumpsters placed at various locations around town. The dumpsters are emptied periodically at a landfill which is located near the airstrip. Solid waste collection is operated by the City.

Operation & Maintenance Procedures

According to Safewater facility operator Paul Ayunerak, complete O&M manuals and maintenance schedules for the entire water treatment system and the wastewater collection and disposal system are not available. The only O&M manual which exists is for the Neptune Microfloc system.

Two operators with partially overlapping schedules maintain the Safewater facility. One operator works from approximately 9:00 a.m. to 5:00 p.m. and the other works from approximately 2:00 p.m. to 9:00 p.m. In addition, two clerks are employed by the Safewater facility, one at the washeteria and one at the sauna. Water is delivered to residents by one of the operators Monday through Friday. Residents must call one day in advance, and water is then delivered in the order in which the calls were received.

Mr. Ayunerak stated that maintenance for the facilities is generally performed on and as needed basis, rather than performing routine preventive maintenance on a set schedule. Mr. Ayunerak has just recently become the Safewater facility operator. He stated that when he took over from the previous operator, the critical spare parts available at the plant were depleted. Since then, he has worked to obtain an adequate supply of spare parts, although an actual list of the critical spare parts has not been prepared.

Mr. Pat McAree of the Yukon Kuskokwim Health Corporation (YKHC), recently prepared a draft maintenance schedule for the Safewater facility. Mr. Ayunerak reviewed the schedule and believes that with only two operators, it is not possible to complete all of the tasks on the schedule for each day. Although the operators may intend to complete the tasks as outlined on the schedule, other problems seem to arise which require their immediate attention.

According to the solid waste facility operation and maintenance personnel, the dumpsters are emptied at the landfill approximately every two weeks. The operator estimates that it takes two men approximately seven hours to empty all of the dumpsters. Generally, a loader and truck are used to transport the solid waste to the landfill. On occasions when the truck is broken down, each dumpster is individually transported to the landfill with the loader. Solid waste collection and facility maintenance is conducted by the same personnel who maintain the roads and the airstrip.

Operator Training & Certification

The operators for the Safewater facility are not currently certified by the State. This is due, in part, to recent changes in maintenance personnel staffing. According to City personnel, the City is actively pursuing providing the appropriate training and certification for the treatment plant operators. Training for the operators is scheduled to be completed this winter.

Field Testing

Mr. Ayunerak stated that chlorine residual in the treated water is tested daily in accordance with ADEC's Drinking Water Standards. The turbidity of the treated water is analyzed approximately twice per week, although the Drinking Water Standards require that the turbidity be measured daily when surface water is used as a source. The regulations also require that the water be tested for fluoride daily. Fluoride is currently tested monthly when coliform samples are sent to Bethel for analysis. Future plans include implementing daily testing for fluoride. In addition, the pH is checked periodically if the operator thinks that it is in need of adjustment. There is no set written schedule for performing the field tests. Sometimes the testing is not performed if the operator's attention is required elsewhere.

Laboratory Analyses

The following table lists the types and frequencies of laboratory analysis required by ADEC for treated drinking water. The information presented in the table applies to treatment systems which utilize surface water as a source. Also presented in the table are the most recent dates on which the City of Alakanuk submitted samples to the YKHC in Bethel for analyses. Data regarding Total Trihalomethane analysis was provided by Lynn Cochrane of ADEC on March 23, 1993. All other data regarding tne Alakanuk treated water sample submittals was provided by Keith Cook of YKHC and was current as of January 29, 1992.

Analysis	Required Frequency	Most Recent Alakanuk Sample Submittals
Inorganic Chemicals	Once per Year	11-18-91(1)
Organic Chemical Pesticides	Once per Three Years	8-24-92
Volatile Organic Chemicals	See 18 AAC 80.405(2)	3-24-92
Total Trihalomethanes	Quarterly	3-31-92(3)
Natural Radioactivity	Once per Four Years	8-24-92
Coliform Bacteria	Once per Month	12-92(4)

Notes: (1) Not in compliance with ADEC frequency requirements.

(2) One sample must be taken every three months for the first year. If no detections are registered during the initial sampling period, additional samples are required every three to five years depending on the number of service connections. If detections are registered, subsequent frequency of sampling may vary.

(3) For systems using a halogen for disinfection, and serving more than 10,000 people.

(4) A sample was sent to YKHC during January of 1993, but due to weather delays the holding time was exceeded.

As indicated in the table above and per conversations with Mr. Cook, the City of Alakanuk generally submits the required samples for laboratory analysis on a regular basis, and generally are in accordance with the regulations. Based on the results of the coliform bacteria analysis over the last two years, coliform levels have only exceeded the requirements twice, during both July and August, 1992. Samples submitted between September and December of 1992 tested negative for coliform bacteria, which would tend to indicate that the system was again in compliance.

Waste Heat Recovery

In some rural communities, waste heat from electric generating plants has been utilized to heat other types of facilities. In general, the source must be relatively close to the potential user to justify waste heat recovery. The AVEC generating facility in Alakanuk is located on the south side of Anderson Road approximately 1,900 feet (2,300 feet following the road) from the Safewater facility. Because of the distance, it may seem that utilizing waste heat from the AVEC plant would not be viable. However, there are many other factors which are important when considering using waste heat. Among these factors are the type and age of the power generator and the energy requirements of the potential user.

The feasibility of waste heat recovery is difficult to evaluate at the conceptual level because of the many factors which must be considered. However, it should not be eliminated simply because of the distance between the source and the Safewater facility. We have discussed the possibility of utilizing waste heat with Steve Stassel of the Alaska Energy Authority (AEA). Mr. Stassel has worked on several projects involving waste heat recovery in Alaska, and was able to provide some baseline information to assist us in evaluating the feasibility of utilizing waste heat in Alakanuk.

According to Mr. Stassel, the AVEC power plant prime unit in Alakanuk is a Cummins KTA 1150 (approximately 285 kW capacity). AVEC is currently modifying the power plant cooling system to allow for the installation of a waste heat utilization system. Based on this type of generation equipment, the kW generated in FY92, and an assumed approximate distance of 2,000 feet between the power plant and the Safewater facility, Mr. Stassel estimates that there is a maximum of approximately 10,000 to 12,000 equivalent gallons of heating fuel that could be saved by a waste heat system annually. This assumes that the end user could use all of the available waste heat 365 days per year, which is obviously not a valid assumption. Realistically, this may be equivalent to a savings of approximately 6,000 to 8,000 gallons of fuel annually. As the distance between the power plant and the end user decreases, the equivalent amount of fuel saved will increase.

Since AVEC is planning to install equipment to allow waste heat recovery in the Alakanuk power plant, waste heat recovery may be viable. For example, heating the new HUD homes which are located on the south side of Anderson Road both to the east and west of the power plant may be feasible since they are much closer to the source. A complete life cycle cost analysis is necessary for each potential end user in order to evaluate the feasibility of waste heat recovery. In order to complete the analysis, future fuel usage estimates for the Safewater facility or other potential users must be obtained. After preparation of the Sanitation Facilities Master Plan, and determination of potential upgrades or expansion of the Safewater facility, fuel usage estimates can be obtained, and the life cycle cost analysis completed.

Aboveground Fuel Storage Tank Regulations

This section presents a brief summary of the regulatory requirements regarding aboveground fuel storage tanks and estimated annual usage rates for commercial facilities in Alakanuk. The data presented in this section is based on conversations with Alakanuk residents and AVEC personnel, and on our review of applicable regulatory requirements. Drawings of the tank farms, excluding the AVEC facility, were not reviewed; therefore, the tank storage volumes as indicated in this section are approximate.

Regulatory Requirements

STATE OF ALASKA

Oil Discharge Prevention and Contingency Plans are required for oil terminal facilities that have an effective storage capacity of greater than 5,000 barrels (210,000 gallons) of crude oil or greater than 10,000 barrels (420,000 gallons) of non-crude oil (AS 46.04.050 and 18 AAC 75). None of the facilities in Alakanuk are subject to these requirements.

FEDERAL

Spill Prevention, Control, and Countermeasures (SPCC) Plans

- SPCC plans must be prepared by owners or operators of non-transportation-related onshore and offshore facilities engaged in drilling, producing, gathering, storing, processing, refining, transferring, distributing, or consuming oil and oil products, and which, due to their location could reasonably be expected to discharge oil in harmful quantities, as defined in Part 110 of this chapter, into or upon the navigable waters of the United States or adjoining shorelines (40 CFR 112). Exceptions to this requirement include the following.

- Facilities not subject to the jurisdiction of the EPA are as follows:

    - Facilities, which due to their location, could not reasonably be expected to discharge oil into or upon the navigable waters of the United States or adjoining shorelines.

    - Equipment or operations of vessels or transportation-related onshore and offshore facilities which are subject to the authority and control of the U.S. Department of Transportation.

- Those facilities which, although otherwise subject to the jurisdiction of the EPA, meet both of the following requirements:

    - The underground buried storage capacity of the facility is 42,000 gallons or less of oil, and

    - The Storage Capacity, which is not buried, of the facility is 1,320 gallons or less of oil, provided no single container has a capacity in excess of 660 gallons.

None of the fuel storage facilities in Alakanuk, which are included as part of this report, meet the requirements for exception to the requirement for an SPCC plan.

Oil Pollution Act of 1990 (OPA 90) Response Planning Requirements

OPA 90 (P.L. 101-380) was enacted to expand prevention and preparedness activities, improve response capabilities, ensure that shippers and oil companies pay the costs of spills that do occur, and establish an expanded research and development program. The Act establishes a new Oil Spill Liability Trust fund, administered by the United States Coast Guard (USCG). Section 4204(a) of OPA 90 amends the Clean Water Act (CWA) section 311(j) to require regulations that provide that owners or operators of facilities prepare and submit "a plan for responding, to the maximum extent practicable, to a worst case discharge, and to a substantial threat of such a discharge, of oil or a hazardous substance." This requirement applies to any onshore facility that, "because of its location, could reasonably be expected to cause "substantial harm" to the environment by discharging into or on the navigable waters, adjoining shorelines, or the exclusive economic zone." The following is a brief summary of response planning requirements under EPA, USCG, and DOT.

EPA

The owner or operator of any non-transportation-related onshore facility that, because of its location, could reasonably be expected to cause substantial harm to the environment by discharging oil into or on the navigable waters or adjoining shorelines shall prepare a facility response plan and shall submit a response plan that satisfies the requirements of this section to the Regional Administrator by February 18, 1993 (40 CFR 112.20). Determination of substantial harm is as follows:

- Facilities that meet one or both of the following two criteria:
  - The facility transfers oil over water to or from vessels and has a total storage capacity greater than or equal to 42,000 gallons.
  - The facility's total oil storage capacity is greater than or equal to one million gallons, and one of the following is true:
    - The facility does not have secondary containment for each aboveground storage area sufficiently large to contain the capacity of the largest aboveground storage tank within each storage area;
    - The facility is located at a distance (calculations provided in Attachment C-III) such that a discharge from the facility could cause injury to an environmentally sensitive area, as defined in Appendix D;

- The facility is located at a distance (calculations provided in Attachment C-III) such that a discharge from the facility would shut down a public drinking water intake; or,

- The facility has had a reportable spill in an amount greater than or equal to 10,000 gallons within the last five years.

- A Flowchart for Determination of Substantial Harm and Certification of Substantial Harm Determination Form are attached. Per the flowchart, none of the fuel storage facilities in Alakanuk, which were included as part of this report, require submittal of a response plan.

USCG

All marine transportation-related facilities (any onshore facility subject to regulation under 33 CFR Part 154 and any deep water port subject to regulations under 33 CFR Part 150) that could reasonably be expected to cause substantial harm or significant and substantial harm to the environment by discharging oil into or on navigable waters, adjoining shorelines, or the exclusive economic zone are required to prepare and submit a Response Plan to the USCG by February 18, 1993 (NVIC 7-92). None of the facilities in Alakanuk, which were included as part of this report, are subject to this requirement.

DOT

Non-marine transportation-related facilities under the jurisdiction of DOT (e.g. DOT regulated pipelines, highway vehicles, and railroad cars). Response plans are to be submitted by February 18, 1993. None of the facilities in Alakanuk, which were included as part of this report, are subject to this requirement.

<u>Fuel Storage and Usage</u>

Based on conversations with Alakanuk residents, it appears that most of the fuel stored for commercial sale is used before spring. There have been times when the fuel supply has run short in late spring. At these times, fuel use is restricted to elderly people or others who may have difficulty gathering firewood to heat their homes. Residents of nearby communities occasionally buy fuel in Alakanuk, adding to potential shortage problems. The following table presents fuel storage capacities at the primary commercial facilities in Alakanuk.

Facility	Type of Fuel	Storage Capacity (gal)	Estimated Annual Usage (gal)	Additional Storage Volume Available (gal)
AVEC Plant	#1 Arctic Diesel	124,534	81,400 (1991) 84,700 (1992)	39,800
Native Store	Heating Fuel	61,000	61,000	0
	Unleaded Gas	91,000	91,000	0
City	Heating Fuel	18,000	14,000 - 15,000	3,000 - 4,000
	Unleaded Gas	3,500	3,500	0
School	Heating Fuel	93,000	80,000	13,000

There are three approximately 5,000 gallon abandoned fuel storage tanks near the west end of town. The condition of the tanks is unknown; however, the piping is damaged, and the tanks are currently located in a low area particularly prone to flooding. Peter Phillip has proposed to the City council to have the tank integrity evaluated, and if the tanks are usable, to move the tanks to a better location and repair the piping. The tanks could then be used to store fuel which could be used by the City or sold to residents as needed.

Conclusions and Recommendations

Since there are no set procedures or schedules for performing the maintenance duties required for the Safewater facility, the potential for problems exists. Although the current operators are fairly knowledgeable of the procedures required to operate the facility, such as mixing chemicals and performing routine tests, if the operators were to become unavailable, improperly treated water could be distributed to the school and the other watering points.

Based on our review of the available operation and maintenance data, we propose that the following recommendations be implemented.

- Provide complete operation & maintenance manuals for the water treatment plant, washeteria and sauna, water distribution system, and the sewage collection and disposal system. Manuals should include operation and maintenance procedures, sample collection and analysis methods, manufacturer's data for all systems, and typical maintenance reports to document repairs, routine maintenance, and test results.

- Establish a fixed schedule for maintenance. The schedule prepared by Pat McAree is a good beginning; however, based on conversations with the operators, it is unlikely that they can or will be able to comply with the schedule. When revising the schedule, it is recommended that the operators be consulted to determine what they believe is reasonable. It must be stressed that routine maintenance is as important as troubleshooting. We believe that if the operators are consulted and assist in the preparation of the schedule, they will be much more likely to follow the schedule when completing their maintenance duties.

- Prepare and maintain a critical spare parts list and inventory. The spare parts inventory has been depleted in the recent past, although the current operators have been trying to replenish the stock to an adequate level. However, an actual written list of critical parts is not available Preparation of a written list of spare parts will provide maintenance personnel with an easy method of tracking parts which are in stock and parts which need to be ordered. The parts list should be included in the appropriate section of the operation and maintenance manual, i.e. water treatment plant, washeteria, etc.

- Maintain current ADEC certifications for all plant operators. It is of extreme importance that the operators of the sanitation facilities become ADEC certified for both water treatment and wastewater disposal.

- Perform field tests and submit samples for laboratory analysis in accordance with ADEC Drinking Water Standards. Field test results should be logged on record sheets daily. The sheets may be set up to accommodate one week of field test results, and the record sheets should be filed at the end of each week. Field and laboratory test frequencies should be defined in both the operation and maintenance manual and in the maintenance schedule. Although we understand that at many times emergencies come up which require the operators immediate attention, the daily chlorine and turbidity tests take little time to complete and should be performed daily. Once log sheets on which to record the results of the tests have been prepared, performing these tasks should take even less time.

- Waste heat recovery should be evaluated further once fuel usage rates of future facilities can be estimated. Life cycle cost analyses should be performed for any facility at which using waste heat may be considered, to determine whether fuel cost savings over the life of the system justify the initial capital costs. Since AVEC currently has plans to modify the existing cooling system at the power plant in Alakanuk to allow for waste heat recovery, heating the new HUD homes or the Safewater facility with waste heat may be economical.

- Owners of fuel storage facilities in Alakanuk must be sure to comply with the appropriate regulations. If SPCC plans do not exist for each facility, then they should be prepared as soon as possible.

- As summarized previously, it appears that there are over 391,000 gallons of available fuel storage volume in Alakanuk. It is estimated that approximately 335,000 gallons of the various types of fuel are used annually. Assuming that approximately 90% of the total annual fuel use occurs during the winter (October through May), then 301,000 gallons of storage volume is required. Therefore, we estimate that there is approximately 90,000 gallons of extra fuel storage capacity currently available in Alakanuk during the winter months.

- We recommend that the three abandoned tanks located near the west end of town be evaluated for potential future use. Although the piping is damaged, it may be possible to relocate the tanks to a more suitable location, rehabilitate the tanks, and replace the piping, thereby avoiding the expense of purchasing new tanks if additional fuel storage volume is required due to potential upgrades or expansion of the Safewater facility. Alternatively, the tanks could be used by the City to store fuel for their use or for commercial sale as suggested by Peter Phillip.

If you have any questions or comments regarding our operation and maintenance practices summary, or if you require any additional information, please give us a call at any time.

Very truly yours,

DAMES & MOORE

Deborah S. Allen

Deborah S. Allen
Project Engineer

Michael L. Foster

Michael L. Foster, P.E.
Project Manager

MLF/DSA:jj
O&M0319.LTR

Attachment

cc: Mr. Paul Gabbert, Village Safe Water

APPENDIX G
ALAKANUK SOLID WASTE USER FEE ORDINANCE

CITY OF ALAKANUK, ALASKA

ORDINANCE NO. 90-6

AN ORDINANCE FOR THE CITY OF ALAKANUK, ALASKA PROVIDING FOR THE ESTABLISHMENT AND ADOPTION OF REFUSE COLLECTION AND DISPOSAL SERVICES.

BE IT ENACTED BY THE COUNCIL OF THE CITY
OF ALAKANUK, ALASKA

Section 1. Classification.

This ordinance is of permanent nature.

Section 2. Purpose.

The purpose of this ordinance is to establish a Refuse Collection and Disposal Services.

Section 3. Chapter.

The Code of Ordinances of the City of Alakanuk, Alaska is hereby amended by addition of a chapter to be numbered 90-6, which chapter reads as attached.

Section 4. Effective Date.

This ordinance becomes effective upon its adoption by the city council.

First Reading 11-8-90
Public Reading 12-11-90

ADOPTED by a duly constituted quorum of the City Council of Alakanuk, Alaska, this 11 day of Dec, 1990.

Peter A. Black
Mayor

ATTEST:

Rebecca A. Chikigak
City Clerk

CHAPTER ___

REFUSE COLLECTION AND DISPOSAL SERVICES

Section 1. Mandatory Subscription.

To protect the health and safety of the citizens of Alakanuk and under the authority of A.S.29.35.050 all occupants of premises capable of being served by the City of Alakanuk's refuse collection and disposal system, at such times as the system is available to their premises, shall enter into an agreement with the City of Alakanuk for refuse collection and disposal services. Persons accepting services thereby agree to abide by the rules and regulations established by the City Council and by the requirements set forth in this Chapter, including alterations and amendments which may be made from time to time.

Section 2. Sanitary Landfill.

The City shall maintain a sanitary landfill for the disposal of refuse and waste materials in accordance with rates, rules and regulations adopted by the Council.

Section 3. Refuse Collection and Disposal.

A. The City of Alakanuk shall manage, operate and maintain refuse collection and disposal services;

B. All refuse shall be deposited in receptacles designated by the City;

C. The City or its designee shall regularly collect refuse from such receptacles within the City boundaries;

D. "Refuse" is garbage, rubbish, ashes and similar material discharged from the routine operation of premises, susceptible of placement in receptacles.

Section 4. Prohibited Acts.

It shall be unlawful for any person or organization

A. To operate or maintain an individual refuse disposal system, unless such system is constructed and maintained in such fashion that it does not contaminate any source of drinking, public or domestic water supply. Such systems shall comply with the applicable standards of the Alaska Department of Environmental Conservation, and be approved by the City Council of Alakanuk;

B. To maintain or permit the accumulation of refuse in or around his premises for more than 72 hours unless the refuse is contained in garbage cans or other containers acceptable to the City Council;

C. To place, deposit or permit to be placed or deposited refuse upon the property of another, including public property, except with the consent of the owner of said property and only when such placement or deposit is for the purpose of collection;

D. To carry, remove or transport refuse on a street or alley unless the refuse is contained or otherwise covered to prevent accidental discharge;

E. To dump or dispose of refuse at any sites except those maintained by the City and according to such rules and regulations as may be adopted by the City Council for the sites' safe and healthful operation and according to such local, state and federal laws and regulations as may apply.

Section 5. Rates, Fees and Charges.

A. Refuse collection and disposal services will be provided only at the rates, fees and charges established by the tariff schedules approved and adopted by the Alakanuk City Council.

B. Each applicant for the service shall complete and sign an application for services or a special contract at the City Office. A special contract may be written for large industrial or commercial customers and shall contain such provisions and stipulations as may be necessary or desirable to protect the interests of both the City and the customer. All fees shall be paid at the time of the service application. If an application for service is made by two or more persons, the City has the right to collect the full amount owed from any one of the applicants. Acceptance of service, with or without a signed application or contract, shall be subject to compliance with the terms of the applicable rate schedule or schedules and the customer service policies contained in this Chapter or in tariffs adopted by the City of Alakanuk.

Section 6. Billing and Payments.

A. Bills shall be mailed to each customer at the end of the month to the mailing address furnished by the customer, and shall be mailed at least twenty (20) days prior to the date the bill becomes delinquent, which date shall be shown on the bill;

Bills shall be considered rendered, and other notices duly given, when delivered to the customer personally, or when mailed or delivered to the customer at the premises where the services are received, or at the last known address of the customer, or at the address furnished by the customer.

Failure to receive bills or notices which have been properly addressed and placed in the United States mail will not prevent the bills from becoming past due or deliquent or excuse the customer's responsibility for payment.

B. Unless otherwise specified by special contract, service is rendered for full billing periods;

C. Monthly flat charges are not subject to proration;

D. customers intending to be absent from Alakanuk and not in need of services for extended periods of one billing or more shall contact the City in reasonable time prior to their departure and notify the City of the expected dates of their absence.

Section 7. Deposits.

A. A person requesting for the services requiring periodic billing to a premises may be required to deposit a reasonable sum of money not exceeding the estimated sum of two months billings for the services requested;

B. A deposit shall be refunded to a customer within twenty (20) days after the customer has ceased purchasing the services if the customer has paid all the accrued rates, charges and penalties;

C. A deposit shall be made in the name of the customer. A deposit may not be transferred from one customer to another.

Section 8. Collection.

A. Nonsufficient Fund Checks. A charge shall be made as shown in the schedule of fees and charges when a customer tenders payment with a nonsufficient funds check. When the City is notified by the customer's bank that there are nonsufficient funds to cover a check tendered for the services, the City may require the customer to pay in cash, by money order, certified check or other means which guarantee the customer's payment to the City of Alakanuk;

B. Nonpayment for Services rendered. In those cases where customers of the City of Alakanuk owe past due bills for services rendered by the City, the City shall make efforts to settle the outstanding bills through deferred payments and alternative methods of payment. If customers owing past due bills still fail to settle their accounts a final notice for payment shall be sent to their address of record by certified mail.

Section 9. General Penalty.

Every act prohibited by this Chapter is unlawful. Unless another penalty is expressly provided for every person convicted of a violation of any provision of this Chapter, shall be punished by a fine of not more than three hundred dollars ($300). Such a fine shall be set at the discretion of the fining authority. Community work may be performed in lieu of a fine. The value of community work shall be not less than $5.00 per hour. A "violation" is a noncriminal offense punishable only by a fine, but not by imprisonment or other penalty; conviction of a violation does not give rise to any disability or legal disadvantage based on conviction of a crime; a person charged with a violation is not entitled

(a) a trial by jury; or
(b) to have a public defender or other counsel appointed at public expense to represent the person;

The penalty provided by this section shall, unless any other penalty is expressly provided, apply to the amendment of any section of this Chapter, whether or not such penalty is re-enacted in the amendment ordinance.

The applicant is bound by the following rules and regulations of the Ordinance of the City of Alakanuk from which these are taken:

1. DEPOSIT FOR SERVICES- ESTABLISHMENT OF CREDIT

The applicant shall deposit with the city an amount equal to two months estimated bills. Which is $20.00 .

The deposits will be refunded at the end of one year (or sooner if the applicant discontinues service) if the applicant has not been delinquent more that once in any twelve (12) consecutive month period. When the service is terminated earlier, any portion of the deposit not required to pay balances owed to the City, will be refunded to the applicant.

2. BILLING AND PAYMENT

The initial billing period shall start when applicant begins receiving the services. The regular billing period is from the first to the last day of the month.

The applicant shall pay the City for services at the rates and upon the terms and conditions set forth in the City schedules of rates and charges. The applicant shall pay to the City not less than $10.00 per month for a service or for having services available.

Bills for service shall be paid at the office of Alakanuk City Clerk in the City of Alakanuk, Alaska. Such payments shall be due on the first day of each month for service provided during the preceding month billing period. All bills must be paid by the 20th of each month.

3. CONTINUITY OF SERVICE

The City shall use reasonable diligence to provide a constant and uninterrupted service. If the supply of services should fail or be interrupted, or become defective through acts of Governmental authority, action of elements, public enemy, accident, strikes, labor trouble, required maintenance work, inability to secure right-of-way, or any other cause beyond the reasonable control of the City, the City shall not be liable therefore or for damages caused thereby.

CITY OF ALAKANUK

By: Peter A. Ulak
Mayor

ALAKANUK CITY COUNCIL
P. O. BOX 51 - ALAKANUK, AK 99554 - (907) 238-3313

December 12,1990

To all residents of Alakanuk:

On November 8,1990, the City Council, on its regular Council metting introduced an ordinance for providing for the establishment and adoption of a refuse collection and disposal services.
A public reading was held on December 11, 1990 and have adopted the ordinance 90-6.
Effective January 1,1991, the City will be charging for collecting trash. The rates for collecting refuse will be as follows:

Individual homeowners......................$10.00 a month
Commercial and Industrial customers........$25.00 a month

This is a mandatory subscription, therefore you are required to fill an application and have it returned to the City Office no later than December 31,1990. If you have any questions feel free to give the City Office a call.

Peter A. Black
Peter A. Black
Mayor

Raymond J. Oney
Raymond J. Oney
City Administrator

APPENDIX H
FINANCIAL ASSESSMENT REPORT

DAMES & MOORE

5600 B STREET, SUITE 100, ANCHORAGE, ALASKA 99518-1641
(907) 562-3366 FAX: (907) 562-1297

January 29, 1993

Mr. Ray Oney
City Manager
City of Alakanuk
Post Office Box 167
Alakanuk, AK 99554

Financial Assessment Report
Sanitation Facilities Master Plan
D&M Job No. 25654-001-160

Dear Mr. Oney:

We are pleased to present our Financial Assessment Report of the financial history of the community on a general basis and more specifically for the existing sanitation facilities. This assessment includes a breakdown of the proposed and actual budgets for the operation and maintenance of the City's existing sanitation facilities and also a comparison of the revenues to actual costs. This part of the project was performed in general accordance with Task 2 of our proposal dated September 14, 1992.

Our assessment was based on our review of the financial data provided to us by the City of Alakanuk. The review was performed in order to evaluate the overall effectiveness and completeness of City records and accounting practices. Annual financial statements for fiscal years 1989, 1990, and 1991 were obtained during our initial site visit. Additional financial data, specifically pertaining to the sanitation facilities, was obtained during our second site visit. The documents collected, in conjunction with interviews conducted with City personnel responsible for recordkeeping, represent the basis of our review. The data presented on the financial documents is assumed to be reasonably accurate. Copies of each of the financial statements are included in Appendices A through C and a copy of the City's monthly ledgers for fiscal year 1992 is included in Appendix D.

The following summary presents a brief evaluation of the financial statement for each year, followed by summary tables which show actual and budgeted expenditures and revenues for the operation and maintenance of the existing sanitation facilities and the total for all City operations. Following the tables, we have included an opinion as to the overall effectiveness and completeness of the financial records. We must stress that our review was conducted from an engineering perspective rather than an accounting perspective. Specifically, the accounting techniques used by the City were not necessarily evaluated, but rather the overall quality and completeness of the statements were reviewed.

The financial statement for the fiscal year ending June 30, 1989 consists of an independent accounting audit performed by the accounting firm of Mikunda, Cottrell, and Co. The audit was performed so that the accountants could form an opinion on the general purpose financial statements which were included in the audit. Since the audit was performed by a certified public accountant, it should provide a fair indication of the effectiveness of the City's recordkeeping practices from an accounting perspective. The audit indicates that, in general, the financial statements "...present fairly, in all material respects, the financial position of the City of Alakanuk, Alaska as of June 30, 1989, and the results of its operations for the year then ended, in conformance with generally accepted accounting principles". Apparently, the only item missing from the 1989 financial statements was the general fixed assets account group, which, according to the audit, should be included for the statements to conform to generally accepted accounting principles. However, this was not considered to be a material flaw in the accounting procedures used by the City.

The audit also included an independent auditor's report on the City's internal accounting controls. During the internal controls audit, nothing was discovered which was considered to be a material or reportable weakness. However, several conditions were identified which may cause problems which would not be detected in a timely manner. The internal accounting controls audit also indicates that these conditions may represent a relatively low risk for errors or irregularities in amounts that would be considered material in relation to the City's financial statements. These items or conditions included the following.

1. Bank reconciliations on City checking accounts other than that of the general fund were not performed throughout the year, and the reconciliation of the general fund checking account was not compared to the cash account balance on the general ledger.

2. Cash receipts were coded to a single line item of revenue in the general fund, and the hand prepared reconciliation of the source of funds did not reconcile to the total revenue recorded on the general ledger.

3. Several disbursements were improperly coded to expenditure line items that were not applicable, resulting in many adjusting journal entries at the end of the year.

Independent auditor's reports on Schedule for State Awards and on Compliance for State Single Audits were also prepared as part of the 1989 audit. The results indicate that, within the scope of the audit, the City complied in all material respects with relevant laws, regulations, contracts, and grants. Several instances of immaterial non-compliance were noted, and are listed in the attached audit report.

The financial data obtained for fiscal years 1990 and 1991 consists of Department of Community and Regional Affairs (DCRA) standard annual financial statement forms. The forms indicate budgeted and actual expenditures and revenues for different categories such as City government, sanitation facilities, police department, etc. The forms were completed by City personnel, and the annual statement for each year was subsequently adopted as a resolution by the City council and submitted to DCRA. The documents appear to be relatively complete, although several mathematical errors were noted on the 1990 report. Errors were also noted on the 1991 report; however, the number of errors had decreased from 1990.

The following tables summarize revenue and expenditure data as shown on the attached financial statements for existing available sanitation facilities and total City operations. The far right two columns in each table include the variance between revenues and expenditures for both the budgeted and actual amounts. A minus (-) sign indicates instances where annual expenditures are greater than annual revenues. Data for the cost of operation and maintenance of the solid waste collection and disposal system is not included in the tables because revenue data was not indicated as a separate line item on the financial statements. Actual expenditure data for solid waste collection and disposal for fiscal years 1989, 1990, and 1991 is listed as $6,066, $2,857, and $2,770, respectively. Assuming that each household (115) and each business (22) regularly pays the mandatory $10 monthly fee, approximately $16,400 of revenue should be generated annually. However, during our second site visit, the City was unable to locate annual payment records for solid waste collection for prior years, so we were unable to verify actual revenue. The only available payment record is attached in Appendix E. The record only covers the period between January 1-18, 1993. At the time of the site visit, only 14 of Alakanuk residents had paid the fee for January, and it is difficult to evaluate whether all residents actually pay the monthly fee on a regular basis. However, due to the low operating costs and the potential revenue generated from user fees, the solid waste facility should be operating at a profit.

Table 1
Fiscal Year 1989
Revenues and Expenditures

	Revenues		Expenditures		Revenues-Expenditures	
	Budget ($)	Actual ($)	Budget ($)	Actual ($)	Budget ($)	Actual ($)
Safewater Facility	97,323	186,522	165,641	167,635	-68,318	18,887
City Total	415,331	481,060	490,387	520,433	-75,056	-39,373

Table 2
Fiscal Year 1990
Revenues and Expenditures

	Revenues		Expenditures		Revenues-Expenditures	
	Budget ($)	Actual ($)	Budget ($)	Actual ($)	Budget ($)	Actual ($)
Safewater Facility	203,978	205,344	139,404	196,000	64,574	9,344
City Total	540,171	534,695	572,431	684,185	-32,260	-149,490

Table 3
Fiscal Year 1991
Revenues and Expenditures

	Revenues		Expenditures		Revenues-Expenditures	
	Budget ($)	Actual ($)	Budget ($)	Actual ($)	Budget ($)	Actual ($)
Safewater Facility	184,000	143,206	148,394	135,786	35,606	7,420
City Total	570,469	457,181	514,320	498,451	56,146	-41,270

As shown above, the cost of operation and maintenance of both the Alakanuk Safewater Facility and the solid waste collection and disposal system is less than or nearly equal to the revenues generated from user fees of the facilities in each of the three years which are included as a part of this summary. Based on conversations with City personnel, and the monthly invoice for water and sewer to the school facility (Appendix F), it appears that revenue generated monthly is approximately $6,000. The school contract includes a cost of $0.09 for the first 50,000 gallons and $0.07 per gallon over 50,000. The value of fuel used by the City at the Safewater Facility is subsequently subtracted from the invoice for a net monthly revenue of approximately $6,000. It appears that at the current user rates, the sanitation facilities are financially sound and are operating without additional government subsidy. However, based on the financial data from the last three years, the expenditures for the total City operations generally exceed available revenues by approximately $30,000 to $40,000 each year.

An interview with City Clerk Juanita Phillip was conducted during the second site visit. Ms. Phillip indicated that some recent changes have been made in the City's accounting practices. In the past, excessive cash transactions made monthly and annual accounting difficult. The City now conducts no cash transactions, except for occasional small petty cash disbursements. All incoming cash is receipted and recorded in a daily ledger. At the end of each week, a cash exchange is performed at the Native Store. The resulting check is then deposited into the appropriate account.

Beginning in December of 1992, cash generated by the Safewater Facility is turned into the City on a daily basis, and the revenues from each type of source such as washers, dryers, sauna, etc., are recorded daily. Each ledger page includes cash receipts for one month. The ledger page for December, 1992 is attached in Appendix G. At the end of each week, cash receipts from the Safewater facility are deposited into the general fund for payroll. Revenue generated by the school is deposited into the Safewater Facility account to pay for supplies. Ms. Phillip stated that Pat McAree has plans to come to Alakanuk to show her how to use a computer spreadsheet program for recording the daily data. Once this is accomplished, monthly and annual accounting should be more accurate and easier to perform.

Based on the information presented above, it appears that during fiscal years 1989, 1990, and 1991, the City kept adequate financial records and complied with regulations regarding financial reporting requirements and appropriation of government funds. In addition, attempts are being made by City personnel to improve daily accounting practices, and to more accurately track revenues and expenditures for the Safewater Facility and for general City management. Additional accounting training for City personnel could only serve to improve accounting practices. The annual financial statements and accounting procedures utilized are acceptable, according to the 1989 audit performed by Mikunda, Cottrell, and Co. As indicated by the financial statements for 1989, 1990, and 1991, the City has operated their sanitation facilities at a profit.

If you have any questions or comments regarding our Financial Assessment Report, or if you require additional information, please give us a call at any time.

Very truly yours,

DAMES & MOORE

Deborah S. Allen

Deborah S. Allen
Project Engineer

Michael L. Foster

Michael L. Foster, P.E.
Project Manager

MLF/DSF:jj
ALAK0129.LTR

Attachment

cc: Mr. Paul Gabbert, Village Safe Water

APPENDIX A
1989 FINANCIAL STATEMENT

CITY OF ALAKANUK, ALASKA

Financial Statements and Compliance Reports

June 30, 1989

CITY OF ALAKANUK, ALASKA

Table of Contents

MIKUNDA, COTTRELL & Co.

A Professional Corporation

Robert N. Mikunda
David J. Cottrell
Johnie F. Jones
John M. Bost
Timothy G. Altman
William S. Coghill

CERTIFIED PUBLIC ACCOUNTANTS

3301 Denali Street
Anchorage, Alaska 99503
(907) 278-8878

Offices in:
Anchorage
Bethel
Kenai

Independent Auditor's Report

Honorable Mayor and City Council
City of Alakanuk, Alaska

Ladies and Gentlemen:

We have audited the accompanying general purpose financial statements of the City of Alakanuk, Alaska, as of June 30, 1989, and for the year then ended, as listed in the table of contents. These general purpose financial statements are the responsibility of the City's management. Our responsibility is to express an opinion on these general purpose financial statements based on our audit.

Except as discussed in the following paragraph, we conducted our audit in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the general purpose financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the general purpose financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall general purpose financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

The general purpose financial statements referred to above do not include the general fixed assets account group which should be included to conform with generally accepted accounting principles. The amount that should be recorded in the general fixed assets account group is not known.

In our opinion, except for the effect on the general purpose financial statements of the omission described in the preceding paragraph, the general purpose financial statements referred to above present fairly, in all material respects, the financial position of the City of Alakanuk, Alaska as of June 30, 1989, and the results of its operations for the year then ended, in conformity with generally accepted accounting principles.

Honorable Mayor and City Council
City of Alakanuk, Alaska

Our audit was made for the purpose of forming an opinion on the general purpose financial statements taken as a whole. The combining and individual fund financial statements listed in the table of contents are presented for purposes of additional analysis, and are not a required part of the general purpose financial statements of the City of Alakanuk, Alaska. The information has been subjected to the auditing procedures applied in the audit of the general purpose financial statements and, in our opinion, is fairly presented in all material respects in relation to the general purpose financial statements taken as a whole.

Mikunda, Cottrell & Co.

December 29, 1989

CITY OF ALAKANUK, ALASKA

Combined Balance Sheet - All Fund Types

June 30, 1989
With Comparative Totals for June 30, 1988

	Governmental Fund Types			Totals (Memorandum Only)	
Assets	General	Special Revenue	Capital Project	1989	1988
Cash	$ 21,841	34,840	644	57,325	110,398
Receivables	4,399	-	197	4,596	5,192
Employee advances and loans	6,624	-	-	6,624	5,557
Prepaid expenses	-	-	-	-	11,823
Due from other funds	6,385	-	-	6,385	16,431
	$ 39,249	34,840	841	74,930	149,401
Liabilities and Fund Balances					
Liabilities:					
Accounts payable	2,279	-	-	2,279	5,771
Accrued payroll and withholdings	24,545	82	-	24,627	15,317
Lawsuit settlement payable	837	-	-	837	20,000
Due to other funds	-	5,544	841	6,385	16,431
Due to grantor	-	293	-	293	-
Deferred revenue	-	-	-	-	12,000
Total liabilities	27,661	5,919	841	34,421	69,519
Fund balances - unreserved:					
Designated	-	-	-	-	14,845
Undesignated	11,588	28,921	-	40,509	65,037
Total fund balances	11,588	28,921	-	40,509	79,882
	$ 39,249	34,840	841	74,930	149,401

See accompanying notes to general purpose financial statements.

CITY OF ALAKANUK, ALASKA

Combined Statement of Revenues, Expenditures and Changes in Fund Balances - All Governmental Fund Types

Year Ended June 30, 1989
With Comparative Totals for Year Ended June 30, 1988

	General	Special Revenue	Capital Project	Totals (Memorandum Only) 1989	1988
Revenues:					
State of Alaska	$ 118,859	17,207	62,525	198,591	395,925
Charges for services	22,129	185,037	-	207,166	201,533
Sales tax	43,603	-	-	43,603	32,646
Other revenues	92,740	1,485	-	94,225	119,564
Total revenues	277,331	203,729	62,525	543,585	749,668
Expenditures:					
Current:					
General government	136,431	-	-	136,431	143,395
Police department	76,140	-	-	76,140	48,736
Public works	64,677	-	-	64,677	55,144
Public service	42,895	32,655	-	75,550	70,650
Safewater facility	-	167,635	-	167,635	191,612
Capital projects	-	-	62,525	62,525	276,523
Total expenditures	320,143	200,290	62,525	582,958	786,060
Excess of revenues over (under) expenditures	(42,812)	3,439	-	(39,373)	(36,392)
Other financing sources (uses) - operating transfers from (to) other funds	(15,448)	15,448	-	-	-
Excess of revenues and other financing sources over (under) expenditures and other uses	(58,260)	18,887	-	(39,373)	(36,392)
Beginning fund balances	69,848	10,034	-	79,882	116,274
Ending fund balances	$ 11,588	28,921	-	40,509	79,882

See accompanying notes to general purpose financial statements.

