INTERIM REPORT — ENGINEERING

WELD CENTRAL HIGH SCHOOL COLORADO PLAN FOR WASTEWATER TREATMENT WORKS

Water Quality Management Plan

LARIMER-WELD REGIONAL COUNCIL OF GOVERNMENTS
LOVELAND, COLORADO

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208 AREAWIDE WATER QUALITY MANAGEMENT PLAN

TECHNICAL PLANNING REPORT
WASTEWATER TREATMENT WORKS
WELD CENTRAL JUNIOR-SENIOR HIGH SCHOOL
KEENESBURG, COLORADO

Prepared For:

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1.0 SUMMARY

The wastewater being discharged from the Weld County Junior-Senior High School does not continuously meet standards, mainly because of the fluxuating influent flows generated by the school. However, the NPDES permit requires that these standards be met continuously.

The Technical Plan discusses several treatment methods available. After analysis, two are offered for the School District's consideration, the present worth of which are about the same. One alternative is to continue to use the existing facility and artificially feed the biological organisms when school is not in session. This alternative requires a very low capital cost, but operating costs are high. The other alternative is to convert the treatment plant to a septic tank and construct a leach field so no surface discharge occurs. This alternative requires a fairly high capital cost, but annual operating costs are negligible.

The first alternative requires only about $1,000 worth of system modifications, but operating costs would approximate $6,700 annually. The alternative of converting the present wastewater treatment plant to a septic tank and installing a leach field would require an initial investment of about $60,000, but operating costs would be negligible.

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 for the Larimer-Weld Regional Council of Governments (LWRCOG). The purpose of the Technical Planning component of the 208 plan is to assist various entities 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 completed now in order to provide near-term guidance. 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

The effluent from the existing wastewater treatment plant occasionally exceeds the effluent limitations specified in the recently issued NPDES permit. A school expansion is being contemplated which will increase the number of students by 250 to 300. This increase may further degrade treatment plant effluent quality.

2.2.1 Purpose

The purpose of this Technical Plan is to reanalyze the capacity of the treatment plant and recommend means of consistently meeting effluent standards.

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;
- 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.

3.0 PLANNING AREA CHARACTERISTICS

The Weld Central Junior-Senior High School is located approximately two miles southeast of Keenesburg in south-central Weld County. It is in the Weld County School District No. RE-3J. The location of the school is shown on Figure 3.0-A.

There are currently about 800 students and faculty at the Weld Central School. A school expansion is planned, which will increase the number of people served by about 250 to 300.

