INTERIM REPORT — ENGINEERING/FINANCIAL

PIERCE, COLORADO

PLAN FOR WASTEWATER TREATMENT WORKS

Water Quality Management Plan

LARIMER-WELD REGIONAL COUNCIL OF GOVERNMENTS
LOVELAND, COLORADO

PREPARED BY BRISCOE, MAPHIS, MURRAY & LAMONT, INC.
BOULDER, COLORADO
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LOVELAND, COLORADO MAY, 1977

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208 AREAWIDE WATER QUALITY MANAGEMENT PLAN

TECHNICAL PLANNING REPORT
WASTEWATER TREATMENT WORKS
PIERCE, COLORADO

Prepared For:

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1.1 TECHNICAL PLANNING SUMMARY

Pierce's treatment facility consists of a single, large, non-aerated lagoon; the effluent is filtered through an exfiltration gallery into the soil, so that no surface discharge occurs.

Recently proposed Federal regulations concerning effluent standards for stabilization ponds have significantly reduced the expected cost of upgrading Pierce's wastewater facilities. Discharge standards could now be met by adding disinfection.

When the BOD_5 standard is in danger of being violated, aerators should be added to the first stage of the stabilization pond. This is not expected to happen until the population reaches about 1,700.

1.2 FINANCIAL PLANNING SUMMARY

Pierce's ability to finance wastewater system improvements must be viewed in the context of its relatively low median family income levels, and the existing burden on its taxpayers to retire $381,000 of outstanding water and sewer bonds. Although no sales tax is levied, the combined property tax rates for the Town, County and School District are close to 90 mills.

Problems that will arise as the Town attempts to garner the necessary financing for its wastewater system will demand much attention from the existing residents. However, care should be exercised not to overlook the broader problem at hand which is how a central wastewater system should be managed in the best long-run interests of the citizens. Management policies regarding the utility service area, extensions, and utility operation are equally as important, and closely related to, financial policies on new hookup and service charges. Policies in these areas should be discussed early to gain citizen understanding and to set the stage for the purely financial decisions. To assist in these areas, the Town should obtain a copy of the Utility Management Handbook (1977) available from the LWRCOG.

The most important financial concern for Pierce is the effect that financing wastewater system improvements will have on the overall tax burden of its residents. Because of the modest amount of proposed improvement costs, Pierce appears to have the option of contributing by increasing Town debt. However, in light of existing obligations, grant assistance would be desirable in order to avoid overextending the Town financially in an attempt to provide sewer system improvements.

It will be particularly important that Pierce's citizens are brought along in the process of deciding about the proposed improvements, and in the development of wastewater management policies so their acceptance of any possible changes in rate levels and management policies can be obtained.

2.0 INTRODUCTION

2.1 AREAWIDE WATER QUALITY MANAGEMENT PLANNING PROCESS

This Technical Planning Report has been prepared as part of an Overall Areawide Water Quality Management Plan (208) for the Larimer-Weld region being developed by Toups Corporation and Briscoe, Maphis, Murray, and Lamont, Inc., for the Larimer-Weld Regional Council of Governments (LWRCOG). The purpose of the Technical Planning component of the 208 plan is to assist various communities in the Larimer-Weld region in solving particular wastewater management problems by developing the best alternative project for waste treatment and disposal.

This Technical Planning Report has been prepared to provide near-term guidance for the Town of Pierce. This report (along with appropriate modifications) will be incorporated into the LWRCOG Areawide Waste Treatment Management Plan following review and approval by all governmental agencies involved.

2.2 PURPOSE AND SCOPE OF TECHNICAL PLAN

Pierce presently has a two cell lagoon system which was installed in 1969. Beginning in about 1970, the population began to increase at an unprecidented rate so that the capacity of the treatment works is threatened.

2.2.1 Purpose

The purpose of this Technical Plan is to reanalyze the existing treatment plant in light of existing effluent standards and population estimates. If upgrading is required in the near future, a best method will be recommended and financial possibilities will be described.

2.2.2 Scope

The scope of this Technical Plan includes the following phases:

- Describe the planning area characteristics;
- Determine wastewater characteristics;
- Analyze waste treatment and discharge requirements;
- Analyze existing facilities;
- Develop, analyze, and screen alternative plans;
- Prepare a detailed description of the best alternative project, including engineering, financial, and institutional programs;
- Prepare a Technical Planning Report presenting all data, and outlining a wastewater management program for the 20-year planning period;
- Assessment of current financial capabilities;
- Development of a procedure for establishing a financial program;
- Analysis of the ability (and risks involved) in financing the proposed wastewater treatement program.

3.0 PLANNING AREA CHARACTERISTICS

Pierce is located approximately fifteen miles north of Greeley on U.S. Highway 85. The community was founded in 1907 and incorporated in 1918. It is primarily an agricultural community, with many residents working and shopping in the Greeley and Eaton areas. The location of Pierce is shown on Figure 3.0-A.

3.1 EXISTING AND PROJECTED POPULATION

The population of Pierce increased from 372 people in 1950 to 452 in 1970. By 1975, the population of Pierce had almost doubled over its 1970 level to a level of 900. Although its population is expected to continue to increase, the anticipated growth rate is significantly less than that experienced during the 1970 to 1975 period. Population projections for Pierce indicate an expected population level by 1990 of between 1000 and 2000 people, and by the year 2000 of between 1400 and 3000. For purposes of this report, a population of 2,700 by the year 2000 will be assumed. These population projections are shown graphically on Figure 3.1-A.

One reason that the projected population is so widely defined is that the growth rate is very dependent on the local growth policy. Presently there is a very strict anti-annexation policy, although there is alot of undeveloped land already in Pierce.

3.2 FINANCIAL CAPABILITIES

The financial capabilities of the Town of Pierce were analyzed by Briscoe, Maphis, Murray and Lamont, Inc., Institutional/Financial Consultants to the LWRCOG. This portion of the Technical Plan is presented in Chapter 8.0.

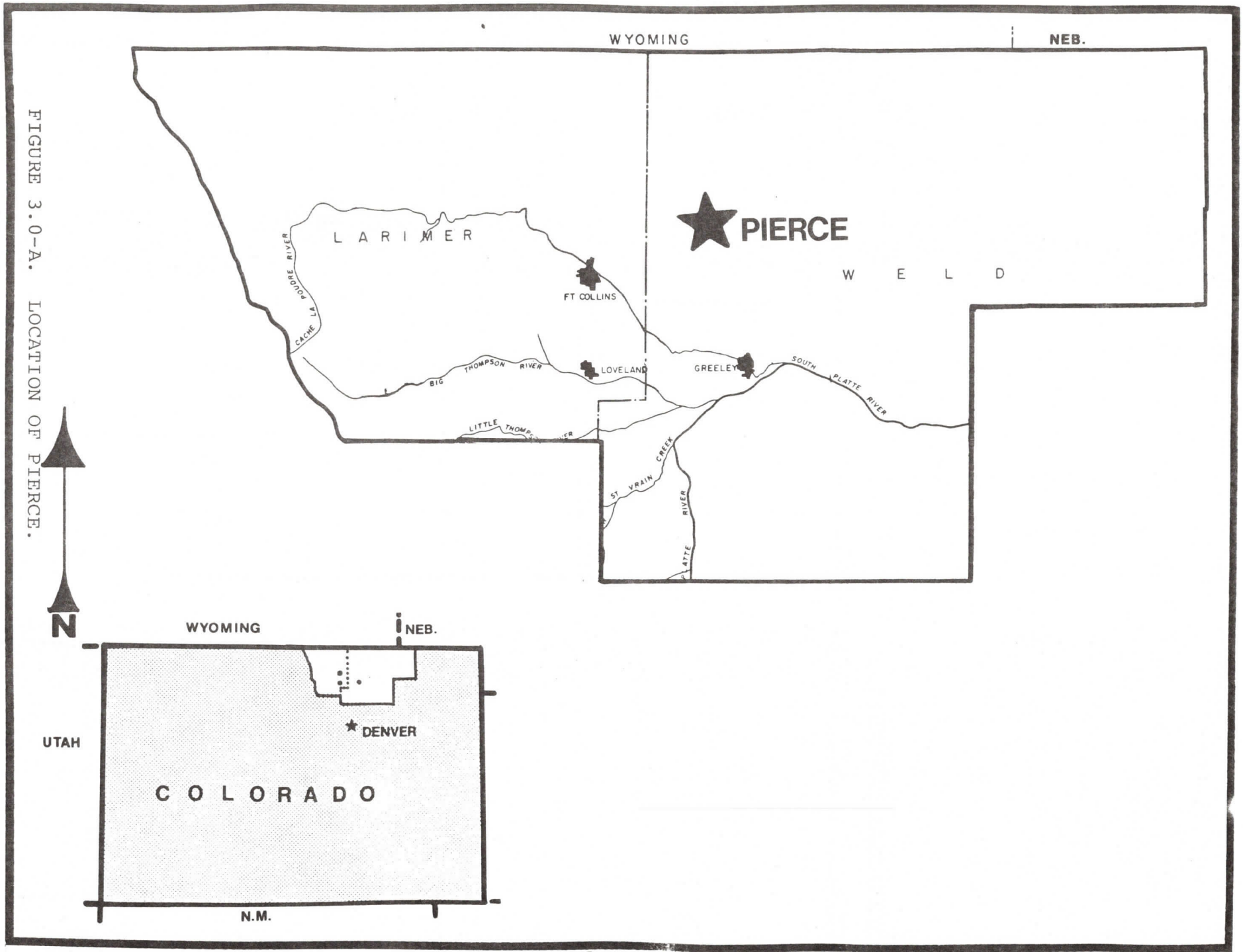

FIGURE 3.0-A. LOCATION OF PIERCE.