Exhibit C-1

CITY OF ALAKANUK, ALASKA

Combined Statement of Revenues, Expenditures and Changes
in Fund Balances - Budget and Actual - General Fund and Special Revenue Funds

Year Ended June 30, 1989

	General Fund			Special Revenue Funds			Totals (Memorandum Only)		
	Budget	Actual	Variance Favorable (Unfavorable)	Budget	Actual	Variance Favorable (Unfavorable)	Budget	Actual	Variance Favorable (Unfavorable)
Revenues:									
State of Alaska	$ 159,152	118,859	(40,293)	17,500	17,207	(293)	176,652	136,066	(40,586)
Charges for services	30,662	22,129	(8,533)	97,323	185,037	87,714	127,985	207,166	79,181
Sales tax	33,788	43,603	9,815	-	-	-	33,788	43,603	9,815
Other revenues	76,906	92,740	15,834	-	1,485	1,485	76,906	94,225	17,319
Total revenues	300,508	277,331	(23,177)	114,823	203,729	88,906	415,331	481,060	65,729
Expenditures:									
General government	119,526	136,431	(16,905)	-	-	-	119,526	136,431	(16,905)
Police department	70,273	76,140	(5,867)	-	-	-	70,273	76,140	(5,867)
Public works	49,403	64,677	(15,274)	-	-	-	49,403	64,677	(15,274)
Public service	51,698	42,895	8,803	33,846	32,655	1,191	85,544	75,550	9,994
Safewater facility	-	-	-	165,641	167,635	(1,994)	165,641	167,635	(1,994)
Total expenditures	290,900	320,143	(29,243)	199,487	200,290	(803)	490,387	520,433	(30,046)
Excess of revenues over (under) expenditures	9,608	(42,812)	(52,420)	(84,664)	3,439	88,103	(75,056)	(39,373)	35,683
Other financing sources (uses) - operating transfers from (to) other funds	(16,346)	(15,448)	898	16,346	15,448	(898)	-	-	-
Excess of revenues and other financing sources over (under) expenditures and other uses	$ (6,738)	(58,260)	(51,522)	(68,318)	18,887	87,205	(75,056)	(39,373)	35,683
Fund balances, July 1, 1988		69,848			10,034			79,882	
Fund balances, June 30, 1989		$ 11,588			28,921			40,509	

See accompanying notes to general purpose financial statements.

(1) Summary of Significant Accounting Policies

The City of Alakanuk, Alaska, was incorporated in 1969 as a second class city and operates under a council - manager form of government. The City provides a variety of services, including water, sewer, laundromat, cable television, health clinic, recreation center, street, airport maintenance, and general administration. The accompanying financial statements include all funds that are controlled by or dependent on the City except the general fixed assets account group. The accounting policies of the City conform to generally accepted accounting principles as applicable to governments. The following is a summary of the more significant policies:

Reporting Entity

The basic principle used in determining the scope of the entity for financial reporting purposes is the exercise of oversight responsibility over other governmental units by the City's elected officials. Oversight responsibility is derived from the governmental unit's power and includes, but is not limited to: financial interdependency, selection of governing authority, designation of management, ability to significantly influence operations, and accountability for fiscal matters. Based upon the application of these criteria, no other entities exist over which the City has oversight responsibility.

Method of Accounting

The modified accrual basis of accounting is utilized in the General Fund, Special Revenue Funds and Capital Project Funds. Under the modified accrual basis of accounting, revenues are recorded when susceptible to accrual; i.e., both measurable and available. All primary revenue sources have been treated as susceptible to accrual except for sales tax which is recorded as revenue when received. Available means collectible within the current period or soon enough thereafter to be used to pay liabilities of the current period. Expenditures are recorded when the liability is incurred.

Fund Accounting

The accounts of the City are organized on the basis of funds, each of which is considered a separate accounting entity. The operations of each fund are accounted for with a separate set of self-balancing accounts that comprise its assets, liabilities, fund equity, revenues, and expenditures, as appropriate. City resources are allocated to and accounted for in individual funds based upon the purposes for which they are to be spent and the means by which spending activities are controlled. The various funds are grouped, in the financial statements in this report, into three generic fund types, all of which are governmental funds as follows:

Summary of Significant Accounting Policies, continued

Fund Accounting, continued

General Fund - the General Fund is the general operating fund of the City. It is used to account for all financial resources except those required to be accounted for in another fund.

Special Revenue Funds - the Special Revenue Funds are used to account for the proceeds of specific revenue sources (other than major capital projects) that are restricted to expenditures for specified purposes.

Capital Project Funds - Capital Project Funds are used to account for financial resources to be used for the acquisition or construction of major capital facilities.

Budgets

Budgets are adopted by the City Council for the General Fund and Special Revenue Fund revenues and expenditures. Budgets are prepared and presented on the modified accrual basis of accounting.

Annual Leave

Annual leave is recorded as an expenditure in the period it is used by the employees. As of June 30, 1989, the amount of accrued but unpaid leave is not known.

Deferred Grant Revenue

Amounts received from grantor agencies which are restricted as to use and have not been expended for the intended use are shown as deferred revenue.

Comparative Data

Comparative total data for the prior year have been presented in the accompanying financial statements in order to provide an understanding of changes in the City's financial position and operations.

Total Columns on Combined Statements

Total columns on the combined statements are provided only to facilitate financial analysis. Data in these columns do not present financial position or results of operations in conformity with generally accepted accounting principles. Neither is such data comparable to a consolidation. Interfund eliminations have not been made in the aggregation of this data.

(2) Cash

At June 30, 1989, the carrying amount of the City's deposits was $57,325 and the bank balance was $67,444. The entire bank balance was covered by federal depository insurance.

(3) Interfund Balances

Individual fund interfund receivable and payable balances at June 30, 1989, consisted of:

	Interfund Receivable	Interfund Payable
General Fund	$ 6,385	-
Special Revenue Funds:		
Alakanuk Safewater Facility	-	5,085
Suicide Prevention	-	459
Capital Project Funds:		
Erosion Control	-	644
Sewer Disposal	-	197
	$ 6,385	6,385

(4) Contingencies - Grants

Amounts received or receivable from grantor agencies are subject to audit and adjustment by the grantor agencies, principally the State of Alaska. Any disallowed claims, including amounts already collected, would become a liability of the City.

(5) Litigation

The City was a defendant along with two village peace officers in a civil suit involving injuries suffered by a minor in an altercation with City of Alakanuk village peace officers in April 1988. The case was settled as of June 29, 1988 and called for a payment of $20,000 to be made to the plaintiff and his attorney. At June 30, 1989, a total of $837 remained unpaid to the plaintiff.

Exhibit D-1

CITY OF ALAKANUK, ALASKA

General Fund

Balance Sheet

June 30, 1989

Assets

Cash	$ 21,841
Receivable - lease	4,399
Employee advances and loans	6,624
Due from other funds	6,385
	$ 39,249

Liabilities and Fund Balance

Liabilities:	
Accounts payable	2,279
Accrued payroll and withholdings	24,545
Lawsuit settlement payable	837
Total liabilities	27,661
Fund balance - unreserved	11,588
	$ 39,249

CITY OF ALAKANUK, ALASKA

General Fund

Statement of Revenues, Expenditures and Changes in Fund Balance - Budget and Actual

Year Ended June 30, 1989

	Budget	Actual	Variance Favorable (Unfavorable)
Revenues:			
State of Alaska:			
Shared revenue	$ 43,217	54,023	10,806
Municipal assistance	102,935	51,836	(51,099)
Airport maintenance contract	13,000	13,000	-
Total State of Alaska	159,152	118,859	(40,293)
Charges for services - recreation center	30,662	22,129	(8,533)
Sales tax	33,788	43,603	9,815
Other revenues:			
Games and raffles	49,633	36,222	(13,411)
AVEC contract	4,070	22,182	18,112
Lease income	21,780	29,531	7,751
Equipment and building rental	1,423	3,117	1,694
Other	-	1,688	1,688
Total other revenues	76,906	92,740	15,834
Total revenues	300,508	277,331	(23,177)
Expenditures:			
General government:			
City council - stipends	5,000	2,720	2,280

Exhibit D-2, continued

CITY OF ALAKANUK, ALASKA

General Fund

Statement of Revenues, Expenditures and Changes in Fund Balance - Budget and Actual, continued

	Budget	Actual	Variance Favorable (Unfavorable)
Expenditures, continued:			
General government, continued:			
Administration and government:			
Salaries and benefits	$ 60,130	60,656	(526)
Travel and per diem	9,546	11,114	(1,568)
Supplies	2,478	3,405	(927)
Electricity	3,092	5,360	(2,268)
Heating fuel	1,324	15,360	(14,036)
Attorney	2,700	2,532	168
Computer training	8,000	8,195	(195)
Equipment	3,872	7,584	(3,712)
Insurance	-	3,032	(3,032)
Freight and postage	350	735	(385)
Elections	508	315	193
Building maintenance	350	213	137
Penalties	200	-	200
Audit and accounting fees	-	11,576	(11,576)
Dues and fees	1,730	2,897	(1,167)
Other	20,246	737	19,509
Total administration and government	114,526	133,711	(19,185)
Total general government	119,526	136,431	(16,905)
Police department:			
Salaries and benefits	53,639	60,559	(6,920)
Electricity	1,324	3,374	(2,050)
Supplies	1,807	1,248	559
Equipment	5,801	7,737	(1,936)
Vehicle gas and oil	1,334	-	1,334
Building maintenance	3,600	135	3,465
Insurance	-	3,032	(3,032)
Training	934	-	934
Rewards	500	-	500
Freight and postage	1,334	55	1,279
Total police department	70,273	76,140	(5,867)

CITY OF ALAKANUK, ALASKA

General Fund

Statement of Revenues, Expenditures and Changes in Fund Balance - Budget and Actual, continued

	Budget	Actual	Variance Favorable (Unfavorable)
Expenditures, continued:			
Public works:			
Roads:			
Salaries and benefits	$ 24,277	24,959	(682)
Supplies	150	2,415	(2,265)
Vehicle gas and oil	2,739	-	2,739
Vehicle maintenance	2,000	941	1,059
Insurance	-	3,032	(3,032)
Electricity	300	500	(200)
Heating fuel	662	500	162
Equipment (street lights)	140	-	140
Freight and postage	500	260	240
Total roads	30,768	32,607	(1,839)
Refuse collection:			
Salaries and benefits	3,482	4,250	(768)
Supplies	-	300	(300)
Vehicle gas and oil	1,096	-	1,096
Vehicle maintenance	1,000	-	1,000
Insurance	-	1,516	(1,516)
Total refuse collection	5,578	6,066	(488)
AVEC:			
Salaries and benefits	-	23,164	(23,164)
Insurance	-	1,516	(1,516)
Total AVEC	-	24,680	(24,680)
Airport:			
Salaries and benefits	1,679	799	880
Vehicle gas and oil	270	-	270
Heating fuel	546	500	46
Equipment rental	10,298	-	10,298
Supplies	264	25	239
Total airport	13,057	1,324	11,733
Total public works	49,403	64,677	(15,274)

CITY OF ALAKANUK, ALASKA

General Fund

Statement of Revenues, Expenditures and Changes in Fund Balance - Budget and Actual, continued

	Budget	Actual	Variance Favorable (Unfavorable)
Expenditures, continued:			
Public service:			
Recreation center:			
Salaries and benefits	$ 16,529	11,824	4,705
Cost of resale merchandise	10,111	4,623	5,488
Supplies	308	2,998	(2,690)
Electricity	300	371	(71)
Equipment maintenance	3,500	-	3,500
Insurance	-	3,032	(3,032)
Heating fuel	1,324	1,000	324
Equipment	-	365	(365)
Total recreation center	32,072	24,213	7,859
Bingo:			
Salaries and benefits	3,335	1,050	2,285
Supplies	200	1,398	(1,198)
Prizes	9,596	11,711	(2,115)
Other	100	50	50
Total bingo	13,231	14,209	(978)
Cable television:			
Salaries and benefits	1,668	820	848
Equipment	1,000	499	501
Equipment maintenance	675	854	(179)
Supplies	-	180	(180)
Travel and per diem	96	96	-
Freight and postage	800	25	775
Dues and fees	150	-	150
Total cable television	4,389	2,474	1,915
Alcoholism program:			
Travel and per diem	-	811	(811)
Electricity	400	483	(83)
Supplies	800	300	500
Freight and postage	100	-	100
Total alcoholism program	1,300	1,594	(294)
Taxi:			
Supplies	152	69	83
Vehicle maintenance	554	336	218
Total taxi	706	405	301
Total public service	51,698	42,895	8,803

CITY OF ALAKANUK, ALASKA

General Fund

Statement of Revenues, Expenditures and Changes in Fund Balance - Budget and Actual, continued

	Budget	Actual	Variance Favorable (Unfavorable)
Expenditures, continued:			
Total expenditures	$ 290,900	320,143	(29,243)
Excess of revenues over (under) expenditures	9,608	(42,812)	(52,420)
Other uses - operating transfers to Health Clinic Special Revenue Fund	16,346	15,448	898
Excess of revenues over (under) expenditures and other uses	$ (6,738)	(58,260)	(51,522)
Fund balance, July 1, 1988		69,848	
Fund balance, June 30, 1989		$ 11,588	

CITY OF ALAKANUK, ALASKA

Special Revenue Funds

Combining Balance Sheet

June 30, 1989

Assets	Alakanuk Safewater Facility	Library	Suicide Prevention	Combined Totals
Cash	$ 34,006	60	774	34,840

Liabilities and Fund Balances				
Liabilities:				
Accrued payroll and withholdings	-	-	82	82
Due to other funds	5,085	-	459	5,544
Due to grantor	-	60	233	293
Total liabilities	5,085	60	774	5,919
Fund balances - unreserved	28,921	-	-	28,921
	$ 34,006	60	774	34,840

Exhibit E-2

CITY OF ALAKANUK, ALASKA

Combining Statement of Revenues, Expenditures and Changes in Fund Balances

Year Ended June 30, 1989

	Alakanuk Safewater Facility	Library	Suicide Prevention	Health Clinic	Combined Totals
Revenues:					
State of Alaska	$ -	4,940	12,267	-	17,207
Charges for services	185,037	-	-	-	185,037
Other revenues	1,485	-	-	-	1,485
Total revenues	186,522	4,940	12,267	-	203,729
Expenditures:					
Public service	-	4,940	12,267	15,448	32,655
Safewater facility	167,635	-	-	-	167,635
Total expenditures	167,635	4,940	12,267	15,448	200,290
Excess of revenues over (under) expenditures	18,887	-	-	(15,448)	3,439
Other financing sources - operating transfers from General Fund	-	-	-	15,448	15,448
Excess of revenues and other financing sources over expenditures	18,887	-	-	-	18,887
Fund balances, July 1, 1988	10,034	-	-	-	10,034
Fund balances, June 30, 1989	$ 28,921	-	-	-	28,921

Exhibit E-3

CITY OF ALAKANUK, ALASKA

Alakanuk Safewater Facility Special Revenue Fund

Statement of Revenues, Expenditures and Changes in Fund Balance - Budget and Actual

Year Ended June 30, 1989

	Budget	Actual	Variance Favorable (Unfavorable)
Revenues:			
Charges for services	$ 97,323	185,037	87,714
Other revenues	-	1,485	1,485
Total revenues	97,323	186,522	89,199
Expenditures:			
Salaries and benefits	100,274	98,097	2,177
Cost of resale merchandise	8,667	10,933	(2,266)
Telephone	-	1,012	(1,012)
Electricity	8,000	7,695	305
Supplies	4,000	5,404	(1,404)
Building maintenance	500	4,085	(3,585)
Travel and per diem	2,000	450	1,550
Fuel	21,000	22,258	(1,258)
Vehicle fuel and oil	1,200	-	1,200
Equipment	17,000	15,712	1,288
Equipment maintenance	2,000	-	2,000
Freight and postage	500	420	80
Dues and fees	-	600	(600)
Other	500	969	(469)
Total expenditures	165,641	167,635	(1,994)
Excess of revenues over (under) expenditures	$ (68,318)	18,887	87,205
Fund balance, July 1, 1988		10,034	
Fund balance, June 30, 1989		$ 28,921	

CITY OF ALAKANUK, ALASKA

Library Special Revenue Fund

Statement of Revenues, Expenditures and Changes in Fund Balance - Budget and Actual

Year Ended June 30, 1989

	Budget	Actual	Variance Favorable (Unfavorable)
Revenues - State of Alaska	$ 5,000	4,940	(60)
Expenditures:			
Salaries and benefits	1,438	1,614	(176)
Electricity	1,123	1,439	(316)
Supplies	669	473	196
Travel and per diem	-	214	(214)
Equipment	1,200	1,200	-
Freight and postage	156	-	156
Dues and fees	414	-	414
Total expenditures	5,000	4,940	60
Excess of revenues over expenditures	$ -	-	-
Fund balance, July 1, 1988		-	
Fund balance, June 30, 1989		$ -	

CITY OF ALAKANUK, ALASKA

Suicide Prevention Special Revenue Fund

Statement of Revenues, Expenditures and Changes in Fund Balance - Budget and Actual

Year Ended June 30, 1989

	Budget	Actual	Variance Favorable (Unfavorable)
Revenues - State of Alaska	$ 12,500	12,267	(233)
Expenditures:			
Salaries and benefits	3,750	3,209	541
Supplies	4,820	4,380	440
Travel and per diem	1,030	2,021	(991)
Equipment	1,000	2,013	(1,013)
Dues and fees	-	449	(449)
Elder stipends	1,900	195	1,705
Total expenditures	12,500	12,267	233
Excess of revenues over expenditures	$ -	-	-
Fund balance, July 1, 1988		-	
Fund balance, June 30, 1989		$ -	

CITY OF ALAKANUK, ALASKA

Health Clinic Special Revenue Fund

Statement of Revenues, Expenditures and Changes in Fund Balance - Budget and Actual

Year Ended June 30, 1989

	Budget	Actual	Variance Favorable (Unfavorable)
Revenues	$ -	-	-
Expenditures:			
Salaries and benefits	11,407	11,439	(32)
Electricity	2,405	3,192	(787)
Supplies	764	762	2
Heating fuel	1,324	-	1,324
Equipment	156	30	126
Freight and postage	50	25	25
Other	240	-	240
Total expenditures	16,346	15,448	898
Excess of revenues over (under) expenditures	(16,346)	(15,448)	898
Other financing sources - operating transfers from General Fund	16,346	15,448	(898)
Excess of revenues and other financing sources over expenditures	$ -	-	-
Fund balance, July 1, 1988		-	
Fund balance, June 30, 1989		$ -	

Exhibit F-1

CITY OF ALAKANUK, ALASKA

Capital Project Funds

Combining Balance Sheet

June 30, 1989

Assets	Erosion Control	Sewer Disposal	Combined Totals
Cash	$ 644	-	644
Accounts receivable	-	197	197
	$ 644	197	841
Liabilities and Fund Balances			
Liabilities - due to other funds	644	197	841
Fund balances	-	-	-
	$ 644	197	841

Exhibit F-2

CITY OF ALAKANUK, ALASKA

Capital Project Funds

Combining Statement of Revenues, Expenditures and Changes in Fund Balances

Year Ended June 30, 1989

	Erosion Control	Sewer Disposal	Combined Totals
Revenues - State of Alaska	$ 2,743	59,782	62,525
Expenditures:			
Salaries and benefits	2,743	34,688	37,431
Materials	-	23,487	23,487
Other	-	1,607	1,607
Total expenditures	2,743	59,782	62,525
Excess of revenues over expenditures	-	-	-
Fund balances, July 1, 1988	-	-	-
Fund balances, June 30, 1989	$ -	-	-

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3301 Denali Street
Anchorage, Alaska 99503
(907) 278-8878

Offices in:
Anchorage
Bethel
Kenai

Independent Auditor's Report on Internal Accounting Controls

Honorable Mayor and City Council
City of Alakanuk, Alaska

Ladies and Gentlemen:

We have audited the general purpose financial statements of the City of Alakanuk, Alaska for the year ended June 30, 1989, and have issued our report thereon dated December 29, 1989.

We conducted our audit in accordance with generally accepted auditing standards and Government Auditing Standards, issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the general purpose financial statements are free of material misstatement.

In planning and performing our audit of the general purpose financial statements of the City of Alakanuk, Alaska for the year ended June 30, 1989, we considered its internal control structure in order to determine our auditing procedures for the purpose of expressing our opinion on the general purpose financial statements and not to provide assurance on the internal control structure.

The management of the City of Alakanuk, Alaska is responsible for establishing and maintaining an internal control structure. In fulfilling this responsibility, estimates and judgments by management are required to assess the expected benefits and related costs of internal control structure policies and procedures. The objectives of an internal control structure are to provide management with reasonable, but not absolute, assurance that assets are safeguarded against loss from unauthorized use or disposition, and that transactions are executed in accordance with management's authorization and recorded properly to permit the preparation of general purpose financial statements in accordance with generally accepted accounting principles. Because of inherent limitations in any internal control structure, errors or irregularities may nevertheless occur and not be detected. Also, projection of any evaluation of the structure to future periods is subject to the risk that procedures may become inadequate because of changes in conditions or that the effectiveness of the design and operation of policies and procedures may deteriorate.

Honorable Mayor and City Council
City of Alakanuk, Alaska

For purposes of this report, we have classified the significant internal control structure policies and procedures in the following categories: cash revenues/receipts, purchases/disbursements, and payroll.

For all of the internal control structure categories listed above, we obtained an understanding of the design of relevant policies and procedures and whether they have been placed in operation, and we assessed control risk.

Our consideration of the internal control structure would not necessarily disclose all matters in the internal control structure that might be material weaknesses under standards established by the American Institute of Certified Public Accountants. A material weakness is a reportable condition in which the design or operation of one or more of the specific internal control structure elements does not reduce to a relatively low level the risk that errors or irregularities in amounts that would be material in relation to the general purpose financial statements being audited may occur and not be detected within a timely period by employees in the normal course of performing their assigned functions. We noted no matters involving the internal control structure and its operation that we consider to be material weaknesses as defined above.

Our study and evaluation disclosed the following conditions that we believe result in more than a relatively low risk that errors or irregularities in amounts that would be material in relation to the financial statements of the City of Alakanuk may occur and not be detected within a timely period:

1. Bank reconciliations on City checking accounts other than that of the General Fund were not performed throughout the year and the reconciliation of the General Fund checking account was not compared to the cash account balance on the general ledger.

2. Cash receipts were coded to a single line item of revenue in the General Fund and the hand prepared reconciliation of the source of funds did not reconcile to the total revenue recorded in the general ledger.

3. Several disbursements were improperly coded to expenditure line items that were not applicable, resulting in many adjusting journal entries at year end.

These conditions were considered in determining the nature, timing, and extent of the audit tests to be applied in 1. our audit of the financial statements and 2. our audit and review of the City of Alakanuk, compliance with laws and regulations, non-compliance with which we believe could have a material effect on the allowability of program expenditures for each state financial assistance program.

Honorable Mayor and City Council
City of Alakanuk, Alaska

This report does not modify our report on the financial statements and on the City of Alakanuk's compliance with laws and regulations as of December 29, 1989.

This report is intended solely for the use of the City of Alakanuk and the State audit agencies and should not be used for any other purpose. This restriction is not intended to limit the distribution of this report which, upon acceptance by the City Council, is a matter of public record.

Mikunda, Cottrell & Co.

December 29, 1989

MIKUNDA, COTTRELL & Co.

A Professional Corporation

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Independent Auditor's Report on Schedule of State Awards

Honorable Mayor and City Council
City of Alakanuk, Alaska

Ladies and Gentlemen:

We have audited the general purpose financial statements of the City of Alakanuk, Alaska, for the year ended June 30, 1989, and have issued our report thereon dated December 29, 1989. These general purpose financial statements are the responsibility of the City of Alakanuk's management. Our responsibility is to express an opinion on these general purpose financial statements based on our audit.

We conducted our audit in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the general purpose financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the general purpose financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall general purpose financial statement presentation.

Our audit was made for the purpose of forming an opinion on the general purpose financial statements taken as a whole. The accompanying Schedule of State Awards is presented for purposes of additional analysis, and is not a required part of the general purpose financial statements. The information in that schedule has been subjected to the auditing procedures applied in the audit of the general purpose financial statements and, in our opinion, is fairly presented in all material respects in relation to the general purpose financial statements taken as a whole.

Mikunda, Cottrell & Co.

December 29, 1989

CITY OF ALAKANUK, ALASKA

Schedule of State Awards and Awards Tested for Compliance

Year Ended June 30, 1989

Name of Award	Amount of Award	Amount Received	Amount Expended and/or Encumbered	Dollar Amount Tested	Amount Questioned
Department of Community and Regional Affairs:					
Shared Revenue	$ 54,023	54,023	54,023	22,408	-
Municipal Assistance	51,836	51,836	51,836	-	-
Department of Administration:					
Erosion Control	-	6,120	2,743	-	-
Sewer Disposal/Jobs Bill	-	47,586	59,782	1,080	-
Department of Transportation - Airport Maintenance	13,000	13,000	13,000	-	-
Department of Education - Public Library Assistance	5,000	5,000	4,940	2,323	-
Department of Health and Social Services - Community Based Suicide Prevention	12,500	12,500	12,267	2,500	-
Totals	$ 136,359	190,065	198,591	28,311	-

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Kenai

Independent Auditor's Report on Compliance for State Single Audits

Honorable Mayor and City Council
City of Alakanuk, Alaska

Ladies and Gentlemen:

We have audited the general purpose financial statements of the City of Alakanuk, Alaska, for the year ended June 30, 1989, and have issued our report thereon dated December 29, 1989.

We conducted our audit in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the general purpose financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the general purpose financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall general purpose financial statement presentation.

Compliance with laws, regulations, contracts, and grants applicable to the City of Alakanuk, Alaska, is the responsibility of the City's management. As part of obtaining reasonable assurance about whether the general purpose financial statements are free of material misstatement, we performed tests of the City's compliance with certain provisions of laws, regulations, contracts, and grants. However, our objective was not to provide an opinion on overall compliance with such provisions.

The results of our tests indicate that, with respect to the items tested, the City of Alakanuk, Alaska, complied, in all material respects, with the provisions referred to in the preceding paragraph. With respect to items not tested, nothing came to our attention that caused us to believe that the City had not complied, in all material respects, with those provisions. However, the results of our procedures disclosed immaterial instances of noncompliance with those requirements, which are described in the accompanying schedule of findings and questioned costs.

This report is intended for the information of management and appropriate State agencies. This restriction is not intended to limit the distribution of this report, which is a matter of public record.

Mikunda, Cottrell & Co.

December 29, 1989

CITY OF ALAKANUK, ALASKA

Schedule of Findings and Questioned Costs

Program		Questioned Cost
Sewer Disposal/ Jobs Bill	Finding	$ 218

Finding

The detail of expenditures in the general ledger do not agree to the detail of expenditures reported to the State:

	Amount Per General Ledger	Amount Reported To State	Amount Over (Under) Reported
Wages	30,667	29,120	(1,547)
Fringe benefits	4,021	-	(4,021)
Materials	23,487	20,775	(2,712)
Administration fee	-	9,736	9,736
Other	1,607	369	(1,238)
	59,782	60,000	218

The costs recorded in the general ledger do appear to be appropriate grant expenditures; however, maintenance of accurate and detailed records throughout the year was not performed resulting in errors in reporting.

Recommendation

We recommend that the City incorporate the capital projects checking account into the general ledger maintained on the computer, and post all activity on a monthly basis. In this manner all year-to-date revenue and expenditure activity will be available to assist the City Manager in the preparation and reconciliation of grant reports filed with the State.

Reply

APPENDIX B
1990 FINANCIAL STATEMENT

RESOLUTION OF THE CITY

OF ALAKANUK, ALASKA

NO. 91-7

A RESOLUTION CERTIFYING THE ANNUAL STATEMENT OF REVENUES AND AUTHORIZED EXPENDITURES FOR THE YEAR ENDING June 30, 1990.

WHEREAS, The City of Alakanuk is a recognized second class city; and

WHEREAS, the Department of Community and Regional Affairs provides funding for second class cities under the State Revenue Sharing Program; and

WHEREAS, second class cities as a condition of eligibility for the FY 92 State Revenue Sharing Program are required by statute to submit a certified statement of income and expenditures for the year ending June 30, 1990, to the Department of Community and Regional Affairs;

NOW THEREFORE BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF Alakanuk, ALASKA:

That the attached STATEMENT OF REVENUES AND EXPENDITURES of Alakanuk, Alaska for the year ending June 30, 1990, and prepared by Rebecca Chikigak, is true and complete to the best of our knowledge.

ADOPTED by a duly constituted quorum of the City Council of Alakanuk, Alaska this 27 day of June, 1991.

Peter G. Black

Mayor

ALAKANUK CITY COUNCIL SEAL

ATTEST: Rebecca A. Chikigak

City Clerk

ORIGINAL - TO BE RETURNED TO DEPT. OF COMMUNITY AND REGIONAL AFFAIRS

COPY - TO BE KEPT BY CITY

ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of Alakanuk

EXPENDITURE CATEGORIES	FY 90 Budget Amount	FY 90 Actual Amount	Variance
GENERAL GOVERNMENT			
Council or Assembly			
Travel and Per diem	$ 770.00	$ 3,528.00	$ -2,758.00
Contractual Services			
Dues and Fees	300.00	180.00	120.00
Salaries	5000.00	2,850.00	2,150.00
Fringe Benefits			
Other (list by name)			
elections	510.00	420.00	90.00 ✓
Planning and Zoning			
Travel and Per Diem			
Salaries			
Fringe Benefits			
Dues and Subscriptions			
Supplies			
Contractual Services			
Other (list by name)			
PAGE SUBTOTAL	$ 6,580.00 ✓	$ 6,978.00 ✓	$ 3,118.00

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ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of Alakanuk

EXPENDITURE CATEGORIES	FY 90 Budget Amount	FY 90 Actual Amount	Variance
GENERAL GOVERNMENT			
Administration and Finance			
Salaries	$ 81,744.00	$ 66,424.30	$ 15,319.70
~~Fringe Benefits~~ Refunds	∅	50.00	- 50.00
Dues and Subscriptions	800.00	1,279.14	- 479.14
Travel and Per Diem	8,000.00	8,317.64	- 317.64
Telephone / Communications	4,000.00	6,181.67	- 2,181.67
Postage	300.00	398.14	- 98.14
~~Freight~~ EQ Rental	90.00	∅	90.00
~~Contractual Services~~ NSF Checks	∅	139.00	- 139.00
Supplies	2,200.00	3,463.27	- 1,263.27
Equipment Maintenance	∅	327.62	- 327.62
Maintenance Building	350.00	∅	350.00
~~Insurance~~ Taxi fare	∅	14.00	- 14.00
Medical			
Workers Compensation	10,718.00	10,698.00	20.00
Property			
Bonding / Errors and Omissions			
General Liability			
Other (list by name)			
Computer Support	∅	1,201.84	- 1,201.84
Job Advertisement	123.00	47.60	75.40
PAGE SUBTOTAL	$ 108,325.00	$ 98,542.60	$ 21,926.42

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ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of

Alakanuk

EXPENDITURE CATEGORIES	FY 90 Budget Amount	FY 90 Actual Amount	Variance
PUBLIC SAFETY			
Fire Department			
Salaries	$ Ø	$ 238.00	$-238.00
Fringe Benefits			
Compensation for Volunteers			
Rent			
Utilities			
Supplies	1,000.00	Ø	1,000.00
Freight	Ø	7.26	- 7.26
Fuel			
Equipment	500.00	Ø	500.00
Maintenance			
Contractual Services			
Training and Certification			
Other (list by name)			
Other Public Safety			
Civil Defense			
Animal Control			
Search and Rescue	800.00	Ø	800.00
PAGE SUBTOTAL	$ 2,300.00	$ 245.26	$ 2545.26

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ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of Alakanuk

EXPENDITURE CATEGORIES	FY 90 Budget Amount	FY 90 Actual Amount	Variance
PUBLIC SAFETY			
Health Clinic			
Salaries / Fringe Benefits	$ 6,820.00	$ 8,109.50	$ - 1,289.50
Rent EQ	50.00	Ø	50.00
Utilities	3,450.00	3,293.68	+ 156.32
Supplies	850.00	1,316.30	- 466.30
Freight	50.00	25.00	25.00
Equipment	1,049.00	706.45	342.55
Maintenance			
~~Contractual Services~~ Taxi fare	Ø	14.00	- 14.00
Other (list by name			
Wash / Dry	70.00	Ø	70.00
Water	160.00	Ø	160.00
~~Ambulance Service~~ Suicide Prevention			
Salaries / Fringe Benefits	Ø	5,386.27	- 5,386.27
~~Equipment~~ Travel / Perdiem	Ø	655.84	- 655.84
Supplies			
Fuel			
Maintenance			
Contractual Services			
PAGE SUBTOTAL	$ 12,499.00	$ 19,507.04	$ 8615.78

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ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of Alakanuk

EXPENDITURE CATEGORIES	FY 90 Budget Amount	FY 90 Actual Amount	Variance
PUBLIC SAFETY			
Police Department			
Salaries	$ 63,350.00	$ 69,724.76	$ - 6,374.76
~~Fringe Benefits~~ Travel + Perdiem	∅	90.00	- 90.00
Compensation for Volunteers			
Rent Equipment	100.00	90.00	10.00
Utilities	3,803.00	3,795.19	7.81
Supplies	2,158.00	2,779.88	- 621.88
Freight	150.00	38.82	111.18
Fuel			
Equipment	∅	3,111.88	- 3,111.88
Maintenance Building	500.00	∅	500.00
Contractual Services			
Training and Certification			
Other (list by name)			
Jail guards	3,302.00	8065.19	-4,763.19
EQ Maintenance	1,500.00	1,820.01	- 320.01
Refund	∅	629.79	- 629.79
PAGE SUBTOTAL	$74,863.00	$90,145.52	$16,540.20

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ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of

Alakanuk

EXPENDITURE CATEGORIES	FY 90 Budget Amount	FY 90 Actual Amount	Variance
PUBLIC WORKS			
Streets and Roads (includes ice roads)			
Salaries	$ 23,181.00	$ 24,700.00	$ − 9,519.00
Fringe Benefits			
Rent			
Utilities	500.00	109.20	390.80
Supplies	1,100.00	2187.17	− 1,087.17
Freight	275.00	1,082.42	− 807.42
Fuel			
Equipment			
Equipment Rental			
Maintenance Equipment	2,200.00	2,433.48	− 233.48
Contractual Services			
Training and Certification			
Other (list by name)			
PAGE SUBTOTAL	$ 27,256.00	$ 38,512.27	$ 12,037.87

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ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of Alakanuk

EXPENDITURE CATEGORIES	FY 90 Budget Amount	FY 90 Actual Amount	Variance
PUBLIC WORKS			
~~Docks and Harbors~~ Lodge			
Salaries	$ Ø	$ 3,495.00	$-3,495.00
Fringe Benefits			
Rent			
Utilities	Ø	1,368.93	– 1,368.93
Supplies	Ø	702.46	– 702.46
Freight			
Fuel			
Equipment	Ø	706.45	– 706.45
Equipment Rental			
Maintenance Building	96Ø.10	976.40	– 976.40
Contractual Services			
Training and Certification			
Other (list by name)			
______________			
______________			
______________			
______________			
______________			
PAGE SUBTOTAL	$ Ø	$7,249.24	$-7,249.24

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ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of

Alakanuk

EXPENDITURE CATEGORIES	FY 90 Budget Amount	FY 90 Actual Amount	Variance
PUBLIC WORKS			
Airports			
Salaries	$ 1,500.00	$ 240.00	$ 1,260.00
Fringe Benefits			
Rent			
Utilities			
Supplies	264.00	0	264.00
Freight			
Fuel			
Equipment			
Equipment Rental			
Maintenance			
Contractual Services			
Training and Certification			
Other (list by name)			
______			
______			
______			
______			
______			
PAGE SUBTOTAL	$ 1,764.00	$ 240.00	$ 1,524.00

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ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of Alakanuk

EXPENDITURE CATEGORIES	FY 90 Budget Amount	FY 90 Actual Amount	Variance
PUBLIC WORKS			
Electrical Utility			
Salaries	$ 18,000.00	$ 27,647.30	$-9,647.30
~~Fringe Benefits~~ 20% Ad fee	3,600.00	Ø	3,600.00
Rent			
Utilities			
Supplies			
Freight			
Fuel			
Equipment			
Equipment Rental			
Maintenance			
Contractual Services			
Training and Certification			
Other (list by name)			
PAGE SUBTOTAL	$ 21,600.00	$27,647.30	$-13,247.20

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ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of Alakanuk

EXPENDITURE CATEGORIES	FY 90 Budget Amount	FY 90 Actual Amount	Variance
PUBLIC WORKS			
Water and Sewer Utility			
Salaries	$66,864.00	$98,093.93	$-31,229.93
~~Fringe Benefits~~ Travel / Perdiems	1,050.00	∅	1,050.00
~~Rent~~ Fuel	24,100.00	798.42	23,301.58
Utilities	7,800.00	8,962.97	-1,162.97
Supplies	4000.00	5,552.17	-1,552.17
Freight	450.00	1,388.71	-938.71
~~Fuel~~ EG maintenance	3,800.00	3,979.96	-179.96
Equipment	2,000.00	6,208.50	-4,208.50
Equipment Rental			
Maintenance Building	200.00	29.06	170.94
~~Contractual Services~~ Bank Service Chg	∅	20.00	-20.00
~~Training and Certification~~ Loan	∅	26,431.61	-26,431.61
~~Other (list by name)~~ Storage Tank	∅	3,567.00	-3,567.00
Vehicle Fuel	800.00	674.09	125.91
Foam Tank	10,000.00	11,300.00	2,300.00
Resale	13,340.00	13,315.32	24.68
Wage Reimbursement	∅	7,245.26	-7,245.26
Tax Paid	∅	7,632.65	-7,632.65
PAGE SUBTOTAL	$139,404.00	$196,000.07	$[illegible]

ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of Alakanuk

EXPENDITURE CATEGORIES	FY 90 Budget Amount	FY 90 Actual Amount	Variance
PUBLIC WORKS			
Solid Waste Collection and Disposal			
Salaries	$ 3000.00	$ 2,685.00	$ 315.00
Fringe Benefits			
Rent			
Utilities			
Supplies			
Freight			
Fuel			
Equipment Maintenance	146.00	171.52	- 25.52
Equipment Rental			
Maintenance			
Contractual Services			
Training and Certification			
Other (list by name)			
Other Public Works			
Telephone			
Fuel Sales			
Other (list by name)			
PAGE SUBTOTAL	$ 3,146.00	$ 2,856.55	$ 34058

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City of Alakanuk

EXPENDITURE CATEGORIES	FY 90 Budget Amount	FY 90 Actual Amount	Variance
PARKS AND RECREATION			
Bingo			
Salaries	$ 3000.00	$ 3,230.00	$ - 230.00
~~Fringe Benefits~~ Dues/Fees	80.00	1,064.55	- 984.55
~~Rent~~ Postage	Ø	524.16	- 524.16
~~Utilities~~ Equipment	1000.00	700.00	300.00
Supplies	200.00	2,841.23	- 2,641.23
Prizes	9,596.00	10,911.50	- 1,315.50
Other (list by name)			
Resale	Ø	2,224.24	- 2,224.24
EQ Maintenance	50.00	Ø	50.00
Library			
Salaries			
Fringe Benefits			
Rent			
Utilities	Ø	500.77	- 500.77
Supplies	Ø	462.94	- 462.94
Maintenance			
Books and Subscriptions			
Other (list by name)			
PAGE SUBTOTAL	$13,926.00	$22,457.41	$9,233.41

ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of Alakanuk

EXPENDITURE CATEGORIES	FY 90 Budget Amount	FY 90 Actual Amount	Variance
PARKS AND RECREATION			
Other Public Recreation			
Special Festivals and Events			
Cable Television Salaries	1,500.00	1,556.00	- 56.00
Dues-Fees	150.00	Ø	150.00
Postage	800.00	Ø	800.00
Supplies	Ø	11.50	- 11.50
Other (list by name)			
Arcade - Salaries	Ø	67.55	- 67.55
Utilities	Ø	279.14	- 279.14
Supplies	Ø	25.66	- 25.66
Cable - E.Q. Rental	Ø	150.00	- 150.00
E.Q. Maintenance	675.00	Ø	675.00
Refunds	Ø	160.00	- 160.00
Transfer, Cable	Ø	150.00	- 150.00
Alchol Program			
Utilities	400.00	474.09	- 74.09
Postage	100.00	Ø	100.00
Supplies	100.00	77.51	22.49
Workshop	200.00	Ø	200.00
Rehab Center	500.00	Ø	500.00
PAGE SUBTOTAL	$4,425.00	$2,951.45	$ ~~3,451.43~~

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ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of Alakanuk