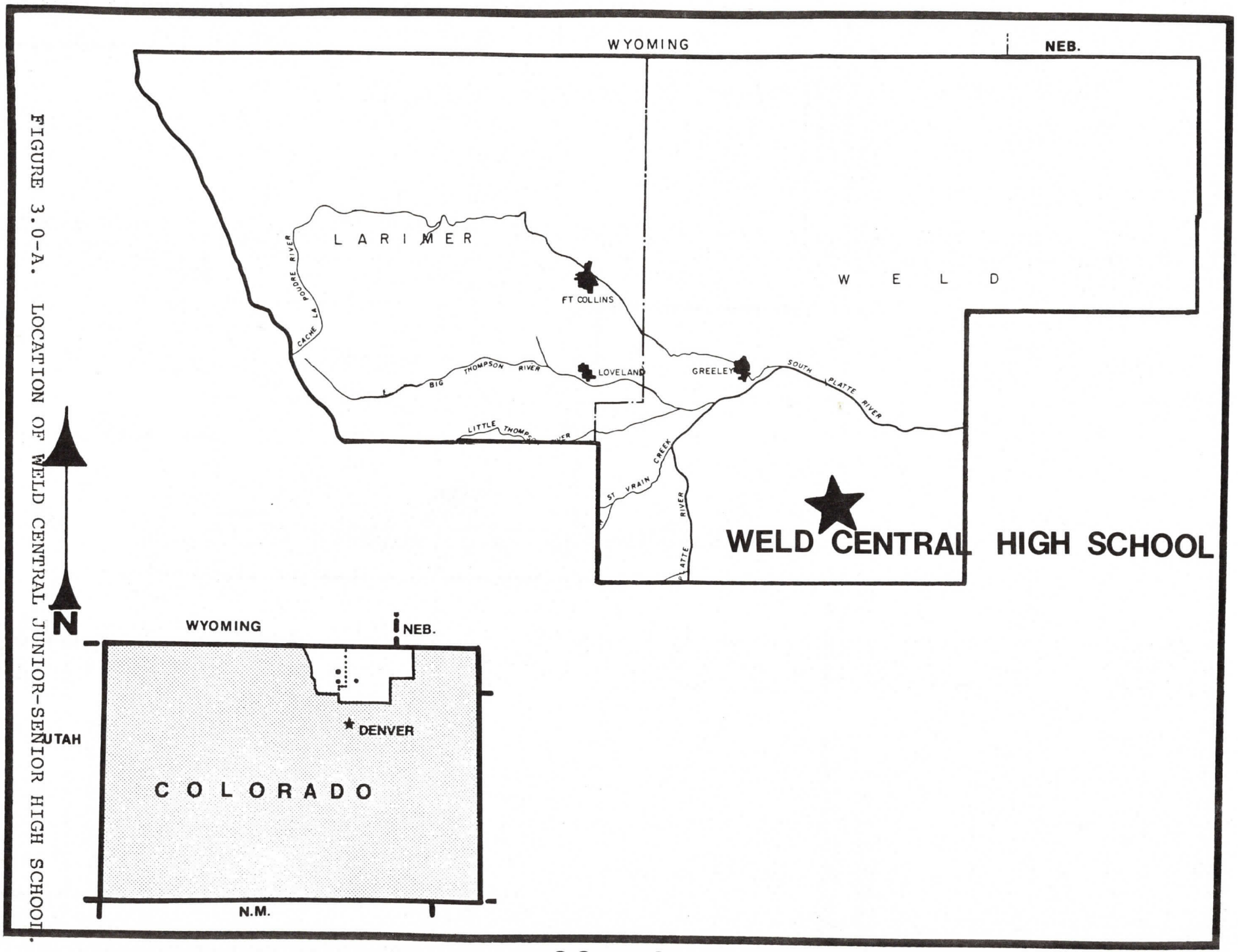


FIGURE 3.0-A. LOCATION OF WELD CENTRAL JUNIOR-SENIOR HIGH SCHOOL.

4.0 WASTEWATER CHARACTERISTICS

Because no extensive sampling program of influent wastewater has been conducted in the past, characteristics will be estimated based on the results of a regional wastewater quality sampling program recently conducted by Toups Corporation, published data relevant to school wastes, and on recommended design criteria published by the Colorado Department of Health. Wasteload projections will be developed based on waste characteristics and student and staff projections.

4.1 ESTIMATED 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

A school with a hot-food cafeteria and shower facilities is normally considered to produce about one-third as much wastewater per student as produced per person in a municipality. However, based on water use from the water tower, it is estimated that the weekday water use is only about 10,000 gpd, which is much less than other schools. The peak flow will be calculated based upon 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 miligrams per liter (mg/l) BOD_5, 200 mg/l SS, and 15 mg/l ammonia. Based on a unit flow of 12.5 gcd, the unit strength of wastewater is 0.02 pounds per capita per day (pcd) BOD_5 and 0.02 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)	12.5
Peak flow (% of average)	250
Wastewater Composition	
BOD_5 (pcd)	0.06
SS (pcd)	0.06
Ammonia (mg/l)	15

gcd = gallons per student per day
pcd = pounds per student per day

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 1100 students. Resulting wasteload projections are summarized in Table 4.2-A.

TABLE 4.2-A. WASTELOAD PROJECTIONS

CONSTITUENT	WASTELOAD
Flow (gd)	
Average flow	14,000
Peak flow	34,000
Average composition (lbs/day)	
BOD_5	22
SS	22
Ammonia	1.7

gd = 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 consistent 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, and an overview of alternative treatment processes are presented.