LOCATION MAP - LARIMER-WELD REGION

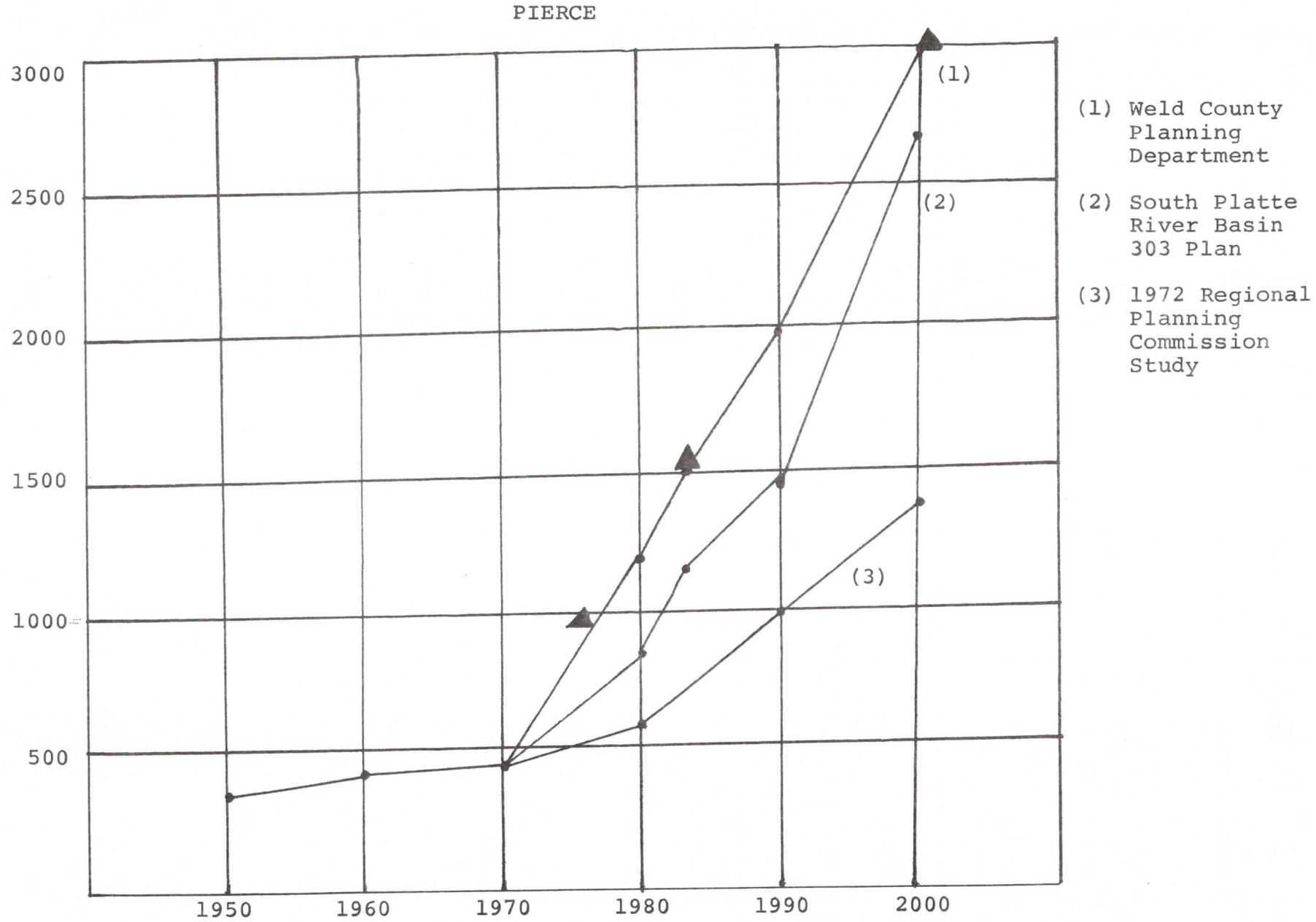

FIG. 3.1-A. PIERCE POPULATION PROJECTIONS.

4.0 WASTEWATER CHARACTERISTICS

The characteristics of Pierce's wastewater will be estimated based on historical data, results of a regional wastewater quality sampling program recently conducted by Toups Corporation, and on recommended design criteria published by the Colorado Department of Health. Wasteload projections will be developed based on waste characteristics and population projections.

4.1 MUNICIPAL WASTEWATER CHARACTERISTICS

In analyzing wastewater characteristics, it is necessary to investigate components affecting both the amount of wastewater and its strength and composition.

4.1.1 Flow

An analysis of wintertime water consumption indicates that the average unit use is 67 gallons per capita per day (gcd). Historically, water consumption is increasing. Partly due to this, the Colorado Department of Health recommends using 100 gcd. This figure will be used in this report. Peak flow will be calculated based on 250 percent of the average flow.

4.1.2 Composition

Wastewater strength is generally measured in terms of biochemical oxygen demand (BOD_5) and suspended solids (SS). Evaluation of other constituents such as chemical oxygen demand (COD), ammonia (NH_3), temperature, and pH are necessary in particular situations.

Based on past analyses of waste characteristics in the area, and the results of a sampling program conducted by Toups Corporation in the Larimer-Weld region as part of the Technical Planning component of the 208 plan, the following unit values are appropriate for design purposes: 200 milligrams per liter (mg/l) BOD_5; 200 mg/l SS; and 15 mg/l ammonia. Based on a unit flow of 100 gcd, the unit strength of wastewater is 0.17 pounds per capita per day (pcd) BOD_5 and 0.17 pcd SS.

4.1.3 Design Factors

A summary of unit design factors for sizing various components of the wastewater system is presented in Table 4.1.3-A.

TABLE 4.1.3-A. UNIT DESIGN FACTORS

ITEM	FACTOR
Wastewater Flow	
Average flow (gcd)	100 (a)
Peak flow (% of average)	250
Wastewater Composition	
BOD_5 (pcd)	0.17
SS (pcd)	0.17
Ammonia (mg/l)	15

gcd = gallons per capita per day
pcd = pounds per capita per day
(a) Includes minimum I/I contributions

4.2 WASTELOAD PROJECTIONS

Wasteload projections have been developed by applying the unit design factors shown in Table 4.1.3-A to the projected population of 2,700. Resulting projections are summarized in Table 4.2-A.

TABLE 4.2-A. WASTELOAD PROJECTIONS

CONSTITUENT	WASTELOAD
Flow (gpd)	
Average flow	270,000
Peak Flow	675,000
Average Composition (lbs/day)	
BOD_5	460
SS	460
Ammonia	34

gpd = gallons per day

5.0 DISCHARGE AND TREATMENT REQUIREMENTS

Wastewater must be disposed of in a manner which will protect the public health, maintain receiving water quality consistant with its beneficial uses, and prevent nuisance at the site of disposal. These conditions, along with economic considerations, determine the degree and type of wastewater treatment necessary prior to disposal or reuse. In this section, discharge standards are delineated, treatment requirements are outlined, an overview of alternative treatment processes are presented, and an evaluation of irrigation reuse potential is given.

5.1 WASTE DISCHARGE STANDARDS

Standards promulgated by the U.S. Environmental Protection Agency (EPA) and the Colorado Water Quality Control Commission (WQCC) for the discharge of wastes to receiving waters have been extensively discussed in the South Platte River Water Quality Management Plan [Toups - 1974]. Current standards have been refined, and further changes are presently being proposed.

5.1.1 Existing Requirements

As a minimum, planning of publically-owned wastewater treatment facilities must provide for secondary treatment by 1977 or as soon as possible thereafter, and for application of Best Practicable Waste Treatment Technology (BPWTT) prior to 1983. The levels of BPWTT and various waste management techniques available to meet those levels have been defined [EPA - 1975]. Secondary treatment and BPWTT requirements apply to discharges to all surface waters of the State. The WQCC has ruled that these standards also apply to discharges to privately-owned irrigation supply waters. More stringent standards apply to discharges to water quality limited segments of State receiving waters; however, no such segments are located in the vicinity of the Town of Pierce. Current EPA secondary treatment requirements as promulgated under the Federal Water Pollution Control Act Amendments (PL 92-500), together with current standards of the Colorado WQCC, are summarized in Table 5.1.1-A.

TABLE 5.1.1-A. CURRENT WASTE DISCHARGE REQUIREMENTS

PARAMETER	Federal PL 92-500		State WQCC		
	30-day Average	7-day Average	30-day Average	7-day Average	Single Sample
BOD_5 (mg/l)	30(a)	45	ns	ns	ns
SS (mg/l)	30(a,d)	45(d)	ns	ns	ns
pH	ns	ns	ns	ns	(b)
Total Residual Chlorine (mg/l)	ns	ns	ns	ns	0.5
Fecal Coliform (MPN/100 ml)	ns	ns	6,000	12,000	ns
Oil & Grease (mg/l)	ns	ns	ns	ns	10(c)

ns = none specified

(a) Shall not exceed 15 percent of 30-day average influent concentration.
(b) Within the limits of 6.0 to 9.0 unless it can be demonstrated that: (1) inorganic chemicals are not added to the waste stream as part of the treatment process; and (2) contributions from industrial sources do not cause the pH to exceed the 6.0 to 9.0 limits (EPA requirements).
(c) Nor shall there be a visible sheen.
(d) Conditional relaxation of these standards now proposed by EPA for communities utilizing stabilization ponds systems with a design capacity of 1 mgd or less.