EXPENDITURE CATEGORIES	FY 90 Budget Amount	FY 90 Actual Amount	Variance
OTHER EXPENDITURE ACCOUNTS			
Grants / Contracts			
Capital Projects			
Salaries	$ Ø	$ 5,659.00	$ - 5,659.00
Fringe Benefits			
Rent			
Utilities			
Supplies	Ø	489.00	- 489.00
Freight	[illegible]	1,021.95	- 1,021.95
Fuel			
Equipment Maintenance	Ø	1,909.25	- 1,909.25
Equipment Rental			
Maintenance			
Contractual Services			
Other (list by name)			
Capital Improvment	34,700.00	Ø	34,700.00
PAGE SUBTOTAL	$ 34,700.00	$ 9,079.20	$ 43,774.20

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City of

Alakanuk

EXPENDITURE CATEGORIES	FY 90 Budget Amount	FY 90 Actual Amount	Variance
OTHER EXPENDITURE ACCOUNTS			
Grants / Contracts ~~AAA Grant~~			
Planning Disaster Fund			
Salaries	$ Ø	$ 9495.00	$ -9,495.00
Fringe Benefits			
Rent			
Utilities			
Supplies			
Freight			
Fuel			
Equipment	Ø	2,260.65	-2,260.65
Equipment Rental			
Maintenance			
Contractual Services			
Other (list by name) AAA Grant			
~~AA~~ Police Informant Fees	2,400.00	Ø	2,400.00
Concerned Citizen Rewards	1,500.00	Ø	1,500.00
P.D. Phone	300.00	Ø	300.00
Purchase of Evidence	1,200.00	Ø	1,200.00
Administrative Cost	600.00	Ø	600.00
PAGE SUBTOTAL	$ 6,000.00	$ 11,755.65	~~$-17,755.65~~

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City of Alakanuk

ANNUAL STATEMENT OF ACTUAL EXPENDITURES

EXPENDITURE CATEGORIES	FY 90 Budget Amount	FY 90 Actual Amount	Variance
MISCELLANEOUS			
~~Public School Support~~			
Liability Insurance	$ 7,000.00	$ 6,994.00	$ 6.00
Audit	7,500.00	16,175.36	- 8,675.36
~~Debt Service~~ Attorney Fees	5,000.00	2,292.52	2,706.48
Fuel Payments	20,000.00	7,106.21	12,893.79
Emergency loans - Funeral	2,900.00	2,364.71	535.29
Employer Payroll Contributions			
FICA	20,222.00	25,790.30	- 5,568.30
ESC	7,215.00	9,297.36	- 2,082.36
Economic Development	1400.00	934.75	465.25
Penalty + Interest (IRS)	Ø	3,035.79	- 3,035.79
Taxes	44,406	63,422.66	- 17,016.66
Other Miscellaneous			
Denali Insurance Audit	Ø	11,573.00	- 11,573.00
Postage/Freight	Ø	525.00	- 525.00
Managers Residence Fuel Building	Ø	115.00	- 115.00
Equipment	Ø	223.00	- 223.00
Sand/Gravel	Ø	136.00	- 136.00
PAGE SUBTOTAL	115,643.00	~~119,956.66~~ 149,[illegible]	67,[illegible]
TOTAL FY 90 EXPENDITURES	572,431.00	~~604,756.27~~ [illegible].89	343,[illegible]4.23 111754.89

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ANNUAL STATEMENT OF ACTUAL REVENUES

City of Alakanuk

REVENUE CATEGORIES	FY 90 Budget Amount	FY 90 Actual Amount	Variance
TAXES			
Municipal Sales Tax	$ 46,554.00	$ 39,268.20	$ 7,285.80 ✓
Municipal Use Tax			
Property Tax			
Real Property			
Personal Property			
Other (list by name)			
S.P. + Tax Cont. (ASWE)	∅	7,778.34	-7,778.34 ✓
OTHER GOVERNMENT REVENUES			
State Revenue Sharing	43,412.00	43,335.00	77.00 ✓
Municipal Assistance	48,378.00	48,349.00	29.00 ✓
State Shared Taxes			
Raw Fish Tax Refunds			
Aviation Fuel Tax Refunds			
Amusement and Gaming Tax Refunds			
Liquor License Tax Refunds			
Telephone and Electric Coop Tax Refunds			
Federal Payments in Lieu of Taxes			
Other (list by name			
PAGE SUBTOTAL	$138,344.00 ✓	$138,730.74 ✓	~~$15,170.34~~

~~-368.74~~

-381.74

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ANNUAL STATEMENT OF ACTUAL REVENUES

City of Alakanuk

REVENUE CATEGORIES	FY 90 Budget Amount	FY 90 Actual Amount	Variance
OTHER GOVERNMENT REVENUES			
Federal Government Grants			
State Government Grants			
AAA Grant	$6,000.00	$ Ø	$ 6000.00
Capitol Projects	35,700.00	Ø	35,700.00
Other Grant Sources			
LICENSES AND PERMITS			
Animal Licenses			
Taxi Licenses			
Garbage Dumping Permits			
All Terrain Vehicle Licenses			
Day Care Licenses			
Building / Land Use Permits			
Other (list by name)			
PAGE SUBTOTAL	$41,700.00 ✓	$ Ø ✓	$41,700.00 ✓

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ANNUAL STATEMENT OF ACTUAL REVENUES

City of Alakanuk

REVENUE CATEGORIES	FY 90 Budget Amount	FY 90 Actual Amount	Variance
ENTERPRISE REVENUES			
Bingo Receipts	$61,044.00	$49,207.15	$11,836.85
Cable Television Receipts Ads/Copies	Ø	66.75	− 66.75
Utilities Arcade Lease	3,600.00	Ø	3600.00
Water Charges School	69,875.00	72,610.72	− 2,735.72
Sewer Charges Emergency Loans	2,300.00	1,982.00	+ 318.00
Telephone Charges	Ø	173.53	− 173.53
Electricity Charges	Ø	347.89	− 347.89
Miscellaneous Charges	1,000.00	98.81	901.19
Fuel Sales Receipts Prepaid	3,504.00	7,007.57	− 3,503.57
Refuse Collections Refunds (ASWF)	Ø	9,451.42	− 9451.42
Harbor / Dock Charges Administration	Ø	821.56	− 821.56
Other (list by name) Arcade	Ø	2,086.51	− 2086.51
ASWF	134,300.00	88,525.63	45,774.37
AVEC	Ø	135.22	− 135.22
ASWF	Ø	1,080.00	− 1,080.00
Library	Ø	Ø	Ø
CHARGES FOR SERVICES			
Health Clinic Lease	43,000.00	43,088.46	− 88.46
Airport Maintenance Contract	13,000.00	13,000.00	Ø
AVEC Contract	16.931.00	27.099.60	− 10.168.60
Other (list by name)			31.574.11
PAGE SUBTOTAL	$263,337.00	$221,782.09	$93,292.37

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ANNUAL STATEMENT OF ACTUAL REVENUES

City of

Alakanuk

REVENUE CATEGORIES	FY 90 Budget Amount	FY 90 Actual Amount	Variance
OTHER REVENUES			
Fines / Penalties	$ 376.00	$ 624.00	$ - 248.00
~~Forfeitures~~ Advance Payments	∅	400.00	- 400.00
~~Parks and Recreation~~ Refund Capitol Projects	∅	573.28	- 573.28
Rental Charges			
Equipment	1,503.00	1,337.26	165.74
Buildings / Land	1,505.00	2,790.00	- 1,285.00
Sales of Municipal Property			
Equipment	∅	156.00	- 156.00
Buildings / Land Sand Gravel	∅	1,174.00	- 1,174.00
~~Investment Income~~ Refund Travel Perdium	∅	917.24	- 917.24
~~Interest Earnings~~ Loan ASWF to G.F.	∅	26,431.61	- 26,431.61
Donations / Contributions			
Other (list by name) Wage Reimbursements ASWF	∅	7,245.26	- 7,245.26
Suicide Prevention	∅	5,496.60	- 5,496.60
Disaster Fund	∅	17,091.35	- 17,091.35
Ad fee (Administration, S.P., Capital, Disaster)	3,386.00	9,744.31	- 6,358.31
PAGE SUBTOTAL	$ 6,770.00	$ 74,181.01	$ ~~67,411.49~~ -67,411.01
TOTAL FY 90 REVENUES	$ 540,171.00	$ 534,694.64	$ ~~217,904.54~~ 5476.36

CHANGE IN CASH BALANCES

City of Alakanuk

		Amount
	BEGINNING CASH BALANCE	2,769.10
PLUS	TOTAL FY 90 REVENUES	534,694.64
EQUALS	TOTAL CASH	537,463.74
LESS	TOTAL FY 90 EXPENDITURES	644,185.89 ~~684,156.27~~
ENDING CASH BALANCE		146,722.15 ~~146,692.53~~

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APPENDIX C
1991 FINANCIAL STATEMENT

RESOLUTION OF THE CITY
OF ALAKANUK, ALASKA

NO. 92-15

A RESOLUTION CERTIFYING THE ANNUAL STATEMENT OF REVENUES AND AUTHORIZED EXPENDITURES FOR THE YEAR ENDING JUNE 30, 1991.

WHEREAS, The City of ALAKANUK is a recognized second class city; and

WHEREAS, the Department of Community and Regional Affairs provides funding for second class cities under the State Revenue Sharing Program; and

WHEREAS, second class cities as a condition of eligibility for the FY 93 State evenue Sharing Program are required by statute to submit a certified statement of income and expenditures for the year ending June 30, 1991, to the Department of Community and Regional Affairs;

NOW THEREFORE BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF ALAKANUK, ALASKA:

That the attached STATEMENT OF REVENUES AND EXPENDITURES of ALAKANUK, Alaska for the year ending June 30, 1991, and prepared by REBECCA A. CHIKIGAK, is true and complete to the best of our knowledge.

ADOPTED by a duly constituted quorum of the City Council of ALAKANUK, Alaska this 26 day of May, 1992.

[illegible] Vice
Mayor

ALAKANUK CITY COUNCIL SEAL ALAKANUK, ALASKA

ATTEST: Rebecca A. Chikigak
City Clerk

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ANNUAL STATEMENT OF ACTUAL REVENUES

City of AIAKANUK

REVENUE CATEGORIES	FY 91 Budget Amount	FY 91 Actual Amount	Variance
TAXES			
Municipal Sales Tax	41,000.00	56,839.82	<15,839.82>
Municipal Use Tax			
Property Tax			
Real Property			
Personal Property			
Other (list by name)			
____			
____			
OTHER GOVERNMENT REVENUES			
State Revenue Sharing	44,213.00	44,213.00	Ø
Municipal Assistance	46,458.00	46,337.00	121.00
State Shared Taxes			
Raw Fish Tax Refunds			
Aviation Fuel Tax Refunds			
Amusement and Gaming Tax Refunds			
Liquor License Tax Refunds			
Telephone and Electric Coop Tax Refunds			
Federal Payments in Lieu of Taxes			
Other (list by name			
____			
PAGE SUBTOTAL	$131,671.00	$147,389.82	$<15,718.82>

ANNUAL STATEMENT OF ACTUAL REVENUES

Page 2 of ___

City of

Alakanuk

REVENUE CATEGORIES	FY 91 Budget Amount	FY 91 Actual Amount	Variance
OTHER GOVERNMENT REVENUES			
State Federal Government Grants			
Capital Improvement	35,000.00	Ø	35,000.00 ✓
Capital Projects	2,220.00	7,388.91	<5,168.91> ✓
State Government Grants			
Other Grant Sources			
Disaster	2,500.00	Ø	2,500.00 ✓
AAA - Cap. Project	6,000.00	Ø	6,000.00 ✓
LICENSES AND PERMITS			
Animal Licenses			
Taxi Licenses			
Garbage Dumping Permits			
All Terrain Vehicle Licenses			
Day Care Licenses			
Building / Land Use Permits			
Other (list by name)			
PAGE SUBTOTAL	$45,720.00 ✓	$7,388.91 ✓	$38,331.09 ✓

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ANNUAL STATEMENT OF ACTUAL REVENUES

Page 3 of ____

City of [illegible]

REVENUE CATEGORIES	FY 91 Budget Amount	FY 91 Actual Amount	Variance
ENTERPRISE REVENUES			
Bingo Receipts	63,044.00	46,431.87	16,612.13 ✓
Cable-Television Receipts Copy/Hv ids	200.00	218.50	<18.50> ✓
Utilities			
Water Charges	166,000.00	135,439.52	30,560.48 ✓
Sewer Charges ASWF Refund	10,000.00	ø	10,000.00 ✓
Telephone Charges			
Electricity Charges			
Miscellaneous Charges – Lodging	1,500.00	2,550.00	<1,050.00> ✓
Fuel Sales Receipts			
Refuse Collections	/	1,078.00	<1,078.00> ✓
Harbor / Dock Charges Tax Cut ASWF	3,000.00	7,766.75	<4,253.75>
Other (list by name) Suicide Prev.	4,550.00	ø	4,550.00 ✓
Rental		2,948.70	<2,948.70> ✓
Wage Reimbursement	12,500.00	2,959.13	1,540.77 ✓
CHARGES FOR SERVICES			
Health Clinic Lease	37,284.00	43,222.65	<5,938.65> ✓
Airport Maintenance Contract	13,000.00	13,000.00	ø ✓
AVEC Contract	32,250.00	26,280.60	5,969.40 ✓
Other (list by name)			
Library	10,000.00	ø	10,000.00 ✓
PAGE SUBTOTAL	358,328.00 ✓	281,895.42 ✓	~~75,965.08~~ 76,432.

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ANNUAL STATEMENT OF ACTUAL REVENUES

City of [illegible]

REVENUE CATEGORIES	FY 91 Budget Amount	FY 91 Actual Amount	Variance
OTHER REVENUES			
Fines / Penalties	1,000.00	1,280.01	<280.01> ✓
Forfeitures			
Parks and Recreation	2,000.00	∅	2,000.00 ✓
Rental Charges			
Equipment	1,500.00	1,835.00	<335.00> ✓
Buildings / Land	2,950.00	6,865.00	<3,915.00> ✓
Sales of Municipal Property	200.00	✓	200.00 ✓
Equipment			
Buildings / Land sand/gravel	1,500.00	∅	1,500.00 ✓
Investment Income			
Interest Earnings			
Donations / Contributions	600.00	527.00	73.00 ✓
Other (list by name)			
Emergency Loans	2,300.00	10,000.00	<7,700.00> ✓
Fuel Payment	9,000.00	∅	9,000.00 ✓
[illegible]	2,200.00	✓	2,200.00 ✓
[illegible] Admin Fee	10,500.00	✓	10,500.00 ✓
PAGE SUBTOTAL	34,750.00 ✓	20,507.01 ✓	14,242.99 ✓
TOTAL FY 91 REVENUES	570,469.00 ✓	457,181.16 ✓	~~114,257.98~~ 113287.84

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ANNUAL STATEMENT OF ACTUAL EXPENDITURES

Page 5 of ____

City of

[illegible]

EXPENDITURE CATEGORIES	FY 91 Budget Amount	FY 91 Actual Amount	Variance
GENERAL GOVERNMENT			
Council or Assembly			
Travel and Per diem	2,600.00	1,283.20	1,216.80
Contractual Services			
Dues and Fees	300.00	Ø	300.00
Salaries	5,000.00	3,245.00	1,755.00
Fringe Benefits			
Other (list by name)			
Elections	510.00	210.00	300.00
Planning and Zoning			
Travel and Per Diem			
Salaries			
Fringe Benefits			
Dues and Subscriptions			
Supplies			
Contractual Services			
Other (list by name)			
PAGE SUBTOTAL	8,310.00	4,738.20	3,571.80

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ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of [illegible]

EXPENDITURE CATEGORIES	FY 91 Budget Amount	FY 91 Actual Amount	Variance
GENERAL GOVERNMENT			
Administration and Finance			
Salaries	49,641.00	35,499.80	14,141.20 ✓
Fringe Benefits			
Dues and Subscriptions	1,200.00	869.85	330.15 ✓
Travel and Per Diem	10,000.00	720.66	9,279.34 ✓
Telephone / Communications			
Postage	350.00	1,586.64	-1,236.64 ✓
Freight Utilities	5,800.00	5,411.85	388.15 ✓
Contractual Services			
Supplies	3,500.00	7,976.38	-4,476.38 ✓
Equipment			
Maintenance	300.00	1,997.16	-1,697.16 ✓
Insurance			
Medical			
Workers Compensation	12,369.00	21,807.90	-9,438.90 ✓
Property			
Bonding / Errors and Omissions			
General Liability	7,000.00	0	7,000.00 ✓
Other (list by name) Job Advert.	125.00	0	125.00 ✓
Utility Deposit	350.00	0	350.00 ✓
Computer support	1,500.00	1,200.00	300.00 ✓
PAGE SUBTOTAL	92,135.00 ✓	77,070.24	~~15,082.76~~

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ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of [illegible]

EXPENDITURE CATEGORIES	FY 91 Budget Amount	FY 91 Actual Amount	Variance
PUBLIC SAFETY			
Fire Department			
Salaries	300.00	Ø	300.00 ✓
Fringe Benefits			
Compensation for Volunteers			
Rent			
Utilities	Ø	487.05	−487.05 ✓
Supplies	1,000.00	2,397.33	−1,397.33 ✓
Freight	7.00	Ø	7.00 ✓
Fuel			
Equipment	500.00	517.77	−17.77 ✓
Maintenance			
Contractual Services			
Training and Certification			
Other (list by name)			
Other Public Safety Alcohol Program			
Civil Defense Utilities	400.00	423.37	−23.37 ✓
Animal Control Postage	100.00	Ø	100.00
Search and Rescue Supplies	100.00	Ø	100.00
Rehab Center	600.00	Ø	600.00
PAGE SUBTOTAL	3,007.00 ✓	3,825.52	−818.52 ✓

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City of

Alakanuk

ANNUAL STATEMENT OF ACTUAL EXPENDITURES

Page 8 of ____

EXPENDITURE CATEGORIES	FY 91 Budget Amount	FY 91 Actual Amount	Variance
PUBLIC SAFETY			
Health Clinic			
Salaries / Fringe Benefits	6,900.00	10,267.00	- 3,367.00
Rent			
Utilities	3,400.00	3,174.42	225.58
Supplies	400.00	1,787.00	- 887.00
Freight	50.00	Ø	50.00
Equipment	1,000.00	Ø	1,000.00
Maintenance	Ø	310.29	- 310.29
Contractual Services			
Other (list by name			
____			
____			
~~Ambulance Service~~ Suicide Prevention			
Salaries / Fringe Benefits	3,500.00	4,406.25	- 906.25
Equipment Travel	400.00	Ø	400.00
Supplies			
Fuel			
Maintenance			
Contractual Services			
PAGE SUBTOTAL	#16,150.00	19944.96 #17,[illegible]	- 3,794.96

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ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of [illegible]

EXPENDITURE CATEGORIES	FY 91 Budget Amount	FY 91 Actual Amount	Variance
PUBLIC SAFETY			
Police Department			
Salaries	40,320.00	37,366.45	2,953.55 ✓
Fringe Benefits			
Compensation for Volunteers			
Rent -equipment	100.00	1,994.00	-1,894.00 ✓
Utilities	3,800.00	4,163.47	-363.47 ✓
Supplies	2,200.00	3,666.79	-1,466.79 ✓
Freight	150.00	25.00	125.00 ✓
Fuel			
Equipment	1,000.00	1,994.00	- 994.00 ✓
Maintenance -equipment	1,500.00	2,994.71	-1,494.71 ✓
Contractual Services			
Training and Certification			
Other (list by name)			
Bldg. Maintenance	500.00	ø	500.00 ✓
Jailguards	2,000.00	1,630.50	369.50 ✓
PAGE SUBTOTAL	51,570.00 ✓	53,834.92 ✓	-2,264.92 ✓

ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of

[illegible]

EXPENDITURE CATEGORIES	FY 91 Budget Amount	FY 91 Actual Amount	Variance
PUBLIC WORKS			
Streets and Roads (includes ice roads)			
Salaries	18,667.00	28,062.50	-9,395.50 ✓
Fringe Benefits			
Rent			
Utilities	500.00	1,209.11	-709.11 ✓
Supplies	3,000.00	326.03	2,673.97 ✓
Freight	800.00	Ø	800.00 ✓
Fuel			
Equipment			
Equipment Rental			
Maintenance	2,500.00	3,615.68	-1,115.68 ✓
Contractual Services			
Training and Certification			
Other (list by name)			
______			
______			
______			
______			
______			
PAGE SUBTOTAL	425,467.00 ✓	433,293.32 ✓	-7,826.32 ✓

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ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of [illegible]

EXPENDITURE CATEGORIES	FY 91 Budget Amount	FY 91 Actual Amount	Variance
PUBLIC WORKS			
Docks and Harbors			
Salaries			
Fringe Benefits			
Rent			
Utilities			
Supplies			
Freight			
Fuel			
Equipment			
Equipment Rental			
Maintenance			
Contractual Services			
Training and Certification			
Other (list by name)			
____			
____			
____			
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____			
PAGE SUBTOTAL	Ø	Ø	Ø

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ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of

[illegible]

EXPENDITURE CATEGORIES	FY 91 Budget Amount	FY 91 Actual Amount	Variance
PUBLIC WORKS			
Airports			
Salaries	1,500.00	1,500.00	Ø ✓
Fringe Benefits			
Rent			
Utilities			
Supplies	700.00	700.00	Ø ✓
Freight			
Fuel			
Equipment			
Equipment Rental			
Maintenance	~~172~~00	172.00	−172.00 ✓
Contractual Services			
Training and Certification			
Other (list by name)			
____			
____			
____			
____			
____			
PAGE SUBTOTAL	2,200.00 ✓	2,372.00 ✓	−172.00 ✓

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ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of

Akiak

EXPENDITURE CATEGORIES	FY 91 Budget Amount	FY 91 Actual Amount	Variance
PUBLIC WORKS			
Electrical Utility			
Salaries	24,000.00	19,477.15	4,522.05
Fringe Benefits			
Rent			
Utilities			
Supplies			
Freight			
Fuel			
Equipment			
Equipment Rental			
Maintenance			
Contractual Services			
Training and Certification			
Other (list by name)			
____			
____			
____			
____			
____			
PAGE SUBTOTAL	24,000.00	19,477.15	4,522.05

ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of

Alakanuk

EXPENDITURE CATEGORIES	FY 91 Budget Amount	FY 91 Actual Amount	Variance
PUBLIC WORKS			
Water and Sewer Utility			
Salaries	74,694.00	78,098.20	—3,404.20
Fringe Benefits			
Rent			
Utilities	8,200.00	10,171.62	—1,971.62
Supplies	4,000.00	10,750.61	—6,750.61
Freight	550.00	2,525.28	—1,975.28
Fuel	24,100.00	Ø	24,100.00
Equipment	2,100.00	3,084.26	—1,084.26
Equipment Rental			
Maintenance ECR	2,000.00	990.00	1,010.00
Contractual Services [illegible] Tank	15,000.00	11,800.00	3,200.00
Training and Certification			
Other (list by name)			
Travel/[illegible]	2,500.00	Ø	2,500.00
Maintenance Bldg.	200.00	328.46	—128.46
Vehicle [illegible]	800.00	115.50	684.50
Rentals	13,350.00	9,154.99	4,195.01
Tax contribution	Ø	7,766.25	—7,766.25
PAGE SUBTOTAL	148,394.00	135,785.77	12,608.23

O INAL - TO BE RETURNED TO DEPT. OF COMMUNITY AND GIONAL AFFAIRS COPY - TO BE KEPT B ITY

ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of

Diomede

EXPENDITURE CATEGORIES	FY 91 Budget Amount	FY 91 Actual Amount	Variance
PUBLIC WORKS			
Solid Waste Collection and Disposal			
Salaries	2,000.00	2,770.00	-770.00
Fringe Benefits			
Rent			
Utilities			
Supplies			
Freight			
Fuel			
Equipment			
Equipment Rental			
Maintenance	200.00	Ø	200.00
Contractual Services			
Training and Certification			
Other (list by name)			
Other Public Works			
Telephone			
Fuel Sales			
Other (list by name)			
PAGE SUBTOTAL	2,200.00	2,770.00	-570.00

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ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of

[illegible] Kamill

EXPENDITURE CATEGORIES	FY 91 Budget Amount	FY 91 Actual Amount	Variance
PARKS AND RECREATION			
Bingo			
Salaries	3,000.00	2,720.00	280.00
Fringe Benefits			
Rent			
Utilities Equipment	1,000.00	0	1,000.00
Supplies	3,000.00	498.40	2,501.60
Prizes	10,000.00	18,693.85	-8,693.85
Other (list by name)			
Direct Fees	1,000.00	585.61	414.39
Postage	500.00	0	500.00
Library Cable T.V.			
Salaries	1,800.00	718.50	1,081.50
Fringe Benefits			
Rent EQ	150.00	0	150.00
Utilities Supplies	50.00	720.00	-670.00
Supplies Transfer Pay	180.00	0	180.00
Maintenance			
Books and Subscriptions Refunds	150.00	0	50.00
Other (list by name)			
Total Library	15,000.00	0	15,000.00
PAGE SUBTOTAL	~~3?,630.00~~ 35,930.00	23,938.36	~~10,448.64~~ 11493.64

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ANNUAL STATEMENT OF ACTUAL EXPENDITURES

Page 17 of ____

City of

[illegible handwriting]

EXPENDITURE CATEGORIES	FY 91 Budget Amount	FY 91 Actual Amount	Variance
PARKS AND RECREATION			
Other Public Recreation			
Special Festivals and Events			
Cable Television			
Other (list by name)			
PAGE SUBTOTAL			

O INAL - TO BE RETURNED TO DEPT. OF COMMUNITY ANI GIONAL AFFAIRS

COPY - TO BE KEPT B ITY

City of

Akiakchak

EXPENDITURE CATEGORIES	FY 91 Budget Amount	FY 91 Actual Amount	Variance
OTHER EXPENDITURE ACCOUNTS			
Grants / Contracts			
Capital Projects			
Salaries			
Fringe Benefits			
Rent			
Utilities			
Supplies	40.00	Ø	40.00
Freight	75.00	Ø	75.00
Fuel			
Equipment			
Equipment Rental			
Maintenance			
Contractual Services			
Other (list by name)			
____			
____			
____			
____			
____			
PAGE SUBTOTAL	115.00 ✓	Ø ✓	115.00 ✓

ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of

[illegible]

EXPENDITURE CATEGORIES	FY 91 Budget Amount	FY 91 Actual Amount	Variance
OTHER EXPENDITURE ACCOUNTS			
Grants / Contracts			
Planning			
Salaries			
Fringe Benefits			
Rent			
Utilities			
Supplies			
Freight			
Fuel			
Equipment			
Equipment Rental			
Maintenance			
Contractual Services			
Other (list by name)			
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PAGE SUBTOTAL	—	—	—

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ANNUAL STATEMENT OF ACTUAL EXPENDITURES

City of [illegible]

EXPENDITURE CATEGORIES	FY 91 Budget Amount	FY 91 Actual Amount	Variance
MISCELLANEOUS			
Public School Support			
Debt Service IRS	30,000.00	33,775.82	-3,775.82
[illegible] Assistance	12,639.00	1,859.90	10,779.10
Express Freight	856.00	0	856.00
Employer Payroll Contributions			
FICA	17,836.00	60,745.31	-42,909.31
ESC	8,736.00	12,238.38	-3,502.38
Small bills	600.00	600.00	0
[illegible]	3,000.00	814.60	2,185.40
[illegible] Dev.	1,400.00	0	1,400.00
Other Miscellaneous			
[illegible] Payment	17,527.00	10,000.00	7,527.00
[illegible]	11,778.00	0	11,778.00
Audit	0	1,198.02	-1,198.02
PAGE SUBTOTAL	$104,912.00	$121,402.03	-16,460.03
TOTAL FY 91 EXPENDITURES	514,320.00	498,451.27	15,868.73

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City of [illegible]

		Amount	
	BEGINNING CASH BALANCE	-4,9[illegible].77	
PLUS	TOTAL FY 91 REVENUES	457,131.16	
EQUALS	TOTAL CASH	452,207.59	
LESS	TOTAL FY 91 EXPENDITURES	418,451.27	
ENDING CASH BALANCE		-40,243.68	

APPENDIX D
FISCAL YEAR 1992 CITY LEDGER

APPENDIX I
MANUFACTURER'S DATA

NALGENE™
Industrial Products

Volume 18

4 How To Choose Your NALGENE Tanks

Tank Resin Selection Guide — For NALGENE Tanks

At low temperatures, protect all tanks from impact. Below 40°F/4°C, specify XLPE tanks.

Resin	Chemical Resistance General	Stress-Crack Resistance[1]	Maximum Service Temperature	Brittleness Temperature	Impact Resistance[2]	Abrasion Resistance	Rigidity	Easy To Clean	Translucent
LLDPE Linear Low-Density Polyethylene	VG	VG	140°F 60°C	−94°F[2] −70°C	G	G	F	VG	Yes
HDPE High-Density Polyethylene	VG	G	150°F 65°C	−94°F[2] −70°C	G	G	G	VG	Yes
XLPE Cross-Linked High-Density Polyethylene	VG	EX	150°F 65°C	−180°F[2] −118°C	EX	G	G	VG	Yes
PP Polypropylene	VG	EX	220°F 104°C	32°F 0°C	F	G	G	G	No
PVDF Polyvinylidene Fluoride	EX	EX	230°F 110°C	−40°F −40°C	F	VG	EX	VG	Yes
NYL Nylon	G w/solvents Do Not Use With Acids	EX	300°F 149°C	32°F 0°C	EX	EX	S	VG	No

SEE PAGES 69-74 FOR SPECIFIC CHEMICAL RESISTANCE

S = SUPERIOR
EX = EXCELLENT
VG = VERY GOOD
G = GOOD
F = FAIR

[1] Cross-linked high-density polyethylene is recommended for use with stress-cracking agents.
[2] Brittleness temperature per ASTM test D-746. The impact resistance of most rotomolded tanks declines at freezing temperatures. Cross-linked high-density polyethylene tanks are well suited for winter storage.
[3] The resins used in NALGENE linear low- and high-density polyethylene and polypropylene tanks comply with U.S. Food and Drug Administration Regulation 177.1520; the resin used in PVDF tanks complies with Regulation 121.2593.

- Tanks with Fiberglass-Reinforced Polyester (FRP) Casings offer service to higher temperatures and with higher specific gravity contents.
- Both operating conditions and type of chemical can decrease maximum service temperatures.
- Regardless of resin, black-pigmented tanks are strongly recommended for outdoor use.
- Continuous service temperatures in ranges above ambient can affect tanks in at least two ways: 1) the useful life of the tank may be shortened; and 2) the ability of the container to maintain its shape may decrease, perhaps resulting in distortion.
- Some *fittings* of these resins are FDA-acceptable.

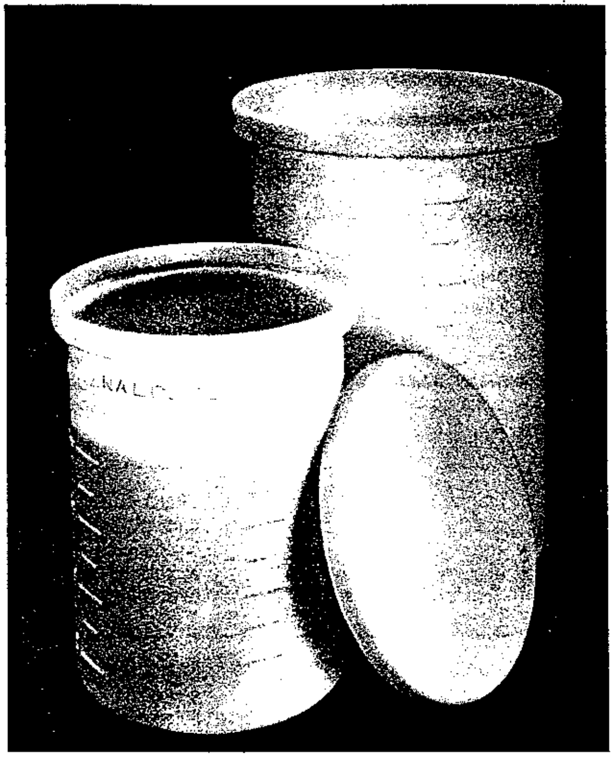
Tank Resin Selection Guide — for NALGENE Tanks

Outdoor Use	Can Be Welded? (hot gas)	FDA Acceptability (natural, unpigmented)	Color (natural, unpigmented)	Advantages & Applications		Do Not Use With:
No	Yes	Yes[3]	White	• Lightweight • Corrosion-resistant • No painting/maintenance • Less expensive than stainless steel or fiberglass • Inorganic chemicals and compounds	• Foodstuffs, liquids and beverages • Organic and inorganic acids • Plating • Water treatment • Brine storage • Dispensing lab and photo chemicals	Strong oxidizing agents, aromatic hydrocarbons, halogenated-aliphatic hydrocarbons, liquified petroleum gas, solvents
Yes, black or with UV stabilizer	Yes	Yes[3]	White	• Hard, smooth finish • Good temperature resistance • Less expensive than stainless steel or fiberglass • Storing caustics • Metal finishing	• Storing organic and inorganic acids • Water treatment • Dispensing lab and photo chemicals • Plating	Strong oxidizing agents, aromatic hydrocarbons, halogenated-aliphatic hydrocarbons, liquified petroleum gas, solvents
Yes, pigmented or with UV stabilizer	No	No	Off-White	• Suitable for many corrosives not handled by FRP • Storing corrosives, including sulfuric, hydrochloric and hydrofluoric acids • Storing sodium hypochlorite (see statement on page 67)	• Storing organic and inorganic chemicals and compounds • Chemical processing • Storing boiler treatment chemicals • Water and waste/water treatment	Strong oxidizing agents, aromatic hydrocarbons, halogenated-aliphatic hydrocarbons, liquified petroleum gas, solvents
No	Yes	Yes[3]	Off-White	• Good resistance to many organic chemicals • Less expensive than comparable stainless steel tanks	• Weldable PP fittings available • Plating and pickling lines • Etch tanks for processing silicon wafers	Strong oxidizing acids; sub-freezing temperatures; aromatic or chlorinated hydrocarbons
No	Yes	Yes[3]	Tan	• Superior resistance to inorganic acids, strong oxidizing agents and halogenated compounds • High purity; does not contaminate process fluids • PVDF Schedule 80 threaded fittings available • Etch tanks for processing silicon wafers	• Ultra-pure water storage (*not* potable) • Precious metal recovery • Storing and processing halogenated compounds (i.e. bromine) • Storing bleach and sulfuric acid for pulp and paper processing • Industrial battery casings • Insecticide manufacturing	Ketones, esters and hot, concentrated caustics; nascent chlorine gas and concentrated caustic soda
No	No	No	Tan	• Excellent resistance and low permeation to fuels, oils and organic solvents, including aliphatic, aromatic and halogenated hydrocarbons; esters and ketones	• Storing organics and solvents • Storing diesel fuels, oils • Storing hydraulic oil	**Do not expose nylon tanks to acids!** Acids will cause softening, loss of strength and rigidity, and eventual failure of the tank. All NALGENE nylon tanks are labeled to indicate material and warning against use with acids.

NALGENE Rotational-Molded Tanks Offer Distinct Advantages

Service depends on contents, location, temperature and other conditions.

- Lower cost than stainless steel or fiberglass
- Seamless construction for easy cleaning and leakproof service
- Controlled wall thickness without corner thinning
- Lightweight; less than one-half the weight of steel
- Virtually maintenance-free
- Available in a wide variety of resins
- Some tanks are molded of natural resin for visible liquid level



Quality Goes Into Every Tank

Nalge starts with precise CAD-generated designs, oversees critical mold-building, inspects incoming resin and adheres to proven rotational-molding techniques. Fittings can be installed, and a final check of the tank is made just prior to protective packaging. Tanks over 200 gal. are stretch-wrapped and skid-mounted.

NALGENE cylindrical tanks are rotationally-molded in one seamless piece. Four resins are offered — HDPE, PP, XLPE and PVDF. These resins offer a broad range of resistance to chemicals, stress-cracking, temperature, impact and abrasion.

NALGENE heavy-duty cylindrical tanks feature rigid walls for maximum strength and durability under severe conditions. NALGENE lightweight tanks are specified as drum liners and for less-demanding applications where cost is a critical factor.

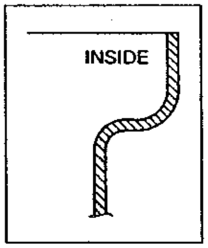
Most NALGENE cylindrical tanks have translucent walls that permit easy visual inspection of liquid levels (except black tanks or those with casings.) Tank flange designs provide strength and ease of handling.

Resin Characteristics

Many factors determine which of five plastic resins is best for your tank's application. The **Tank Resin Selection Guide** on pages 4 and 5 offers full information on all resins used in these tanks. The maximum service temperature for each NALGENE cylindrical tank is noted on the following pages.

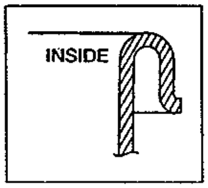
All Tanks Come With Covers

NALGENE matching covers significantly decrease evaporation and contamination, but are not airtight. *Floating covers* are available: see Cat. No. 54104. *Hinges* can be installed on all cylindrical covers: see Cat. No. 87500.

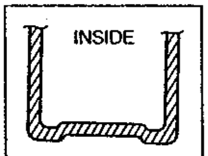


Two Flange Designs Available

Most NALGENE cylindrical tanks feature a **stepped-flange** design that adds rigidity and strength. It also helps contain drips when used in dipping/plating operations.



Some cylindrical tanks offer **curl-cuff** flanges. This design permits use of the tank as a drum liner, preventing chemicals from spilling between drum and liner.

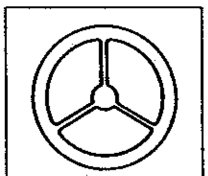


Cyl. tanks 30 gal. and below

Flat-Bottom Tanks

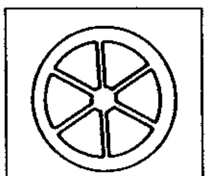
With Raised Or Spoked Bottoms

NALGENE flat-bottom cylindrical tanks offer good drainage. All 11000 and 18000 series tanks up to 30 gal. feature a slightly raised bottom that channels liquids to the tank walls and fittings.



55- and 80-gal. cyl. tanks, spoked bottom

NALGENE 11000-series tanks 55 gal. and larger have a spoked-bottom design. This reinforces and strengthens the tanks, and provides near-total drainage. For cylindrical tanks *with complete drainage,* order conical-bottom tanks.



100-gal. cyl. tanks and above, spoked bottom

Bio-Tech Tanks

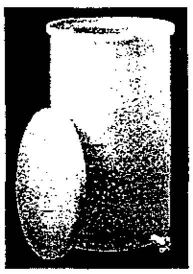
These closed-dome tanks are ideal for bioscience production applications. Tanks and all components, including gasket and closures, comply with FDA regulations. They can be repeatedly autoclaved without significant change in shape or loss of function.

Conical-Bottom Tanks

Nalge offers five sizes of conical-bottom tanks from 30 to 500 gal. NALGENE conical-bottom tanks feature a 30° cone angle* for **complete drainage** — excellent for viscous liquids. Their shape also permits better dispersal of solids when used in NALGENE tank and mixer packages. A flat at the cone's tip permits installation of welded or bulkhead fittings.

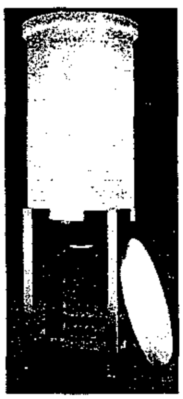
These tanks are calibrated and offer a 10% freeboard for trouble-free storage and mixing. All conical-bottom tanks come with covers and are available with FRP casings.

*500-gal. has a 45° angle



Tanks For Easy Dispensing

These HDPE tanks come complete with a PP needle-type spigot, making them excellent for chemical dispensing. To ensure strength and leak-free operation, Nalge welds a mounting boss onto the tank, then installs the spigot. Available in both heavy- and light weight versions, in sizes from 5 to 55 gallons.



Three Tank Stands Available

Sturdy NALGENE all-metal stands are painted with a durable, chemical-resistant polyurethane coating and are fully assembled. **Floor stands** are designed to support mixers above the tank. **NALGENE elevated flat-bottom tank stands** position flat-bottom cylindrical tanks 22 in. off the floor for fittings and piping clearance. **NALGENE elevated conical-bottom stands** *are needed* to support conical-bottom tanks and position them 18 in. from the floor.

Closed-Dome Tanks

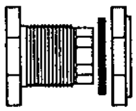
When applications require totally-enclosed tanks, NALGENE closed-dome tanks are excellent choices. These HDPE or PP tanks are available in 30-, 55- and 100-gal. sizes. A screw-on closure with gasket securely fits a large, 6¼-in. I.D. opening. With 2-in. bung.