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 school. Table 5.1.1-A summarizes 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. These standards are reflected in the recently issued NPDES permit, reproduced in Appendix 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 and 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 individual 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 pond 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 (10/2/76). The proposed standards recognize the need to retain pond systems 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 school 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 the school'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 Keenesburg. 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 at the school, is the impact of such a program on water rights. This will be discussed in more detail in a later section of the report.

6.0 ANALYSIS OF EXISTING FACILITIES

This section will describe the existing treatment facilities, and will determine the growth capability of the treatment works.

6.1 DESCRIPTION OF FACILITIES

The treatment facilities consist of two package extended aeration plants, each of which consists of an aeration basin, a clarifier, and a chlorination basin. One of these plants is a 10,000 gpd plant; the other is a 7,500 gpd plant.

Presently the two plants are operated in series. The larger plant is the first unit and is used for biological treatment followed by clarification. The smaller plant is used for additional settling and a portion of it is used as a chlorination basin. HTH chlorine tablets are used for the chlorine source.

6.2 INADEQUACIES OF FACILITIES

There are significant problems with the existing facility which makes it difficult to produce an acceptable effluent. The greatest cause of problems is the intermittent, or shock, type of loading on the plant. The biological organisms which are grown in the aeration basin are being constantly disrupted because they are "fed" normally five days a week, and "starved" on weekends. The problem is even worse during longer periods of limited loading, such as during the Thanksgiving, Christmas, and Easter holidays. During these periods the organisms almost die completely, and new organisms must be produced after school reconvenes each time.

There are also physical problems with this facility. The clarifiers are hopper bottom clarifiers with no mechanical scraping devices. The Colorado Department of Health no longer allows this type of clarifier to be installed in Colorado. Fortunately, there are operational means of overcoming the inadequacies of these clarifiers which will be discussed in a later section of this report.

There are no flow meters to measure influent or effluent flow, or to measure return sludge. The recently issued NPDES permit requires that a flow meter be installed which gives a representative value of effluent volume at some point in the plant circuit.

6.3 CAPACITY FOR FUTURE GROWTH

With the present flow pattern of the school's waste treatment plant, the projected wasteload can be treated if very good operation is provided. Minor modifications of the facilities would ease the operational requirements somewhat. This modification is illustrated in Figure 6.3-A. By modifying the flow pattern, the capacity can be significantly increased, although operational requirements would increase tremendously. There are two means of modifying the flow pattern, each of which will yield a different treatment capacity, and each poses differing operational problems.

The first major modification could treat wastewater up to about 17,500 gpd. This can be accomplished by operating the two plants in parallel, as shown on Figure 6.3-B. Each plant would be operated in similar manner to the operation of the present plant. One of the most severe problems with this operational mode is that effective flow splitting is very difficult to achieve. Further, operational time and expense will approximately double, since there are essentially two plants rather than one.

The second major modification would drastically alter the operational pattern. Rather than using the extended aeration type of activated sludge, the plant could be converted to operate in the contact stabilization mode. This flow pattern is shown on Figure 6.3-C. Although this type of operation would greatly increase capacity, operational skill requirements become very severe. Due to these stringent operating requirements, this modification will not be considered further.

6.4 CONCLUSIONS REGARDING EXISTING FACILITIES

The two options regarding the use of the existing facilities that will be further considered are the option of running the two plants in series with only minor modification and running the two plants in parallel, as previously discussed. In a subsequent section, these alternatives will be compared to other means of treatment and disposal.