5.1.2 Proposed Requirements

EPA has recently proposed a relaxation of suspended solids limitations in discharge standards of communities which utilize stabilization pond systems (Fed. Reg. 10/2/76). The proposed standards recognize the need to retain pond system for many smaller communities because of their inherent economical and functional advantages. Adoption of the regulations would allow the EPA Regional Administrator or state agency to grant a variance with respect to suspended solids limitations of secondary treatment requirements defined in NPDES permits, providing the community can show that: (1) waste stabilization ponds are used as the process for secondary treatment; (2) the treatment facilities have a design capacity of 1 mgd or less; and (3) performance data indicates that the facilities cannot comply with present suspended solids limitations, even if properly operated, without the addition of treatment systems not historically considered as secondary treatment (i.e., filtration systems for algae removal).

Pond systems would still be required to meet an effluent quality achievable by "best waste stabilization pond technology" (BWSPT). BWSPT is defined as a suspended solids value which is equal to the effluent concentration achieved 90 percent of the time within a state or appropriate contiguous geographical area, by waste stabilization ponds that are achieving the levels of effluent quality established for BOD (30/45 mg/l).

5.2 OVERVIEW OF ALTERNATIVE DISPOSAL OPTIONS

There are three general classes of disposal options available today: treatment and discharge, treatment and reuse (land treatment), and land disposal. The first two alternatives will be discussed in detail while the third--land disposal--will be discussed in general.

5.2.1 Treatment and Discharge

There are many methods of treating municipal wastewater to a quality at which it can be discharged. As indicated previously, the Town of Pierce is not situated on a water-quality limited receiving water segment. Therefore, discharge levels must only comply with secondary treatment and BPWTT requirements of EPA. A thorough analysis of Pierce's treatment processes is presented in a later section of this report.

5.2.2 Treatment and Reuse

Four factors prerequisite to wastewater reclamation for reuse of treated wastewater are: 1) the availability of a wastewater reuser (industry or irrigation operation located in close proximity to source of reclaimed water); 2) storage facilities or alternate disposal site for wastewater during periods of non-reuse; 3) capability of producing reclaimed water of required quality; and 4) legal ownership of the wastewater by the municipality.

The State of Colorado currently does not have water quality standards for reuse of wastewater for irrigation purposes. Assuming that the applicable standards will be no less stringent than the existing recommended Federal standards, it will be necessary for the plant to produce secondary effluent. Since this standard is identical with the quality requirements for discharge, no additional treatment facilities would be required for irrigation reuse than if the water were directly discharged to a receiving water. An exception is probable higher levels of disinfection to insure the protection of public health at the reuse site. An identical discharge standard also eliminates the requirement for effluent

storage during non-irrigation periods. If it is desired to maximize the amount of wastewater reuse, a reservoir would be required for seasonal storage of reclaimed water. This alternative will be further discussed later in the report.

5.2.3 Land Disposal

Percolation of wastewater through the soil provides additional treatment of the applied wastewater. Suspended solids, bacteria, BOD and phosphorous are all effectively removed by filtering and straining action of the soil [EPA-1975]. Nitrogen removal, however, is poor. In addition, EPA requirements for secondary treatment do not apply to this alternative. However, to control such things as odors, prudent engineering judgment requires that, as a minimum, secondary treatment as defined by EPA be achieved prior to land disposal.

If a crop is grown in conjunction with a land disposal operation, the project is effectively one of agricultural reuse. The factors which affect the cost of such a system most directly is the area of land required for the design flowrate of the community. Both the size of the application equipment and the land capital costs are directly related to the required area which is determined by the allowable hydraulic loading rate. The allowable hydraulic loading rate for a high-rate irrigation process is dependent only upon the soils' capacity for transmitting water and not on crop irrigation requirements. The maximum hydraulic loading rate is the sum of soil moisture depletion plus the quantity which can be transmitted through the root zone. The soil moisture depletion for the local climatic conditions is approximately 12 inches for the season while the soil transmission rate can range between 10 and 600 inches per year depending on soil type and surficial geology. Total hydraulic loading rates can therefore range between 22 and 612 inches per year which correspond to area requirements of 610 acres/million gallons, and 20 acres/million gallons, respectively.

The suspended solids concentration of the water also affects the hydraulic loading rate by clogging the soil. The rates discussed above must be considered maximum. There is also a "buffer area" requirement which increases the necessary amount of land.

5.3 POTENTIAL FOR WASTEWATER RECLAMATION

Analysis indicates that irrigation is essentially the only potential method of reclamation in Pierce. Agricultural interests in the general vicinity of the plant may find it to their advantage to consider irrigation with reclaimed water. One restraint on any wastewater reclamation project in Colorado, and particularly Pierce, is the impact of such a program on water rights. This will be discussed in more detail in a later section of the report.

5.3.1 Potential Irrigation Demand

Irrigation of landscape or agriculture with reclaimed water must consider both the annual and seasonal irrigation requirements of the area. As indicated on Figure 5.3.1-A, irrigation use is highly seasonal, with monthly rates varying from 0 to 350 percent of yearly average.

Irrigation requirements for agricultural irrigation are based on a unit factor of 19 inches per year (1.6 acre-feet/gross acre/year). Considering these rates and seasonal variations, there is sufficient wastewater production at the treatment facility to irrigate 20 acres without the need of providing seasonal storage. Maximum daily reclaimed water demand would approximate 300 gpm to irrigate 20 acres. By lining the ponds to reduce seepage loss, 40 acres could be irrigated without expanding facilities. With increasing flows, and provisions for reclaimed water storage to meet peak irrigation demands, additional area could be irrigated with reclaimed water. This is demonstrated by Figure 5.3.1-B.

5.3.2 Quality Requirements for Reuse

Probably the most important consideration in evaluating the reuse potential of wastewater for irrigation is the quality requirements for the irrigation water. Quality requirements are determined by bacteriological regulations for wastewater reclamation, plus evaluation of the possible adverse effects on the irrigated crop by individual constituents contained in the water. The specification of non-injurious chemical constituent concentrations is a difficult and involved task requiring an extensive review and evaluation of available literature and other data prepared and compiled by numerous agronomists.