Fittings That Connect To Your System

Many types of fittings are available for piping into your NALGENE cylindrical tanks, including bulkhead fittings, valves, nipples, spigots and tubing adapters. They are available factory-installed or loose for field installation. See pages 37-39.

Welded

Welded fittings are factory-installed, and offer superior sealing integrity. Fittings can only be welded to tanks of the same material. XLPE tanks cannot be welded.



Bulkhead

Bulkhead-type fittings offer mechanical seals with gaskets for easy field installation. See pages 37-39.

Plastic Tanks For High-Purity Storage

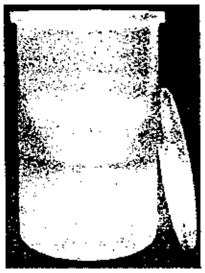
Plastic tanks are the solution when metal tanks could contaminate contents. Generally speaking, plastics are "cleaner" than metals. NALGENE PVDF cylindrical tanks are often specified for electronic chip manufacturing because they're low in extractables.

Storage of Sodium Hypochlorite

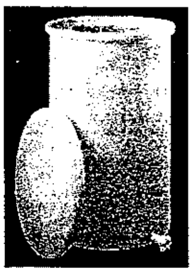
NaOCl

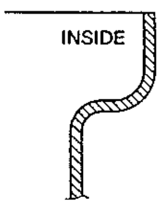
Nalge Company *strongly recommends* using only black, heavy-walled tanks to store NaOCl. See page 67 or contact Nalge for information.

Flat-Bottom Cylindrical Tanks, Nominal Wall Thickness By Resin


Cat. No. 11100


Cat. No. 18100


Cat. No. 54102



Stepped-Flange Design

			HDPE						
			Heavyweight					Lightweight	
Size	Grad., gal./liter	Nominal Dimensions, O.D. × depth, in. *Casing*	Natural Cat. No. 11100	Black Cat. No. 18100	W/Casing Cat. No. 19100 Tank	Casing	W/Spigot Cat. No. 11102	Natural Cat. No. 54100	W/Spigot Cat. No. 54102
5 Gals.	0.5/2	11 × 15	3/16	†	†		3/16	3/32	3/32
		—	*SIZE CODE -0005*						
7.5 Gals.	0.5/*	12 × 18	3/16	†	†		3/16	3/32	3/32
		—	*SIZE CODE -0007*						
10 Gals.	1/*	13 × 20	3/16	†	†		3/16	3/32	3/32
		—	*SIZE CODE -0010*						
15 Gals.	1/4	13 × 27	3/16	†	†		3/16	3/32	3/32
		—	*SIZE CODE -0015*						
30 Gals.	2.5/10	18 × 30	3/16	3/16	3/16	3/16	3/16	3/32	3/32
		19 1/8 × 30 1/4	*SIZE CODE -0030*						
55 Gals.	2.5/10	22 × 36	1/4	1/4	1/4	3/16	1/4	3/32	3/32
		23 × 36 1/4	*SIZE CODE -0055*						
80 Gals.	5/20	24 × 48	1/4	1/4	1/4	3/16	—	—	—
		24 3/4 × 48 1/4	*SIZE CODE -0080*						
100 Gals.	5/20	28 × 44	1/4	1/4	1/4	3/16	—	—	—
		29 3/16 × 44 1/4	*SIZE CODE -0100*						
150 Gals.	10/40	31 × 49	1/4	1/4	1/4	3/16	—	—	—
		32 7/16 × 49 1/4	*SIZE CODE -0150*						
200 Gals.	25/200	36 × 51	1/4	1/4	1/4	3/16	—	—	—
		37 1/2 × 51 1/4	*SIZE CODE -0200*						
275 Gals.	25/100	42 × 49	1/4	1/4	1/4	3/16	—	—	—
		43 1/2 × 49 1/4	*SIZE CODE -0275*						
360 Gals.	25/100	48 × 49	1/4	1/4	1/4	3/16	—	—	—
		49 3/8 × 49 1/4	*SIZE CODE -0360*						
500 Gals.	25/100	53 × 62	5/16	5/16	5/16	3/16	—	—	—
		54 1/8 × 62 1/4	*SIZE CODE -0500*						
1,000 Gals.	25/100	66 × 72	7/16	7/16	7/16	3/16	—	—	—
		67 1/2 × 72 1/4	*SIZE CODE -1000*						
		Max. Service Temp.	150°F 65°C		220°F 104°C		150°F 65°C	140°F 60°C	

*NALGENE 7.5- and 10-gal. cylindrical tanks do not have liter calibrations.
†These sizes quoted on request.
— = Not Available

XLPE Heavyweight Natural Cat. No. 11300	XLPE Heavyweight Black Cat. No. 18300	XLPE Heavyweight W/Casing Cat. No. 19300 Tank	XLPE Heavyweight W/Casing Cat. No. 19300 Casing	PP Heavyweight Natural Cat. No. 11200	PP Heavyweight W/Casing Cat. No. 19200 Tank	PP Heavyweight W/Casing Cat. No. 19200 Casing	PVDF Natural Cat. No. 11500	PVDF W/Casing Cat. No. 19500 Tank	PVDF W/Casing Cat. No. 19500 Casing	Approx. Shipping Weight, lb. Tank Light	Approx. Shipping Weight, lb. Tank Heavy	Approx. Shipping Weight, lb. W/Casing	Size Code
3/16	†	†		3/16	†		3/32	†		4	5.5	—	SIZE CODE -0005
3/16	†	†		3/16	†		3/32	†		4½	7	—	SIZE CODE -0007
3/16	†	†		3/16	†		3/32	†		7	8	—	SIZE CODE -0010
3/16	†	†		3/16	†		3/32	†		8	11.5	—	SIZE CODE -0015
3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/32	3/32	3/16	12	19	42	SIZE CODE -0030
1/4	1/4	1/4	3/16	1/4	1/4	3/16	1/8	1/8	3/16	18	27	53	SIZE CODE -0055
1/4	1/4	1/4	3/16	1/4	1/4	3/16	—	—	—	—	50	80	SIZE CODE -0080
1/4	1/4	1/4	3/16	1/4	1/4	3/16	—	1/8	3/16	—	50	80	SIZE CODE -0100
1/4	1/4	1/4	3/16	1/4	1/4	3/16	—	1/8	3/16	—	60	135	SIZE CODE -0150
1/4	1/4	1/4	3/16	1/4	1/4	3/16	—	1/8	3/16	—	80	150	SIZE CODE -0200
1/4	1/4	1/4	3/16	1/4	1/4	3/16	—	1/8	3/16	—	110	200	SIZE CODE -0275
1/4	1/4	1/4	3/16	1/4	1/4	3/16	—	—		—	120	220	SIZE CODE -0360
—	—	—	—	—	—	—	—	—		—	190	325	SIZE CODE -0500
—	—	—	—	—	—	—	—	—		—	300	500	SIZE CODE -1000

XLPE: 150°F 65°C — PP: 220°F 104°C — PVDF: 230°F 110°C

Please order by Cat. No. and Size Code. For example, a 100-gal. Natural HDPE tank would be: Cat. No. 11100, Size Code -0100.

WARNING: Never use FRP casings alone as a tank. Always use a liner. For continuous service at elevated temperatures or storage of high specific-gravity materials, always use an FRP casing with your tank.

10 Cylindrical Tanks

Conical-Bottom Tanks

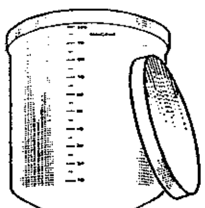
NALGENE conical-bottom tanks feature a 30° cone angle (45° for 500 gal.) for complete drainage — excellent for viscous liquids. Their shape also permits better dispersal of solids when mixing. A flat at the cone's tip permits easy installation of welded or bulkhead fittings. HDPE and polypropylene resins comply with FDA Reg. 117.1520.

These tanks offer a 10% freeboard. All conical-bottom tanks come with cover. Durable, rigid and corrosion-resistant FRP casings are available for all sizes of these tanks.

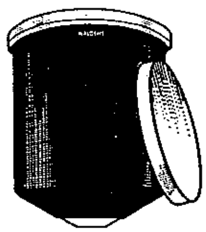
These tanks *require* metal stands to elevate them off the floor; see Cat. Nos. 17109 and 17110. Clearance from floor to bottom of tanks is 18 in. Refer to cylindrical tank stands on pages 12 and 13.

> **WARNING:** Never use FRP casings alone as a tank. Always use a liner.
>
> For continuous service at elevated temperatures or storage of high specific-gravity materials, always use an FRP casing with your tank.

Do you mix in conical-bottom tanks? See NALGENE Tank and Mixer Packages.



Cat. No. 16120

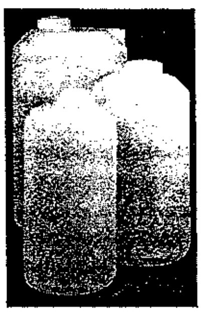


Cat. No. 17120

Conical-Bottom Cylindrical Tanks, Nominal Wall Thickness By Resin

Size	Grad. gal./liter	Nom. Tank Dimensions O.D. × Depth,* in.	Bottom Flat Dia., in.	HDPE Natural Cat. No. 16120	HDPE W/Casing Cat. No. 17120 Casing	PP Natural Cat. No. 16220	PP W/Casing Cat. No. 17220 Casing	XLPE Natural Cat. No. 16320	XLPE W/Casing Cat. No. 17320 Casing	Approx. Shipping Weights, lb. Tank	W/Casing
30 Gals.	2.5/10	18 × 35	3	3/32	3/16	1/4	3/16	3/16	3/32	16	37
					SIZE CODE -0030						
55 Gals.	2.5/10	22 × 44	5	3/16	3/16	1/4	3/16	3/16	3/16	26	71
					SIZE CODE -0055						
100 Gals.	5/20	32 × 38	5	1/4	3/16	5/16	3/16	1/4	3/16	52	95
					SIZE CODE -0100						
250 Gals.	25/100	43 × 54	5	5/16	3/16	5/16	3/16	5/16	3/16	186	241
					SIZE CODE -0250						
500 Gals.	25/100	53 × 80	7	5/16	3/16	—	—	—	—	251	331
					SIZE CODE -0500						
	Max. Service Temp.			150°F 65°C	220°F 104°C			150°F 65°C	220°F 104°C		

*To cone flat — = Not Available Cone Angles: 30° on 30, 55, 100 & 250 gal.; 45° on 500 gal.



Cat. No. 2650

Bio-Tech Closed-Dome Tanks

Manufactured from high-grade polypropylene resin, these closed-dome tanks are designed for bioscience production applications. Tanks and all components, including gasket and closure, comply with FDA regulations. They can be repeatedly autoclaved without significant change in shape or loss of function. Each is individually packaged to assure clean arrival.

Bio-Tech Closed-Dome Tanks, Wall Thickness By Resin

Size	Size Code	Grad., gal./liter	Nom. Dimensions O.D. × Depth, in.	PP Natural Cat. No. 2650	Approx. Shipping Weights, lb.
30 Gals.	-0030	2.5/10	18 × 36¾	1/4	20
55 Gals.	-0055	2.5/10	22 × 39½	1/4	31
100 Gals.	-0100	10/50	28½ × 51¼	5/16	60

NOTE: Contact Nalge Company if you require bio-tech tanks with fittings or mixer mountings.

Closed-Dome Tanks

Threaded screw closure with EPDM gasket securely fits 6¼-in. I.D. fill well, greatly reducing evaporation and protecting contents from contamination. The 2-in. top bung (buttress thread on HDPE, 2-in. NPS on PP), permits access for tubing or piping. Two mounting flats accept bulkhead fittings up to 2 in. Domed bottoms offer good drainage. Graduations in gallons and liters permit easy liquid level check through tanks' translucent walls.

HDPE and polypropylene resins comply with FDA Reg. 177.1520.

Accessories/options
- Viton closure gasket
- Metal stands; elevates tanks 22 in. from floor — Cat. No. 19009
- NALGENE hand pumps for 30- and 55-gal. sizes. PP tank uses Cat. No. 6530 with 6531-0020 adapter; use -0010 adapter for HDPE tank*
- Many fittings available

Two Mounting Flats 180° apart

Closed-Dome Tanks, Nominal Wall Thickness By Resin

Size	Size Code	Grad., gal./liter	Nom. Dimensions O.D. × Depth, in.	HDPE Natural Cat. No. 11150	PP Natural Cat. No. 11250	Approx. Shipping Weights, lb.
30 Gals.	-0030	2.5/10	18 × 36¾	3/16	¼	20
55 Gals.	-0055	2.5/10	22 × 39½	¼	¼	31
100 Gals.	-0100	10/50	28½ × 51¼	¼	5/16	60

*Hand pump reaches bottom of 30-gal. tank, and is approximately 3 inches off the bottom of 55-gal. tanks and 15 inches off the bottom of 100-gal. tanks.

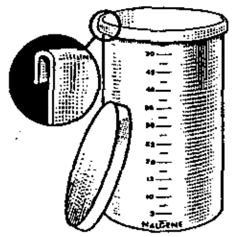
Closed-Dome Tank—Top View

Special-Purpose Cylindrical Tanks and Containers — HDPE

Curled-Cuff Tanks

Ideal for use as drum liners for metal finishing. Cuff-type flange fits over drum's top edge, preventing spills from leaking between liner and drum. Tank bottoms are flat.

Size	Nominal O.D. × Depth, In.	Size Code	Cat. No. 55105 Wall Thickness, In.	Grad., gal.	Approx. Shipping Wt., lb.
30 Gals.	19½ × 28¼	-0030	3/32	2.5	11
55 Gals.	23¾ × 34¼	-0055	3/32	2.5	14



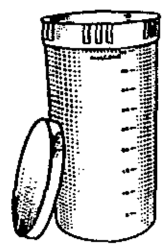
Cat. No. 55105

Tapered General Purpose Container

Straight, no-lip flange. Often used in water treatment. Rigid and lightweight. Largest size (150-gal.) fits through standard door for portability. Sold 5 in a package.

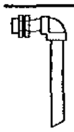
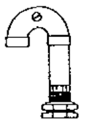
Size	Nominal O.D. × Depth, in.	Size Code	Cat. No. 56104 Wall Thickness, in.	Grad., gal.	Approx. Shipping Wt., lb.*
30 Gals.	22 × 22½	-0030	3/32	5	55
50 Gals.	22 × 38⅞	-0050	3/32	5	80
150 Gals.	33⅛ × 56¼	-0150	3/32	5	187

*5/package

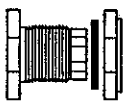
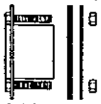
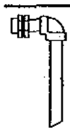
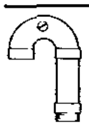
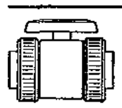


Cat. No. 56104

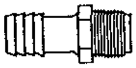
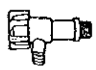
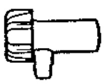
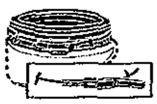
Installed Fittings, Mechanical (CONT'D)

	Fitting	Material	Cat. No.	Size Code and Availability (X)									
				-0025 (¼ in.)	-0050 (½ in.)	-0075 (¾ in.)	-0100 (1 in.)	-0125 (1¼ in.)	-0150 (1½ in.)	-0200 (2 in.)	-0300 (3 in.)	-0400 (4 in.)	-0600 (6 in.)
	Siphon Tube with Bulkhead Fitting	PVC	48125	–	–	–	–	–	–	X	X	–	–
		316SS	48151	–	–	–	–	–	–	X	X	–	–
		PP	48126	–	–	–	–	–	–	X	X	–	–
	Siphon Tube for Flanged Fitting (Fitting not included)	PVC	86900	–	X	X	X	X	X	X	X	–	–
		316SS	86930	–	X	X	X	X	X	X	X	–	–
	U-Vent with Bulkhead Fitting	PVC	85001	–	–	–	–	–	X	X	X	X	–
	Sight-Glass Assembly	PE/PVC	76000 -0001	–	X	–	–	–	–	–	–	–	–
	Consists of PVC valves, fittings and translucent PE tubing (⅝-in. I.D. x ¾-in. O.D.). Installed close to top and bottom of tank unless otherwise specified.												

Loose Fittings, Mechanical

F.O.B. Factory	Fitting	Material	Cat. No.	Size Code and Availability (X)									
				-0025 (¼ in.)	-0050 (½ in.)	-0075 (¾ in.)	-0100 (1 in.)	-0125 (1¼ in.)	-0150 (1½ in.)	-0200 (2 in.)	-0300 (3 in.)	-0400 (4 in.)	-0600 (6 in.)
 (Plastic)	Bulkhead Fittings  (316 Stainless Steel)	PVC	97001	–	X	X	X	X	X	X	X	X	–
		PP	98001	–	X	X	X	X	X	X	X	X	–
		316 SS	48050	–	X	–	X	–	X	X	X	X	X
		Teflon TFE	96001	X	X	–	–	–	–	–	–	–	–
		Nylon	89001	–	X	X	X	–	X	–	–	–	–
	PVC and PP two-part fittings screw together over a hole cut in the tank. Other gasket materials are available at added cost. PVC, SS and PP bulkhead fittings are supplied with one EPDM gasket.												
	Siphon Tube with Bulkhead Fitting	PVC	48025	–	–	–	–	–	–	X	X	–	–
		316 SS	48051	–	–	–	–	–	–	X	X	–	–
		PP	48026	–	–	–	–	–	–	X	X	–	–
	U-Vent Without Bulkhead Fitting	PVC	95001	–	–	–	–	–	X	X	X	X	–
	Flange Adapter without Bulkhead Fitting	PVC	93420	–	–	–	X	–	X	X	X	X	–
	Self-Aligning Bulkhead Fittings	PVC Body, Teflon Sealing Ring	97002	–	–	–	X	–	–	X	X	–	–
	For use on top head only.												
	Gaskets for PP and PVC Bulkhead Fittings*	EPDM	48080	–	X	X	X	†	X	X	X	X	–
		VITON	48090	–	X	X	X	†	X	X	X	X	–
	For Stainless Steel Bulkhead Fittings*	EPDM	48081	–	X	–	X	–	X	X	X	X	X
		VITON	48091	–	X	–	X	–	X	X	X	X	X
	*Where an additional gasket is needed, or as a replacement for original gasket. †1½-in. gasket can be used on 97001-0125 and 98001-0125 bulkhead fittings.												
	Sight-Glass Assembly	PE/PVC	96000 -0001		X	–	–	–	–	–	–	–	–
	Consists of PVC valves, fittings and translucent PE tubing (⅝-in. I.D. x ¾-in. O.D.). Specify tubing length.												
	Close Nipples	PVC	97103	–	X	X	X	X	X	X	X	X	–
		PP	98103	–	X	X	X	X	X	X	X	X	–
	True Union Ball Valves, Threaded	PVC	97003	–	X	X	X	X	X	X	–	–	–
		PP	98003	–	X	X	X	X	X	X	–	–	–
		Nylon	89004	–	X	X	X	–	–	–	–	–	–
	Female pipe thread on both ends. These valves must be supported. Installed with 93857 nipples, 97001 or 98001 bulkhead fittings and 97103 or 98103 close nipples.												
	Nipples, Threaded	Nylon	89003	–	X	X	X	–	–	–	–	–	–

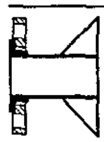
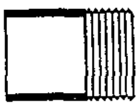
Loose Fittings, Mechanical (CONT'D)

	Fitting	Material	Cat. No.	-0025 (¼ in.)	-0050 (½ in.)	-0075 (¾ in.)	-0100 (1 in.)	-0125 (1¼ in.)	-0150 (1½ in.)	-0200 (2 in.)	-0300 (3 in.)	-0400 (4 in.)	-0600 (6 in.)
	Tubing Adapter (insert-type), Male Thread	PVC	97006	–	X	X	X	–	X	X	–	–	–
	For NALGENE PVC tubing. Complete with stainless steel hose clamp.												
	Spigot	PP	97424	–	–	X	–	–	–	–	–	–	–
	With male ¾-in. thread and neoprene seat gasket. Can be easily field-installed with bulkhead fitting. For tubing: PVC-3/8" I.D. to 5/16" I.D. (1/16-in. wall) PVC-5/16 to 5/8" I.D. (1/8–3/16-in. wall) LDPE-5/8" I.D. (1/16-in. wall)												
 Boss not included	Spigot Needle-Type	PP	6421 -0010	X	–	–	–	–	–	–	–	–	–
	Replacement spigot for Cat. No. 96423. Installed on threaded boss welded to tank at factory.												
 Lever-lock device	16-in. Manway Cover	HDPE	59000-0016										
	Note: For 550-, 850-, 1100-, 1550-, 2000-, and 2500-gallon verticals and 1575- and 2600-gal. conical-bottom tanks.												
	21-in. Threaded Manway with Cover	HDPE	59000-0021										
	Optional For 550-, 850-, 1100-, 1550-, 2000-, 2500-gallon verticals. Replacement for 3000- to 12,000-gal. vertical and 3000- to 8000-gal. conical-bottom tanks.												
	24-in. Hinged Manway Cover	XLPE	59000-0024										
	Note: For 2000- to 12,000-gallon verticals and 6000- and 8000-gal. conical-bottom tanks.												

*Nylon bulkhead fittings have one Viton gasket.
Teflon bulkhead fittings have a bead seal and do not require a gasket.
Note: Installation instructions for bulkhead fittings are available by contacting the NALGENE Industrial Products Group at Nalge Company.

Installed Fittings, Welded

Welded fittings must be of the *same resin* as the tank on which they will be installed. Fittings *cannot* be welded to XLPE or nylon tanks. These fittings are for open-top tanks up to 1000 gallons.

	Fitting	Material	Cat. No.	-0025 (¼ in.)	-0050 (½ in.)	-0075 (¾ in.)	-0100 (1 in.)	-0125 (1¼ in.)	-0150 (1½ in.)	-0200 (2 in.)	-0300 (3 in.)	-0400 (4 in.)	-0600 (6 in.)
	Full Couplings, Female Threads	PE	87005	–	X	X	X	–	X	X	X	X	–
		PP	89005	–	X	X	X	–	X	X	–	–	–
		PVDF	87006	–	X	X	X	–	X	X	–	–	–
	Specify installation with one end flush inside of tank, or half in/half out. Coupling will be installed half in/half out unless otherwise specified. For room temperature service only. Specify nipples for service above 70°F/21°C and below 140°F/60°C.												
	Flanged Couplings with PE-coated Aluminum Pressure Plates	PE	93400	–	X	X	X	–	X	X	X	X	X
		O.D. Flange		–	(3½")	(3⅞")	(4½")	–	(5")	(6")	(7½")	(9")	(11")
	½-in., ¾-in. and 1-in. HDPE flanges are one-piece, all-plastic with 150-lb. ASA bolt pattern dimensions.												
	Spigot, Needle-Type, with Boss & two Teflon TFE O-rings	PP Spigot with HDPE Boss	96423	–	–	–	X	–	–	–	–	–	–
	For tanks up to 100 gal. For larger tanks, use valves. PP spigots are installed on threaded HDPE boss which is spin-welded onto tank at factory. Spigot has 1¼-12 straight female threads, ¾-in. flow. Accepts ⅝-in. I.D. tubing. Boss fits only NALGENE tanks.												
	Half Nipples, Male Threads	PE	93857	–	X	X	X	–	X	X	X	X	–
		HDPE (FDA)	93859	–	X	X	X	–	–	X	–	–	–
		PP	95857	–	X	X	X	–	X	X	–	–	–
		PVDF	93858	–	X	X	X	–	X	X	–	–	–
	Half Couplings, Female Threads	PE	93840	–	X	X	X	–	X	X	X	X	–
		PP	95840	–	X	X	X	–	X	X	–	–	–
		PVDF	93841	–	X	X	X	–	X	X	–	–	–
	For room temperature service only. Specify nipples for above 70°F/21°C and below 140°F/60°C.												

RESINS

Polyethylene
The polymerization of ethylene results in a branched-chain, high molecular weight hydrocarbon. The polyethylenes are classified according to the relative degree of branching (side chain formation) in their molecular structures and by density, which can be controlled with selective catalysts.

The polyethylenes are chemically inert. They have no known solvent at room temperature.

Strong oxidizing agents will eventually cause oxidation and embrittlement. Aggressive solvents will cause softening or swelling, but these effects are normally reversible.

High-Density Polyethylene
HDPE
has minimal branching, which makes it more rigid and less permeable than LLDPE and gives it superior temperature resistance.

Linear Low-Density Polyethylene
LLDPE
has more branching, resulting in a less compact molecular structure.

Cross-Linked High-Density Polyethylene
XLPE
is a form of high-density polyethylene wherein the individual molecular chains are bonded to each other (using heat, plus chemicals or radiation) to form a three-dimensional polymer of extremely high molecular weight. This structure provides superior environmental stress-crack resistance and impact strength.

XLPE is a superior material for molding very large storage tanks. Since XLPE becomes a thermoset (not meltable) after molding, it is not weldable, and fittings must be installed mechanically on XLPE tanks.

Polyvinylidene Fluoride
PVDF
such as Kynar* is a fluoropolymer with alternating CH_2, and CF_2 groups. It has excellent chemical resistance.

In blower applications PVDF withstands temperatures to 180°F/83°C. It has exceptional abrasion resistance and is unaffected by ultraviolet radiation.

Nylon
A form of polyamide plastic. Because of its chemical structure nylon is very strong and tough, has a very high temperature resistance limit (300°F/149°C) and excellent chemical resistance to aromatic and aliphatic hydrocarbons, halogenated hydrocarbons and other similar fuels and solvents. WARNING: Do not expose nylon tank to acids. Acids will cause softening, loss of strength and rigidity, and eventual failure of the tank.

Fiberglass Reinforced Polyester
FRP
is formed by the reaction of dicarboxylic acids with dihydric alcohols which are mixed with glass fibers and cross-linking chemicals to form a strong, rigid, reinforced thermosetting (not meltable) structure. FRP is an excellent material for casings to support tanks in high-stress applications. FRP is also used to make housings for some NALGENE blowers.

Polyvinyl Chloride
PVC
is similar in structure to polyethylene but each unit contains a chlorine atom. The chlorine atom renders it vulnerable to some solvents, but also makes it more resistant to strong oxidizing acids. The excellent physical and mechanical properties of PVC make it a choice material for NALGENE blowers, especially for use in the presence of chromic, phosphoric, nitric and sulfuric acids in the vapor phase.

Polypropylene
PP
is similar to polyethylene, but each unit of the chain has a methyl group attached. It is opaque. PP has no known solvent at room temperature. It is slightly more susceptible than polyethylene to strong oxidizing agents, but offers superior environmental stress-crack resistance and higher temperature resistance than polyethylene.

Environmental Stress-Cracking
Environmental stress-cracking is the failure of a plastic material in the presence of certain types of chemicals. This failure is *not* a result of chemical attack. Simultaneous presence of three factors causes stress-cracking:

- Tensile stress
- A stress-cracking agent
- Inherent susceptibility of the plastic to stress-cracking

Tensile Stresses
These are set up during some molding and fabrication processes. Environmental conditions can add tensile stress, particularly if the tank is inadequately supported. Rotational molding creates parts that are virtually stress-free, so rotomolded tanks are less subject to environmental stress-cracking than fabricated tanks. Use of an FRP casing will minimize tensile stress from added load and further decrease the likelihood of environmental stress-cracking.

Common Stress-Cracking Agents
Detergents, surface active chemicals, lubricants, oils, ultra-pure water and plating additives such as brighteners and wetting agents.

Relatively small concentrations of stress-cracking agent may be sufficient to cause cracking. (Stress cracking agents are identified in the Chemical Resistance Chart.)

* Trademark of Pennwalt Corp.

Susceptibility to Stress-Cracking
This varies from plastic to plastic depending on several characteristics of the molecular structure. Cross-linked high-density polyethylene is inherently more resistant to stress-cracking than either low- or high-density polyethylene. PVDF and nylon also have excellent stress-crack resistance.

Physical Service Capabilities
Prolonged use of a plastic tank at temperatures above ambient will shorten tank life. Temperature effects are directly dependent on the characteristics of the plastic resin, specific gravity of tank contents, tank size and configuration, exterior support and wall thickness of the tank.

Temperature cycling will shorten tank life. The impact resistance of most rotomolded tanks declines at low temperatures. Cross-linked high-density polyethylene retains much of its impact resistance in low temperature applications.

Ultraviolet (UV) Stabilization
Plastics are attacked and deteriorate when exposed to direct sunlight. When plastic tanks absorb the sun's ultraviolet light, the UV energy excites the polymers' chains, causing them to break. The effects are discoloration, embrittlement and eventual cracking. Elevated temperatures and oxygen tend to accelerate the deterioration. Those NALGENE tanks listed as suitable for outdoor service are protected from UV attack by: coloring or pigmenting and/or adding internal stabilizers which preferentially absorb or dissipate the UV energy. Shading tanks from the sun will also prevent deterioration.

> **For assistance** in selecting the appropriate tank for a specific application, see the Tank Resin Selector Guide (pages 4 and 5) or contact NALGENE Industrial Products Group at (716) 586-8800.

NaOCl

Storage of Sodium Hypochlorite in Polyethylene Tanks
Some concerns have been expressed to Nalge Company regarding the storage of sodium hypochlorite in NALGENE polyethylene tanks.

Although polyethylene storage tanks have been used for storage of sodium hypochlorite in the field for many years, there have been premature failures in very specific locales. We have reviewed all data available on the chemistry and technology of sodium hypochlorite storage, and we have the following information:

Sodium hypochlorite (NaOCl) has no direct effect on polyethylene. This has been confirmed by resin manufacturers. It is suspected though, that *contaminated* sodium hypochlorite does cause accelerated deterioration of polyethylene tanks when stored over a period of time. Contamination such as trace metals, e.g. iron, copper, etc., which may be generated from pumps, plumbing, fittings, etc., or a poor quality (trace contamination) sodium hypochlorite shipment, can cause brittleness and cracking of the polyethylene tanks.

We feel the main contributor to premature failure of polyethylene storage tanks is contamination; the presence of sunlight catalyzes/accelerates the rate on attack of polyethylene. Nalge Company recommends the following points for storage of sodium hypochlorite in polyethylene tanks:

- Heavy-walled tanks should be used
- Only black tanks should be used
- Preferred material is cross-linked polyethylene (XLPE)

We recommend the following steps to be taken by the end user:

- Flush/clean tanks periodically to remove contaminants, deposits
- Check quality of received NaOCl (chemical analysis/purity)
- Check plumbing, pumps and delivery methods for materials of construction
- Protect non-black tanks from sunlight

We wish to emphasize that *non-contaminated* sodium hypochlorite storage in polyethylene is an acceptable and compatible combination. It appears that cracking and premature tank failures occur only when *contaminated* sodium hypochlorite is contaminated with trace amounts of metals and subjected to sunlight.

FDA Regulation
The resins used in NALGENE low-density and high-density polyethylene tanks comply with U.S. Food and Drug Administration Regulation 177.1520. These tanks may be used with the following kinds of food products:

- Nonacid, aqueous products; may contain salt or sugar or both (pH above 5.0)
- Dairy products and modifications: oil-in-water emulsions, high or low fat
- Moist bakery products with surface containing no free fat or oil
- Dry solids with the surface containing no free fat or oil (no end-test required) and under all conditions of use as described in Table 2 of FDA Regulation 177.1520 except for condition A — high-temperature heat sterilization (e.g., over 100°C)

The resin used in NALGENE PVDF tanks complies with FDA Regulation 121.2593.

Plastic Products For Biotechnology
Knowing whether a plastic is toxic to cell cultures is critical to biotechnology production. To test for cytotoxicity, Nalge submitted representative molded resin samples to an independent laboratory.

Samples were evaluated utilizing an MEM Elution Procedure, utilizing a W.I. 38 cell line. This is a standard cytotoxicity test for pharmaceutical, medical devices and ophthalmic products (though it typically utilizes an L929 cell line.)

Resins Non-Toxic To Cell Cultures

Resin	Color	Product
Cross-Linked High-Density Polyethylene (XLPE)	Natural	Tanks
High-Density Polyethylene (HDPE)	Natural	Tanks and Carboys
Low-Density Polyethylene (LDPE)	Natural	Carboys
Polypropylene (PP)	Natural	Carboys
Polyvinylidene Fluoride (PVDF)	Natural	Tanks

Contact Nalge Technical Service for details.

AIRVAC®

VACUUM SYSTEMS

PROTECTING AND CONSERVING
OUR WATER RESOURCES

VACUUM SYSTEMS

INTRODUCTION

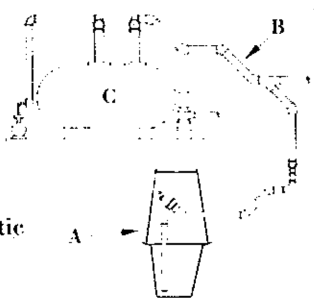
One of the major concerns throughout the world is how to protect and save our environment for future generations. Protecting and conserving our air and water resources has become a leading priority of mankind.

In many parts of the world, droughts are expanding at an accelerated rate, creating severe hardships. Presently, there is enough evidence to indicate that conservation measures of our precious water resources must accelerate if we are going to have adequate water supplies as we enter the next century.

The use of vacuum to collect and transport sewage, wastewater and other liquids through a piping network to a discharge point is a technology that is growing quite rapidly throughout the world. AIRVAC®, the world leader in vacuum sewage collection systems, has been at the center of this expanding technology.

SYSTEM DESCRIPTION

A Vacuum Collection and Transport System consists of three main components: (A) the Interface Valve/Sump, (B) the Vacuum Piping and (C) the Vacuum Station.



Liquid flows by gravity to a collection sump. At a preset volume level a pneumatic signal is sent to the controller which opens the valve. The collected liquid is drawn through the vacuum piping by a pressure differential at an average of 15 to 18 feet per second.

The liquid is transported to the Vacuum Station which consists of a collection tank, vacuum pumps (2), control panel and transfer pumps (2). When the collection tank fills to a predetermined level, sensors activate one of the transfer pumps which, in turn, transports the liquid to a point of discharge or treatment.

APPLICATIONS

Since the first patent for Vacuum Sewer Collection Systems was issued in Germany in 1886 the primary application for Vacuum Transport Systems has been in Residential Communities. However, over the years a variety of applications have been developed. Following is a partial list of applications now in use.

Residential
Rural Communities
Municipal Developments
Private Developments
Lake Communities
CSO Separation
Gravity Sewer Replacement
Waterfront Communities
Houseboat Communities
Mobile Home Parks
Temporary Sewage Collection

Industrial
Plant Sewage
Plant Wastewater
Processing Liquids
Condensate Liquids
Exhaust Fluids & Gases
Hazardous Wastes
Landfill Leachate
Storm Run-off Containment

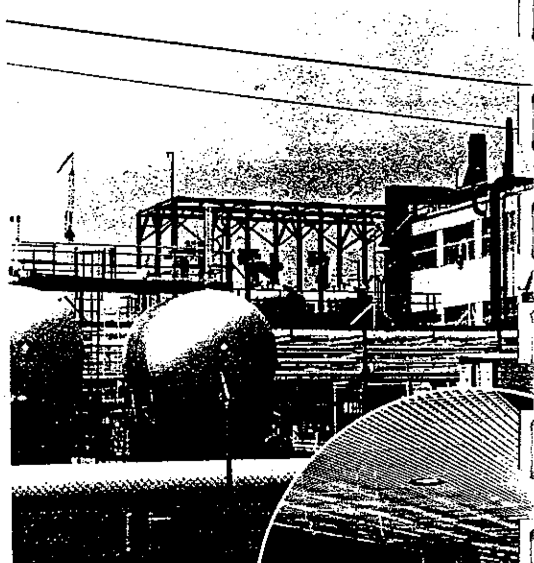
Commercial
Supermarkets
Airports
Prisons
Shopping Centers
Office Buildings
Hospitals
Light Industry
Schools

Transportation
Trains
Train Stations
Planes
Ships

Recreational
Marinas
Ski Resorts
Campgrounds
Portable Restroom Trailers
Individual Portable Toilets

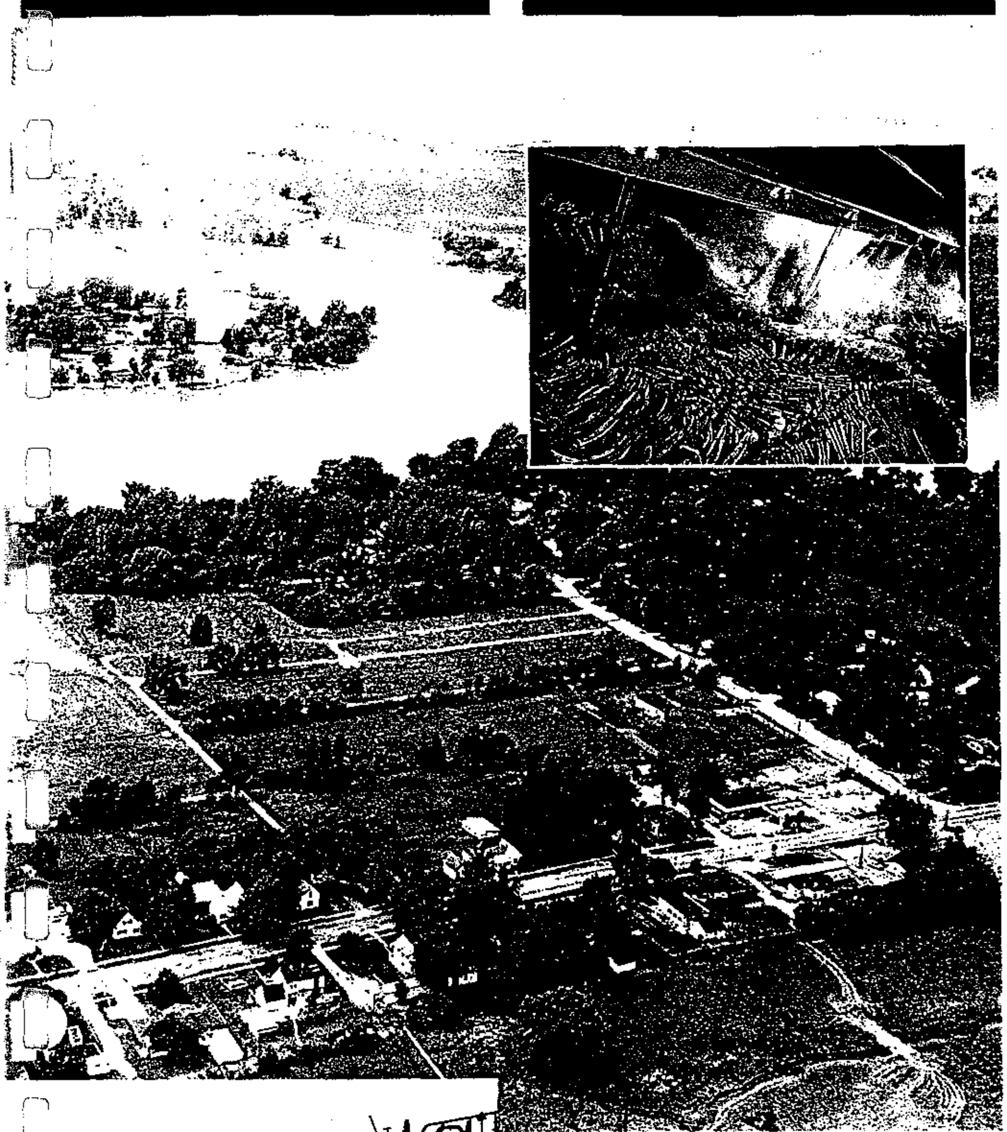
► ***Supermarkets*** *(inset)* *Vacuum Systems are used in supermarkets to remove condensate and washdown water from refrigeration units and to discharge wastewater from floor drains. A major advantage of this application is the ability to rearrange the piping network to a different configuration without regards to fixed gravity floor drains.*

► ***Residential Communities*** *The major use of Vacuum Sewer Systems has been in residential communities where Conventional Gravity Sewers may prove to be expensive. Rock, high water tables, unstable soils and flat or hilly terrains contribute to high construction costs. Where such conditions exist, Vacuum Sewers have been installed at a cost savings of up to 60 percent over Gravity Sewers. The largest AIRVAC® Residential Vacuum Sewer System in the United States has approximately 5000 connections.*



► ***Train Stations*** *Recent federal regulations require that all passenger train cars must have holding tanks for sewage. This has created a need for an effective method to remove the sewage from the holding tanks at the train stations. A Vacuum Sewage System offers a quick and efficient way to remove the sewage and discharge it to a Municipal System.*

ADVANTAGES



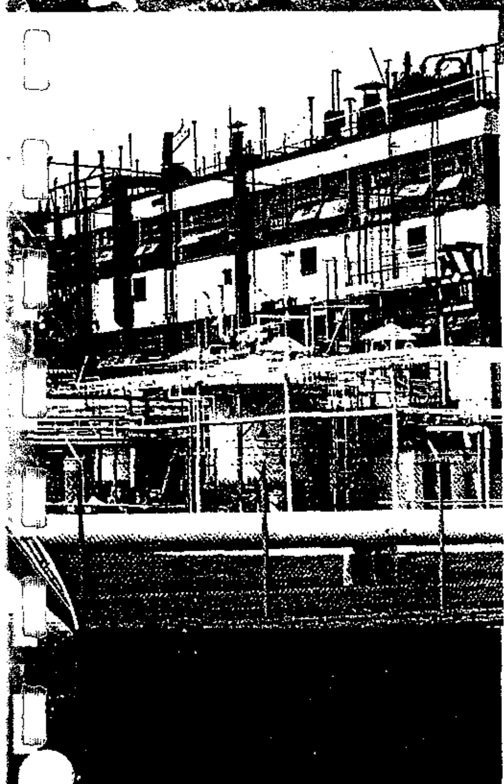
Advantages of Vacuum Systems

Municipalities. Developers and Industrial Firms are looking for the most cost effective method available to comply with State and Federal Regulations. In many situations, Vacuum Transport Systems will offer the most economical solution.