FIGURE 6.3-A MINOR MODIFICATION OF EXISTING FACILITY

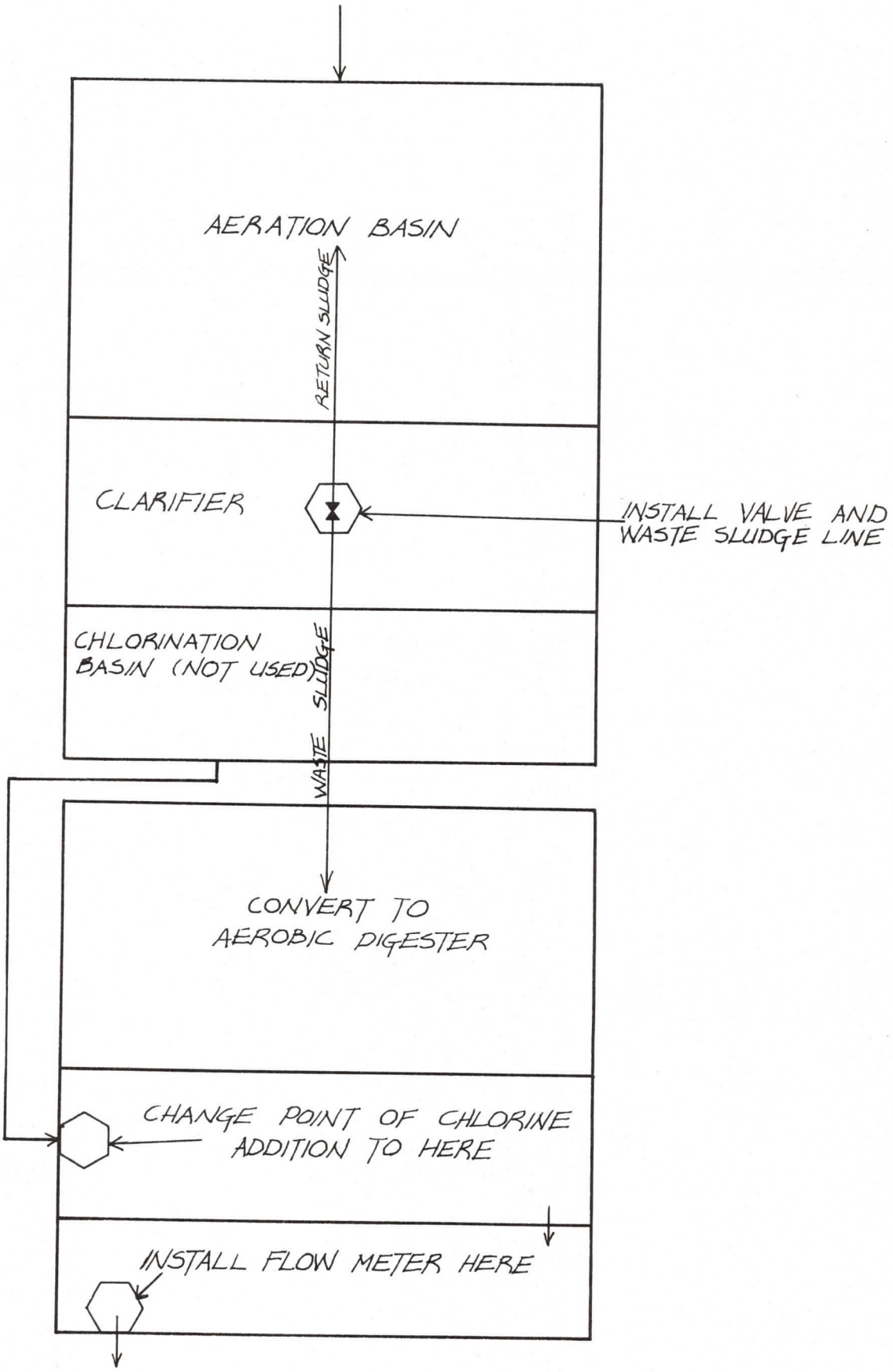


FIGURE 6.3-B PARALLEL FLOW PATTERN