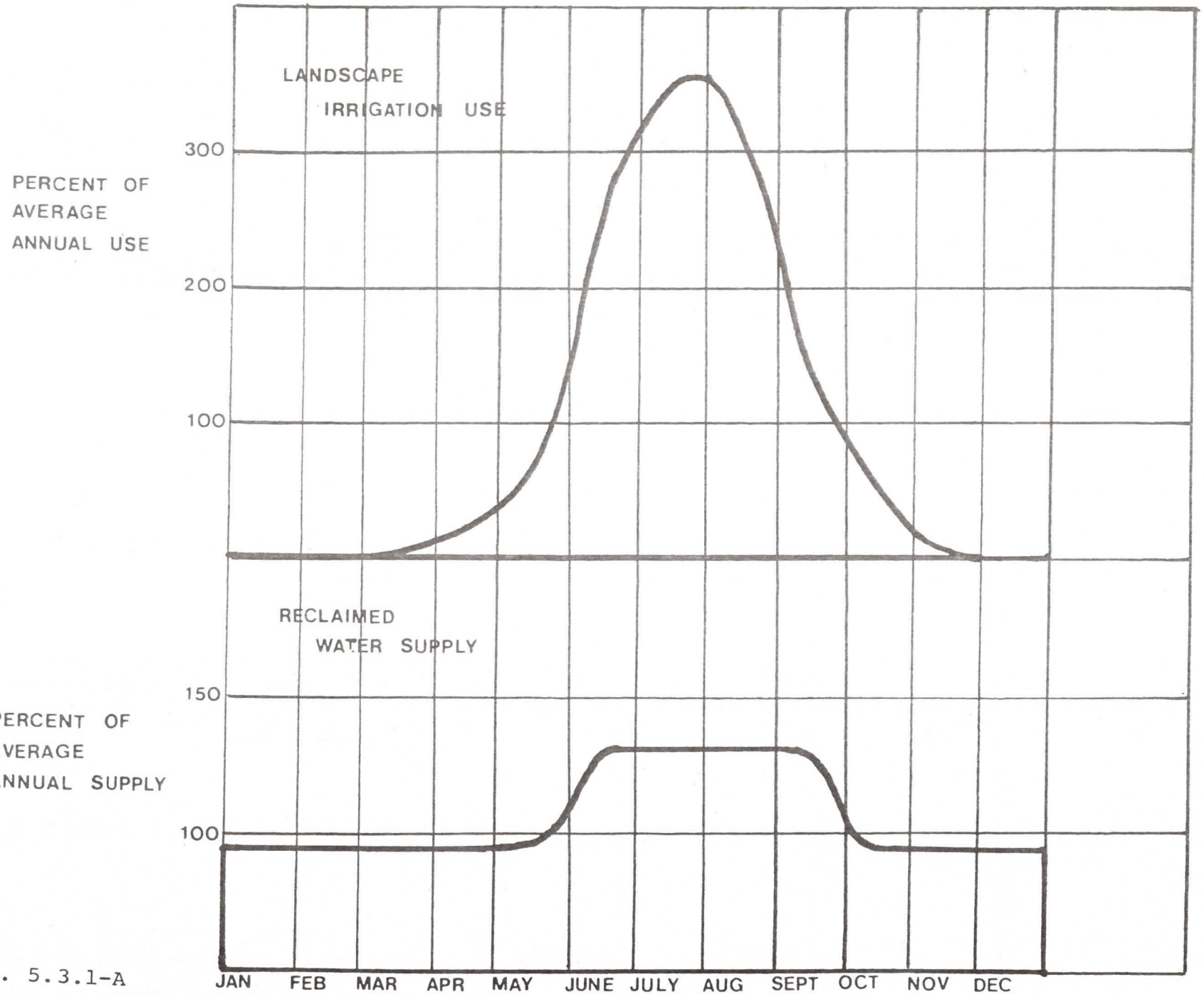

FIG. 5.3.1-A

SEASONAL VARIATIONS OF IRRIGATION USE AND RECLAIMED WATER SUPPLY

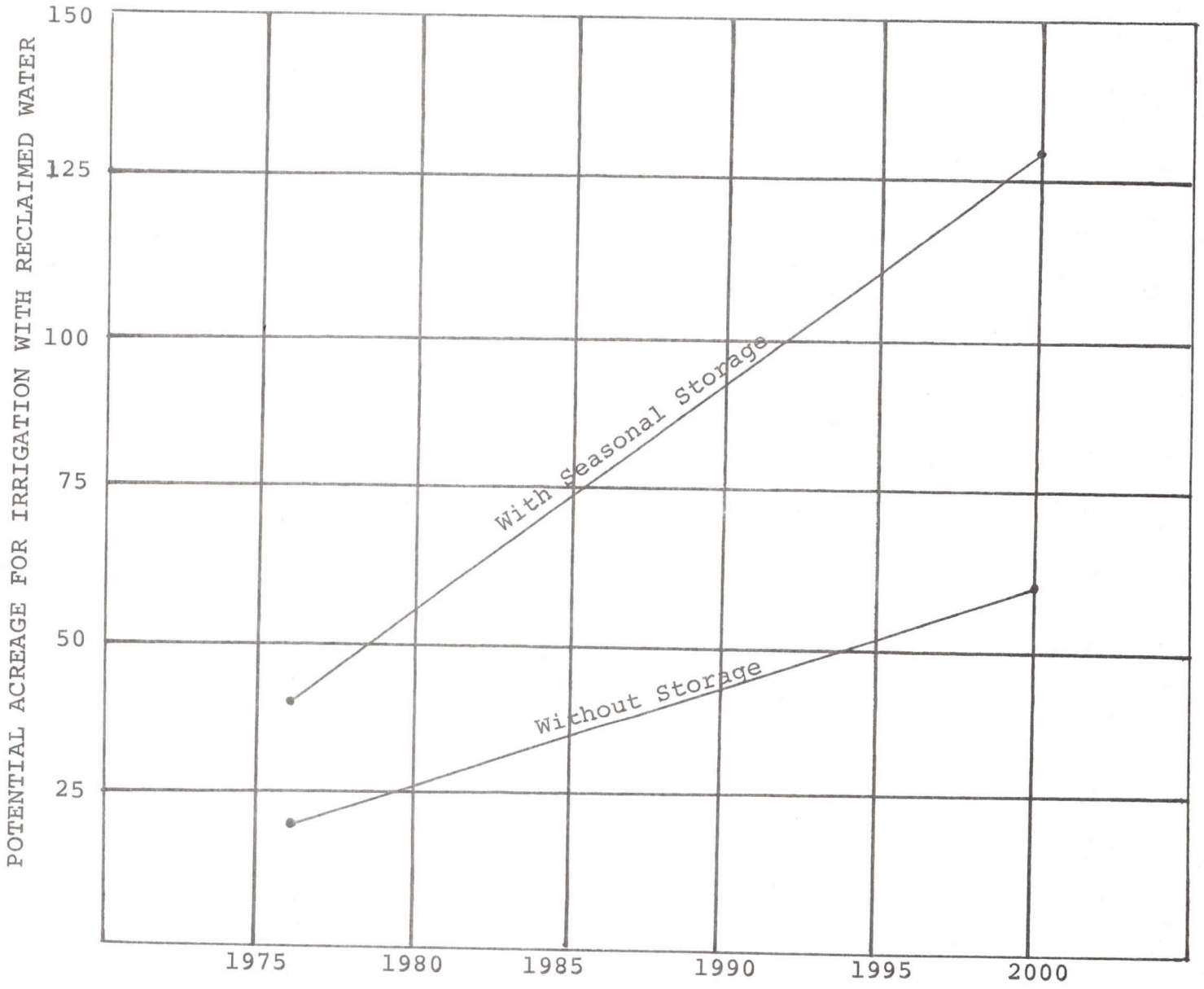

FIG. 5.3.1-B. IRRIGATION REUSE POTENTIAL.

5.3.2.1 Public Health Guidelines

Additional precautions are necessary in a reuse program for the protection of public health. Such precautions have been documented as guidelines issued by the California Department of Health. Particular specific documents are of interest to any Pierce project:

- Guidelines for Use of Reclaimed Water for Landscape Irrigation
- Guidelines for Use of Reclaimed Water for Surface Irrigation of Crops
- Guidelines for Worker Protection at Water Reclamation Use Areas

These guidelines are reproduced in entirety in Appendix B. In addition to general guidelines concerning pipeline coding, on-site water control and use of reclaimed wastewater, the guidelines address such factors as protection from cross-connections, prevention of unauthorized public use, identification tags, minimized exposure of drinking fountains and picnic tables, public notification of the reclamation operation, and precautionary measures concerning employee contact with reclaimed wastewater.

5.3.3 Water Rights Implications

As mentioned earlier in this report, legal ownership of the water is necessary for any irrigation project. Pierce is a member of GASP, which is a water augmentation agency. The District I Water Engineer indicates that this wastewater can be used for irrigation if about 60 percent of the total volume is replaced by GASP [Dugal Wilkinson, 1976].

6.0 ANALYSIS OF EXISTING FACILITIES

This section will describe Pierce's existing collection and treatment facilities, and will determine the growth capability of its treatment works.

6.1 DESCRIPTION OF FACILITIES

The collection sewers at Pierce are 8- and 10-inch lines. Sewage is transported by gravity to the treatment plant.

The treatment plant is a triangular shaped unaerated waste stabilization pond. The pond is split into two cells by a submerged dike.

The configuration of the piping and treatment system is such that short circuiting is severe. The effect of this is that the full capacity of the system is not used. At present, the loading on the system is light enough that the effluent BOD_5 can still meet 30 mg/l.

6.1.1 Future Capacity

If there was no short circuiting of this plant, effluent BOD_5 standards could be met at a population of 2,700. Although it is not possible to determine the exact effect of the short circuiting, reasonable approximations can be estimated. It is believed that this system has capacity for about 1,700 people. It is necessary to verify this by testing the effluent BOD_5 for compliance with the 30 mg/l standard as the population increases.

6.1.2 Discharge Analysis

The sewage plant does not discharge to surface waters; consequently, Pierce has no NPDES permit. The two means of eliminating a surface discharge are seepage and evaporation. The annual net evaporation in this area is about 33 inches per year. This indicates that evaporation accounts for about 26 percent of the influent volume. The rest, or about 44,000 gallons per day, is lost as seepage.

6.2 OPERATION AND MAINTENANCE

There is one maintenance man at Pierce. He is responsible for maintaining all of the town's equipment, including the sewer lines and lagoon. This man is not a certified operator.

Sewer line maintenance is best accomplished by routinely flushing lines with water. This is commonly done with fire fighting equipment. This is done to keep problems from developing in the lines. If a plug develops, it is usually necessary to use rodding equipment to clear the line.

Lagoon maintenance is predominately control of weeds and rodents. Weed growth often occurs in the shallow water at the pond's edge. It is especially important to control these weeds, as the stagnant water in these areas is very good breeding ground for mosquitoes and other insects which potentially could carry disease. Weeds can be controlled by cutting, burning, or pulling them. Herbicides or soil sterilants are not recommended. Herbicides also kill algae, which are beneficial. Vegetation on the dikes is good because it helps control erosion. Burning weeds with an agricultural burner is the most common method of control, and is especially effective in controlling weeds growing out of the water. If burning is to be done, a permit should be obtained from the Weld County Health Department. Rodents burrow into dikes and eventually can cause the dikes to fail. Rodents are not believed to be a problem at Pierce, although the operator should be prepared to set traps if an influx of the animals is noticed.

7.0 ALTERNATIVE PLANS FOR UPGRADING AND DISPOSAL

As stated in Chapter 6.0, it is estimated that BOD_5 standards can be met up to a population of about 1,700. Comparison with Figure 3.1-A shows that this population won't be reached until 1986 at even the highest growth projection.

The significance of this is that if a surface discharge should occur in the near future, the only upgrading that will be necessary to meet standards is disinfection. Disinfection should be provided if the effluent is discharged or used for irrigation.

7.1 DESCRIPTION OF DISINFECTION

Domestic wastewater carries large numbers of bacteria, many of which are pathogenic. For public safety reasons, it is required to partially kill the bacteria. This is commonly done by injecting chlorine into the wastewater and providing a basin in which the bacteria can come into contact with the chlorine.

The detention time in the chlorination basin should be at least 30 minutes. The cost of a unit large enough to serve 2,700 people is about $39,000.