Of particular importance to the environment is the elimination of exfiltration in Vacuum Transport Systems. Since it is a sealed system under negative pressure, there is no possibility of pollutants leaking into the surrounding ground water tables.

Other advantages include:

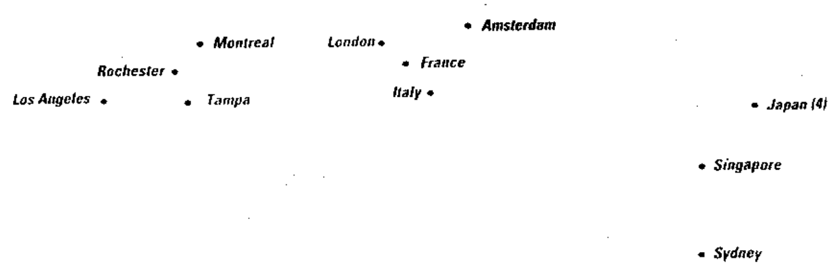
Eliminate infiltration
Use narrow and shallow trenches
Use small diameter plastic pipe
No electrical hookups at valves
Lift capabilities up to 30'
One person can service system
Eliminate gravity manholds
Standby generator for long power outages
Minimize health risks to servicemen
Multiple homes served by one valve
Control bacteria contamination
Flexibility to reroute pipe above ground
Eliminate need for dual piping
Reduce construction time
Eliminate odors due to closed system
High velocity prevents plugging
Minimize environmental impact
Reduce water consumption
Low O & M cost
Low installation cost
Meets explosion-proof requirements



◄ ***Industrial Plants***
Vacuum Sewer Systems have been used to collect sewage throughout plant complexes since 1972. Other applications are now coming into use such as condensate collection and the transportation of processing wastewater which can contain hazardous chemicals.

AIRVAC® WORLDWIDE SALES OFFICES

AIRVAC® markets products and technology on a worldwide basis through a network of Factory and Manufacturers' Representatives and Licensees. These Vacuum Sewer Systems are currently in operation in the United States, Canada, Mexico, England, Holland, France, Australia and Japan. AIRVAC® is a division of the Ebara Group, an international multi-billion dollar environmental equipment manufacturer.



RESEARCH AND DEVELOPMENT

AIRVAC® research engineers are constantly working on the development of new applications and products for Vacuum Systems as well as to expand the field of vacuum hydraulics. To assist in these activities, AIRVAC® has constructed a Vacuum Transport System test rig at its Research Center. This rig consists of 3000 feet of plastic pipe (up to 8" diameter), numerous Vacuum Interface Valves, and multiple Vacuum Stations. A recent development by AIRVAC® research engineers in vacuum hydraulics is a method to increase the lift capability of a Vacuum Transport System in excess of 30 feet.

APPLICATION ENGINEERING

AIRVAC® application engineers are available to work with consulting engineers to provide conceptual design recommendations and related budget estimates. AIRVAC® field technicians are available during the installation of Vacuum Transport Systems to assist the contractor and project engineer in the proper installation of the system and to assist in the initial start-up. Factory training schools are held on a regular basis to train system operators.

MANUFACTURING

AIRVAC® manufactures and assembles 1 1/4", 2" and 3" Vacuum Interface Valves and Controllers along with other related system components at its plant in Rochester, Indiana. Prepackaged Vacuum Stations are assembled at the factory, rigidly tested and shipped to the project site for immediate installation. A computerized network coordinates incoming parts, production assembly and outgoing shipments to insure that the materials arrive on time at the construction site.

QUALITY CONTROL

The objective of the AIRVAC® Quality Control Department is to seek the highest standard of quality possible in the Industry. This objective is attained through document and design control, receiving inspection, process and procurement control and the use of standard operating instructions. A system of accountability and traceability has been established to provide quick internal or external response to any problem which may arise. AIRVAC® is now working toward certification to the accepted worldwide quality system standard ISO 9000. These standards have been adopted in the European Community and most industrialized countries.

If you would like more information about AIRVAC® Vacuum Systems or would be interested in obtaining a budget estimate for a specific project, please feel free to contact our office in Rochester, Indiana.

AIRVAC®

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VACUUM SEWER SYSTEMS

Due to the high costs of conventional gravity sewer systems and more recently the growing concerns of future water shortages, the use and acceptance of alternative wastewater collection systems continue to expand throughout the United States.

At present, the design engineer can choose from three alternative wastewater collection systems. The available options are vacuum sewers, pressure sewers and small gravity sewers. The first two were introduced in the United States in the early seventies whereas small gravity sewers were introduced in the mid-seventies.

HISTORY OF VACUUM SEWERS

It is well known that gravity sewers have been in use for over 2,000 years dating back to early Roman societies. Of the three alternative sewer systems in use today, the oldest concept is vacuum sewers.

The original patent for vacuum sewers was issued in Germany in 1886 to an American citizen, Captain Charles Liernur. However, it was not until the early sixties that a Swedish engineer, Joel Liljindahl, invented a vacuum sewer transport system utilizing a vacuum toilet. This design actually discharged black water (sewage) and gray water (bath, sink, etc.) from the residence by two different pipes.

In 1971, The AIRVAC Division of Burton Mechanical Contractors was established in Rochester, Indiana, and they began developing a vacuum sewer system to collect all wastewater from the home through one discharge pipe. The one pipe vacuum sewer system has been proven in operation and today is the accepted method to design vacuum sewers for land applications.

SYSTEM DESCRIPTION AND OPERATION

A vacuum sewer system consists of three major components: the valve pit package, vacuum service lines, branch lines and mains and the vacuum collection station.

Raw sewage flows from the home usually through a 4" pipe by gravity to a valve pit package located in the yard, a public right-of-way or in the roadway. When approximately 10 gallons of sewage flows into the sump basin, a pneumatic signal is sent to the controller mounted on top of the interface valve which opens the valve by vacuum. When the 10 gallons of sewage is drawn into the vacuum lines, the interface valves closes. Sewage is propelled through the vacuum lines at a velocity of 15-18 feet per second by energy created from a sewage/air mixture commonly referred to as 2 phase flow. The mixture and energy created would be similar to foam produced by shaking a bottle of soda. Sewage is drawn to the collection tank by the vacuum pumps. As the tank fills, sensing rods in the tank activate the sewage pumps which in turn pump the sewage to a gravity interceptor or treatment plant.

VALVE PIT PACKAGE

This package consists of a 3" interface valve, pneumatic controller, fiberglass valve pit and sump basin with fiberglass sump cover and valve pit cover. The valve pit cover can be non-traffic or traffic bearing utilizing plastic, steel, cast iron or aluminum materials.

Valve pits are 27" to 36" diameter tapered by 42" in depth. Sump basins are 30" to 16" diameter tapered by 30" in depth for homes with no basements. Sump basins with 54" depth are available for homes with basements. Overall depth of valve pit and sump basin are 72" or 96" depending on the depth of the sump basin.

One valve pit package can handle up to four residential homes or 12 condos or apartment family units. A 3" interface valve has a capacity of 30 gpm and will pass a 2 7/8" spherical solid. A 2" interface valve is available for industrial or marina applications.

If more capacity is required, the valve can be installed in a concrete buffer tank to provide additional storage capacity and a duplex valve system can be furnished to discharge higher flows. Since the interface valve is pneumatically operated, no electrical power is required anywhere throughout the collection system except at the collection station. If the valve pit floods with ground water, the interface valve will continue to function indefinitely.

VACUUM SERVICE LINES, BRANCH LINES AND MAINS

Vacuum lines and mains are laid in narrow trenches just below the frost line in a saw tooth profile for grade and upgrade transport and follow grade on down grade transport. A 0.2% slope is normally maintained between lifts. Maximum static lift and friction loss is 13 feet measured from the valve pit package to the collection station.

Service lines are 3" schedule 40 or SDR 21, gasketed or solvent weld, PVC pipe. Branch lines and vacuum mains can be 4", 6", 8" or 10" pipe, gasket or solvent weld PVC pipe. A 3", 4" and 6" pipe can be either schedule 40 or SDR 21, but 8" and 10" pipe should be SDR 21 only. Since there is no exfiltration with vacuum sewers, some states will allow water and sewer pipe to be laid in the same trench.

Valve pits have been installed up to three miles from the collection station utilizing a saw tooth profile design. Division valves of the eccentric plug type are recommended approximately every 1,500 feet in the vacuum mains and at each branch line connection. Division valves are used to isolate and locate a failed interface valve or a leak in the vacuum lines.

VACUUM COLLECTION STATION

The station is similar to a conventional sewage lift station with the addition of two vacuum pumps. Sewage is drawn through the vacuum mains into the enclosed collection tank under vacuum. As the sewage rises in the collection tank, sensing rods activate the sewage pumps. Sewage is pumped through a force main to the treatment plant.

Vacuum pumps can be liquid ring or rotary vane type. Sewage pumps are conventional flooded suction, dry pit, horizontal or vertical type. Progressive cavity pumps can be used in high head applications.

Vacuum tanks can be horizontal or vertical steel or fiberglass construction. Normally three or four vacuum mains discharge into the collection tank. A spare sewer inlet can be furnished for future expansion.

The collection stations are furnished with automatic telephone dialers connected to the system operator through a beeper, utility office, operators residence, etc. A combination of numbers can be programmed. If there is a loss of vacuum or other service requirements, the operator is alerted by a phone call. The homeowner is not involved in an alarm condition.

In most federally funded projects, a standby generator is required. If there is a long power outage, the sewage collection system can remain in operation until power is restored.

Collection station equipment can be prepackaged and mounted on steel skids at the factory and shipped to the jobsite if peak flow is below 125 gpm. In a prepackaged station, the floor plan would be approximately 16' by 22'.

If the peak flow exceeds 125 gpm, the collection station would consist of a two story custom designed building. The basement floor will contain the sewage pumps and collection tank while the first floor will contain the vacuum pumps, reserve tank, control panel and standby generator. The reserve tank is used for extra storage and to prevent condensation entering the vacuum pumps. Floor plan size would be about 20' by 24'.

Another option used frequently in Europe and Canada is to install all equipment in an underground collection station. To date, only one system has been installed in an underground collection station in the United States.

APPLICATIONS

The primary applications for vacuum sewers are rural communities, recreational lake developments and subdivisions being constructed in the outlying districts of larger towns and cities.

Other potential land applications, include marinas and industrial systems consisting of the collection and transportation of sewage and processing water including hazardous wastes. Miscellaneous applications would be shipboard such as cruise ships and navy vessels, commercial aircraft and trains. These latter applications normally utilize vacuum toilets as an integral part of the system.

INSTALLATION

Vacuum sewer systems can be installed with a trencher, backhoe or trackhoe. Pipe profiles can be accurately laid with the use of a laser beam.

A portable vacuum test rig can be furnished with each project. The purpose of the test rig is to vacuum test the lines installed each day. The test consists of applying 24" of mercury vacuum pressure, allowing to stabilize for fifteen minutes and then not lose more than 1% vacuum pressure per hour during the test period.

AIRVAC furnishes a field supervisor on each project for whatever time it takes to complete installation. The purpose of the field supervisor is to act as advisor to the project engineer and contractor.

ADVANTAGES OF VACUUM SEWERS

The major advantages of vacuum sewers over gravity sewers, pressure sewers and small gravity sewers is the elimination of exfiltration, continued oxygenation of sewage and the ability to keep a vacuum sewer system in 100% working order year in and year out.

With the event of the greenhouse effect, there is a growing emphasis on protecting our valuable groundwater resources. Since there is no exfiltration with vacuum sewers, there is little concern of sewage leaking into the water tables. On the other hand, gravity sewers, pressure sewers and small gravity sewers could be leaking sewage into the water tables for long periods of time undetected.

Since the vacuum sewer alarm system is designed to alert the operator to any problem within the system, repairs can and must be made within a reasonable time frame or additional problems could develop. On the other hand, components and the collection lines of gravity sewers, pressure systems and small gravity sewers may be deteriorating over long periods of time, but could continue to operate for a number of years before repairs would become critical and much more costly.

The major advantage of vacuum sewers over gravity sewers is lower cost, especially when rock, high water tables, flatlands or hilly terrain are present. This is primarily due to the elimination of deep trenches and use of smaller diameter pipe with vacuum sewers.

Important advantages of vacuum sewers over pressure sewers is the elimination of electrical hookups at the individual homes, elimination of antisiphoning and air release valves, connecting up to four homes to the valve pit package, availability of a standby generator and the elimination of grease and sand buildup in the sump.

In comparison to small gravity sewers, the major advantage of vacuum sewers is the elimination of the septic tank and potential odor and corrosion problems.

LIMITATIONS

There are three general limitations in using vacuum sewers. One is the limitation of head capabilities (maximum 13') and another relates to the service demands of the system. When there is an alarm condition such as low vacuum resulting from a failed valve, the operator must respond within a reasonable period to correct the problem or the failed valve can effect other parts of the system. The third relates to systems under 50 homes. In these cases, vacuum sewers are usually not competitive to other alternative systems due to the added cost of the collection station.

CAPITAL COSTS

The cost of a vacuum sewer system, as with any other sewer collection system, will be depend on many factors. In most cases, the design engineer will perform a cost analysis of conventional gravity sewers versus one or more alternative systems. Terrain, water table depth, soil conditions, dwelling densities, etc. will all have an effect on costs.

If the terrain is natural for gravity, it is unlikely vacuum sewers will be competitive. However, in hilly terrain, high water tables, rock conditions, and flat lands, the vacuum sewer can provide savings of up to 50%. As an example, in the Ohio County, West Virginia, vacuum sewer project, a gravity system was bid at $2.1 million; whereas, the vacuum system was bid at $1.2 million. In the Queen Anne's County, Maryland, project, vacuum sewers were $7.4 million less than gravity sewers and $2.3 million less than pressure sewers. Vacuum sewers can also be cost effective when competing against the other alternative systems. The list price of a standard valve pit package is $1,438.20. This can be compared to the list price of a standard grinder pump package of $3,000.00 and up.

O & M COSTS

There has been some misconception that vacuum sewers generate high O & M costs. This has been proven to be untrue in actual field operations. The vacuum collection station containing the vacuum pumps and sewage pumps would require the same maintenance procedures as a pump station of similar horsepower and capacities.

It is recommended that the controllers be inspected every seven years and overhauled if required. The interface valves should operate up to ten years before overhaul is required. The cost of overhauling an interface valve and controller including labor would be less than $100.00 in comparison to a grinder pump of $400.00 to $600.00.

A preventative maintenance inspection of valve pits is recommended once a year. As for electrical costs, power for the collection station, when prorated to the number of dwellings, is comparable to power costs of a pressure sewer. As an example, in the Ohio County, West Virginia, project, the power cost averaged $0.66/connection per month.

SUMMARY

Although the concept of vacuum sewers has been around for 100 years, information about its application as a viable wastewater collection and transport system has not been widely promoted among consulting engineers, developers and regulatory agency personnel.

Due to educational efforts from several sources, this trend is beginning to change as more and more engineers become aware of the positive features of vacuum sewers and the performance of the systems that have been in operation since 1974.

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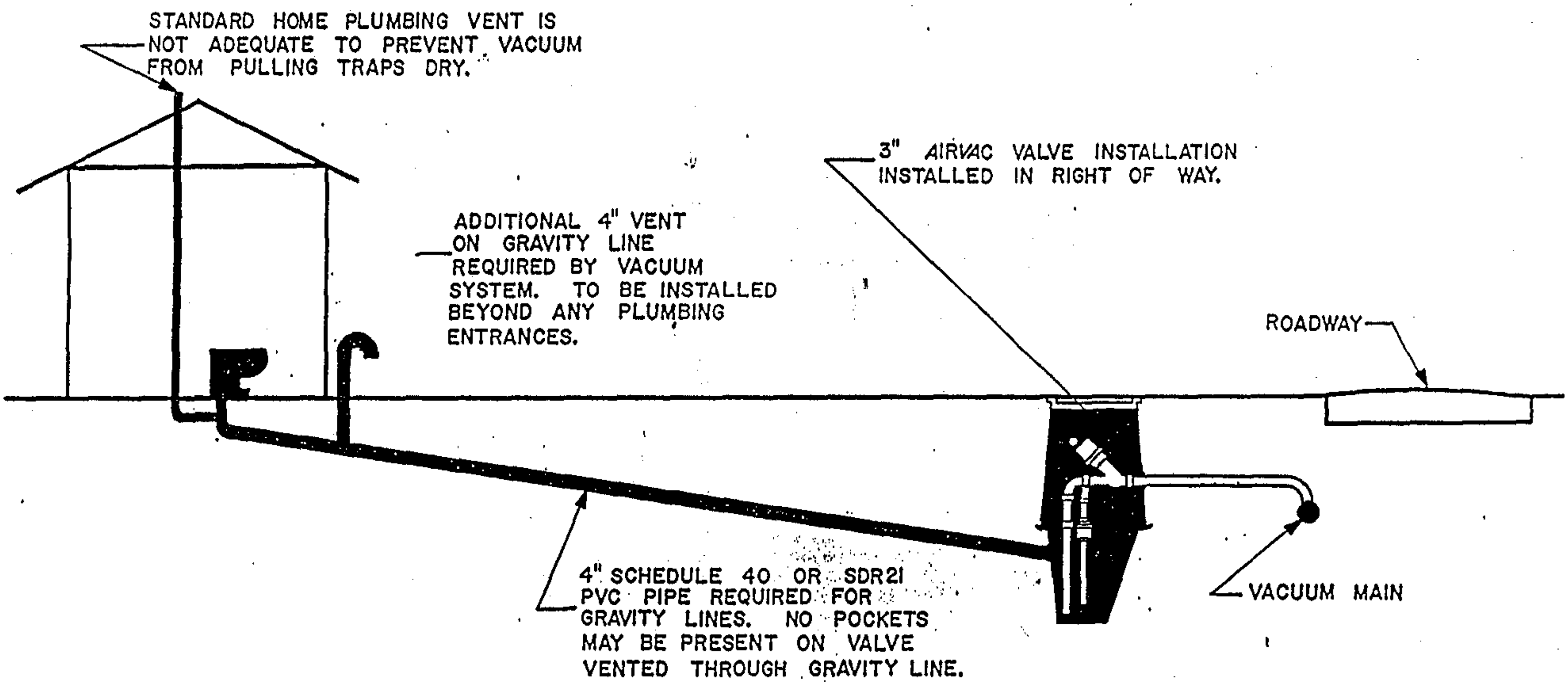
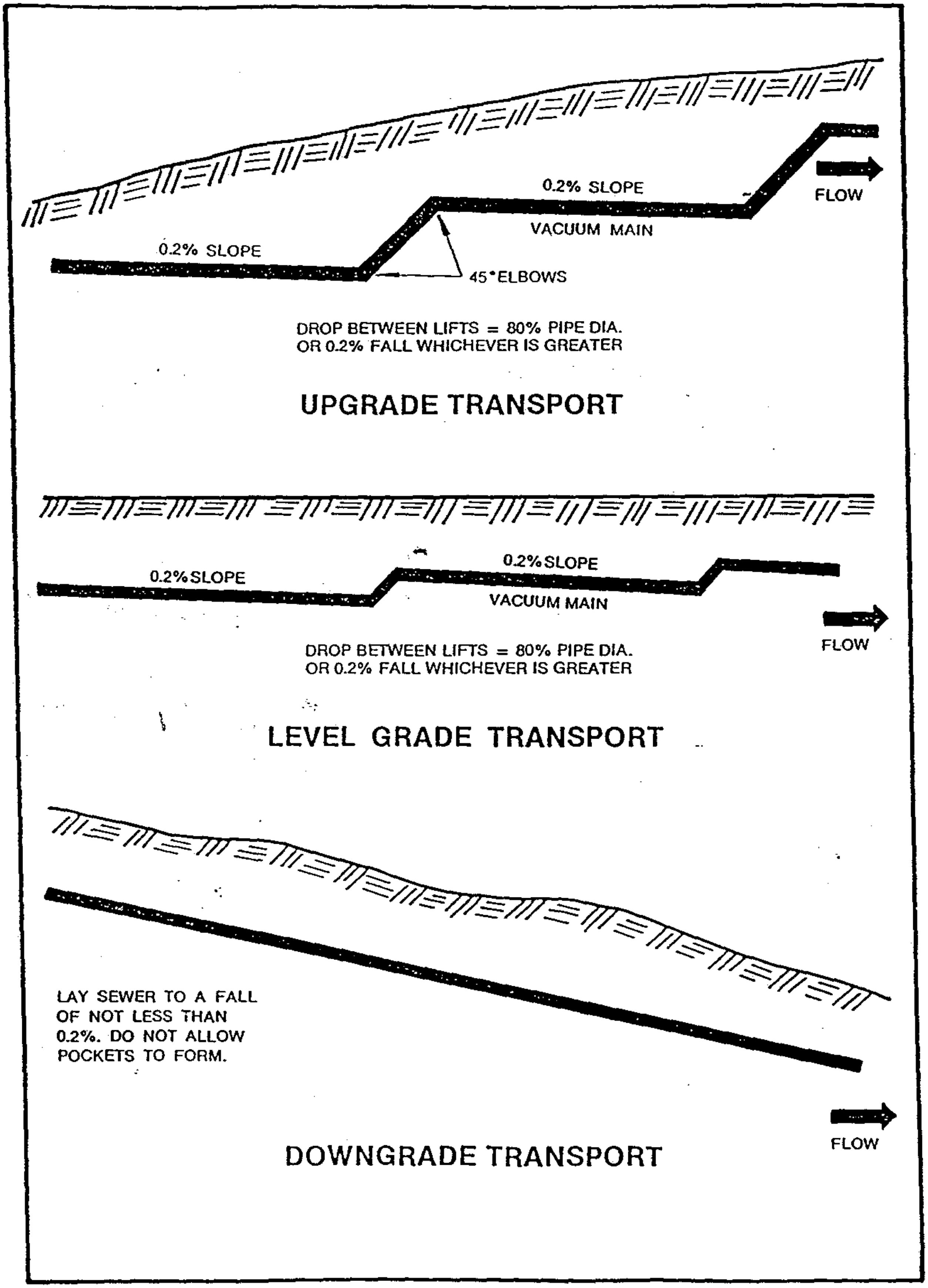
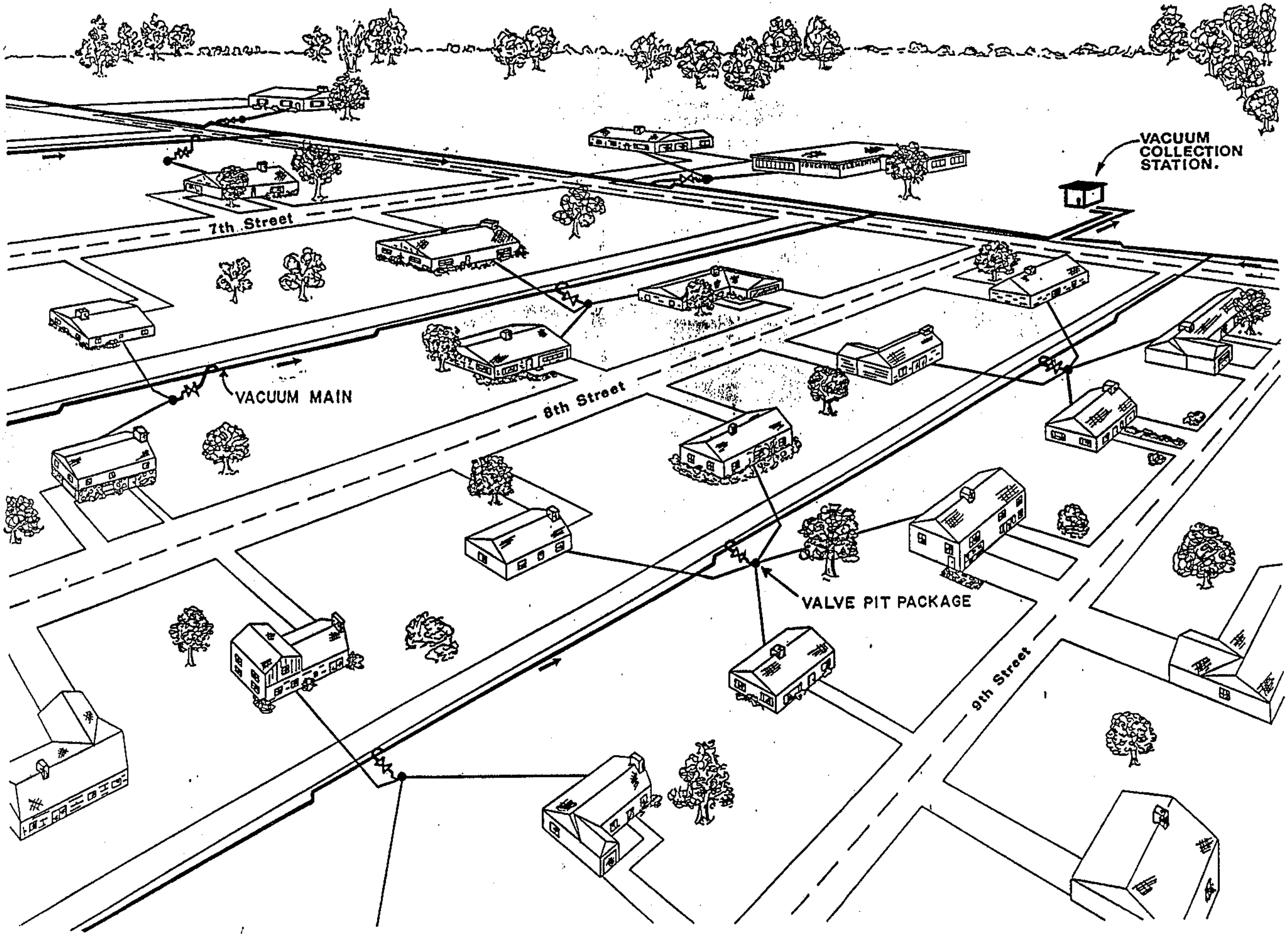
VALVE PIT PACKAGE





- VACUUM SEWER PROFILES

VACUUM SEW SYSTEM



VACUUM SEWER SYSTEMS
IN COMPARISON TO OTHER
SEWAGE COLLECTION SYSTEMS

Vacuum sewers are mechanized systems of wastewater transport. They utilize differential air pressure to create flow, as opposed to gravity-induced flow of conventional wastewater collection systems. In this respect, a vacuum sewer system is essentially a negative pressure system. However, there are considerable differences between vacuum or negative pressure transport and the technology of positive pressure transport. Consider the essential elements of the optional systems available to the design engineer today.

(a) To the homeowner a gravity system is an uncomplicated system consisting of a network of underground piping that flows continually downhill eventually arriving at some sewage termination point (Fig. 1). Indeed, where the topography is appropriate, some systems are that simple. However, unless the sewage is being allowed to outfall into a natural body of water, it must first empty into a pumping station (Fig. 2), from where it is pumped into a treatment facility. Generally, gravity systems are not that simplistic, and may need a number of lift stations along the way in order to avoid the deep trenching that would normally be necessary with flat or undulating terrain (Fig. 3). For this reason, many gravity sewer systems are really mechanized systems and not "natural" systems. Pipe sizes usually start at 8" diameter and get progressively larger.

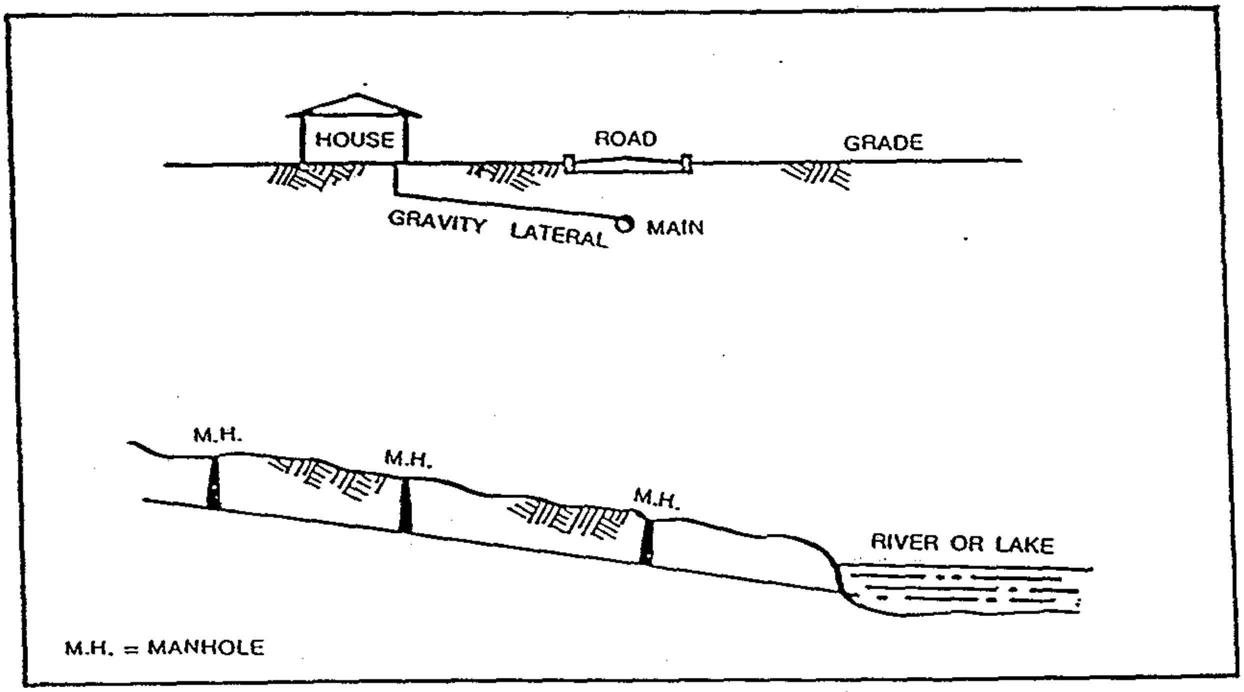
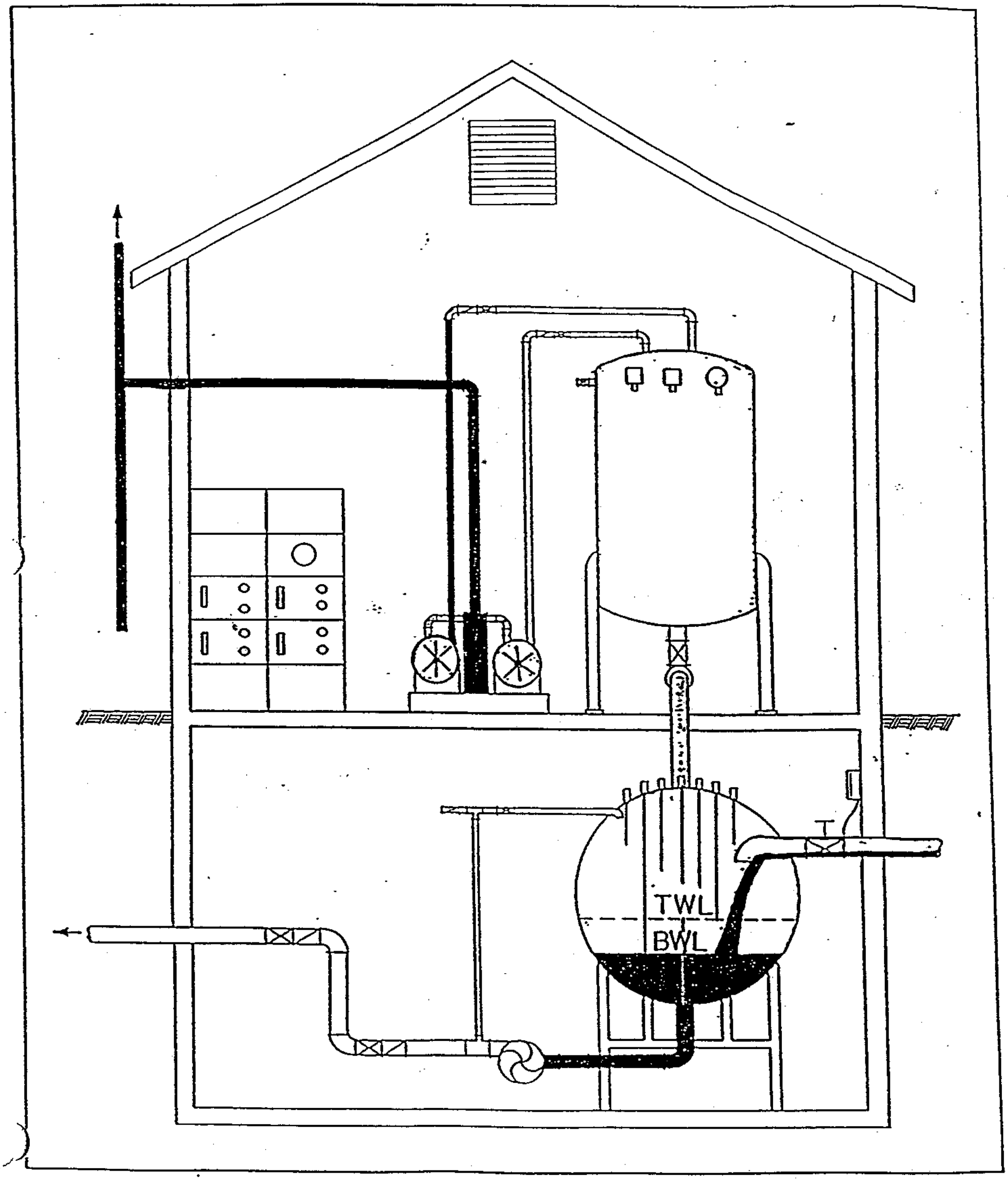


FIGURE 1 - CONVENTIONAL GRAVITY

COLLECTION STATION



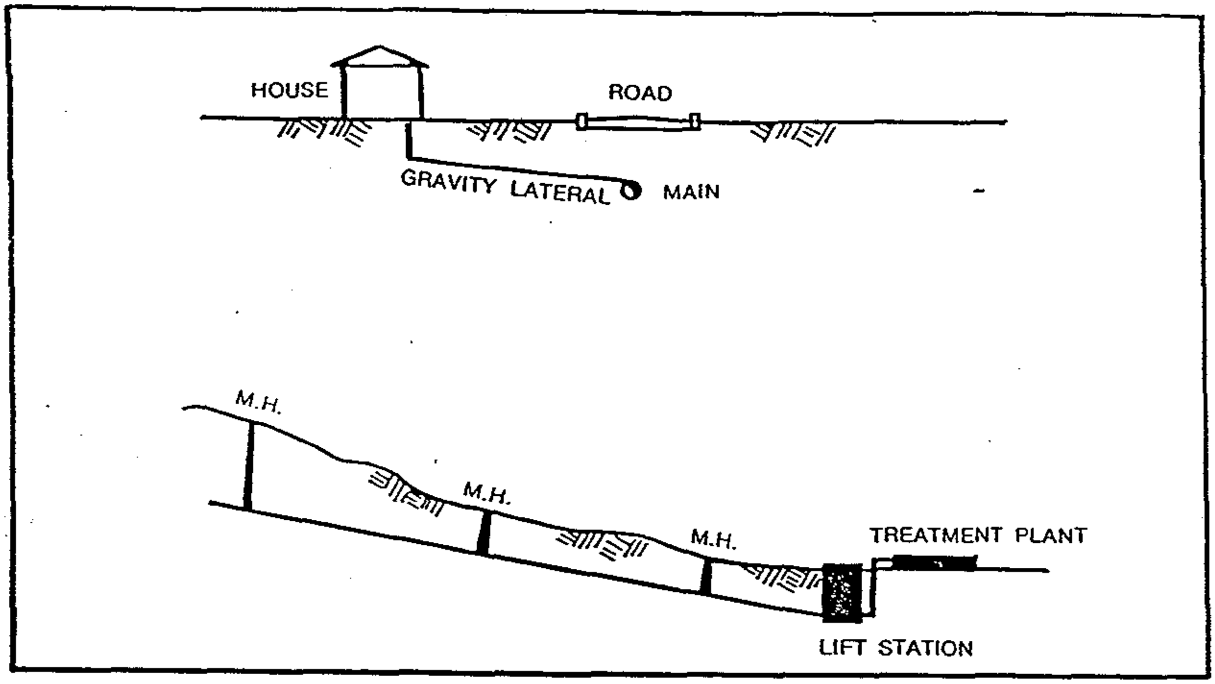


FIGURE 2 - CONVENTIONAL GRAVITY WITH LIFT STATION

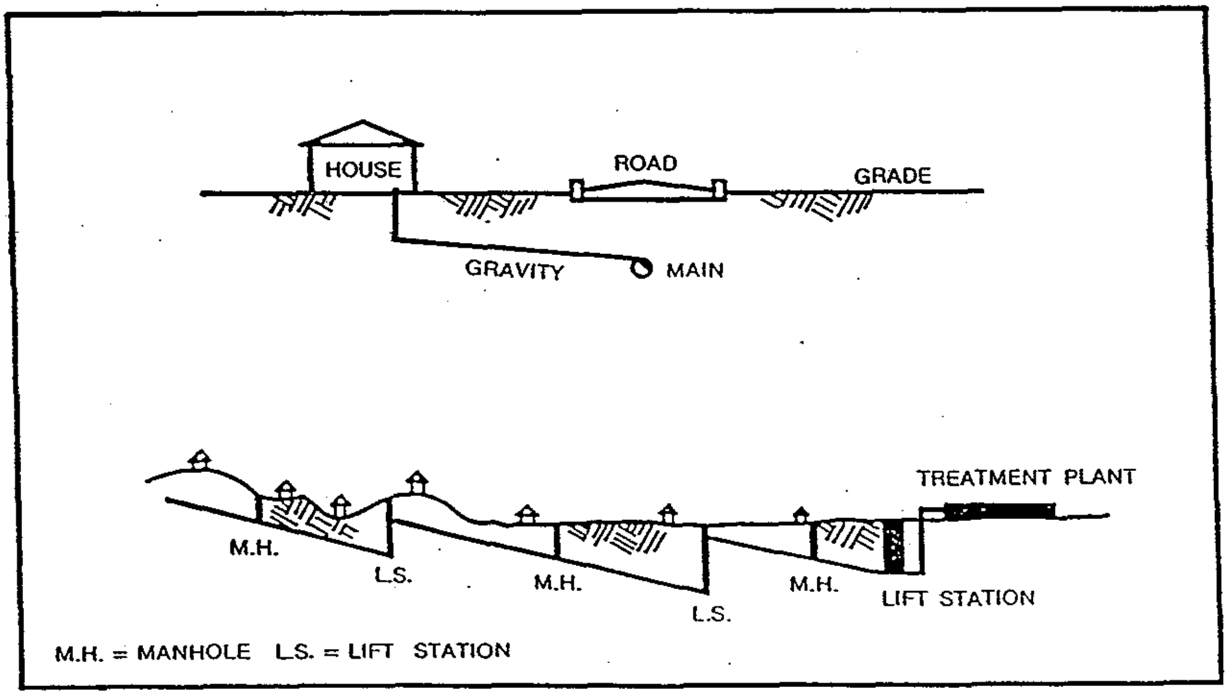


FIGURE 3 - CONVENTIONAL GRAVITY USING MULTIPLE LIFT STATION

(b) A variation of conventional gravity sewers are referred to as small gravity sewers. These systems utilize a septic tank to collect the settleable solids and grease. The septic tank effluent flows by gravity from the septic tank to small diameter gravity mains at the street (Fig. 4). If the ground is flat or hilly, pumping stations will be required as with conventional gravity sewer systems.