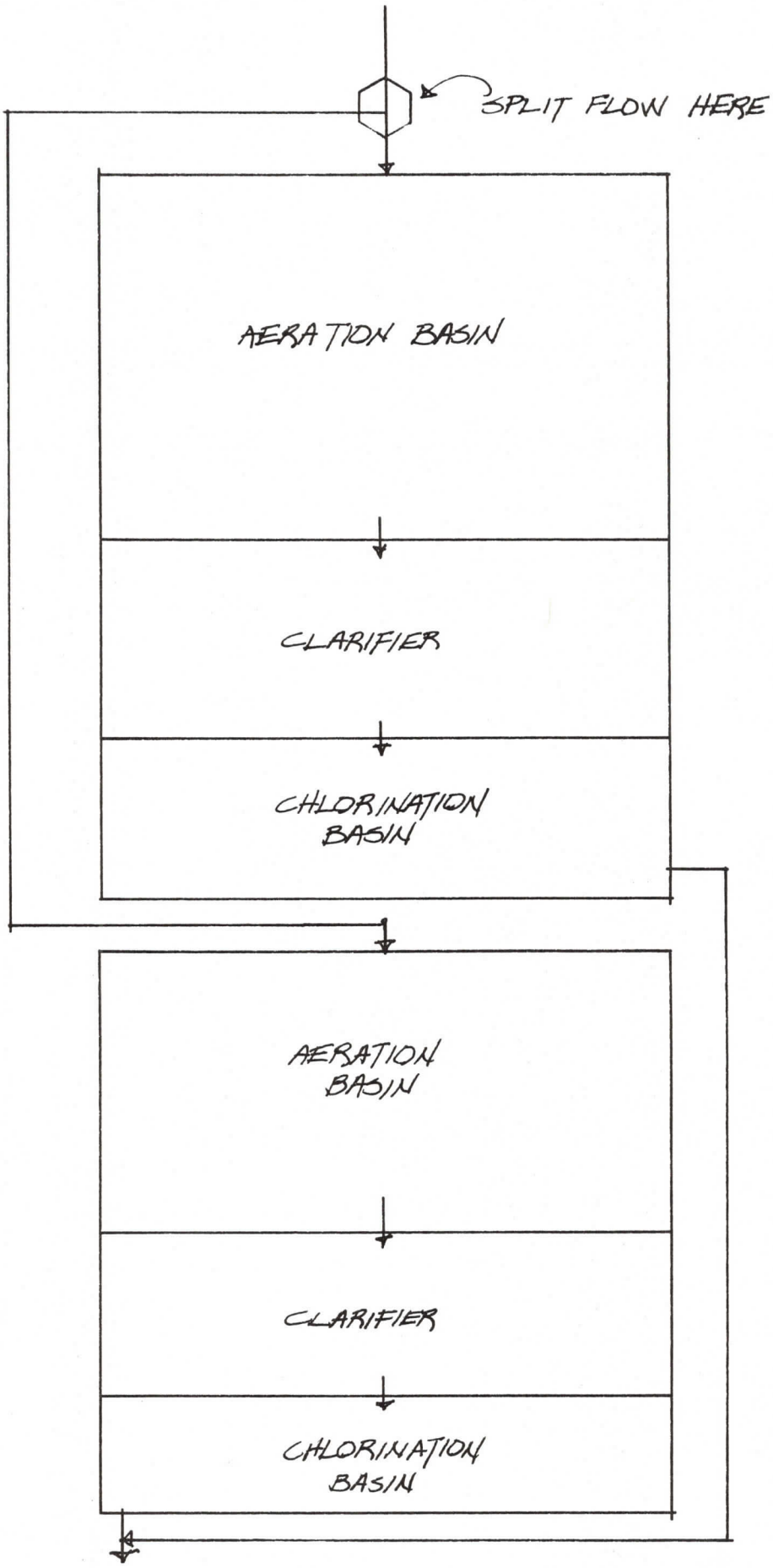
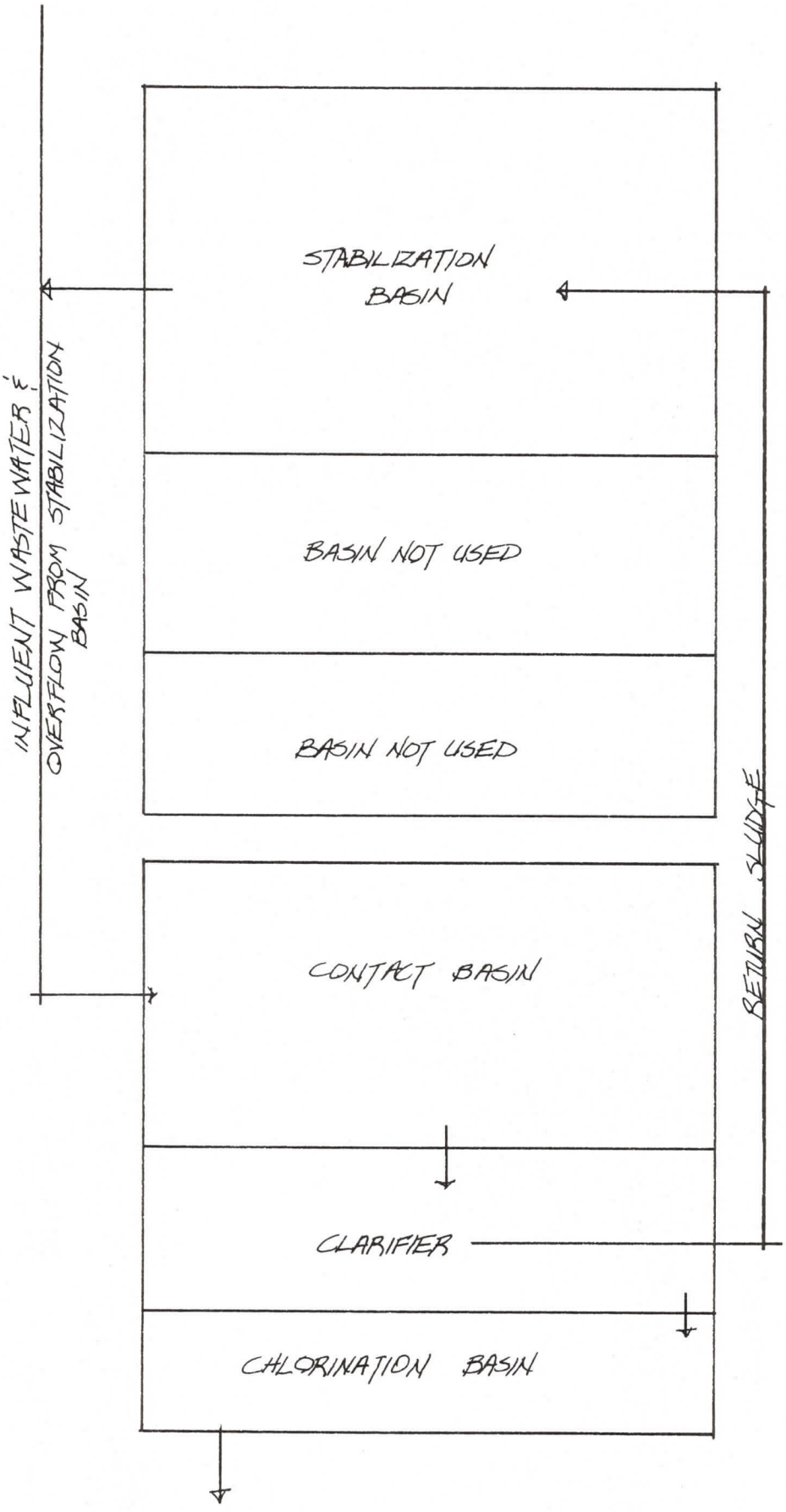