7.2 UPGRADING FOR FUTURE POPULATION

Effluent samples should be seen to check for compliance with BOD_5 standards. When the plant load increases to the point where a violation could occur, aerators can be added to the first cell to increase BOD_5 removal efficiency. With a sufficient amount of aerators, approximately 3,500 people can be served at this plant.

7.3 REUSE POSSIBILITIES

As mentioned earlier in this report, the only feasible reuse alternative appears to be irrigation with effluent. Treatment should be the same as discussed above for the treatment and discharge alternative. In order to utilize the maximum amount of water for irrigation, seepage should be reduced by lining the ponds and additional storage capacity should be added. The cost of this upgrading is shown in Table 7.3-A.

TABLE 7.3-A. COST OF IRRIGATION STORAGE FACILITIES

ITEM	COST
Storage Pond Construction	$187,000
Lining New Storage Ponds	174,000
Lining Existing Storage Pond	56,000
Land - 24 acres	72,000
TOTAL CONSTRUCTION COSTS	$489,000

7.3.1 Conclusions Regarding Reuse

In light of the fact that the treatment and discharge alternative requires so little expenditure, the high cost of providing excess storage is not justified. It is recommended that the town let it be known to nearby farmers that this wastewater could be used by them. Any expenses attributable to reuse should be borne by the farmer.

7.4 RECOMMENDED ALTERNATIVE

It is recommended that the facilities be upgraded to meet discharge standards. This can be accomplished with the addition of a chlorination basin, which will cost approximately $40,000.

7.5 IMPLEMENTATION PROGRAM

The minimum practical timetable for implementing the proposed project is presented in Table 7.5-A. Many of the steps are dependent on previous steps, so if any are delayed, the others should be set back accordingly.

TABLE 7.5-A. ESTIMATED IMPLEMENTATION SCHEDULE

PROJECT TASK	IMPLEMENTATION DATE
Approval by Council	May, 1977
Authorize and Process Site Application	June-August, 1977
Establish Financial Program	June-July, 1977
Prepare Engineering Plans & Specifications	August-September, 1977
Review and Approval of Plans & Specs by Colorado Department of Health	September, 1977
Advertise for Bids & Award Contract	October-November, 1977
Construction of Facilities	December, 1977
Start-Up of Facilities	December, 1977

8.0 FINANCIAL PROGRAM

8.1 EXISTING CONDITIONS IN PIERCE

8.1.1 Financial Capabilities

The 1976 estimated population of Pierce is 900, an increase of about 450 people from the 1970 census figure (a 100% increase). This is a very rapid increase by normal community growth standards.

The community's current (1977) financial picture can be briefly summarized as follows:

- Assessed Valuation: $1.19 million
- Anticipated Town Revenue from Property Tax (1977): $16,195
- Combined Mill Levy on Pierce Taxpayers: 89.66 mills

Town	13.61 mills
County	21.13 mills
School District	54.92 mills

- Total Sales Tax: 3% (State only)
- Additional Sales Tax Capability (Town and County): 4%
- Town's Bonded Indebtedness (January 1, 1977):

General Obligation Bonds:	$ None
Revenue Bonds - Joint Water and sewer	239,000
Revenue Bonds - Water	142,000
Total	$381,000

- Median Family Income: $5,846

Although Pierce presently has almost $120,000 of unused general obligation bonding capacity, its ability to raise the revenues to support such an issue is rather limited. At a present combined mill levy of almost 90 mills, there is not much opportunity to further expand revenues from this source. Of course, a sales tax levy is possible. Estimating from state sources, something less than $5,800 per penny would be raised with a local sales tax. The state collection figures are high due to their inclusion of sales made by town accounts outside of Pierce, which would be excluded from a purely Town tax. Thus, even if its full taxing authority is utilized, Pierce will be limited in its ability to finance major community projects by this means.

8.1.2 Sewage Handling Facilities and Proposed Improvements

In December, 1976, the Town had a total of 287 sewer connections; 268 of these were residential taps, 19 were

commercial taps. Annual rates for sewer services are $72, with the exception of a packing plant which pays a negotiated fee of $65 per month ($780 annually). The current tap fee is $350.

Joint sewer and water bonds were issued in 1970. The original amount of these bonds was $250,000; the outstanding debt on the bonds as of January 1, 1977, is $239,000. These bonds require an annual debt service of approximately $14,950, and will be retired in 2009. Although they are described as water and sewer bonds, all proceeds of the bonds were used for sewer purposes. In addition, there are revenue bonds of $142,000 outstanding for water purposes.

Water and sewer operations and maintenance costs are combined in a single budget, projected to total $38,070 in 1977. The City Clerk estimates that only about $4,000 is spent each year to maintain and operate the sewage system. The balance of $34,070 is spent on water system related items. Thus, cash outlays required in 1976 for sewer operation, maintenance, and debt service were $18,950. There have been no reserves set aside for the purpose of depreciation or for future expansion of the system.

The technical analysis has recommended the addition of a chlorination basin. The estimated capital cost of a unit large enough to serve the projected population is $40,000. It is not anticipated that operating and maintenance costs will increase because of this addition.

8.2 RECOMMENDATIONS FOR SEWER UTILITY MANAGEMENT

The following are suggested general principles for a balanced utility program. This management process has proven successful in preventing construction and operation of sewer systems from posing an unreasonable burden on residents of growing communities and is the basis for determining optimum financing capabilities.

8.2.1 Utility Service Area

The community should lead, not merely follow, development. The community should decide where it is most economical and efficient to provide services, and make known where it prefers growth to take place. By not annexing or extending utility lines outside the Town into areas it does not want to see grow, it can avoid having to serve those areas. Conversely, for those areas in which it wishes to encourage growth, it can build trunk lines into them and save potential developers that front end cost. This approach must be tied to other community goals, programs, and strategies in order to be successful.

8.2.2 Financial Policies

Utility financing for growing communities should be designed

so that "he who benefits pays." This approach may be tempered by other community policies, such as a desire to keep or attract an industry unable to pay its fair share, or to assist development of low income housing which could not be built if a full tap fee were required.

This philosophy can be implemented by applying the following policies:

- Establish service fees based on all costs of operation, including employees' wages and benefits, maintenance, and depreciation. Additional costs may be included, such as a reasonable fee paid into the General Fund for services or facilities, provided to the sewer utility by other municipal departments, such as office space and vehicles.

- Establish plant investment or tap fees (PIF) for all new customers or expansions of service, proportionate to treatment plant and trunk capacities the customer is expected to use. (See 8.3.1.1)

- Charge all direct costs of attaching to the system directly to the customer; e.g., costs of tapping into the line, and laterals and pipe from the street to the building.

8.2.3 Service for New Developments

Internal or lateral lines or pumps required to serve new developments should be provided by the developers. They may directly finance and build them, passing on costs to future occupants; or, where occupancy is relatively assured, the community may permit a special improvement district to be formed with the bonds paid back over an extended period of years through added mill levies on the properties benefiting. The cost of these localized facilities should not be borne by the community at large.

All extensions of lines past undeveloped areas to a development should be financed by the development seeking the service. Some of these costs can be paid back as intervening property is developed and attached to the system. The community should not be committed to providing such lines on request.

8.3 ANALYSIS OF PIERCE'S ABILITY TO UPGRADE ITS WASTEWATER TREATMENT SYSTEM

The major questions a community must ask itself when considering its capabilities to finance and operate a sewer utility are:

- Can the community raise enough money to cover capital cost requirements?

- Can the community support the system on a continuing basis (operating and maintenance costs)?

- What are the utility financing implications of whether or not the population in the community increases?

In developing a financing program, sewer utility needs for financing should always be placed in the context of total community funding needs. Because locally generated funds all come from the same taxpayer or user, a more moderate commitment to sewer costs may be necessary in order to achieve other community goals. Considering that there are many ways to accomplish funding goals, financing strategy must be used to develop the most equitable system for the users with a minimum of future risk.

Table 8.3-A illustrates the basic financial picture. The residents of Pierce will have to pay an estimated $5,050 annually by 1981 to maintain the improved system, plus some amount to retire whatever borrowing for construction is required. The table shows how much cost for these two items would fall upon each system user (tap) annually under various assumptions about future growth and required borrowing.

The remainder of this section addresses questions of how capital and operating funds for the addition might be raised and, in particular, the implications of various population growth rates.

8.3.1 Financing the Proposed Capital Improvements

A total capital investment of $40,000 would be required to implement the addition proposed in this report. Major sources of capital funding are plant investment fees (PIF's), grants, and borrowing.

8.3.1.1 Plant Investment Fees

A plant investment fee is normally set by dividing the total capital cost of the system by its capacity, and determining the pro rata share. For example, a $100,000 system to serve 100 units would indicate a PIF of $1,000 per unit. Where a community is large and wealthy enough to generate proportionate shares of the capital cost, PIF's could fully finance its system.

Since Pierce's existing residents are already hooked up to the existing sewer system, revenue from PIF's will be limited to new development and will depend on the extent of development that occurs. The current tap fee of $350 is lower than that charged by many other area communities. Because growth has been taking place and is a major generator of new needs, this would be a logical area in which to increase (8.3.1.1 continued on page 28.)