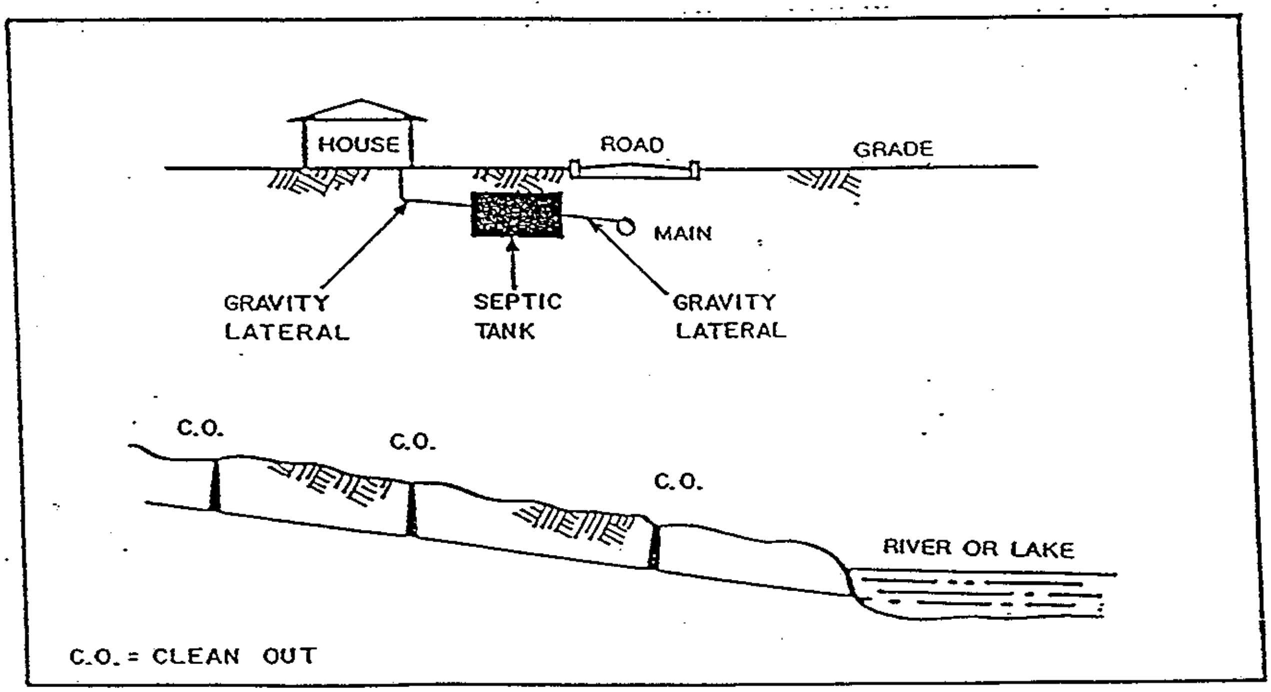


FIGURE 4 - SMALL GRAVITY SEWERS

(c) Pressure sewers eliminate the need to lay pipe to hydraulic grade lines. However, in this instance, a grinder or effluent pump is usually required at every sewage input point to pump sewage into the network of pressure collection mains (Fig. 4). The pressure mains eventually empty into a gravity manhole or treatment facility.

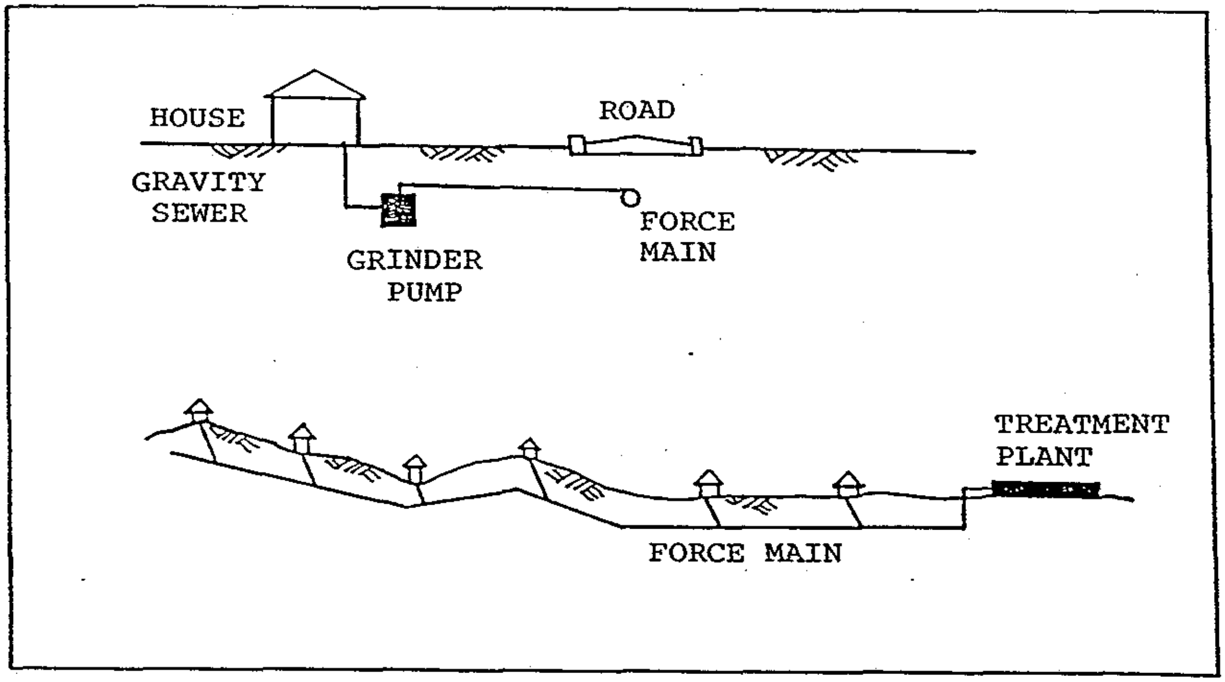


FIGURE 5 - PRESSURE SEWERS USING GRINDER PUMPS

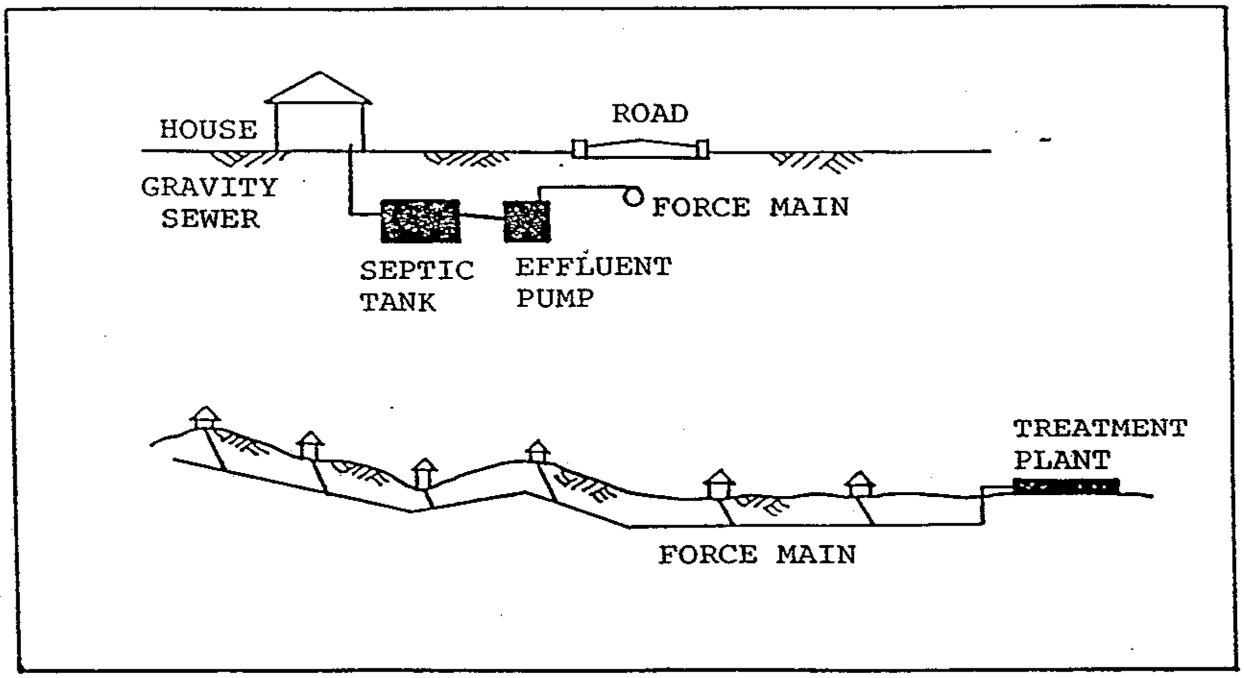


FIGURE 6 - PRESSURE SEWERS USING EFFLUENT PUMPS

The positive pressure sewer system may eliminate some or all lift stations of a gravity system and substitute small diameter plastic pipe for large diameter tile and concrete pipe. This is done at the expense in most situations of requiring electrically operated mechanical equipment at every sewage input point to the collection system.

(d) The vacuum sewer system (Fig. 7) requires a main collection station or pump station similar to that of the other systems. Unlike other systems, it also requires vacuum pumps at the collection station to maintain a vacuum in the collection mains feeding the station. The 3", 4", 6" or 8" diameter PVC collection mains are laid in a saw tooth profile. The system requires a normally closed valve at each sewage input point to seal the vacuum lines so vacuum can be maintained. The valve opens automatically when a given quantity of sewage has accumulated in the collecting sump, admits the sewage into the mains and then closes. This valve is entirely pneumatic in its control and operation. The differential pressure between local atmospheric pressure and the vacuum pressure on the immediate downstream side of the valve controls and operates the valve automatically.

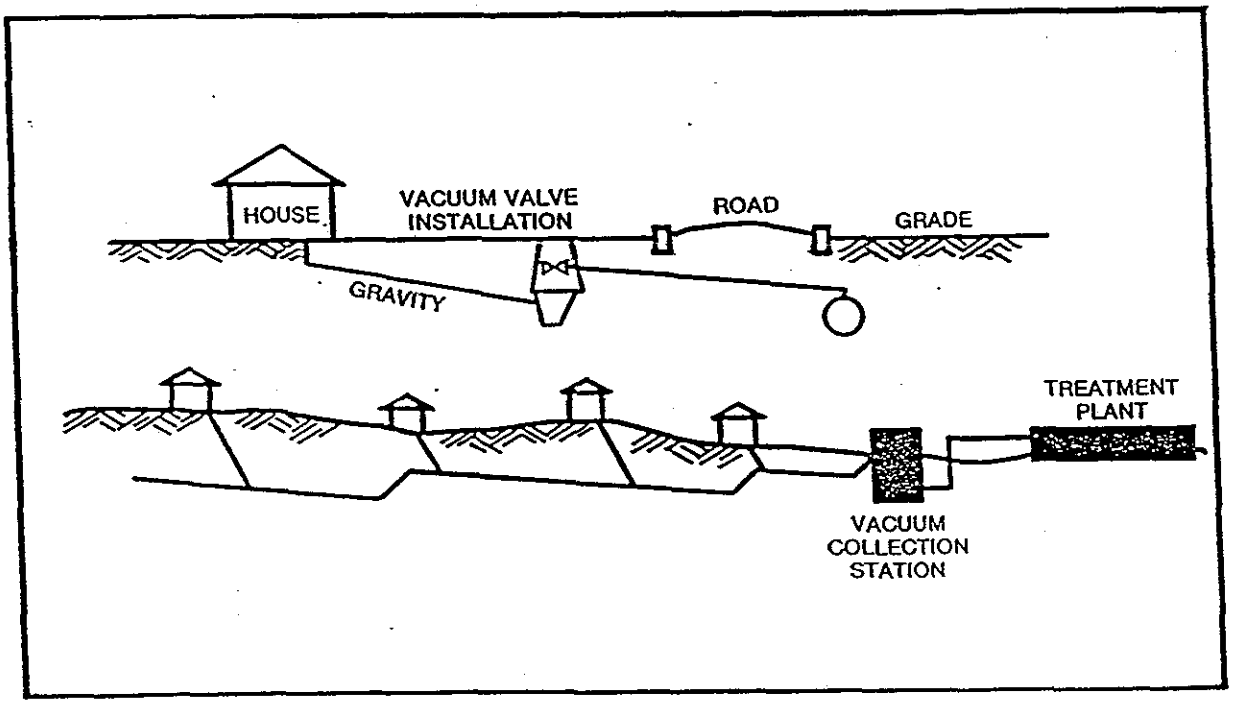


FIGURE 7 - VACUUM TRANSPORT

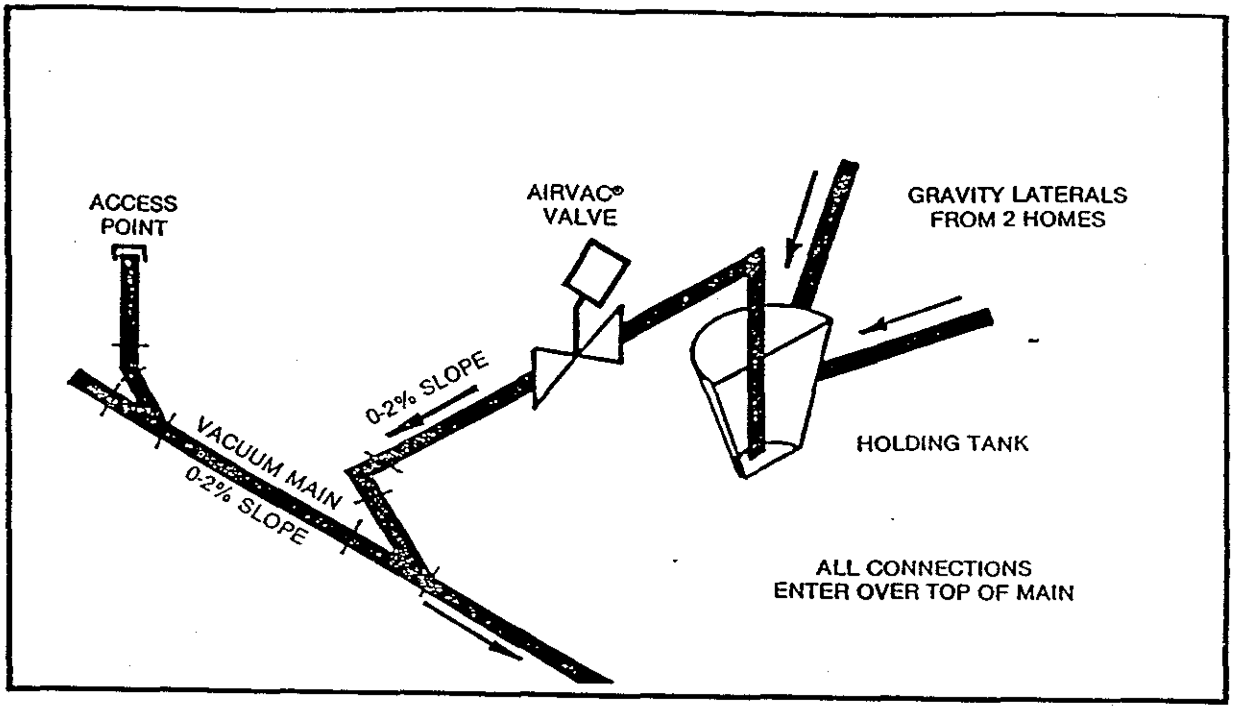


FIGURE 8 - ONE PIPE VACUUM SYSTEM

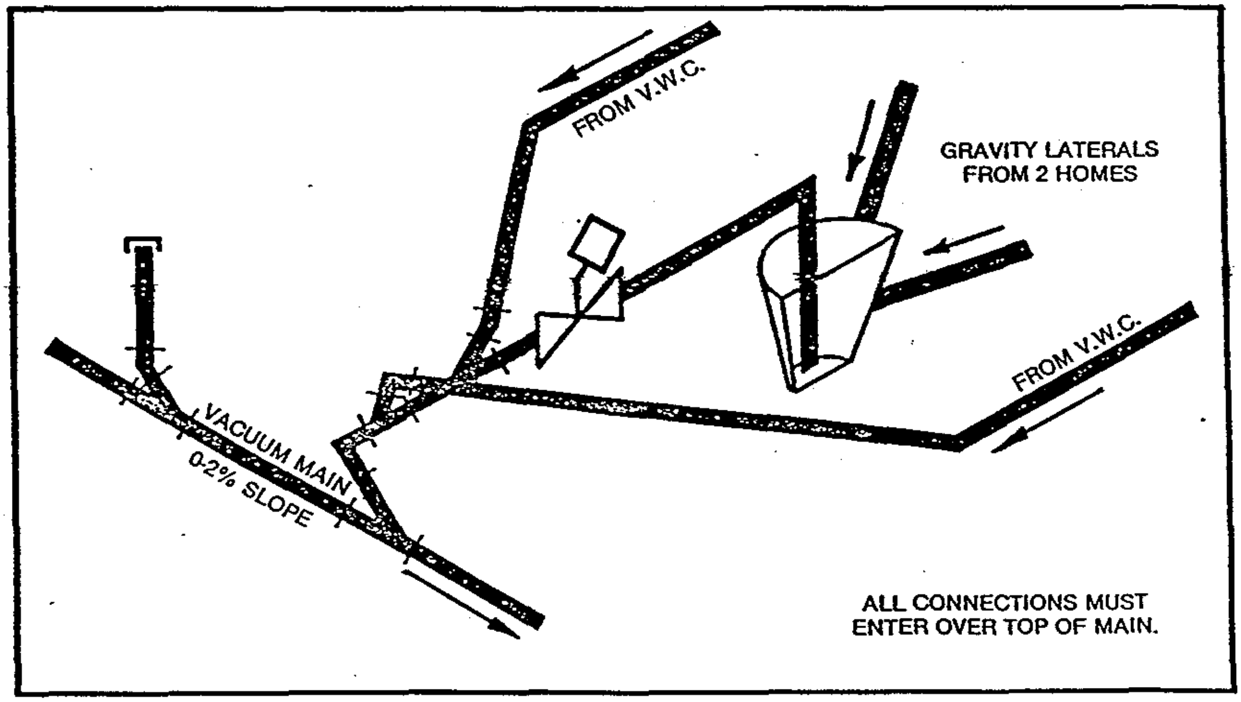


FIGURE 9 - ONE PIPE SYSTEM WITH VACUUM TOILETS

A vacuum sewer collection system closely resembles a water distribution system, only the flow is in reverse (Fig. 10). The analogy would be complete if the sewage valve was manually operated by the homeowner similar to a water faucet in the home. With proper design, equipment selection, installation and operation and maintenance, a vacuum sewer collection system can perform equal to a water distribution system in dependability.

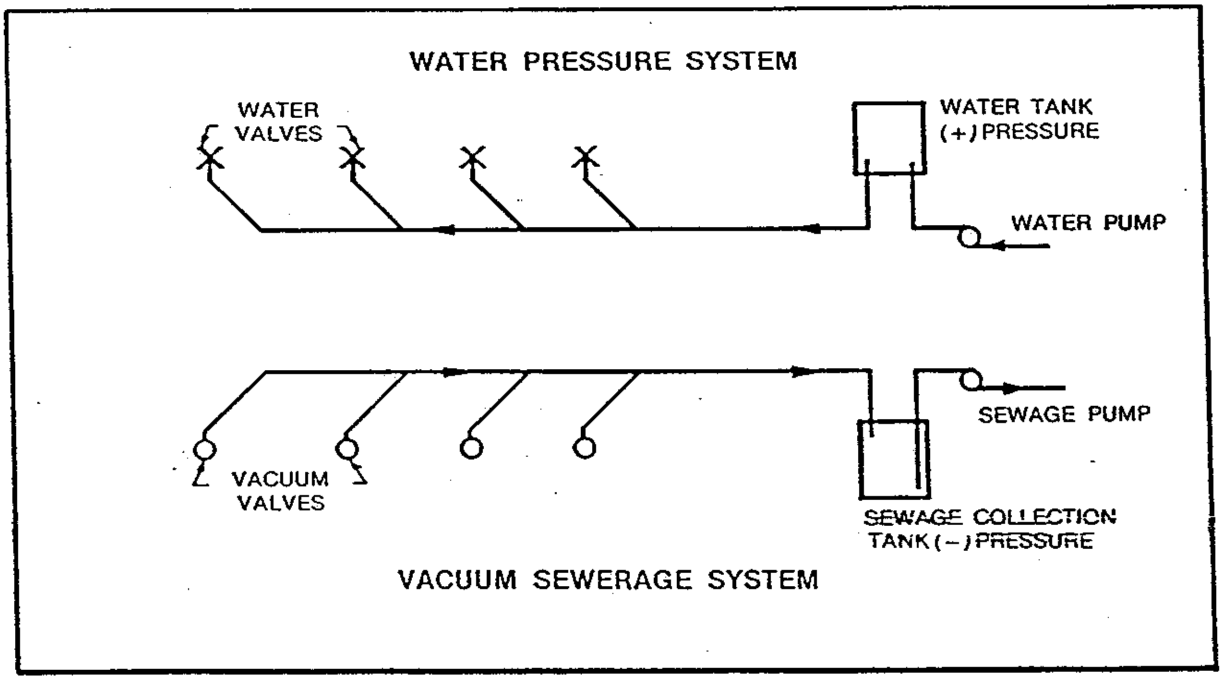


FIGURE 10 - WATER PRESSURE SYSTEM/SANITARY VACUUM SYSTEM

Vacuum sewer systems of various types have been used since 1882. Some of these early systems required special water closets and fixtures installed in the homes.

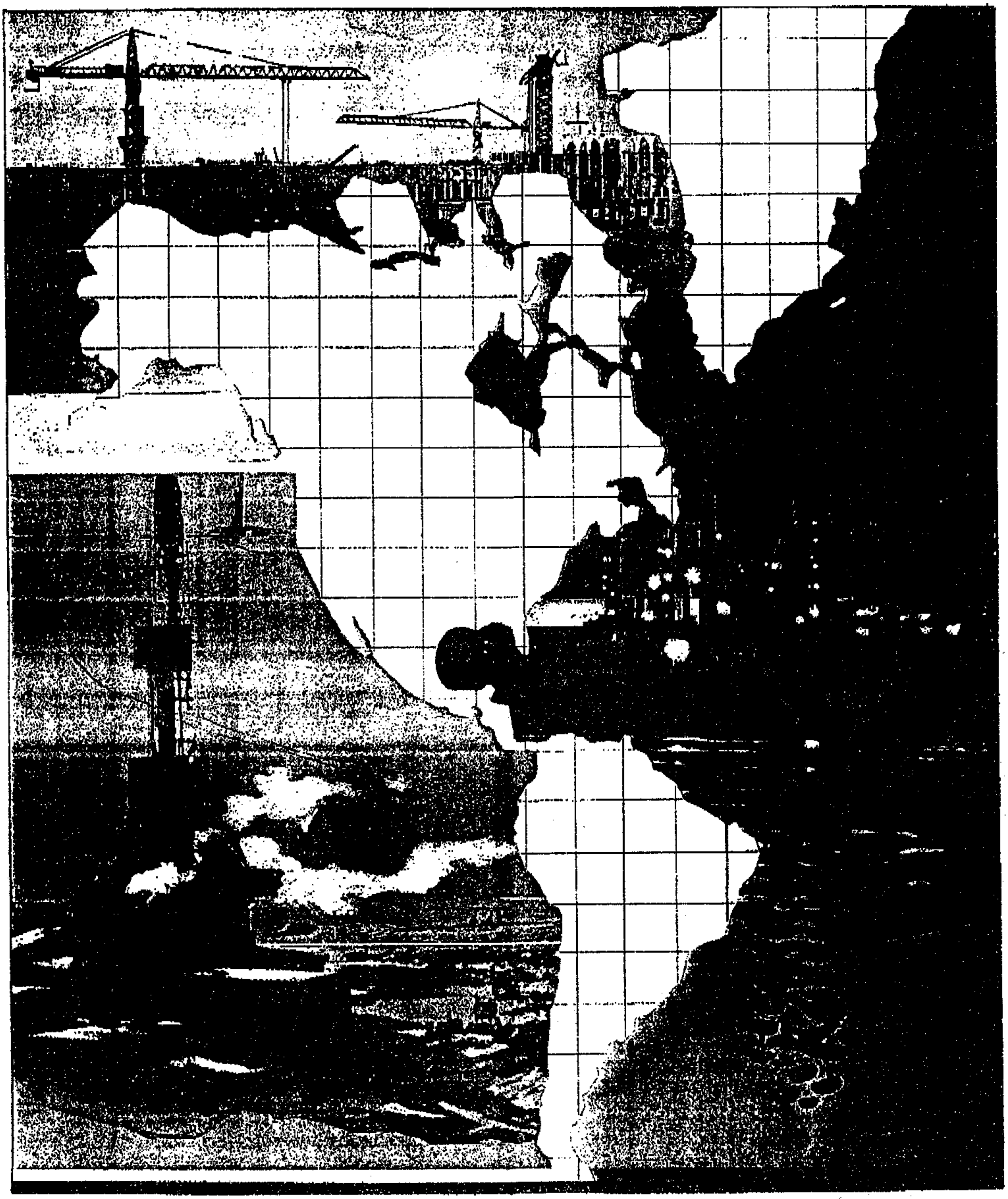
In 1970, the AIRVAC 3" valve was developed to collect the sewage from conventional plumbing fixtures installed within the homes. The valve is designed to pass any solids that will pass through U.S. made water closets. The AIRVAC valve is designed to operate indefinitely when its chamber or pit is flooded with groundwater.

A 2" model of the successful 3" valve was introduced in late 1982. This 2" valve is used for industrial applications, sewering campgrounds, marinas, as a urinal valve on ships and as a sump valve in vacuum collection stations.

Since 1970, the AIRVAC system has been effectively used in numerous applications including townships, schools, industrial complexes, comfort stations, private housing developments and marinas.

ENVIROVAC

VACUUM TOILET COLLECTION SYSTEMS



The ENVIROVAC system approach

The maximum benefits of ENVIROVAC's vacuum toilet collection system can be best achieved by a thorough evaluation of each application whether it be a straight forward stand-alone module or a system for a multiple building labor camp.

Because of the significant advantages of incorporating ENVIROVAC vacuum toilet collection system in an original building design, it is important that this system be evaluated as a valuable architectural tool to reduce building costs, simplify construction and to speed up building completion.

In addition to dramatic water savings, the use of ENVIROVAC's vacuum toilet collection system offers many significant economic benefits such as: reduced overall project construction time; smaller water treatment plants; simplified and less expensive piping installation; simplified building design; etc.

Our system approach takes these factors and many more into consideration so our final recommendations will meet the most demanding economic and engineering analysis. The combination of application engineering, reliable, high-performance hardware, installation supervision and operator training results in a successful installation and a satisfied customer.

If you face any of these problems:

- lack of water
- hauling water
- high water table
- limited water supply
- flat terrain
- hauling sewage
- desalting water
- rock, coral or sand

And are involved in the design or operation of:

Labor Camps–large, multiple building complexes or a few dormitories housing the labor force for a remote project.

Rapid Deployment Facilities–military, fire fighting and disasters.

Drill Sites–oil or gas drilling projects where personnel are located at the site.

Mining–remote mining sites where production and administrative personnel live and work.

Large Production Plants–the location of toilet facilities in remote areas of a large plant are typically too expensive to provide.

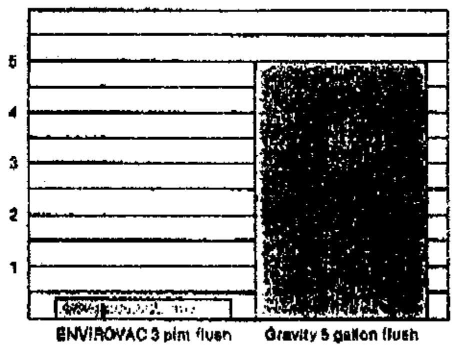
Relocatable Restrooms–those facilities providing complete sanitation services that can be easily and quickly moved to different sites without connecting to a sewer.

Office Buildings–requiring self-contained water and sewage systems.

Consider the important ENVIROVAC vacuum toilet system benefits:

3 pint water flush

As the illustration shows, there is a dramatic difference in the volume of water used in the ENVIROVAC vacuum toilet compared to the conventional gravity flush toilet. The ENVIROVAC 3 pint flush toilet offers these significant benefits:



- 90% reduction in sewage volume (toilet function)
- 40% total sewage reduction when laundry, shower, kitchen and other gray water is included
- smaller sewage treatment plants
- reduced hydraulic loading to existing treatment plants
- dramatic reduction in potable water requirements
- smaller water treatment plants
- smaller diameter water lines
- reduced water storage facilities

Upward flushing capability

In contrast with the downward flush of a gravity flush toilet, ENVIROVAC's vacuum flush toilet can flush vertically up to 20 feet. This gives considerable flexibility in the design of offices, dormitories, restroom modules, etc.

Additional cost and installation benefits include:

- flush up into overhead vacuum sewer piping
- penetration of floor eliminated
- placement of all utilities in ceiling

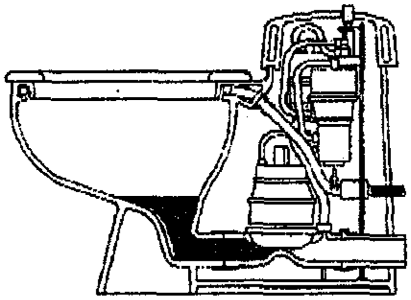
Small diameter piping

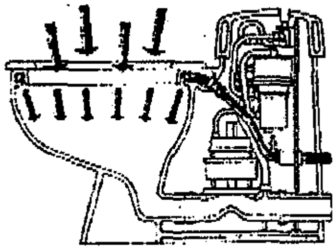
- smaller diameter water supply piping inside and outside building
- smaller diameter sewer piping inside and outside building
- lower material and labor costs for water and sewer piping installation
- no toilet vent piping

3 pint, vacuum flush toilet operation

Controls for toilet flush cycle are located in the back of the toilet and are not submerged in water. The differential pressure between the vacuum maintained by the vacuum system and atmospheric pressure provides the driving force for the flushing action and the operation of automatic flush mechanism controls.

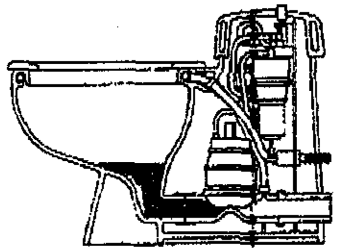
A built-in memory device does not allow the toilet to be flushed unless there is at least 12 inches vacuum. If the button is depressed when there is less than 12 inches vacuum, the memory device stores the signal and upon 12 inches or greater vacuum the toilet automatically flushes.





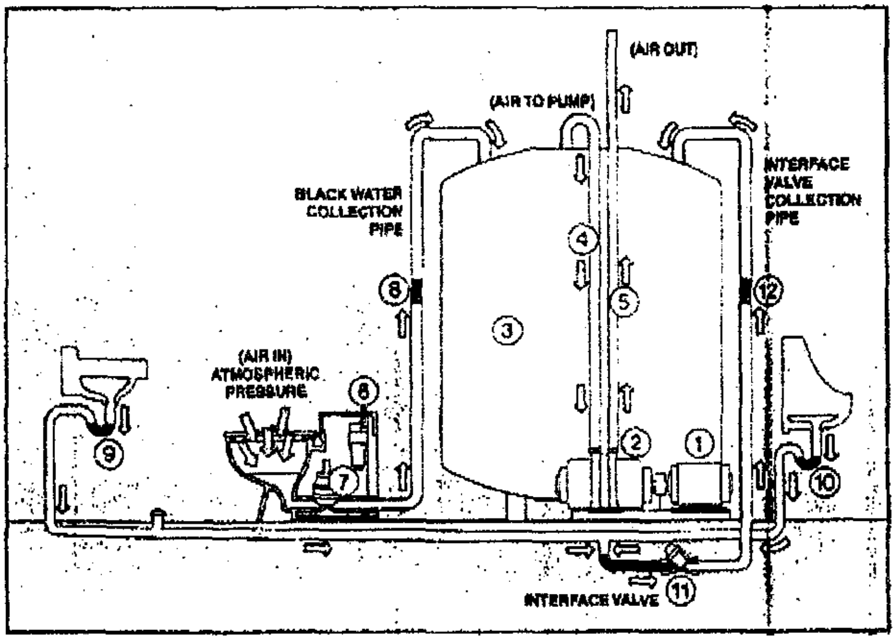
When the pushbutton is pressed, a timing mechanism in the pneumatic controls opens the discharge valve for about 3 seconds. Air at atmospheric pressure forces the sewage through the discharge valve and into the vacuum piping. This air also removes odor, and airborne bacteria and viruses from the surrounding area.

A second timing mechanism supplies wash-down water to the bowl at the same time the discharge valve opens. The water valve stays open 4 seconds longer than discharge valve to provide a pool of water in the bowl.



The toilet is again ready for use. Total operating time . . . 7 seconds. Total water used . . . 3 pints (0.375 gallons) a reduction of over 90%.

System operation

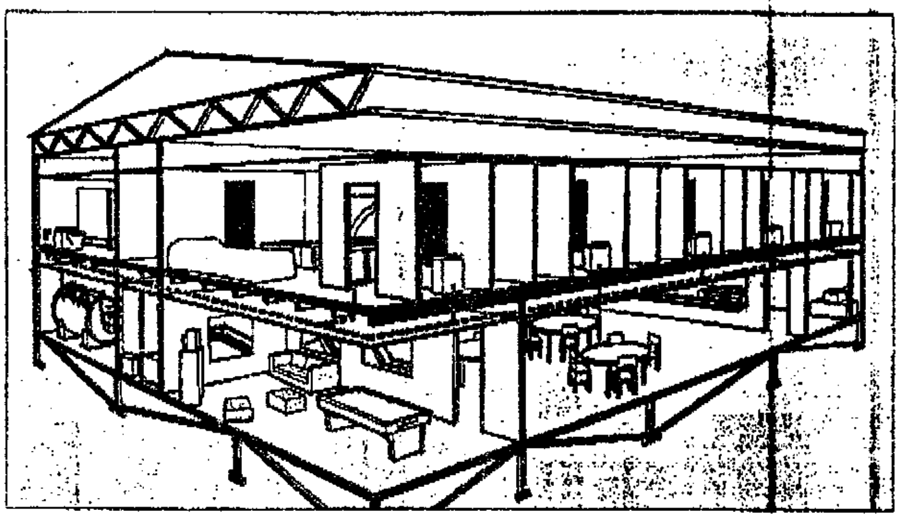


Electric motor **1** driven vacuum pump **2** maintains vacuum on steel vacuum tank **3** by removing air from vacuum tank through line **4** and then discharging to atmosphere through line **5**. User presses button **6** on toilet to flush. Discharge valve **7** opens allowing atmospheric pressure to force sewage through piping to the vacuum tank. Fresh water cleans bowl and also enters the vacuum line **8** passing on to the vacuum tank. Discharge valve **7** closes and fresh water refills toilet bowl reservoir. Total elapsed time is 7 seconds before toilet is ready for reuse.

Sink and Urinals

Sink waste **9** and urinal waste **10** gravity flow to interface valve 11. When interface valve has sufficient liquid waste volume to activate, interface valve opens and sewage passes to vacuum tank in line **12**. Interface valve closes automatically after 2-4 seconds and is ready for reuse.

Typical ENVIROVAC system applications



Labor camp facilities

In order to provide the most cost-effective sanitation facilities for a remote labor camp, both capital cost and operational benefits should be evaluated. ENVIROVAC will have a beneficial impact on the following:

- installation cost
- building design
- water & waste treatment cost
- disposal method
- water consumption
- energy use
- future expansion
- maintenance cost

Whether the camp is contained in a large single structure or comprised of multiple buildings, ENVIROVAC provides the most flexible sanitary systems available. Because the ENVIROVAC system requires no gravity to transport sewage, the following advantages are consistent in all types of structures:

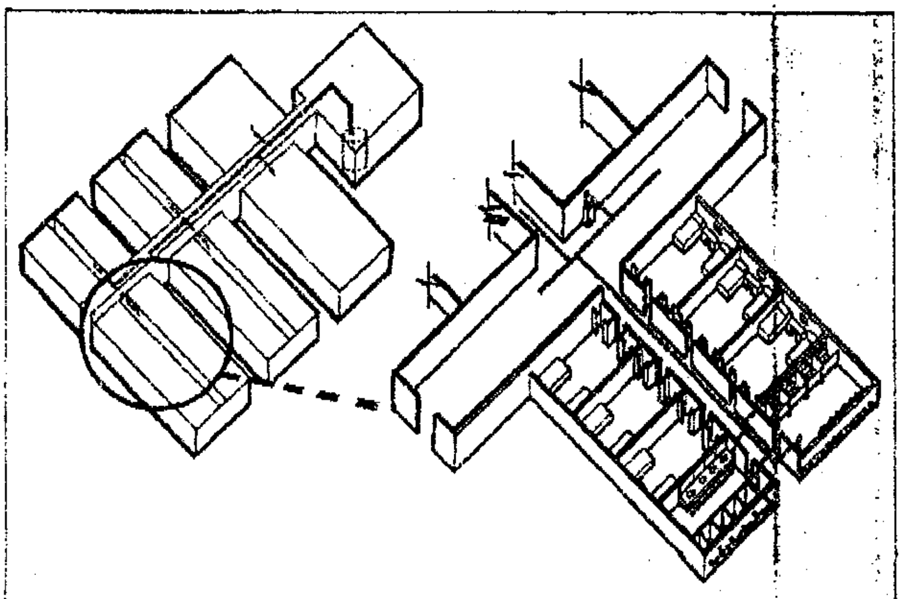
- pump stations and ejectors eliminated
- greater design flexibility in locating sanitary facilities
- enclosed pipe space under buildings eliminated
- no piping need be placed in the ground floor joist space
- vacuum pipe may be run in overhead utility spaces
- dramatically reduced installation labor cost

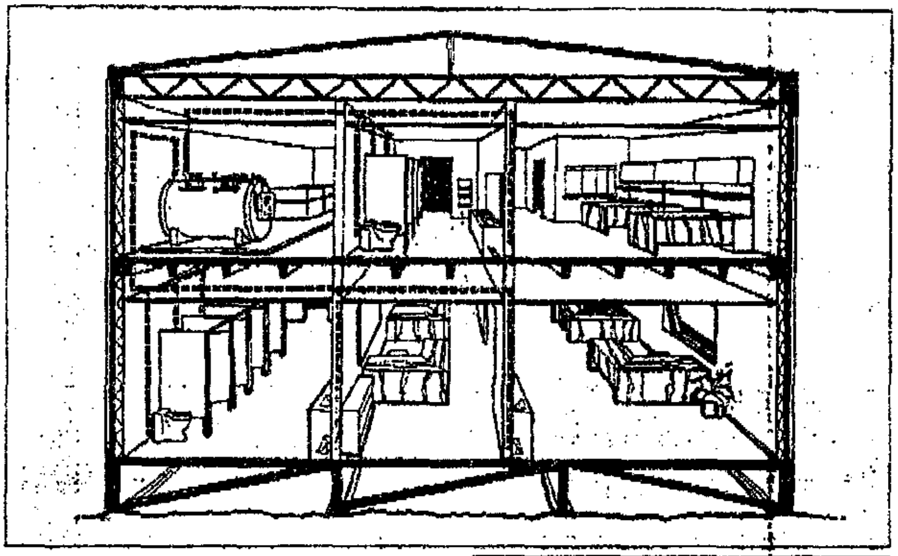
The installed cost of an ENVIROVAC system becomes particularly attractive because the system adapts so well to any type of construction. Factory built modules, large steel modules, or site built structures all benefit from the following:

- small diameter pipe (1½"-3")
- nearly flat pipe profile
- no electrical or compressed air lines
- pre-piped and pre-wired vacuum central station
- heat tracing of sewer lines virtually eliminated
- allows totally factory installed piping

Further, ENVIROVAC has proven to be operationally efficient. Because waste volume is so dramatically reduced, mechanical systems have been kept very simple, centrally grouped, and extremely durable. The result is a camp that experiences the following operational assurances:

- 40-50% lower water consumption
- lower energy use
- reduced water and waste treatment costs
- reduced maintenance costs

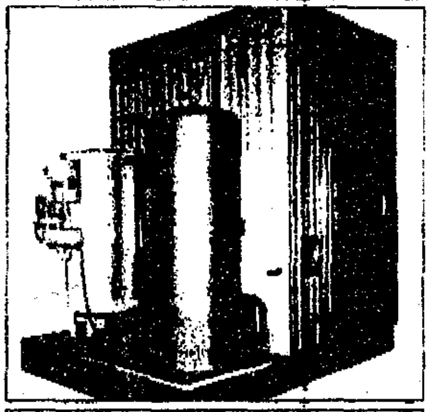




Self-contained office building

In large construction projects where centralized office facilities are needed, multi-story office buildings equipped with water and wastewater storage are often necessary.

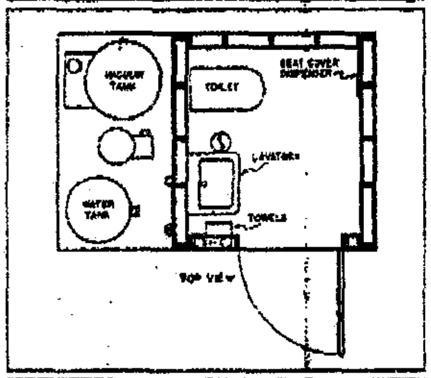
As shown in the illustration, maximum utilization of the first floor space is possible because both water storage and the ENVIROVAC vacuum central collection system are located out-of-the-way on the second floor. Small diameter vacuum lines are placed in walls and run above false ceilings with other utilities.