FIGURE 6.3-C CONTACT STABILIZATION



7.0 BASIS OF PROJECT DEVELOPMENT

In subsequent chapters, specific treatment alternatives and costs will be discussed. A best alternative and recommended course of action will be derived from those discussions.

The treatment processes discussed will be evaluated in accordance with the Colorado Health Department's design criteria.

The cost of constructing and maintaining the facilities required for each of the alternative plans considered will be compared to the cost of an operational technique which will offset the affect of shock loads. These costs will include the capital outlay necessary for initial funding plus continued expenditures for operation throughout the lifetime of the project. The data presented in the following sections will provide sufficient information for comparison of alternative plans.

8.0 ALTERNATIVE PLANS FOR TREATMENT AND DISPOSAL

8.1 PROCESS SELECTION CRITERIA

The selection of the optimum process should not be based exclusively on the economics of the individual processes capable of satisfying discharge requirements. Many of the technical and social factors should be considered in evaluation of viable alternatives. Other characteristics such as growth rate, land cost and availability, proximity of treatment facilities to residential or commercial areas, available operator capabilities, and treatment facility aesthetics effects (visual and odor) all have a bearing on the best suited treatment facilities.

There are a great number of alternative treatment processes capable of satisfying BOD and suspended solids (SS) discharge requirements of 30 mg/l. The alternatives discussed in the following sections are those which have been found suitable for small facilities. Processes requiring extremely sophisticated operator capabilities generally unavailable to small facilities such as continuous operator monitoring, etc., are not considered in this report.

There are two major treatment plant classifications: biological and physical/chemical. Both types of processes have the same objective--removal of dissolved and particulate organic material. Biological treatment processes, some of which have been used since the turn of the century, depend on microorganisms to convert putrescible substances to less toxious chemical forms which are compatible with the environment. Controlled biological processes are those such as activated sludge or biofilter in which the biological growth conditions are artificially controlled; stabilization ponds or aerated lagoons are considered uncontrolled biological processes. Physical/chemical treatment consists of the addition of various chemicals to aggregate and to aid settling particulate matter and to oxidize organic substances. Depending on the particular effluent quality goals, physical/chemical plants may employ multimedia filtration, activated carbon adsorption, ozonation or any one of several other processes. While there are several small physical/chemical package plants currently on the market, none will be considered in view of their stringent operational requirements.

There are several other processes which will not be considered as viable alternatives. For example, biofiltration, which consists of spraying or trickling settled sewage (primary effluent) over synthetic plastic media or rocks which provide a large surface area for growth of attached organisms has design or operational characteristics which are generally unsuitable for small communities. Biofiltration requires both primary and secondary clarifiers which greatly increase both capital and O&M costs for small plants. Primary sludges also have a much greater potential for odor problems than do secondary sludges which are partially stabilized by the secondary biooxidation process. Another characteristic is that while the biofiltration process can produce a relatively high degree of treatment, it is difficult to consistently produce biofilter effluent that meets the 30 mg/l suspended solids limitation of the secondary treatment required. Therefore, the biofiltration process will not be considered in this report.

Likewise, the conventional activated sludge process and those of its modifications which require primary clarification will not be considered in view of the disadvantages discussed above.

8.2 ALTERNATE TREATMENT PROCESSES

The treatment processes that will be considered as alternatives in this report are shown in Table 8.2-A. Each is described below.

TABLE 8.2-A. ALTERNATIVE TREATMENT PROCESSES

DESIGNATION	PROCESS
	Pond Systems
1	Unaerated Stabilization Ponds
2	Aerated Stabilization Ponds
3	Aerated Stabilization Ponds with Algae Removal
4	Total Evaporation System
	Mechanical Systems
5	Extended Aeration
6	Oxidation Ditch
7	Rotating Biological Contactor
8	Land Disposal
9	Septic Tank Systems

8.2.1 Pond Systems

According to the EPA, 25 percent of the wastewater treatment plants in this country are lagoons (Fed. Reg. 10/2/76). Nearly 90 percent of these wastewater treatment ponds serve communities of 5,000 population or less [ibid]. The reason they are so popular with small communities is because initial installation costs and operation and maintenance costs are relatively low. Because of the fairly long detention times in lagoons, they are less susceptible to shock loads or breakdown than are mechanical plants.