TABLE 8.3-A*

TYPICAL ANNUAL COST FOR EACH UNIT ON THE SYSTEM

Annual Growth Every Year Through 1996	New Population Each Year	New Taps	Funds Borrowed by Town for Sewer System Improvements		
			$0	20,000	40,000
	0	0	$71	78	85
	6	2	66	73	80
	12	4	62	68	75
	18	6	58	64	70
	24	8	54	60	66
	30	10	50	56	62
ANNUAL COSTS:					
Operation and Maintenance			5,050	5,050	5,050
Old Debt			15,350	15,350	15,350
New Debt			0	1,962	3,925
TOTAL			20,400	22,362	24,325

* See Notes page 26.

Source: Murray; Briscoe, Maphis, Murray & Lamont, Inc.; March, 1977.

NOTES ON TABLE 8.3-A

- Annual cost to each user must be covered by service fees and/or taxes.

- All annual costs are estimated for the year 1981 but this method gives reasonably close estimates of annual user costs through 1996.

- The operation and maintenance (O&M) costs are those associated with the present system and are inflated for price and wage increases to 1981. In 1977 dollars, the total operation and maintenance cost would be $4,000. Inflated at 5% annually, this would rise to $5,050 by 1981.

- Existing taps 287.

- New debt is figured at being retired in 20 years and paying an interest rate of 7-1/2%. Actual terms will be closely related to local financial conditions and bond market conditions upon issue.

- Tap fee is $350.

- Tap or Plant Investment Fees are used to retire as much new debt as possible. For instance, with the addition of 10 taps at $350 each, as much as $3,500 in new debt could be retired. In some cases where the growth rate is high and borrowing is low, tap fees are applied to the cost of old debt and/or O&M costs.

- The yearly growth rate necessary to achieve the annual costs shown on the chart would have to occur every year. For example, if $40,000 were borrowed, 10 new taps would have to be added every year for the next five years (or a total of 50 new taps added to the system over the five-year period) for the annual cost to be $62 per unit by 1981. To maintain that annual charge, the growth would have to continue by that rate beyond 1981.

- The source of revenue to pay the annual costs is a local decision. The table simply indicates the amount needed.

- The table may be adjusted as new information becomes available by using the following basic formula:

$$\text{Annual Cost Per Unit} = \frac{\text{Annual O\&M + Annual Debt Service - Tap Fees}}{\text{Number of Units on System}}$$

- Note that the table shows the remaining cost, over and above that paid by tap fees, to be shouldered by system users. It may be determined that the maximum or "worst

(Continuation of Notes on Table 8.3-A)

case" figure shown in the top row of the table is not unreasonable in terms of user's ability to pay. This is the case if no growth occurs and only current residents are available to pay the full cost. If the figure is unreasonable, funds from other sources should be sought to cover the total cost. An alternative would be initially to scale down the amount of borrowing, if possible.

charges and thus raise a greater portion of needed capital funds from PIF's. This would reduce the amount of borrowing which would have to be paid back through user fees.

8.3.1.2 Grants and Subsidized Loans

Grant funds may be available to assist with the costs of capital construction. Because the availability of such funds will be important in figuring the remaining burden on the local residents, this source of funding should be investigated early in the process of deciding if and how the Town should proceed.

Determine the approximate amount of grants (and/or subsidized loans) available from various government sources. For smaller communities such as Pierce, these are the most likely sources at this time:

- Farmers Home Administration
- The Colorado Department of Local Affairs
- HUD Community Development discretionary funds for service lines

In order to gauge a community's eligibility, these funding agencies typically evaluate the locality's ability and efforts to finance its own system. For example, for each community requesting assistance, the Colorado Department of Local Affairs takes into consideration the following:

- Legal ability to tax
- Assessed valuation
- Median family income
- Current bonded indebtedness
- Total tax effort
- Number of people on fixed incomes
- Level of user charges

The key element considered by the Department of Local Affairs and the Farmers Home Administration, other factors being equal, is the state guideline that a community's annual user charge for sewer service should be at least 1-1/2% of the median family income. This guide is used to determine if a community is doing its fair share to pay for the system. The figure can be lowered for a number of reasons: for example, if a town is in a weak financial condition, or has a large number of people on fixed incomes. But as a general guide, this tells a community how it will stand in potential aid levels from the various funding sources.

The state guideline that 1-1/2% of a community's median family income represents a reasonable annual user fee, indicates that Pierce's reasonable fee level would be $87.69 per tap per year (1-1/2% X $5,846). Comparing this figure with annual costs projected in Table 8.3-A indicates that with no grant assistance Pierce would still be able to charge

a reasonable annual fee and finance the improvements by borrowing the money through revenue bonds repaid directly by user charges.

All potential sources should be checked for assistance. A summary of sources of financial aid can be found in Table 8.3.1-A. Funding availability varies from month to month as new revenues are made available or previously obligated funds are returned for redistribution.

8.3.1.3 Town Borrowing

To determine estimated borrowing needs, deduct anticipated grant amounts and any immediate local funds that might be allocated to the project from the capital cost estimates for the proposed system.

Whenever possible, revenue bonds should be used to finance sewer system improvements. If a community must borrow to finance utility improvements, it is desirable to protect its general obligation bonding capacity (tied by state law to assessed valuation) for uses where revenue bonding is not feasible. This is because numerous community needs usually cannot be financed from revenue bonds (e.g., parks, libraries, or police facilities). Therefore, any revenue generating operation, such as a sewer system, should borrow on the direct ability of the system to retire the debt.

There are limitations to this financing method; i.e., cases where the cost of the system exceeds its ability to generate revenue, or where general obligation bonds are not limited by state statute (e.g., bonds for water improvements). Even in these cases, the maximum reasonable revenues should be raised from PIF and user fees to retire at least a portion of the debt. Other sources must then supplement system revenues if the project is to occur.

Borrowing appears to be a reasonable and financially feasible means by which Pierce can raise the needed capital funds. Table 8.3-A shows the financial implications for Pierce of various levels of borrowing and increases in population.

8.3.2 Sources for Financing System Operating Costs

Funds to pay annual operating costs can be obtained from a number of sources. Most typically, these sources are service or user rates, property taxes and sometimes other general fund revenues.

Service or user rates can be the most equitable source of funds. The beneficiary pays in proportion to the amount of benefit received. Rates should be pegged to reflect the full cost of operation, maintenance, and depreciation, and perhaps some portion of debt service where borrowing to