Self-contained restroom module for production or warehouse buildings.

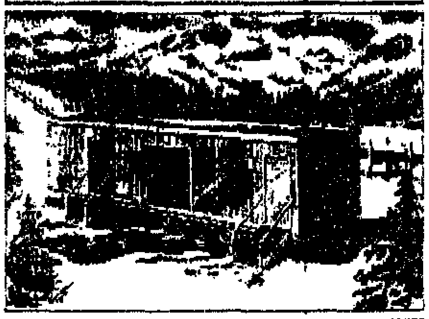
The cost of locating convenient restroom facilities in a large warehouse, in a new plant expansion, in a remote production or warehouse facility is often prohibitive because of the cost of running a sewer and water line. ENVIROVAC's compact skid-mounted restroom module can be easily and quickly placed anywhere it is needed.

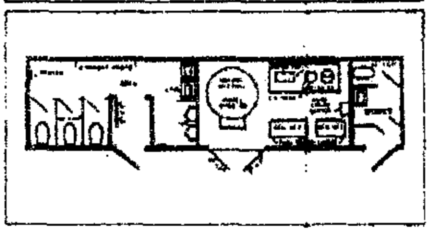
When the self-contained water system is provided as part of the module, the only hookup required is power. These modules are designed to provide from 200 to thousands of uses while dramatically reducing water and sewage hauling costs. The 3 pint flush allows the water and sewage tanks to be 90% smaller . . . likewise, hauling costs are reduced 90%.



Mobile restroom

As depicted in the illustration, ENVIROVAC's mobile restroom systems are completely portable and can be equipped with an onboard water supply system. Many models are available ranging from 2 toilets to complete men's and women's toilet and shower models. These restrooms can provide from 200 to thousands of uses between servicing and can be easily and quickly moved to different sites without connecting to a sewer. ENVIROVAC's mobile restrooms are ruggedly designed and constructed with quality materials and components for minimum maintenance and long life.





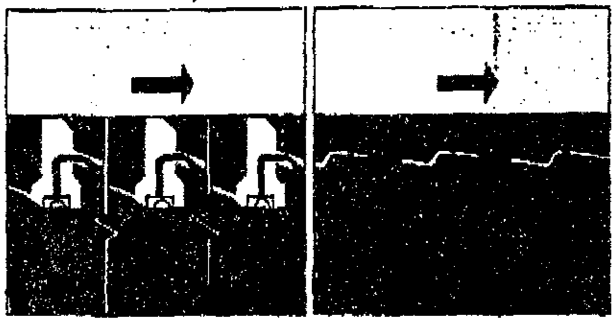
Sewer Comparisons

Gravity | Vacuum

Flat terrain/ long piping runs

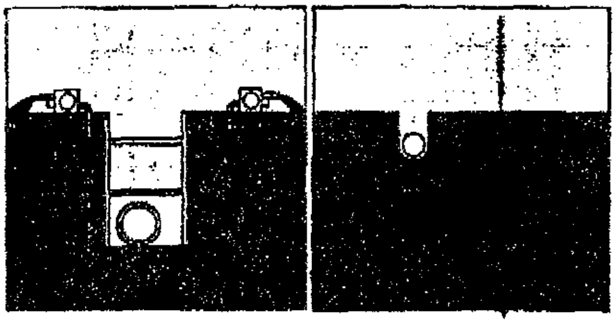
In flat terrain or in long, single and double story buildings, gravity systems typically require the use of multiple lift stations.

With vacuum sewer mains, lift stations are eliminated. The cost of laying vacuum sewer mains in the ground is relatively inexpensive because of the shallow excavation required. In buildings, vacuum mains can be conveniently placed above ceilings or in walls. Floor to ceiling dimensions can be kept to a minimum since there is no slope requirement.



High water table

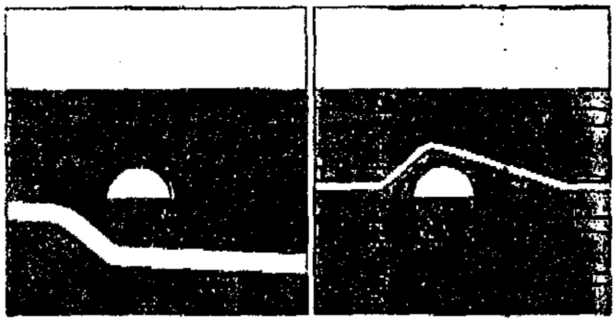
For those sites where high water table is a problem, gravity sewer trenches typically require costly dewatering and stabilization procedures. Shallow vacuum mains eliminate or minimize dewatering and trench stabilization procedures.



Obstructions

Whether it be unforseen obstructions in the ground such as large boulders, out-cropping of rocks, or in buildings . . . air supply runs, water mains, the cost of rerouting gravity sewers is expensive and time consuming.

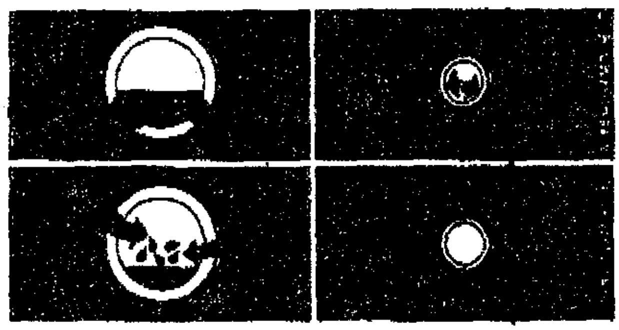
With the vertical lift capability of ENVIRO-VAC's vacuum mains, obstructions are easily, inexpensively passed over, under, or around, resulting in minimum delay and elimination of extra costs.



Exfiltration/ Infiltration

In the case of in-ground gravity sewer mains, exfiltration (leaking pipes) can contaminate the surrounding area (aquifer, water source, lakes and rivers). Infiltration is also a serious problem with gravity sewer mains which can cause treatment plants to be hydraulically overloaded.

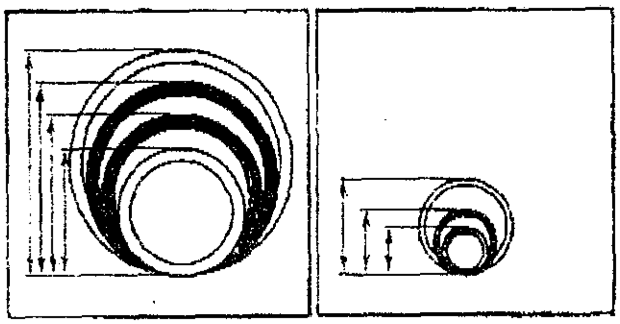
Vacuum sewer mains are fail-safe . . . field tested and operated under vacuum conditions. A broken main at worst, results in infiltration of air or water . . . never an outflow of sewage.



Large vs. small pipes

Gravity sewer mains are typically 8" to 14" diameter, are expensive to install and extend project completion time.

Vacuum sewer mains ranging from 2" to 6" are typical. Labor costs, material costs and installation time are dramatically lower than gravity systems.



8

Early planning with ENVIROVAC will save more than just water.

Economic Impact

Building design with gravity mains must always take into account floor-to-ceiling dimensions to allow for proper slope, extensive vent piping, etc. Typically all other mechanicals are designed around gravity mains. With the ENVIROVAC vacuum system, vacuum mains can be placed in ceiling or floors or wherever the other building utilities are placed. This reduces building construction time and costs, and gives much more design flexibility.

Building design for arctic conditions presents special problems for gravity systems such as heating of the space beneath the building in order to prevent pipe and pump station freeze-up. Since vacuum mains do not require continuous slope, they are easily built into wall or ceiling cavities of a building thus minimizing the need to heat trace sewer pipe.

Maintenance
With most typical gravity systems considerable mechanical and electrical maintenance of pump stations is required. With the ENVIROVAC vacuum toilet collection system, maintenance is only required at the vacuum central located in a controlled heated environment, usually in the same building or area of the treatment plant.

Disposal options
The use of the ENVIROVAC vacuum toilet system gives much more flexibility in selecting a disposal option that best suits the specific economic and environmental conditions. Because of the dramatic reduction in sewage volume, it may be economic to haul away the sewage to a centralized treatment facility. The size and type of treatment plant may also be affected when reduced hydraulic load is considered.

Expansion
In those situations where a labor camp or facility is expanding, the use of the ENVIROVAC vacuum toilet system allows off-peak pumping to treatment plant thereby eliminating or dramatically reducing the need for expanding the wastewater treatment facility. New sanitary facilities can be easily connected to an existing vacuum main without the need for lift stations or electrical hook-up.

Water supply
The use of the ENVIROVAC vacuum toilet system results in 90% reduction in sewage volume from office type complexes or about 40% total sewage reduction from a typical labor camp where laundry and kitchen wastewater is included. Water supply requirements are similarly reduced providing the following economic benefits: reduced number of waterwells, reduced water hauling costs, reduced water storage requirements, reduced size of water treatment plant and reduced pipe size in the water distribution network.

Energy
With the advantages of overall water reduction, the pumping power cost to operate both the water and wastewater systems throughout a facility is reduced. It is less expensive to provide stand-by power to an ENVIROVAC vacuum central than to a typical gravity system where power has to run to multiple lift stations. In arctic or cold weather regions the energy required for heated lift stations is eliminated. Heat tracing of sewer pipe is minimal when the ENVIROVAC system is used.

Wastewater treatment
In those cases where wastewater must be hauled away from the site, the use of the ENVIROVAC vacuum toilet system dramatically reduces the amount of sewage to be hauled.

This is possible because of the dramatic water savings of the ENVIROVAC 3 pint vacuum flush toilet and the capability of the system to store sewage for discharge to the treatment plant during off-peak periods.

Retro-fit
The addition of an ENVIROVAC vacuum toilet system to an existing building is easily accomplished because piping can be placed in ceilings along with other utilities.

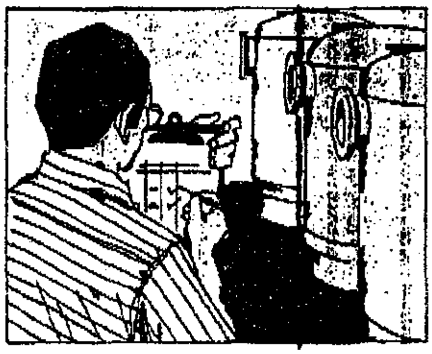
ENVIROVAC total system responsibility

Design engineering

Whether your project is in the concept stage or hardline drawings, ENVIROVAC engineers will work directly with you to provide detailed or generalized design recommendations, economic analysis or a complete system proposal.

Manufacturing

The results of our comprehensive quality control program are that every system and component will work properly on start-up and in strict accordance with specifications. Our customers are kept up-to-date on production and delivery by our sales and manufacturing staff. We believe this close communication is an essential part of our total system responsibility.



Field engineering

ENVIROVAC will provide qualified personnel on-site to insure proper installation and interface of components with other project systems. Follow-up field engineering is also available for evaluation of existing ENVIROVAC systems where expansion is being considered.

Start-up and operator training

Start-up services can be provided. As part of start-up services, ENVIROVAC will instruct operating personnel in the operation and maintenance of the system. Comprehensive operating and maintenance manuals are provided for each project.

ENVIROVAC INC.

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Calgary, Alberta, Canada

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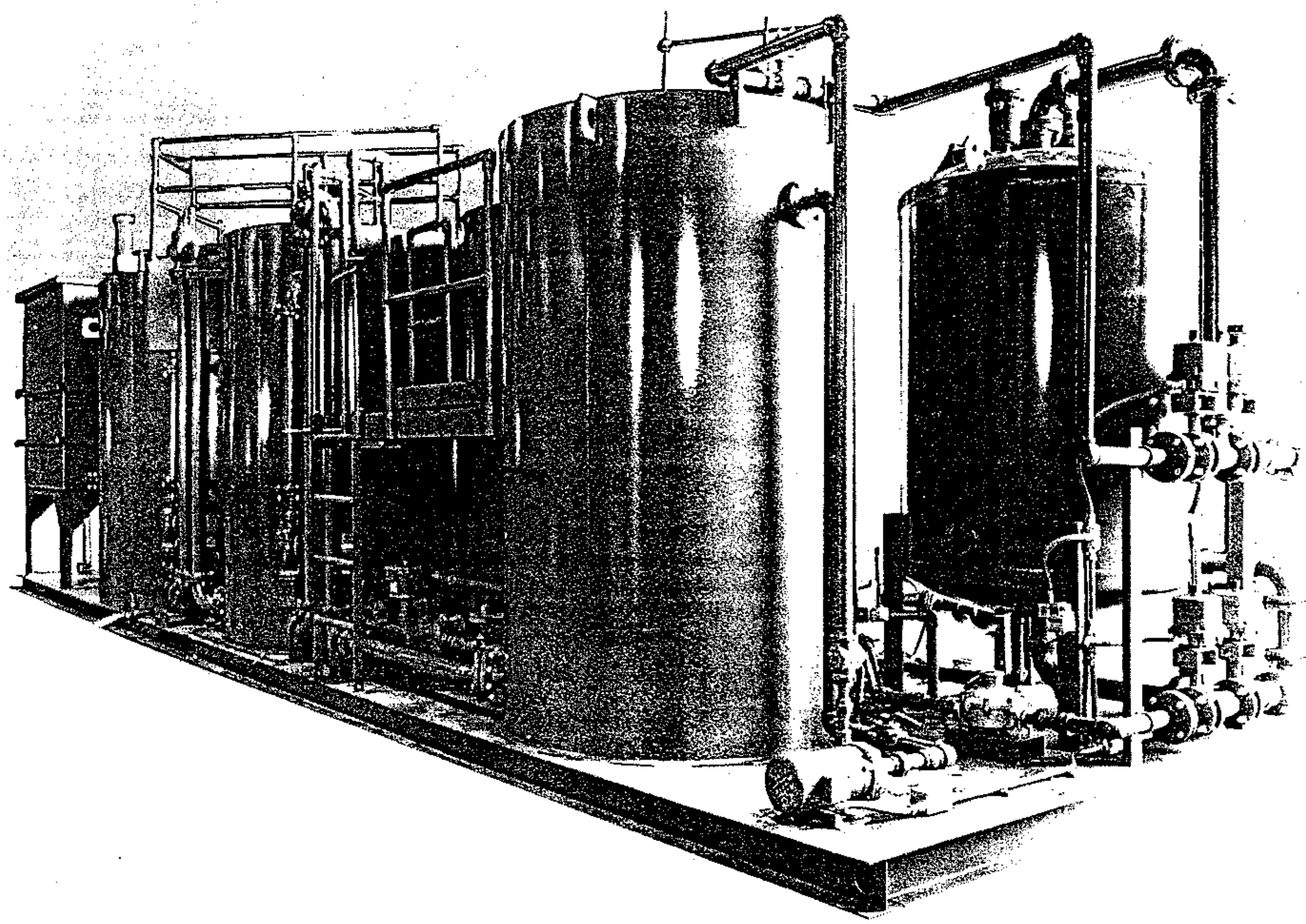
BULLETIN 12000

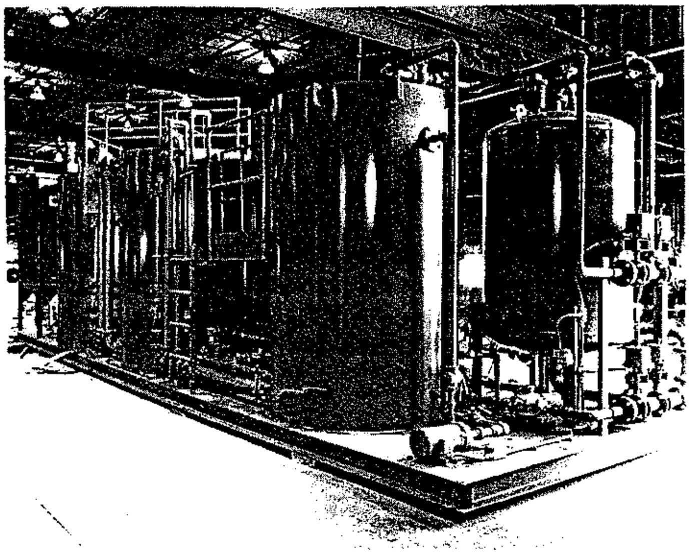
SERIES 12000 INDEPENDENT PHYSICAL CHEMICAL

WASTEWATER TREATMENT SYSTEMS

MET PRO CORPORATION **Systems Division**



IPC Advanced Wastewater Treatment Systems



Delivery of each factory built IPC system is fast and efficient, arriving at the site pre-piped and pre-wired—ready for trouble free start up. Years of experience and proven technology have made the IPC Wastewater Treatment System the most reliable and self-contained system in the industry today, one that's backed by unmatched, field proven, modern physical-chemical treatment processes that Met-Pro Corporation's Systems Division has refined.

Capacities

- Standard IPC systems are available for flows of 15,000 to 300,000 gallons per day.

Treatment Capabilities (Domestic Wastewater)

- 99% BOD removal
- 98% suspended solids removal
- 96% phosphorus removal

What is IPC?

IPC, or *Independent Physical Chemical,* is our name for the reliable, factory built, advanced wastewater treatment system developed by Met-Pro Corporation's Systems Division. Designed by Met-Pros' experienced team of engineers, the IPC system has become well known around the world, for producing a high quality effluent from the day it goes into operation. Additionally, it's known for its unique abilities to overcome the shortcomings of other treatment methods when treating domestic or industrial wastewaters where steady state or variable flow conditions exist.

Space–Time–Reliability

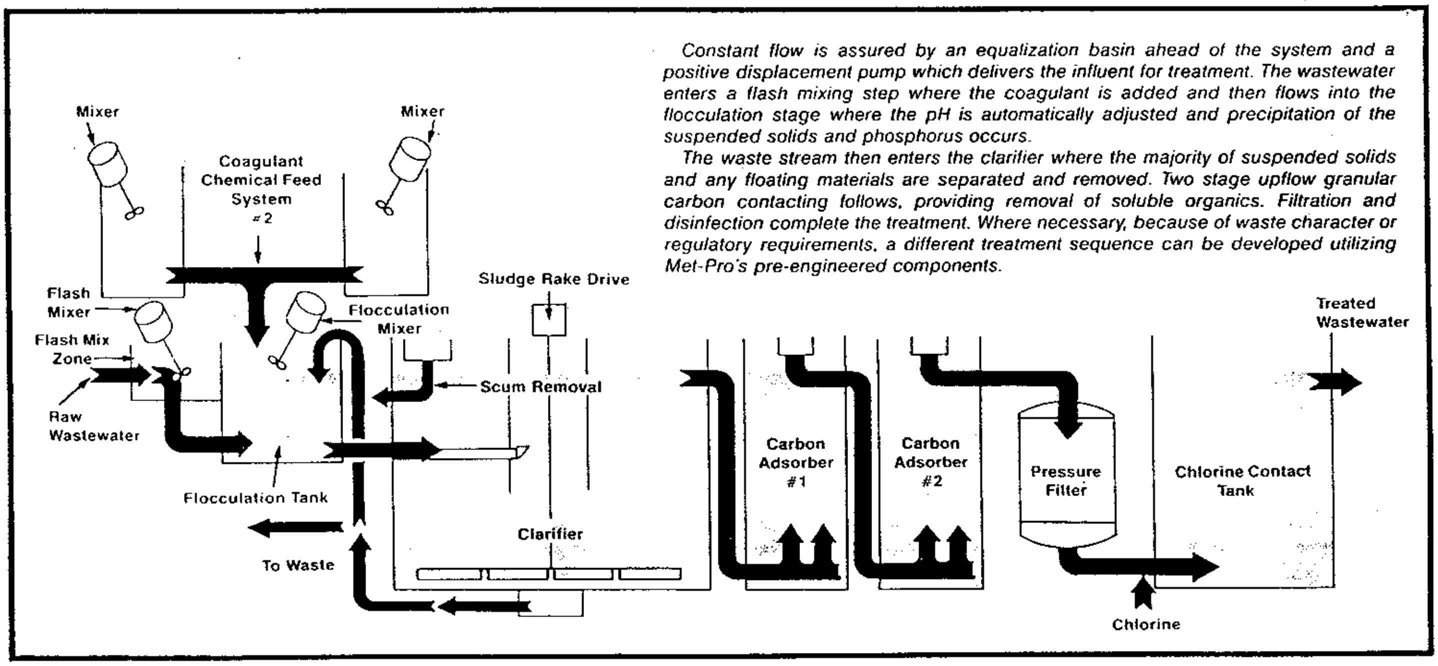
The IPC system is self-contained, factory built, and easily installed. Each system combines the performance of primary, secondary and tertiary treatment into one compact, flexible and integrated system that requires a minimum amount of space.

How Does IPC Operate?

Chemical coagulation, settling, adsorption, filtration and disinfection are all incorporated into this compact system. The chemical addition, coagulation, settling and filtration steps remove suspended and floating solids and phosphorus. Adsorption by granular activated carbon provides removal of soluble organic materials. Finally, disinfection permits safe discharge of the effluent. Each of these steps are automatically controlled and assure that the IPC system produces an effluent low in suspended solids, phosphates and organic matter. *(See Diagram)*

Operator Attention

Because the IPC system is practically self-sustaining, the need for operator attention is minimal. In fact, the few requirements necessary to assure the IPC system's superior effluent, are *chemical make-up, sludge disposal and general mechanical maintenance.*



Constant flow is assured by an equalization basin ahead of the system and a positive displacement pump which delivers the influent for treatment. The wastewater enters a flash mixing step where the coagulant is added and then flows into the flocculation stage where the pH is automatically adjusted and precipitation of the suspended solids and phosphorus occurs.

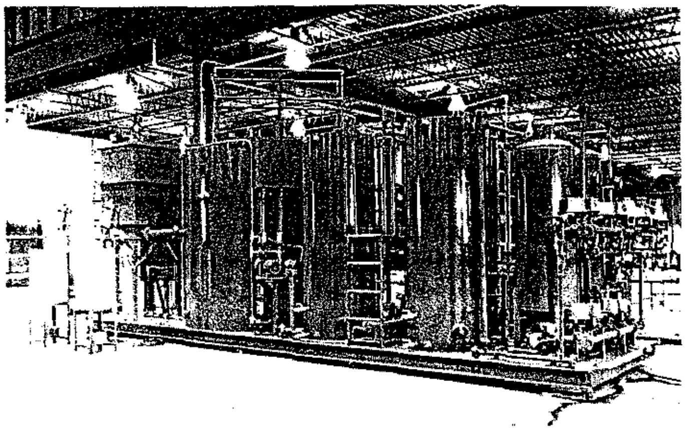
The waste stream then enters the clarifier where the majority of suspended solids and any floating materials are separated and removed. Two stage upflow granular carbon contacting follows, providing removal of soluble organics. Filtration and disinfection complete the treatment. Where necessary, because of waste character or regulatory requirements, a different treatment sequence can be developed utilizing Met-Pro's pre-engineered components.

What are applications of IPC?

- Small Communities
- Recreational Areas
- Schools
- Industry
- Construction Sites
- Portable Camps
- Roadside Rest Stops
- Pilot Plants

These are just a few of the many IPC system uses . . . the applications are unlimited!

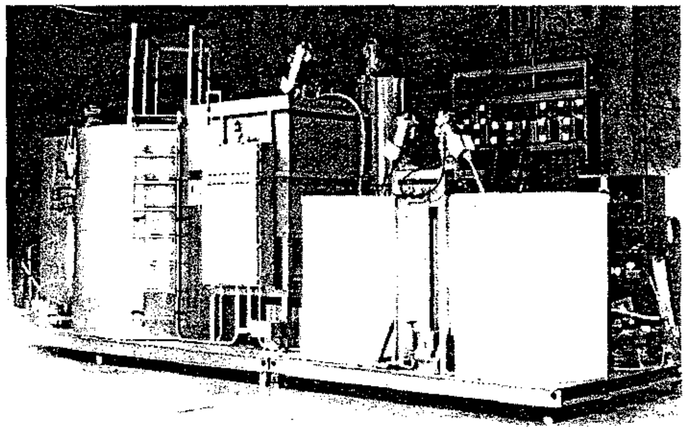
Whether your particular application is for constant industrial wastewater flow, or a weekend resort where the flow varies, the Met-Pro IPC system is ideal. That's because of its unique ability to operate in an on/off mode while still producing a high quality effluent—an ability not found in any other system. When relocation or off season periods occur, the unit can be turned off—then re-started with minimum effort—and produce an effluent that will meet the most stringent requirements. Additionally, the compact design permits simple transport from one location to another, if required.



The Model 12015 System, installed in the Shenandoah National Park, is treating up to 15,000 gallons per day of waste that is predominately laundry in nature but also contains domestic sewage and kitchen wastes from a rest area and restaurant. The system is located at Thornton Gap near Luray, Virginia.

Flow Variation and Expansion

Daily flow variations experienced at schools and factories or peak weekend or holiday flows at campgrounds, ski-resorts, and roadside rests can easily be handled through the balancing effect obtained with the customer installed equalization basin. Subdivisions located beyond existing sewer lines can be serviced with these systems, even when only a few homes are occupied during initial construction. And when the flow approaches the capacity of the first IPC system, additional units can easily be installed, operating in parallel, to handle the increased flow.



This industrial IPC wastewater system is installed at the Minnesota Mining & Manufacturing Company, Nekoosa, Wisconsin. The plant is treating paper finishing waste, and is designed for a flow of 35,000 gallons per day.

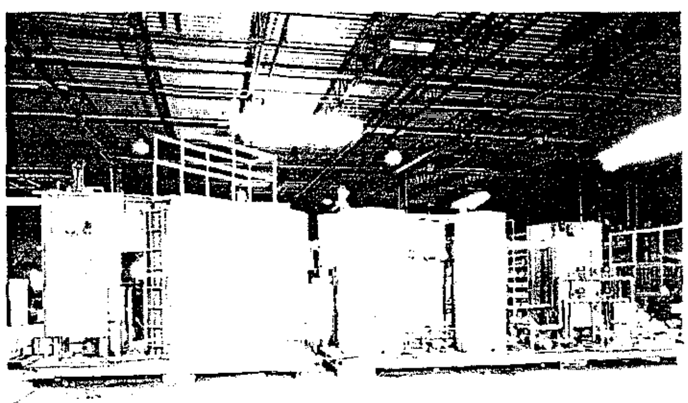
Use of Effluent

Reuse of the high-quality effluent is possible, for vehicle washing, toilet flushing, irrigation and other non-potable applications. This is particularly attractive in water short areas or where the cost of water is high, making the IPC system ideal for construction, geological survey or well drilling sites.

Pilot Plants

Consulting engineers can utilize the IPC system to evaluate the potential of physical chemical treatment for larger flows, by employing these integrated processes as a pilot plant. The pre-engineered package permits evaluation of a variety of unit processes—individually or collectively—with a minimum of up-front design time.

Met-Pro's Series 12000 IPC Systems fit many applications. Please contact our representatives or the Sales Department in Harleysville, Pennsylvania for application assistance on your particular projects.



This Model 12050 IPC system has been furnished as part of an EPA funded demonstration project to prove suitability of relocatable wastewater treatment systems. It provides for a variety of treatment flow patterns for testing purposes.

General Information

The IPC Advanced Wastewater Treatment Systems are completely pre-assembled on skids, piped, wired and finish painted for simple installation in the field.

The number of skids and the arrangement of equipment has been carefully engineered by Systems Division to minimize runs of pipe and conduit, and to facilitate plant operation. The following table provides information that will assist you in the preliminary selection of a plant to suit your needs.

Plant Capacity (Gals./Day)	Space Req'd. (Sq. Ft.)	No. of Skids	Total Power Requirements (Horsepower)	Shipping Weight (lbs.)
5,000	120	1	8	11,000
10,000	140	1	9	12,000
15,000	140	1	10	14,000
25,000	205	1	14	19,000
35,000	210	1	15	20,000
50,000	350	2	19	23,000
75,000	415	2	25	27,000
100,000	580	4	28	37,000
150,000	725	4	36	47,000
300,000	1450	8	62	84,000

Determining Plant Capacity

Since an IPC system is physical-chemical in nature, hydraulic loading is of more importance than organic loading. Whenever possible, plant capacity should be based on actual flow measurements or water meter readings. With normal domestic sewage, the following data may be used as a guide for determining plant capacity.

		Gallons per capita per day
Homes	Luxury	75-100
	Medium	65-85
	Small (cottages)	50-60
Apts.	Luxury	60-75
	Small	40-50
Motels, Hotels		25-40
Trailer Parks		50
Factories		15-30 (all flow in 8-10 hrs.)
Construction Camps		50-75
Schools		10-25 (all flow in 8-10 hrs.)

Other Systems Division Products

FACTORY BUILT WATER TREATMENT PLANTS *(Request Bulletin 2000)*

Ideal for use in State & National Parks, construction camps, mobile home parks and rural subdivisions. Pre-piped and pre-wired to minimize installation expense, these units economically provide potable water with unsurpassed reliability.

CUSTOM BUILT WASTEWATER TREATMENT SYSTEMS *(Consult Factory)*

Factory built systems utilizing integrated unit processes necessary for the specific wastewater in question. Examples are acid/alkali neutralization, emulsion breaking, metal finishing, pilot plants, etc.

GRAVITY AND PRESSURE FILTERS *(Request Bulletin 6000 & 8000)*

For removal of suspended matter from raw water and wastewater. May be used independently or with flash mixing, flocculation and clarification for color removal or for turbidity reduction. Various filter media are available, depending on application.

CARBON ADSORPTION COLUMNS *(Request Bulletin 10000)*

For removal of soluble organic materials from wastewater as part of physical/chemical system or for tertiary applications following the secondary stage of sewage treatment. Available in down-flow or up-flow models, with or without air fluidization, the design provides optimum contact of liquid with the granular activated carbon, without channeling.

METAL FINISHING WASTEWATER TREATMENT SYSTEMS *(Request Bulletin 13000)*

Factory built systems are available for batch or continuous treatment of acid-alkali, cyanide and chrome bearing wastewaters. Complete packages including effluent clarification and filtration are also available.

CLARIFIERS *(Request Bulletin 9000)*

For use wherever settleable solids must be removed from raw waters or wastewaters. Standard sizes 4' to 26' in diameter available. Units up to 10' in dia. shipped completely assembled. Larger units shipped in sections, marked for simple field erection.

SLUDGE DEWATERING AND THICKENING *(Request Bulletin 17000)*

Factory built, automatic centrifuge systems are capable of thickening most municipal and industrial sludges to 15-20% solids by weight. These systems are furnished complete with electrical controls, centrate holding tank, centrate return pump and solid bowl centrifuge. In addition, gravity thickeners are available up to 26 feet in diameter.

03-10-5802 685

MET PRO CORPORATION Systems Division
160 CASSELL ROAD • BOX 144 • HARLEYSVILLE, PA 19438
(215) 723-6751 • Telex 846-424

SERIES 12000
INDEPENDENT PHYSICAL CHEMICAL

MET PRO CORPORATION Systems Division
160 CASSELL ROAD • BOX 144 • HARLEYSVILLE, PA 19438 • (215) 723-6751 • TELEX: 846-424

ESTIMATED OPERATING COSTS

Assuming the following raw sewage composition:

BOD	250 mg/l
Suspended Solids	250 mg/l
Total Phosphates as P	8 mg/l

and producing an effluent containing:

BOD	7.5 mg/l or less
Suspended Solids	5.0 mg/l or less
Total Phosphates as P	.5 mg/l or less

the projected chemical costs, by item, would be:

Cost Item	Dose/Loading	Cost/lb. Or Other Unit	Cost per 1000 Gallons Treated
Coagulant	230 mg/l	$0.10	$0.20
pH Correction	120 mg/l	.18	.15
Activated Carbon	.25 lb/1000 gal.	.79	.19
Disinfectant (chlorine gas)	3 mg/l	.36	.009
Electricity		.04/kw-hr.	.13
Total			$0.679

The basis for these estimated costs of operation are as follows:

1. The cost per pound is based on the quantity of chemicals that would be purchased for a 50,000 gpd plant.
2. The plant is designed for high levels of BOD_5, suspended solids and phosphate removal. Removal of chemical or nitrogenous oxygen demand may affect these costs.
3. The costs outlined above include chemical and power consumption of the basic Met-Pro 12000 Series plant. Operating costs for auxiliary equipment, operator's wages, heat, light and maintenance, amortization, etc. are not included.

APPENDIX J
COST ESTIMATE SPREADSHEETS

Conceptual Construction Cost Estimates

Individual Holding Tanks Option 1 - Above-Ground Water and Sewage Tanks

Assumptions:

1. An experienced superintendant will be hired to run the job and supervise the local labor.
2. Above-ground plastic or fiberglass 500 gallon tanks will be used for both water storage and sewage collection.
3. Adequate labor and heavy equipment is available in Alakanuk to install the tanks.
4. Both water and sewage tanks will be placed in the same 6 foot by 10 foot insulated enclosure adjacent to each home.
5. There are 115 occupied households. 21 additional homes will be built by HUD this summer. There are approxiamtely 20 businesses or public buildings which will also require tanks. Total number of tanks required is approximately 156 each, water and sewage.
6. Low water use plumbing fixtures will be installed.
7. New sewage pumping and water delivery trucks will be required.
8. The bathroom and kitchen of each home will be plumbed for water and sewer.
9. Labor and equipment will be available at the following rates.

	Range ($ per hr)		Range ($ per hr)
Superintendant (Anc)	35-40	Electrician (Anc)	25-35
Foreman	18-22	Loader	60
Operator/Mechanic	14-18	Backhoe	45
Laborer	10-14	Dozer	50
Plumber (Anc)	25-35	Pickup Truck (VSW)	0
Mechanic (Anc)	25-35		

10. Construction materials will be shipped from Anchorage or Fairbanks through Nenana downriver, using the Yutana Barge Company at the following approximate rates.

Material Type:	Rate per 100 Pounds	
Lumber, Manholes, Plumbing Fixtures, Miscellaneous Construction Materials. etc.	$30	(Type 1)
Vehicles and Heavy Equipment	$40	(Type 2)
Tanks	$50	(Type 3)
Windows, Doors, Insulation, Prefab Roofs, etc.	$70	(Type 4)

11. It will take approximately 16 weeks (based on 40 hours per week) to complete the project.
12. Sixteen laborers will be required.

Cost to Install One Water and One Sewage Tank

Materials:	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**		
Tank (water)	1	each	$823	$823		
Tank (sewage)	1	each	$823	$823		
Home Plumbing Supplies	1	each	$2,000	$2,000		
Lumber	1	each	$1,000	$1,000		
Misc. Construction Supplies	1	each	$500	$500		
Heating System Supplies	1	each	$500	$500		
			Materials Subtotal		$5,646	
Labor & Equipment:						
Superintendant (Anc)	4	hour	$40	$160		
Foreman	4	hour	$22	$88		
Operator/Mechanic	2	hour	$18	$36		
Laborer	65	hour	$14	$910		
Plumber (Anc)	4	hour	$35	$140		
Mechanic (Anc)	0	hour	$35	$0		
Electrician (Anc)	4	hour	$35	$140		
Loader	2	hour	$60	$120		
Backhoe	0	hour	$45	$0		
Dozer	0	hour	$50	$0		
Pickup Truck (VSW)	0.5	day	$0	$0		
Misc. Equipment	1	each	$250	$250		
Subsistence	12	hour	$10	$120		
			Labor Subtotal		$1,964	
Freight:						
Type 1	50	100 pounds	$30	$1,500		
Type 2	0	100 pounds	$40	$0		
Type 3	3	100 pounds	$50	$150		
Type 4	5	100 pounds	$70	$350		
			Freight Subtotal		$2,000	
		Subtotal For One Home (water & sewer)			$9,610	
		City total (156 homes or businesses)				$1,499,160
		Sewage Pumping Truck and Water Delivery Truck				$150,000
		Design and Construction Management (10%)				$164,916
		Contingency (15%)				$272,111
		Total				**$2,086,000**

City of Alakanuk - Sanitation Facilities Master Plan
Conceptual Construction Cost Estimates
Individual Holding Tank Option 2 - Above-Ground Water and Buried Sewage Tanks
Assumptions:

1. An experienced superintendant will be hired to run the job and supervise the local labor.
2. 500 gallon tanks will be used for both water storage and sewage collection. Plastic or fibergalss tanks will be used for water. Steel tanks will be used for sewage. The average length of the service line from the tank to the home will be 20 feet.
3. Adequate labor and heavy equipment is available in Alakanuk to install the tanks.
4. The water and tank will be placed in a 6 foot by 6 foot insulated enclosure adjacent to each home.
5. There are 115 occupied households. 21 additional homes will be built by HUD this summer. There are approxiamtely 20 businesses or public buildings which will also require tanks. Total number of tanks required is approximately 156 each, water and sewage.
6. Low water use plumbing fixtures will be installed.
7. New sewage pumping and water delivery trucks will be required.
8. The bathroom and kitchen of each home will be plumbed for water and sewer.
9. Labor and equipment will be available at the following rates.

	Range ($ per hr)		Range ($ per hr)
Superintendant (Anc)	35-40	Electrician (Anc)	25-35
Foreman	18-22	Loader	60
Operator/Mechanic	14-18	Backhoe	45
Laborer	10-14	Dozer	50
Plumber (Anc)	25-35	Pickup Truck (VSW)	0
Mechanic (Anc)	25-35		

10. Construction materials will be shipped from Anchorage or Fairbanks through Nenana downriver, using the Yutana Barge Company at the following approximate rates.

Material Type:	Rate per 100 Pounds	
Lumber, Manholes, Plumbing Fixtures, Miscellaneous Construction Materials. etc.	$30	(Type 1)
Vehicles and Heavy Equipment	$40	(Type 2)
Tanks	$50	(Type 3)
Windows, Doors, Insulation, Prefab Roofs, etc.	$70	(Type 4)

11. It will take approximately 16 weeks (based on 40 hours per week) to complete the project.
12. Sixteen laborers will be required.

Cost to Install One Water and One Sewage Tank

Materials:	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**		
Tank (water)	1	each	$823	$823		
Tank (sewage)	1	each	$1,045	$1,045		
Home Plumbing Supplies	1	each	$1,500	$1,500		
Lumber	1	each	$750	$750		
Service Connection Line	20	lineal feet	$50	$1,000		
Misc. Construction Supplies	1	each	$500	$500		
Heating System Supplies	1	each	$500	$500		
			Materials Subtotal		$6,118	
Labor & Equipment:						
Superintendant (Anc)	4	hour	$40	$160		
Foreman	4	hour	$22	$88		
Operator/Mechanic	4	hour	$18	$72		
Laborer	65	hour	$14	$910		
Plumber (Anc)	4	hour	$35	$140		
Mechanic (Anc)	0	hour	$35	$0		
Electrician (Anc)	4	hour	$35	$140		
Loader	0	hour	$60	$0		
Backhoe	4	hour	$45	$180		
Dozer	0	hour	$50	$0		
Pickup Truck (VSW)	0.5	day	$0	$0		
Misc. Equipment	1	each	$250	$250		
Subsistence	12	hour	$10	$120		
			Labor Subtotal		$2,060	
Freight:						
Type 1	50	100 pounds	$30	$1,500		
Type 2	0	100 pounds	$40	$0		
Type 3	5	100 pounds	$50	$250		
Type 4	5	100 pounds	$70	$350		
			Materials Subtotal		$2,100	
		Subtotal For One Home (water & sewer)			$10,278	
		City total (156 homes or businesses)				$1,603,368
		Sewage Pumping and Water Delivery Trucks				$150,000
		Design and Construction Management (10%)				$175,337
		Contingency (15%)				$289,306
		Total				**$2,218,000**

Conceptual Construction Cost Estimates

Piped Water and Sewer System Option 1 - Buried Gravity/Force Main Sewer & Pressurized Water

Assumptions:

1. An experienced superintendent will be hired to run the job and supervise the local labor.
2. Adequate labor and heavy equipment is available in Alakanuk to complete the project.
3. Four lift stations will be required.
4. Dewatering will be required throughout the project.
5. Service connections to each home will also be buried.
6. Approximately 21,000 lf of water and sewer main and 12,000 lf of water and sewer service connections will be installed.
7. Water and sewer pipe will be placed in the same trench.
8. All pipe will be insulated and heat traced.
9. Labor and equipment will be available at the following rates.

	Range ($ per hr)		Range ($ per hr)
Superintendant (Anc)	35-40	Electrician (Anc)	25-35
Foreman	18-22	Loader	60
Operator/Mechanic	14-18	Backhoe	45
Laborer	10-14	Dozer	50
Plumber (Anc)	25-35	Pickup Truck (VSW)	0
Mechanic (Anc)	25-35		

10. Construction materials will be shipped from Anchorage or Fairbanks through Nenana downriver, using the Yutana Barge Company at the following approximate rates.