TABLE 8.3.1-A
SOURCES OF POTENTIAL FINANCIAL AID

	FHA COMMUNITY FACILITY LOANS/GRANTS - FEDERAL	CONSTRUCTION GRANTS FOR SEWERAGE WORKS (STATE OF COLORADO) STATE	FOUR CORNERS REGIONAL COMMISSION, SUPPLEMENTAL GRANT-REGIONAL	COMMUNITY DEVELOPMENT ACT (HUD)-DISCRETIONARY FUNDS FEDERAL	EPA CONSTRUCTION GRANTS - FEDERAL	PREDESIGN ENGINEERING GRANTS (STATE OF COLORADO) STATE	ECONOMIC DEVELOPMENT-ADMINISTRATION (EDA) - FEDERAL
AM DESCRIPTION							
D USAGE	TO CONSTRUCT, ENLARGE, EXTEND, OR IMPROVE SEWERAGE SYSTEMS.	TO CONSTRUCT, EXPAND, OR MODERNIZE SEWAGE TREATMENT FACILITIES	PROGRAM IS GEARED FOR ECONOMIC DEVELOPMENT TYPE PROJECTS. HOWEVER ECONOMIC DEVELOPMENT HAS A VERY BROAD DEFINITION.	TO CONSTRUCT SEWAGE COLLECTION LINES NOT TREATMENT FACILITIES.	TO PLAN, DESIGN, AND CONSTRUCT SEWERAGE COLLECTION AND TREATMENT FACILITIES.	PREDESIGN ENGINEERING FOR THE EXPANSION, CONSTRUCTION, OR MODERNIZATION OF SEWAGE TREATMENT SYSTEMS INCLUDING COLLECTION OF FACILITIES	THE PROGRAM IS CURRENTLY BEING RECONSIDERED BY THE CONGRESS. IT IS ANTICIPATED THAT THE QUALIFICATION REQUIREMENTS WILL NOT CHANGE. THE BASIC REQUIREMENT BEING HIGH UNEMPLOYMENT RATE AND HIGH NUMBER OF UNEMPLOYED.
M OF ASSIS-ICE	MAY BE EITHER LOAN OR GRANT. GRANT OR LOAN 50% OF PROJECT. LOAN 40 YEARS AT 5%.	ASSISTANCE IS GIVEN IN THE FORM OF A GRANT. THE AMOUNT VARIES UPON THE FINANCIAL NEED OF THE COMMUNITY	ASSISTANCE IS IN THE FORM OF A GRANT. MAXIMUM SUPPLEMENTAL GRANT IS 6% OF OTHER FEDERAL FUNDING OR $150,000.	GRANT FROM DISCRETIONARY FUNDS FOR ALL PORTION OF PROJECT.	ASSISTANCE IS IN THE FORM OF A 75% GRANT.	NORMAL STATE GRANT OF 80% APPLICANT MATCHING FUNDS OF 20%. THE APPLICANTS SHARE IS VARIABLE DEPENDING UPON FINANCIAL NEED.	
OUNT OF ASSIS-ICE	LOAN/GRANT RANGE: $20,000-$200,000.	AVG. GRANT: $50,000 MAX. GRANT: $500,000	AVG. GRANT: $75,000	AVG. GRANT: $130,000 GRANT RANGE: $50,000-$300,000	AVG. GRANT: N/A GRANT RANGE:	AVG. GRANT: $3,000	
RRENT FISCAL AR APPRO-IATION	$4.8 MIL LOANS, .9 MIL GRANTS	$2.3 MIL	$2.5 MIL	$2.5 MIL FISCAL YEAR 1977 (COLORADO NONMETROPOLITAN)		$200,000	
TICIPATED APPRO-IATION NEXT SCAL YEAR	ABOUT THE SAME AS PRIOR YEAR.	$2.0 MIL	$1.7 MIL	MINOR INCREASE FOR FY 1978		$200,000	
IBILITY REQUIREMENTS							
IGIBLE ENTITIES	MUNICIPALITIES AND DISTRICTS	ANY MUNICIPALITY OR SPECIAL DISTRICT	ANYONE WHO CAN GET FEDERAL BASIC FUNDING	A FORM OF GENERAL PURPOSE GOVERNMENT, E.G. INCORPORATED MUNICIPALITIES, COUNTIES, THE STATE OR INDIAN TRIBES.	SEE ATTACHED NOTICE OF FINAL ADOPTION OF FEDERAL CONSTRUCTION GRANT PRIORITY SYSTEM, DATED AUG. 20, 1975.	ANY MUNICIPALITY OR SPECIAL DISTRICT.	
IGIBILITY RE-IREMENTS	MUST NOT HAVE THE CAPABILITY TO FINANCE THE PROJECT THROUGH AVAILABLE COMMUNITY RESOURCES. HAVE POP. LESS THAN 10,000 AS OF LAST CENSUS	APPLICANT'S POPULATION MUST BE 5,000 OR LESS, AS OF THE LATEST CENSUS.	MUST HAVE RECEIVED ANOTHER SOURCE OF FEDERAL AID.	N/A	N/A	APPLICANT'S POPULATION MSUT BE 5,000 OR LESS, AS OF THE LATEST CENSUS.	
SCRIMINATING CTORS	FINANCIAL NEED, THE ENTITY MUST BE AT OR NEAR THEIR LIMIT ON BONDING INDEBTEDNESS.	FINANCIAL NEED, BONDED INDEBTEDNESS, ASSESSED VALUATION, MEDIAN INCOME, ETC.	THE PROJECT MUST PROMOTE ECONOMIC DEVELOPMENT.	EXTENT TO WHICH: COMMUNITY HAS POVERTY, SUBSTANDARD HOUSING, BENEFITS LOW-MODERATE INCOME HOUSING, NEEDED FOR HOUSING STOCK, ALLEVIATING HEALTH,SAFETY, & WELFARE PROBLEMS AND GRANTS FROM OTHER AGENCIES.	N/A	FINANCIAL NEED, SERIOUSNESS OF POLLUTION PROBLEM.	
ICATION MECHANICS							
PLICATION PRO-SS	BEGIN WITH COUNTY FHA REPRESENTATIVE.	A. SUBMIT GRANT APPLICATION TO DIRECTOR OF LOCAL GOVERNMENTS AND APPLY FOR SITE APPROVAL FROM THE COLORADO WATER POLLUTION CONTROL COMMISSION. B. DIVISION OF LOCAL GOVT. THEN ISSUE A CERTIFICATE OF FINANCIAL NEED STATING AMOUNT OF GRANT AND THAT THE APPLICANT MUST OBTAIN SITE APPROVAL. C. SUBMIT SITE APPROVAL, FINAL PLANS AND SPECIFICATIONS TO THE DIVISION OF LOCAL GOVERNMENTS. D. SUBMIT TWO SETS OF FINAL PLANS AND SPECIFICATIONS TO COLORADO DEPARTMENT OF HEALTH.	DETERMINE A SOURCE OF FEDERAL FUNDING OR POSSIBILITY THEREOF. ARRANGE A PRE-APPLICATION CONFERENCE WITH THE FOUR CORNERS REGIONAL COMMISSION REPRESENTATIVE. ARRANGE FOR AN A-95 REVIEW OF PROJECT.	APPLICATION PROCESS WAS PUBLISHED IN THE FEDERAL REGISTER ON OCT. 13, 1976. COMPETITION IS VERY STIFF FOR THESE FUNDS.	THE STATE HEALTH DEPARTMENT WILL CONTACT THE MUNICIPALITY WHEN FUNDING BECOMES AVAILABLE.	A. OBTAIN LETTER FROM LOCAL HEALTH DEPARTMENT OFFICIAL CERTIFYING THAT SYSTEM IS CURRENTLY IN VIOLATION OF STATE STANDARDS. B. OBTAIN ENGINEERS PROPOSAL FOR WORK. C. OBTAIN APPLICATION FORM LG-PS275. SUBMIT ALL OF THE ABOVE TO THE DIVISION OF LOCAL GOVERNMENTS.	
PLICATION ADLINES	FIRST COME, FIRST SERVED UNTIL APPROPRIATION RUNS OUT.	FUNDING IS ON A FIRST COME, FIRST SERVE BASIS.	NO DEADLINES. FUNDING IS ON A FIPST COME, FIRST SERVE BASIS.	TO BE DETERMINED	N/A	FUNDING IS ON A FIRST COME, FIRST SERVE BASIS.	
ME REQUIRED TO ALUATE APPLICA-ON	3 MONTHS	1-3 MONTHS. THIS INCLUDES TIME REQUIRED FOR HEALTH DEPARTMENT REVIEW OF PLANS AND SPECIFICATIONS.	VERY FAST, AS FUNDING IS TIED TO ALREADY APPROVED FEDERAL FUNDING.	TO BE DETERMINED 5-6 MONTHS, EXCEPT FOR EMERGENCY SITUATIONS	N/A	2 MONTHS	
ELLANEOUS		IF FUNDING IS NOT RECEIVED UPON INITIAL APPLICATION, IT IS REVIEWED MONTHLY UNTIL IS IS FUNDED OR THE APPROPRIATION IS EXHAUSTED. THESE FUNDS MAY BE USED IN CONJUNCTION WITH OTHER LOANS OR GRANTS. THE COMMUNITY MUST BE PREPARED TO USE 1.5% OF ITS MEDIAN FAMILY INCOME PER CUSTOMER PER ANNUM TO OPERATE ITS EXISTING SYSTEM AND/OR PAY FOR ITS SHARE OF THE NEW PROJECT.			CURRENTLY THERE IS A LARGE EMPHASIS ON STEP 1 AND 2 GRANTS, HOWEVER, AS COMMUNITIES BECOME READY FOR STEP 3 GRANTS, THE AMOUNTS AVAILABLE FOR STEP 1 AND 2 GRANTS WILL BE GREATLY DIMINISHED.	THESE FUNDS MAY BE USED IN COMBINATION WITH OTHER LOANS/GRANTS.	
ACTS	JOHN MEIKLE, FHA, 337-0717	BILL PEED, STATE OF COLORADO, DIVISION OF LOCAL GOVERNMENTS 892-2156 JEB LOVE, STATE HEALTH DEPT. 388-6111	IVO ROOSPOLD, DEPT. OF LOCAL AFFAIRS, RURAL DEVELOPMENT 892-2631	ARMAND SEDGELEY, HUD-DENVER 837-4666	RON SCHUYLER, STATE DEPT. OF HEALTH, 388-6111 JERRY BURKE, SAM BERMAN FEDERAL EPA, 837-3961	BILL PEED, STATE OF COLORADO DIVISION OF LOCAL GOVERNMENTS 892-2156	PAUL RENNE, ALL PROGRAMS, JOHN ZENDER LOCAL PUBLIC WORKS ACT, 337-4714

BRISCOE, MAPHIS, MURRAY & LAMONT, INC. MARCH 3, 1976

provide a plant for existing customers remains unpaid. Tap or plant investment fees can also be used if necessary, but this is not considered a desirable practice for paying operating costs, as it defeats the purpose of the tap fee. Rather, tap fees should be applied to repay bonds issued to finance the added plant capacity serving the new taps.

Because of historical precedent, many communities do not charge users in proportion to their use, but keep a low user rate by subsidizing costs with mill levies on property. This is particularly true in special districts where high user rates would discourage potential hookups. The argument against this use of property tax revenues is that it depletes an important source of funding general purpose, non-revenue producing facilities.

A community can choose to subsidize rates from its general fund monies. These might be composed, for example, of revenue sharing funds, sales tax, fees or licenses, or cigarette taxes. The same drawback as with using property taxes applies.

Most generally, however, operations and maintenance costs are covered by annual user rates. To determine if a community can generate sufficient user rate revenue to support the system, the state guideline of 1-1/2% of the median family income can be used as a general guide. While a community can certainly charge more than 1-1/2%, anticipated user fees far in excess of this figure may indicate that the residents of the community will find the sewer utility extremely difficult to support.

$87.69 represents a reasonable annual fee level, according to the state guidelines. Table 8.3-A indicates that meeting annual maintenance and operations costs of $5,050 by 1981 would require an annual fee of $85 at the most (with 100% borrowing and no population growth). This would represent a moderate increase in Pierce's current $72 annual fee.

Neither property taxes nor miscellaneous fees appear to present a viable means of raising operating revenue, as Pierce's taxing capacity has little room to expand. But the size of improvement cost does not demand additional sources be used if user fees are raised.

8.3.3 Effects of Population Growth

Consider the implications of population growth. Increased population can provide increased revenue through PIF's, user fees, and taxes, all of which can ease the burden of supporting the sewer utility on existing residents.

A realistic anticipation of growth might encourage the community to borrow more money to finance its system, and will

influence the size and/or type of system the community decides to use.

However, bear in mind that increased population may also generate needs for system expansion (necessitating further borrowing) and that projected growth which does not occur on schedule may seriously burden existing residents with higher annual payments than had been planned. Recognizing the possibility for growth--without counting on it to carry the community's financing needs--is a necessary component of evaluating the community's capabilities to support the sewer utility.

Table 8.3-A illustrates impacts for Pierce of various combinations of borrowing levels and growth rates and immediate hookups to the system. It can be used to evaluate risk and anticipated cost per user should the Town borrow money to upgrade its system.

8.4 CONCLUSIONS AND RECOMMENDATIONS FROM FINANCIAL ANALYSIS

8.4.1 Conclusions

Pierce is presently relying heavily on property taxes and has outstanding water and sewer debt of $381,000. Care must be taken so that additions to these obligations do not overextend the Town's taxpayers.

Because of the modest amount of proposed system improvement and associated operating costs, Pierce appears to have the alternative of using Town borrowing. On the other hand, grant assistance would be desirable in light of the existing burden of taxes, outstanding Town debt and relatively low household income levels.

If growth continues at the level experienced during the early 1970's, tap fee revenue may help pay for improvements within the limit of the facility's capacity to serve such new hookups.

8.4.2 Recommendations

It is recommended that Pierce assemble data on its fixed income residents before developing its financing plan. Special income-related provisions or rebates in the annual fee structure may be necessary. The information will also influence Pierce's ability to obtain assistance through grants.

Careful consideration should be given to educating the community as to the need for system upgrading and the importanct of the annual user fee, to prepare them for fee increases which may need to be made.

Grant assistance agencies should be contacted by Town representatives to get an idea of the likelihood of obtaining financial aid.

Finally, the Town should agree on policies regarding its overall approach to management of a central wastewater system. A recommended approach is discussed in detail in the Utility Management Handbook (1977), available from the Larimer-Weld Council of Governments.

APPENDIX A

BIBLIOGRAPHY

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APPENDIX B

CALIFORNIA DEPARTMENT OF HEALTH - WASTEWATER RECLAMATION GUIDELINES

STATE OF CALIFORNIA DEPARTMENT OF HEALTH

GUIDELINES FOR USE OF RECLAIMED WATER FOR SURFACE IRRIGATION CROPS

1. Reclaimed water shall meet the Regional Water Quality Control Board requirements and the quality requirements established by the State of California Department of Health for health protection.

2. The discharge shall be confined to the area designated and approved for disposal and reuse. Irrigation should be controlled to minimize ponding of wastewater and runoff should be contained and properly disposed.

3. Maximum attainable separation of reclaimed water lines and domestic water lines shall be practiced. Domestic and reclaimed water transmission and distribution mains shall conform to the "Separation and Construction Criteria" (see attached).

   a. The use area facilities must comply with the "Regulations Relating to Cross-Connections," Title 17, Chapter V, Sections 7583-7622, inclusive, California Administrative Code.

   b. Plans and specifications of the existing and proposed reclaimed water system and domestic water system shall be submitted to State and/or local health agencies for review and approval.

4. All reclaimed water valves and outlets should be appropriately tagged to warn the public that the water is not safe for drinking or direct contact.

5. All piping, valves, and outlets should be color-coded or otherwise marked to differentiate reclaimed water from domestic or other water.

6. All reclaimed water valves and outlets should be of a type that can only be operated by authorized personnel.

7. Adequate means of notification shall be provided to inform the public that reclaimed water is being used. Conspicuous warning signs with proper wording of sufficient size to be clearly read shall be posted at adequate intervals around the use area.

8. The public shall be effectively excluded from contact with the reclaimed water used for irrigation.

   a. The irrigated areas should be fenced where primary effluent is used.

   b. Irrigated areas must be kept completely separated from domestic water wells and reservoirs. A minimum of 500 feet should be provided.

9. Adequate measures should be taken to prevent the breeding of flies, mosquitoes, and other vectors of public health significance during the process of reuse.

10. Operation of the use area facilities should not create odors, slimes, or unsightly deposits of sewage origin.

11. Adequate time should be provided between the last irrigation and harvesting to allow the crops and soil to dry.

    a. Animals, especially milking animals, should not be allowed to graze on land irrigated with reclaimed water until it is thoroughly dry.

12. There should be no subsequent planting of produce on lands irrigated with primary effluent.

13. Adequate measures shall be taken to prevent any direct contact between the edible portion of the crops and the reclaimed water.

STATE OF CALIFORNIA DEPARTMENT OF HEALTH

GUIDELINES FOR USE OF RECLAIMED WATER FOR LANDSCAPE IRRIGATION

1. Reclaimed water shall meet the Regional Water Quality Control Board requirements and the quality requirements established by the State of California Department of Health for health protection.

2. The discharge shall be confined to the area designated and approved for disposal and reuse. Irrigation should be controlled to minimize ponding of wastewater and runoff should be contained and properly disposed.

3. Maximum attainable separation of reclaimed water lines and domestic water lines shall be practiced. Domestic and reclaimed water transmission and distribution mains shall conform to the "Separation and Construction Criteria" (see attached).

   a. The use area facilities must comply with the "Regulations Relating to Cross-Connections," Title 17, Chapter V, Sections 7583-7622, inclusive, California Administrative Code.

   b. Plans and specifications of the existing and proposed reclaimed water system and domestic water system shall be submitted to State and/or local health agencies for review and approval.

4. All reclaimed water valves, outlets and/or sprinkler heads should be appropriately tagged to warn the public that the water is not safe for drinking or direct contact.

5. All piping, valves, and outlets should be color-coded or otherwise marked to differentiate reclaimed water from domestic or other water.

   a. Where feasible, differential piping materials should be used to facilitate water system identification.

6. All reclaimed water valves, outlets, and sprinkler heads should be of a type that can only be operated by authorized personnel.

   a. Where hose bibbs are present on domestic and reclaimed water lines, differential sizes should be established to preclude the interchange of hoses.

7. Adequate means of notification shall be provided to inform the public that reclaimed water is being used. Such notification should include the posting of conspicuous warning signs with proper wording of sufficient size to be clearly read. At golf courses, notices should also be printed on

score cards and at all water hazards containing reclaimed water.

8. Tank trucks used for carrying or spraying reclaimed water should be appropriately identified to indicate such.

9. Irrigation should be done so as to prevent or minimize contact by the public with the sprayed material and precautions should be taken to insure that reclaimed water will not be sprayed on walkways, passing vehicles, buildings, picnic tables, domestic water facilities, or areas not under control of the user.

   a. Irrigation should be practiced during periods when the grounds will have maximum opportunity to dry before use by the public unless provisions are made to exclude the public from areas during and after spraying with reclaimed water.

   b. Windblown-spray from the irrigation area should not reach areas accessible to the public.

   c. Irrigated areas must be kept completely separated from domestic water wells and reservoirs. A minimum of 500 feet should be provided.

   d. Drinking water fountains should be protected from direct or windblown reclaimed water spray.

10. Adequate measures should be taken to prevent the breeding of flies, mosquitoes, and other vectors of public health significance during the process of reuse.

11. Operation of the use area facilities should not create odors, slimes, or unsightly deposits of sewage origin in places accessible to the public.

STATE OF CALIFORNIA DEPARTMENT OF HEALTH

GUIDELINES FOR WORKER PROTECTION AT WATER RECLAMATION USE AREAS

1. Employees should be made aware of the potential health hazards involved with contact or ingestion of reclaimed water.

2. Employees should be subjected to periodic medical examinations for intestinal diseases and to adequate immunization shots.

3. Adequate first aid kits should be available on location, and all cuts and abrasions should be treated promptly to prevent infection. A doctor should be consulted where infection is likely.

4. Precautionary measures should be taken to minimize direct contact of employees with reclaimed water.

   a. Employees should not be subjected to reclaimed water sprays.

   b. For work involving more than a casual contact with reclaimed water, employees should be provided with protective clothing.

   c. At crop irrigation sites, the crops and soil should be allowed to dry before harvesting by employees.

5. Provisions should be made for a supply of safe drinking water for employees. Where bottled water is used for drinking purposes, the water should be in contamination-proof containers and protected from contact with reclaimed water or dust.

   a. The water should be of a source approved by the local health authority.

6. Toilet and washing facilities should be provided.

7. Precautions should be taken to avoid contamination of food taken to areas irrigated with reclaimed water, and food should not be taken to areas still wet with reclaimed waer.

8. Adequate means of notification shall be provided to inform the employees that reclaimed water is being used. Such notification should include the posting of conspicuous warning signs with proper wording of sufficient size to be clearly read.

   a. In some locations, especially at crop irrigation use areas, it is advisable to have the signs in Spanish as well as English.

9. All reclaimed water valves, outlets, and/or sprinkler heads should be appropriately tagged to warn employees that the water is not safe for drinking or direct contact (direct contact is allowed at non-restricted recreational impoundments).

10. All piping, valves, and outlets should be color-coded or otherwise marked to differentiate reclaimed water from domestic or other water.

    a. Where feasible, differential piping materials should be used to facilitate water system identification.

11. All reclaimed water valves, outlets, and sprinkler heads should be of a type that can only be operated by authorized personnel.

    a. Where hose bibbs are present on domestic and reclaimed water lines; differential sizes should be established to preclude the interchange of hoses.