Material Type:		Rate per 100 Pounds	
	Lumber, Manholes, Plumbing Fixtures, Miscellaneous Construction Materials. etc.	$30	(Type 1)
	Vehicles and Heavy Equipment	$40	(Type 2)
	Tanks	$50	(Type 3)
	Windows, Doors, Insulation, Prefab Roofs, etc.	$70	(Type 4)
	Fill Material	$28 (per cy)	(Type 5)

11. The project will take eight years (based on 40 hours per week) to complete.
12. Three operators and six laborers will be required.

Cost to Install One Lineal Foot of Trench

Materials:	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**	
Sewer Pipe	1	lf	$50	$50	
Water Pipe	1	lf	$50	$50	
Fill material	0.25	cy	$13	$3	
Heat Trace Supplies	1	lf	$10	$10	
Misc. Construction Supplies	1	each/lf	$20	$20	
			Materials Subtotal		$133
Labor & Equipment:					
Superintendant (Anc)	0.2	hour	$40	$8	
Foreman	0.2	hour	$22	$4	
Operator/Mechanic	0.6	hour	$18	$11	
Laborer	1.2	hour	$14	$17	
Plumber (Anc)	0	hour	$35	$0	
Mechanic (Anc)	0.2	hour	$35	$7	
Electrician (Anc)	0	hour	$35	$0	
Loader	0.2	hour	$60	$12	
Backhoe	0.2	hour	$45	$9	
Dozer	0.2	hour	$50	$10	
Pickup Truck (VSW)	0.2	day	$0	$0	
Misc. Equipment	1	each	$10	$10	
Subsistence	0.4	hour	$10	$4	
			Labor Subtotal		$92
Freight:					
Type 1	0.75	100 pounds	$30	$23	
Type 2	0.1	100 pounds	$40	$4	
Type 3	0	100 pounds	$50	$0	
Type 4	0	100 pounds	$70	$0	
Type 5	0.25	cy	$28	$7	
			Freight Subtotal		$34
			Cost to Install One Lineal Foot of Water & Sewer Pipe		$259

W & S Main	21000	lf	$259	$5,439,000	
W & S Services	12000	lf	$259	$3,108,000	
Manholes	70	each	$10,000	$700,000	
Lift Stations	4	each	$100,000	$400,000	
Home Plumbing	156	each	$5,000	$780,000	
		Subtotal			**$10,427,000**
		Design and Construction Management (20%)			**$2,085,400**
		Contingency (20%)			**$2,502,480**
		Total			**$15,015,000**

Conceptual Construction Cost Estimates

Piped Water and Sewer System Option 2 - Aboveground Gravity/Force Main Sewer and Pressurized Water

Assumptions:

1. An experienced superintendant will be hired to run the job and supervise the local labor.
2. Adequate labor and heavy equipment is available in Alakanuk to complete the project.
3. Four pump stations will be required.
4. All service connections to each home will also be aboveground.
5. Approximately 21,000 lf of water and sewer main and 12,000 lf of water and sewer service connections will be installed.
6. Water and sewer pipe will be placed on wood sills which will be placed directly on the existing ground.
7. All pipe will be insulated and heat traced.
8. Fill material will be imported from outside of Alakanuk for road crossings only.
9. Labor and equipment will be available at the following rates.

	Range ($ per hr)		Range ($ per hr)
Superintendant (Anc)	35-40	Electrician (Anc)	25-35
Foreman	18-22	Loader	60
Operator/Mechanic	14-18	Backhoe	45
Laborer	10-14	Dozer	50
Plumber (Anc)	25-35	Pickup Truck (VSW)	0
Mechanic (Anc)	25-35		

10. Construction materials will be shipped from Anchorage or Fairbanks through Nenana downriver, using the Yutana Barge Company at the following approximate rates.

Material Type:		Rate per 100 Pounds	
	Lumber, Manholes, Plumbing Fixtures, Miscellaneous Construction Materials. etc.	$30	(Type 1)
	Vehicles and Heavy Equipment	$40	(Type 2)
	Tanks	$50	(Type 3)
	Windows, Doors, Insulation, Prefab Roofs, etc.	$70	(Type 4)
	Fill Material	$28 (per cy)	(Type 5)

11. The project will take four years (based on 40 hours per week) to complete.
12. Three operators and six laborers will be required.

Cost to Install One Lineal Foot of of Aboveground Pipe

Materials:	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**	
Sewer Pipe	1	lf	$50	$50	
Water Pipe	1	lf	$50	$50	
Fill Material	0.10	cy	$13	$1	
Heat Trace Supplies	1	lf	$10	$10	
Misc. Construction Supplies	1	each/lf	$20	$20	
			Materials Subtotal		$131
Labor & Equipment:					
Superintendant (Anc)	0.08	hour	$40	$3	
Foreman	0.08	hour	$22	$2	
Operator/Mechanic	0.24	hour	$18	$4	
Laborer	0.48	hour	$14	$7	
Plumber (Anc)	0	hour	$35	$0	
Mechanic (Anc)	0.08	hour	$35	$3	
Electrician (Anc)	0	hour	$35	$0	
Loader	0.08	hour	$60	$5	
Backhoe	0.08	hour	$45	$4	
Dozer	0.08	hour	$50	$4	
Pickup Truck (VSW)	0.08	day	$0	$0	
Misc. Equipment	1	each	$5	$5	
Subsistence	0.16	hour	$10	$2	
			Labor Subtotal		$38
Freight:					
Type 1	1	100 pounds	$30	$30	
Type 2	0.1	100 pounds	$40	$4	
Type 3	0	100 pounds	$50	$0	
Type 4	0	100 pounds	$70	$0	
Type 5	0.1	cy	$25	$3	
			Freight Subtotal		$37
			Cost to Install One Lineal Foot of Water & Sewer Pipe		**$206**

W & S Main	21000	lf	$206	$4,326,000	
W & S Services	12000	lf	$206	$2,472,000	
Pump Stations	4	each	$75,000	$300,000	
Home Plumbing	156	each	$5,000	$780,000	
		Subtotal			**$7,878,000**
		Design and Construction Management (20%)			**$1,575,600**
		Contingency (20%)			**$1,890,720**
		Total			**$11,344,000**

Conceptual Construction Cost Estimates

Piped Water and Sewer System Option 3 - Aboveground Vacuum and Pressurized Water

Assumptions:

1. An experienced construction foreman and operator/mechanic will be hired to run the job and supervise the local labor.
2. Adequate labor and heavy equipment is available in Alakanuk to complete the project.
3. The vacuum plant will be located adjacent to the AVEC plant.
4. All service connections to each home will also be aboveground.
5. Approximately 21,000 lf of water and sewer main and 12,000 lf of water and sewer service connections will be installed.
6. Water and sewer pipe will be placed on wood sills which will be placed directly on the existing ground.
7. All pipe will be insulated.
8. No fill material will be imported from outside of Alakanuk.
9. Labor and equipment will be available at the following rates.

	Range ($ per hr)		Range ($ per hr)
Superintendant (Anc)	35-40	Electrician (Anc)	25-35
Foreman	18-22	Loader	60
Operator/Mechanic	14-18	Backhoe	45
Laborer	10-14	Dozer	50
Plumber (Anc)	25-35	Pickup Truck (VSW)	0
Mechanic (Anc)	25-35		

Pickup Truck = $30 per day

10. Construction materials will be shipped from Anchorage or Fairbanks through Nenana downriver, using the Yutana Barge Company at the following approximate rates.

Material Type:		Rate per 100 Pounds	
	Lumber, Manholes, Plumbing Fixtures, Miscellaneous Construction Materials. etc.	$30	(Type 1)
	Vehicles and Heavy Equipment	$40	(Type 2)
	Tanks	$50	(Type 3)
	Windows, Doors, Insulation, Prefab Roofs, etc.	$70	(Type 4)
	Fill Material	$28 (per cy)	(Type 5)

11. The project will take 6 years (based on 40 hours per week) to complete.
12. Three operators and six laborers will be required.

Cost to Install One Lineal Foot of of Aboveground Pipe

Materials:	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**	
Sewer Pipe	1	lf	$50	$50	
Water Pipe	1	lf	$50	$50	
Fill Material	0.1	cy	$13	$1	
Misc. Construction Supplies	1	each/lf	$20	$20	
			Materials Subtotal		$121
Labor & Equipment:					
Superintendant (Anc)	0.08	hour	$40	$3	
Foreman	0.08	hour	$22	$2	
Operator/Mechanic	0.24	hour	$18	$4	
Laborer	0.48	hour	$14	$7	
Plumber (Anc)	0	hour	$35	$0	
Mechanic (Anc)	0.08	hour	$35	$3	
Electrician (Anc)	0	hour	$35	$0	
Loader	0.08	hour	$60	$5	
Backhoe	0.08	hour	$45	$4	
Dozer	0.08	hour	$50	$4	
Pickup Truck (VSW)	0.08	day	$0	$0	
Misc. Equipment	1	each	$5	$5	
Subsistence	0.16	hour	$10	$2	
			Labor Subtotal		$38
Freight:					
Type 1	1	100 pounds	$30	$30	
Type 2	0.1	100 pounds	$40	$4	
Type 3	0	100 pounds	$50	$0	
Type 4	0	100 pounds	$70	$0	
Type 5	0.1	cy	$28	$3	
			Freight Subtotal		$37
			Cost to Install One Lineal Foot of Water & Sewer Pipe		$196

W & S Main	21000	lf	$196	$4,116,000
W & S Services	12000	lf	$196	$2,352,000
Vacuum Plant Building	1000	sf	$200	$200,000
Vacuum Plant Equipment	1	each	$250,000	$250,000
Home Plumbing	156	each	$5,000	$780,000

Subtotal	**$7,698,000**
Design and Construction Management (20%)	**$1,539,600**
Contingency (20%)	**$1,847,520**
Total	**$11,085,000**

City of Alakanuk - Sanitation Facilities Master Plan
Conceptual Construction Cost Estimates
Sewage Treatment Facility Option 1 - Construct New Lagoon Near the Existing Landfill
Assumptions:

1. An experienced superintendant will be hired to run the job and supervise the local labor.
2. Adequate labor and heavy equipment is available in Alakanuk to construct the lagoon.
3. The slopes of the lagoon will be lined with 60 mil HPDE.
4. Half of the total amount of fill required to construct the lagoon dikes will be imported from St. Marys and will be shipped downriver by barge. The remainder of fill will be obtained in the Alakanuk area.
5. The size of the lagoon is based on the following.

Assume:	Sewage Depth =	12 ft
	Freeboard =	3 ft
	Berm Slopes =	3 :1
Volume required = 635 persons(80 gal/day/person)(8 months storage/year)(30 days/month) =		1629947 ft^3
	Top of berm width =	10 ft
Calculated Values:	Inside bottom length/width of lagoon =	333 ft
	Perimeter Length at Center of Berm =	1550 ft
	Cross Sectional Area of Berm =	825 ft^2
	Volume of Fill Required to Construct Berm =	47367 yd^3
	Footprint Area of Entire Lagoon =	6.51 ac
	Perimeter Length of Entire Lagoon =	2130 ft
	Surface Area of Inside of Lagoon =	182224 ft^2

6. Labor and equipment will be available at the following rates.

	Range ($ per hr)		Range ($ per hr)
Superintendant (Anc)	35-40	Electrician (Anc)	25-35
Foreman	18-22	Loader	60
Operator/Mechanic	14-18	Backhoe	45
Laborer	10-14	Dozer	50
Plumber (Anc)	25-35	Pickup Truck (VSW)	0
Mechanic (Anc)	25-35		

7. Construction materials will be shipped from Anchorage or Fairbanks through Nenana downriver, using the Yutana Barge Company at the following approximate rates.

Material Type:		Rate per 100 Pounds	
	Lumber, Manholes, Plumbing Fixtures, Miscellaneous Construction Materials. etc.	$30	(Type 1)
	Vehicles and Heavy Equipment	$40	(Type 2)
	Tanks	$50	(Type 3)
	Windows, Doors, Insulation, Prefab Roofs, etc.	$70	(Type 4)
	Fill Material	$28 (per cy)	(Type 5)

8. The lagoon and force main will be constructed in approximately 12 weeks (based on 40 hours per week).
9. The force main to the lagoon will be aboveground.
10. Four laborers will be required.

Materials:	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**	
Imported Fill Material	28000 (1)	cy	$13	$364,000	
Liner (installed)	10800	sy	$15	$162,000	
Fence	2130	lf	$30	$63,906	
Force Main to Lagoon	2500	lf	$50	$125,000	
Lift Station	1	each	$75,000	$75,000	
Land Acquisition	7	ac	$1,000	$7,000	
Misc. Construction Supplies	1	each	$25,000	$25,000	
			Materials Subtotal		$821,906
Labor & Equipment:					
Superintendant (Anc)	480	hour	$40	$19,200	
Foreman	480	hour	$22	$10,560	
Operator/Mechanic	720	hour	$18	$12,960	
Laborer	1920	hour	$14	$26,880	
Plumber (Anc)	40	hour	$35	$1,400	
Mechanic (Anc)	40	hour	$35	$1,400	
Electrician (Anc)	40	hour	$35	$1,400	
Loader	240	hour	$60	$14,400	
Backhoe	240	hour	$45	$10,800	
Dozer	240	hour	$50	$12,000	
Pickup Truck (VSW)	60	day	$0	$0	
Subsistence	600	hour	$10	$6,000	
Misc. Equipment	1	each	$10,000	$10,000	
			Labor Subtotal		$127,000

Freight:						
Type 1	500	100 pounds	$30	$15,000		
Type 2	0	100 pounds	$40	$0		
Type 3	0	100 pounds	$50	$0		
Type 4	0	100 pounds	$70	$0		
Type 5	28000	cy	$28	$784,000		
			Freight Subtotal		$799,000	
		Subtotal				**$1,747,906**
		Design and Construction Management (20%)				**$349,581**
		Contingency (20%)				**$419,497**
		Total				**$2,517,000**

Notes:

(1) 20% factor applied for compaction and/or waste.

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Conceptual Construction Cost Estimates

Sewage Treatment Facility Option 2 - Package Sewage Treatment Plant

Assumptions:

1. An experienced superintendant will be hired to run the job and supervise the local labor.
2. Adequate labor and heavy equipment is available in Alakanuk to complete the project.
3. A package, skid-mounted sewage treatment plant will be barged to Alakanuk from Seattle.
4. The package plant will be installed in a new building on City property.
5. The package plant will have a capacity of treating average and peak daily sewage flows for the design population of 635.
6. The effluent from the treatment plant will be discharged to Alakanuk Pass through a gravity freshwater outfall. The outfall will be buried.
7. Labor and equipment will be available at the following rates.

	Range ($ per hr)		Range ($ per hr)
Superintendant (Anc)	35-40	Electrician (Anc)	25-35
Foreman	18-22	Loader	60
Operator/Mechanic	14-18	Backhoe	45
Laborer	10-14	Dozer	50
Plumber (Anc)	25-35	Pickup Truck (VSW)	0
Mechanic (Anc)	25-35		

8. Construction materials will be shipped from Anchorage or Fairbanks through Nenana downriver, using the Yutana Barge Company at the following approximate rates.

Material Type:		Rate per 100 Pounds	
	Lumber, Manholes, Plumbing Fixtures, Miscellaneous Construction Materials. etc.	$30	(Type 1)
	Vehicles and Heavy Equipment	$40	(Type 2)
	Tanks	$50	(Type 3)
	Windows, Doors, Insulation, Prefab Roofs, etc.	$70	(Type 4)
	Fill Material	$28 (per cy)	(Type 5)

9. The project can be completed in 12 weeks (based on 40 hours per week).
10. Four laborers will be required.

Materials:	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**		
Package Treatment Plant	1	each	$210,000	$210,000		
Outfall to Alakanuk Pass	500	lf	$50	$25,000		
Imported Fill Material	200	cy	$13	$2,600		
Sewage Trt. Plant Building	1000	sf	$100	$100,000		
Misc. Construction Supplies	1	each	$10,000	$10,000		
			Materials Subtotal		$347,600	
Labor & Equipment:						
Superintendant (Anc)	480	hour	$40	$19,200		
Foreman	480	hour	$22	$10,560		
Operator/Mechanic	160	hour	$18	$2,880		
Laborer	1920	hour	$14	$26,880		
Plumber (Anc)	160	hour	$35	$5,600		
Mechanic (Anc)	0	hour	$35	$0		
Electrician (Anc)	160	hour	$35	$5,600		
Loader	40	hour	$60	$2,400		
Backhoe	80	hour	$45	$3,600		
Dozer	40	hour	$50	$2,000		
Pickup Truck (VSW)	48	day	$0	$0		
Misc. Equipment	1	each	$2,000	$2,000		
Subsistence	800	hour	$10	$8,000		
			Labor Subtotal		$88,720	
Freight:						
Type 1	400	100 pounds	$30	$12,000		
Type 2	0	100 pounds	$40	$0		
Type 3	270	100 pounds	$50	$13,500		
Type 4	50	100 pounds	$70	$3,500		
Type 5	200	cy	$28	$5,600		
			Freight Subtotal		$34,600	
		Subtotal				**$470,920**
		Design and Construction Management (20%)				**$94,184**
		Contingency (20%)				**$113,021**
		Total				**$678,000**

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Conceptual Construction Cost Estimates

Sewage Treatment Facility Option 3 - Activated Sludge System

Assumptions:

1. An experienced superintendant will be hired to run the job and supervise the local labor.
2. Adequate labor and heavy equipment is available in Alakanuk to complete the project.
3. A 25,000 gallon bolted steel and insulated clarifier tank will be constructed adjacent to the AVEC plant.
4. A 50,000 gallon bolted steel and insulated aeration tank will be constructed adjacent to the clarifier.
5. A 1000 sf building will be constructed adjacent to the tanks to house the plant equipment.
6. Effluent from the sewage treatment facility will be discharged to Alakanuk Pass through a buried gravity freshwater outfall.
7. Labor and equipment will be available at the following rates.

	Range ($ per hr)		Range ($ per hr)
Superintendant (Anc)	35-40	Electrician (Anc)	25-35
Foreman	18-22	Loader	60
Operator/Mechanic	14-18	Backhoe	45
Laborer	10-14	Dozer	50
Plumber (Anc)	25-35	Pickup Truck (VSW)	0
Mechanic (Anc)	25-35		

8. Construction materials will be shipped from Anchorage or Fairbanks through Nenana downriver, using the Yutana Barge Company at the following approximate rates.

Material Type:		Rate per 100 Pounds	
	Lumber, Manholes, Plumbing Fixtures, Miscellaneous Construction Materials. etc.	$30	(Type 1)
	Vehicles and Heavy Equipment	$40	(Type 2)
	Tanks	$50	(Type 3)
	Windows, Doors, Insulation, Prefab Roofs, etc.	$70	(Type 4)
	Fill Material	$28 (per cy)	(Type 5)

9. The project can be completed in 9 weeks (based on 40 hours per week).
10. Four laborers will be required.

Materials:	Quantity	Unit	Unit Cost	Extended Cost		
Tank Construction Supplies	1	each	$100,000	$100,000		
Plant Equipment	1	each	$50,000	$50,000		
Outfall to Alakanuk Pass	500	lf	$50	$25,000		
Imported Fill Material	2000	cy	$13	$26,000		
Sewage Trt. Plant Building	1000	sf	$100	$100,000		
Misc. Construction Supplies	1	each	$10,000	$10,000		
			Materials Subtotal		$311,000	
Labor & Equipment:						
Superintendant (Anc)	360	hour	$40	$14,400		
Foreman	360	hour	$22	$7,920		
Operator/Mechanic	120	hour	$18	$2,160		
Laborer	1440	hour	$14	$20,160		
Plumber (Anc)	120	hour	$35	$4,200		
Mechanic (Anc)	0	hour	$35	$0		
Electrician (Anc)	120	hour	$35	$4,200		
Loader	40	hour	$60	$2,400		
Backhoe	80	hour	$45	$3,600		
Dozer	40	hour	$50	$2,000		
Pickup Truck (VSW)	48	day	$0	$0		
Misc. Equipment	1	each	$2,000	$2,000		
Subsistence	600	hour	$10	$6,000		
			Labor Subtotal		$69,040	
Freight:						
Type 1	1000	100 pounds	$30	$30,000		
Type 2	0	100 pounds	$40	$0		
Type 3	150	100 pounds	$50	$7,500		
Type 4	20	100 pounds	$70	$1,400		
Type 5	2000	cy	$28	$56,000		
			Freight Subtotal		$94,900	
		Subtotal				$474,940
		Design and Construction Management (20%)				$94,988
		Contingency (20%)				$113,986
		Total				**$684,000**

Conceptual Construction Cost Estimates

Sewage Treatment Facility Option 4 - Construct Tundra Pond South of the AVEC Plant

Assumptions:

1. An experienced superintendant will be hired to run the job and supervise the local labor.
2. Adequate labor and heavy equipment is available in Alakanuk to construct the lagoon.
3. No fill will be imported except for construction of a service road from the vacuum plant to the lagoon.
4. The length of the service road and outfall will be 300 feet.
5. The width of the service road will be 10 feet. A depth of two feet of imported fill will be placed to construct the road.
6. Geotextile fabric will be placed between the existing ground and the imported fill.
7. The size of the lagoon is based on the following.

Assume:	Sewage Depth =	12 ft
	Freeboard =	3 ft
	Berm Slopes =	3 :1
Volume required = 635 persons(80 gal/day/person)(8 months storage/year)(30 days/month) =		1629947 ft^3
	Top of berm width =	10 ft
Calculated Values:	Inside bottom length/width of lagoon =	333 ft
	Perimeter Length at Center of Berm =	1550 ft
	Cross Sectional Area of Berm =	825 ft^2
	Footprint Area of Entire Lagoon =	6.51 ac
	Perimeter Length of Entire Lagoon =	2130 ft

8. Labor and equipment will be available at the following rates.

	Range ($ per hr)		Range ($ per hr)
Superintendant (Anc)	35-40	Electrician (Anc)	25-35
Foreman	18-22	Loader	60
Operator/Mechanic	14-18	Backhoe	45
Laborer	10-14	Dozer	50
Plumber (Anc)	25-35	Pickup Truck (VSW)	0
Mechanic (Anc)	25-35		

9. Construction materials will be shipped from Anchorage or Fairbanks through Nenana downriver, using the Yutana Barge Company at the following approximate rates.

Material Type:		Rate per 100 Pounds	
	Lumber, Manholes, Plumbing Fixtures, Miscellaneous Construction Materials. etc.	$30	(Type 1)
	Vehicles and Heavy Equipment	$40	(Type 2)
	Tanks	$50	(Type 3)
	Windows, Doors, Insulation, Prefab Roofs, etc.	$70	(Type 4)
	Fill Material	$28 (per cy)	(Type 5)

10. The lagoon and force main will be constructed in approximately 12 weeks (based on 40 hours per week).
11. The force main to the lagoon will be aboveground.
12. Four laborers will be required.

Materials:	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**	
Imported Fill Material	267 (1)	cy	$13	$3,467	
Geotextile Fabric	333	sy	$10	$3,333	
Fence	2130	lf	$30	$63,906	
Force Main to Lagoon	300	lf	$50	$15,000	
Lift Station	1	each	$75,000	$75,000	
Land Acquisition	7	ac	$1,000	$7,000	
Misc. Construction Supplies	1	each	$10,000	$10,000	
			Materials Subtotal		$177,706
Labor & Equipment:					
Superintendant (Anc)	480	hour	$40	$19,200	
Foreman	480	hour	$22	$10,560	
Operator/Mechanic	720	hour	$18	$12,960	
Laborer	1920	hour	$14	$26,880	
Plumber (Anc)	40	hour	$35	$1,400	
Mechanic (Anc)	40	hour	$35	$1,400	
Electrician (Anc)	40	hour	$35	$1,400	
Loader	240	hour	$60	$14,400	
Backhoe	240	hour	$45	$10,800	
Dozer	240	hour	$50	$12,000	
Pickup Truck (VSW)	60	day	$0	$0	
Subsistence	600	hour	$10	$6,000	
Misc. Equipment	1	each	$10,000	$10,000	
			Labor Subtotal		$127,000

Freight:						
Type 1	500	100 pounds	$30	$15,000		
Type 2	0	100 pounds	$40	$0		
Type 3	0	100 pounds	$50	$0		
Type 4	0	100 pounds	$70	$0		
Type 5	267	cy	$28	$7,467		
		Freight Subtotal			$22,467	
		Subtotal				$327,173
		Design and Construction Management (20%)				$65,435
		Contingency (20%)				$78,521
		Total				**$471,000**

Notes:

(1) 20% factor applied for compaction and/or waste.

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Conceptual Construction Cost Estimates

Raw Water Intake Structure - Infiltration Gallery

Assumptions:

1. An experienced superintendant will be hired to run the job and supervise the local labor.
2. The engineer's investigation will indicate that construction of a more reliable intake structure will be required.
3. Adequate labor and heavy equipment is available in Alakanuk to construct the infiltration gallery
4. The infiltration gallery will consist of a large diameter, vertical, shallow well.
5. A small insulated wooden pump house will be constructed over the well.
6. The material from the excavation will be mixed 1 to 1 with granular fill material imported from St. Marys.
7. Labor and equipment will be available at the following rates.

	Range ($ per hr)		Range ($ per hr)
Superintendant (Anc)	35-40	Electrician (Anc)	25-35
Foreman	18-22	Loader	60
Operator/Mechanic	14-18	Backhoe	45
Laborer	10-14	Dozer	50
Plumber (Anc)	25-35	Pickup Truck (VSW)	0
Mechanic (Anc)	25-35		

8. Construction materials will be shipped from Anchorage or Fairbanks through Nenana downriver, using the Yutana Barge Company at the following approximate rates.

Material Type:		Rate per 100 Pounds	
	Lumber, Manholes, Plumbing Fixtures, Miscellaneous Construction Materials. etc.	$30	(Type 1)
	Vehicles and Heavy Equipment	$40	(Type 2)
	Tanks	$50	(Type 3)
	Windows, Doors, Insulation, Prefab Roofs, etc.	$70	(Type 4)
	Fill Material	$28 (per cy)	(Type 5)

9. Power for the structure is available nearby.
10. The infiltration gallery and pump house will be constructed in approximately 2 weeks (based on 40 hours per week).
11. The infiltration gallery will be located near the existing intake structure. Relocation of the intake line will not be required.
12. Two laborers will be required.

Materials:	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**		
Imported Fill Material	250	cy	$13	$3,250		
Wooden Structure	50	sf	$20	$1,000		
Well Construciton Supplies	1	ls	$2,000	$2,000		
Pumps and Appurtenances	1	each	$5,000	$5,000		
Misc. Construction Supplies	1	each	$1,000	$1,000		
			Materials Subtotal		$12,250	
Labor & Equipment:						
Superintendant (Anc)	80	hour	$40	$3,200		
Foreman	80	hour	$22	$1,760		
Operator/Mechanic	80	hour	$18	$1,440		
Laborer	160	hour	$14	$2,240		
Plumber (Anc)	40	hour	$35	$1,400		
Mechanic (Anc)	4	hour	$35	$140		
Electrician (Anc)	40	hour	$35	$1,400		
Loader	20	hour	$60	$1,200		
Backhoe	40	hour	$45	$1,800		
Dozer	20	hour	$50	$1,000		
Pickup Truck (VSW)	10	day	$0	$0		
Subsistence	164	hour	$10	$1,640		
Misc. Equipment	1	each	$1,000	$1,000		
			Labor Subtotal		$18,220	
Freight:						
Type 1	50	100 pounds	$30	$1,500		
Type 2	0	100 pounds	$40	$0		
Type 3	0	100 pounds	$50	$0		
Type 4	0	100 pounds	$70	$0		
Type 5	250	cy	$28	$7,000		
			Freight Subtotal		$8,500	
		Subtotal				$38,970
		Design and Construction Management (20%)				$7,794
		Contingency (20%)				$9,353
		Total				**$56,000**

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Conceptual Construction Cost Estimates

Water Treatment Plant Upgrade

Assumptions:

1. An experienced superintendant will be hired to run the job and supervise the local labor.
2. Adequate labor and heavy equipment is available in Alakanuk to complete the project.
3. The existing water treatment plant equipment will be upgraded to treat an average daily flow of 76,000 gallons and a peak daily flow of 175,000 gallons.
4. Relocation or expansion of the existing water treatment plant will not be necessary.
5. Order of magnitude materials costs to upgrade the system were provided by Alaska Pump & Supply.
6. Labor and equipment will be available at the following rates.

	Range ($ per hr)		Range ($ per hr)
Superintendant (Anc)	35-40	Electrician (Anc)	25-35
Foreman	18-22	Loader	60
Operator/Mechanic	14-18	Backhoe	45
Laborer	10-14	Dozer	50
Plumber (Anc)	25-35	Pickup Truck (VSW)	0
Mechanic (Anc)	25-35		

7. Construction materials will be shipped from Anchorage or Fairbanks through Nenana downriver, using the Yutana Barge Company at the following approximate rates.

Material Type:		Rate per 100 Pounds	
	Lumber, Manholes, Plumbing Fixtures, Miscellaneous Construction Materials. etc.	$30	(Type 1)
	Vehicles and Heavy Equipment	$40	(Type 2)
	Tanks	$50	(Type 3)
	Windows, Doors, Insulation, Prefab Roofs, etc.	$70	(Type 4)

8. The work required to upgrade the water treatment plant can be completed in 4 weeks (based on 40 hours per week).
9. Three laborers will be required.

Materials:	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**		
Treatment Plant Upgrade	1	each	$150,000	$150,000		
Misc. Construction Supplies	1	each	$10,000	$10,000		
			Materials Subtotal		$160,000	
Labor & Equipment:						
Superintendant (Anc)	160	hour	$40	$6,400		
Foreman	160	hour	$22	$3,520		
Operator/Mechanic	16	hour	$18	$288		
Laborer	480	hour	$14	$6,720		
Plumber (Anc)	160	hour	$35	$5,600		
Mechanic (Anc)	0	hour	$35	$0		
Electrician (Anc)	80	hour	$35	$2,800		
Loader	16	hour	$60	$960		
Backhoe	0	hour	$45	$0		
Dozer	0	hour	$50	$0		
Pickup Truck (VSW)	20	day	$0	$0		
Misc. Equipment	1	each	$1,000	$1,000		
Subsistence	400	hour	$10	$4,000		
			Labor Subtotal		$31,288	
Freight:						
Type 1	200	100 pounds	$30	$6,000		
Type 2	0	100 pounds	$40	$0		
Type 3	0	100 pounds	$50	$0		
Type 4	5	100 pounds	$70	$350		
			Freight Subtotal		$6,350	
		Subtotal				**$197,638**
		Design and Construction Management (20%)				**$39,528**
		Contingency (20%)				**$47,433**
		Total				**$285,000**

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Conceptual Construction Cost Estimates

Upgrade Existing Landfill

Assumptions:

1. An experienced superintendant will be hired to run the job and supervise the local labor.
2. Adequate labor and heavy equipment is available in Alakanuk to complete the project.
3. No fill material will be imported from outside of Alakanuk.
4. Ten percent of the existing 3,500 lf of fencing will require new materials. The remainder will require repair only.
5. Labor and equipment will be available at the following rates.

	Range ($ per hr)		Range ($ per hr)
Superintendant (Anc)	35-40	Electrician (Anc)	25-35
Foreman	18-22	Loader	60
Operator/Mechanic	14-18	Backhoe	45
Laborer	10-14	Dozer	50
Plumber (Anc)	25-35	Pickup Truck (VSW)	0
Mechanic (Anc)	25-35		

6. Construction materials will be shipped from Anchorage or Fairbanks through Nenana downriver, using the Yutana Barge Company at the following approximate rates.

Material Type:		Rate per 100 Pounds	
	Lumber, Manholes, Plumbing Fixtures, Miscellaneous Construction Materials. etc.	$30	(Type 1)
	Vehicles and Heavy Equipment	$40	(Type 2)
	Tanks	$50	(Type 3)
	Windows, Doors, Insulation, Prefab Roofs, etc.	$70	(Type 4)
	Fill Material	$28 (per cy)	(Type 5)

7. The work will be completed in one week (based on 40 hours per week).
8. Two laborers and one operator will be required.

Materials:	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**		
New Fence	350	lf	$20	$7,000		
Dumpster Covers	30	each	$250	$7,500		
Misc. Construction Supplies	1	each	$1,000	$1,000		
			Materials Subtotal		$15,500	
Labor & Equipment:						
Superintendant (Anc)	8	hour	$40	$320		
Foreman	20	hour	$22	$440		
Operator/Mechanic	40	hour	$18	$720		
Laborer	80	hour	$14	$1,120		
Loader	5	hour	$60	$300		
Backhoe	8	hour	$45	$360		
Dozer	20	hour	$50	$1,000		
Pickup Truck (VSW)	5	day	$0	$0		
Misc. Equipment	1	each	$500	$500		
Subsistence	8	hour	$10	$80		
			Labor Subtotal		$4,840	
Freight:						
Type 1	30	100 pounds	$30	$900		
Type 2	0	100 pounds	$40	$0		
Type 3	0	100 pounds	$50	$0		
Type 4	0	100 pounds	$70	$0		
			Freight Subtotal		$900	
		Subtotal				**$21,240**
		Design and Construction Management (10%)				**$2,124**
		Contingency (15%)				**$3,505**
		Total				**$27,000**

O&M Costs for One Lift Station

	Quantity per Year	Unit Cost	Annual Cost
Routine O&M			
Operator (1 hour per week)	52 hr	$15	$780
Major Repair			
Pump Replacement (Once per 10 years)	0.1 ea	$2,000	$200
Misc. Repair	1 ls	$100	$100
Chemicals	0	$0	$0
Electricity	0	$0	$0
2.3 hP motor*3 hrs/day running time*0.7457 kWh/hPh *365 days/yr	3175 kWh	$0.40	$1,270
Vehicle Maintenance	0	$0	$0
Heating Fuel	0	$0	$0
Total			**$2,350**

O&M Costs for Water Treatment Plant

	Quantity per Year	Unit Cost	Annual Cost
Routine O&M			
Operator (30 hours per week)	1560 hr	$15	$23,400
Parts & Equipment (20% of Labor)	1 ls	$4,680	$4,680
Major Repair (One per Year)			
Labor (2 men for 1 week)	80 hr	$15	$1,200
Parts & Equipment (20% of Labor)	1 ls	$240	$240
Chemicals	1 ls	$10,000	$10,000
Electricity			
WTP Equipment (0.30/1000 gallons*50800 gpd)	1 ls	$5,563	$5,563
Circulating Pumps (0.30/1000 gallons*50800 gpd)	1 ls	$5,563	$5,563
Plant Building ($200 per month)	1 ls	$2,400	$2,400
Vehicle Maintenance	0	$0	$0
Heating Fuel ($1000/month for 8 Months)	1 ls	$8,000	$8,000
Misc.	1 ls	$5,000	$5,000
Total			**$66,045**

O&M Costs for Above-Ground Piped System

	Quantity per Year	Unit Cost	Annual Cost
Routine O&M			
Operator (12 hours per week)	624 hr	$15	$9,360
Parts & Equipment (10% of Labor)	1 ls	$936	$936
Major Repair (Three per Year)			
Labor (2 men for 1 week per Repair)	240 hr	$15	$3,600
Parts & Equipment (20% of Labor)	1 ls	$720	$720
Chemicals	0 ls	$0	$0
Electricity	0 ls	$0	$0
Vehicle Maintenance ($100 per month)	1 ls	$1,200	$1,200
Heating Fuel	0 ls	$0	$0
Misc.	1 ls	$2,000	$2,000
Total			**$17,816**

O&M Costs for Below-Ground Piped System

	Quantity per Year	Unit Cost	Annual Cost
Routine O&M			
Operator (16 hours per week)	832 hr	$15	$12,480
Parts & Equipment (10% of Labor)	1 ls	$1,248	$1,248
Major Repair (One per Year)			
Labor (2 men for 1 week per Repair)	80 hr	$15	$1,200
Parts & Equipment (100% of Labor)	1 ls	$1,200	$1,200
Chemicals	0 ls	$0	$0
Electricity	0 ls	$0	$0
Vehicle Maintenance ($100 per month)	1 ls	$1,200	$1,200
Heating Fuel	0 ls	$0	$0
Misc.	1 ls	$2,000	$2,000
Total			**$19,328**

O&M Costs for Package Sewage Treatment Plant

	Quantity per Year	Unit Cost	Annual Cost
Routine O&M			
Operator (40 hours per week)	2080 hr	$15	$31,200
Parts & Equipment (20% of Labor)	1 ls	$6,240	$6,240
Major Repair (One per Year)			
Labor (2 men for 1 week)	80 hr	$15	$1,200
Parts & Equipment (20% of Labor)	1 ls	$240	$240
Chemicals	1 ls	$10,000	$10,000
Electricity			
STP Equipment ($0.30/1000 gallons*50800 gpd)	1 ls	$5,563	$5,563
Plant Building ($200 per month)	1 ls	$2,400	$2,400
Vehicle Maintenance ($150/month)	1 ls	$1,800	$1,800
Heating Fuel ($500/month for 8 Months)	1 ls	$4,000	$4,000
Misc.	1 ls	$5,000	$5,000
Total			**$67,643**

O&M Costs for Activated Sludge System

	Quantity per Year	Unit Cost	Annual Cost
Routine O&M			
Operator (16 hours per week)	832 hr	$15	$12,480
Parts & Equipment (10% of Labor)	1 ls	$1,248	$1,248
Major Repair (One per Year)			
Labor (2 men for 1 week)	80 hr	$15	$1,200
Parts & Equipment (10% of Labor)	1 ls	$120	$120
Chemicals	0 ls	$0	$0
Electricity			
Blowers (0.4/1000 gallons*50800 gpd)	1 ls	$7,417	$7,417
Plant Building ($100 per month)	1 ls	$1,200	$1,200
Vehicle Maintenance ($150 per month)	1 ls	$1,800	$1,800
Heating Fuel ($500/month for 8 Months)	1 ls	$4,000	$4,000
Misc.	1 ls	$4,000	$4,000
Total			**$33,465**

O&M Costs for Sewage Lagoon or Tundra Pond

	Quantity per Year	Unit Cost	Annual Cost
Routine O&M			
Operator (8 hours per week)	416 hr	$15	$6,240
Parts & Equipment (10% of Labor)	1 ls	$624	$624
Major Repair (One per Year)			
Labor (2 men for 1 week)	80 hr	$15	$1,200
Parts & Equipment (10% of Labor)	1 ls	$120	$120
Chemicals	0 ls	$0	$0
Electricity	0 ls	$0	$0
Vehicle Maintenance	1 ls	$500	$500
Heating Fuel	0 ls	$0	$0
Misc.	1 ls	$2,000	$2,000
Total			**$10,684**

O&M Costs for Vacuum Plant

	Quantity per Year	Unit Cost	Annual Cost
Routine O&M			
Operator (40 hours per week)	2080 hr	$15	$31,200
Parts & Equipment (20% of Labor)	1 ls	$6,240	$6,240
Major Repair (One per Year)			
Labor (2 men for 1 week)	80 hr	$15	$1,200
Parts & Equipment (50% of Labor)	1 ls	$600	$600
Chemicals	0 ls	$0	$0
Electricity			
Vacuum Plant ($0.30/1000 gallons*50800 gpd)	1 ls	$5,563	$5,563
Plant Building ($100 per month)	1 ls	$1,200	$1,200
Vehicle Maintenance ($150 per month)	0 ls	$0	$0
Heating Fuel ($500/month for 8 Months)	1 ls	$4,000	$4,000
Misc.	1 ls	$5,000	$5,000
Total			**$55,003**

O&M Costs for Individual Holding Tank Systems

	Quantity per Month	Unit Cost	Monthly Cost per Household
Home Services			
Water Delivery (1 hr each)	2 ea	$15	$30
Sewage Pumping and Disposal (1 hr each)	2 ea	$15	$30
Rountine O&M			
Operator	4 hr	$15	$60
Parts & Equipment (25% of Labor)	1 ls	$15	$15
Vehicle Maintenance			
Sewage Pump Truck	1 ea	$10	$10
Water Delivery Truck	1 ea	$10	$10
Misc.	1 ea	$25	$25
Total			**$180**

O&M Costs for Residential Lift Stations

	Quantity per Year	Unit Cost	Annual Cost
Major Repair			
Pump Replacement (Once per 10 years)	0.1 ea	$1,500	$150
Misc. Repair	1 ls	$150	$150
Chemicals	0	$0	$0
Electricity	0	$0	$0
0.25 hP motor*1 hrs/day running time*0.7457 kWh/hPh *365 days/yr	345 kWh	$0.40	$138
Vehicle Maintenance	0	$0	$0
Misc.	1	$50	$50
Total			$488