8.2.1.1 Unaerated Stabilization Ponds

Unaerated stabilization ponds are lagoons with no mechanical aeration or mixing. These ponds generally range in depth from 3 to about 7 feet. Algae growing in the ponds supply dissolved oxygen. Because oxygen is only produced when algae is active, the ponds normally are anaerobic (no dissolved oxygen) at night and during the winter months. Odors are produced during anaerobic conditions. These odors can be especially bad in the spring right after the ice melts off the ponds. Unless the ponds are located quite a distance from inhabited buildings, the aesthetic effects make them undesirable. Further, it is stated in Colorado's manual of design criteria, that "It is very doubtful that unaerated waste stabilization ponds can meet the effluent standards for discharge." [Rozich, 1973].

8.2.1.2 Aerated Stabilization Ponds

The only difference between these and unaerated stabilization ponds is that one or more of these ponds are aerated and mixed mechanically. This virtually eliminates periods of zero dissolved oxygen, and therefore odors are controlled. Since the addition of energy is required, operation and maintenance (O&M) costs are higher than for unaerated stabilization ponds, but not as high as for mechanical plants. These plants are normally designed with two or more cells in series. The final cell must be a quiescent pond to settle heavy particles. The weight of algae is so close to the weight of water that it remains suspended in the water and will not settle. It is for this reason that EPA is considering changing the suspended solids standard for stabilization ponds.

8.2.1.3 Aerated Stabilization Ponds with Algae Removal

Many processes have recently been tested which could be added to lagoons to remove algae. These include rapid sand filters, intermittent sand filters, rock filters, air flotation, and chemical addition which aids settling. Chemical costs and/or operational costs for several of these processes are so high that the advantages of using lagoons are eliminated. Rock filters showed a great deal of promise. Several have been installed in Colorado recently. Evaluation of these indicates that about 50 percent of the algae is removed. Unfortunately, suspended solids concentrations due to algae frequently exceeds 90 mg/l in the summer, indicating the 30 mg/l effluent standard cannot be consistently met. The other process which has low O&M costs is the intermittent sand filter. Sand beds are installed with underdrains. Lagoon effluent is poured on the beds intermittently, allowed to percolate, and dry out. Periodically the sand is scarified and eventually replaced after it becomes thoroughly plugged.

8.2.1.4 Total Evaporation System

In Colorado the evaporation rate exceeds the precipitation rate by about 33 inches per year. This phenomenon can be put to work by designing ponds large enough to store water during periods of low evaporation and to totally evaporate when the rate is high. Since no discharge occurs, the need to meet standards is nullified.

8.2.2 Mechanical Systems

As previously stated, only biological mechanical plants will be evaluated.

8.2.2.1 Extended Aeration

Extended aeration is a modified activated sludge process suitable for use by small communities. Basically, raw wastewater is aerated for 24 hours in a tank containing a high concentration of activated sludge microorganisms which break down the waste substances. The mixture of water and sludge is then sent to a clarifier or settling tank where the activated sludge organisms are separated from the liquid phase. The settled sludge is returned to the aeration tank and the clear wastewater is discharged. Depending on the discharge quality requirements, disinfection of the final outflow may be required.

The major mechanical equipment required for an extended aeration plant are aerators (diffused or mechanical) and sludge return pumps. External separate sludge digestion facilities are not absolutely necessary since digestion occurs while the sludge is in the aeration circuit (internal digestion). A relatively small aerated sludge holding tank enabling uniform wasting of sludge from the aeration circuit would greatly reduce operational difficulties. Depending on local conditions, sludge is generally pumped to sludge drying beds for dewatering and subsequent trucking to sanitary landfills, disposed of by land treatment, or trucked as a liquid to an appropriate disposal site.

The primary advantage of extended aeration over conventional activated sludge is that extended aeration is more stable biologically and thus requires less operation and maintenance. Proper operation will require the services of a relatively highly-trained operator for several hours each day. It has generally been found that a well-operated plant does not result in any odor problem.

8.2.2.2 Oxidation Ditch

The oxidation ditch is a modification of the extended aeration-activated sludge process which utilizes a closed loop channel as an aeration chamber. The process was originally intended to be a low-cost system requiring non-sophisticated construction methods and mechanical equipment. The process flow scheme consists of aeration of raw wastewater in the loop channel followed by the sedimentation of the activated sludge in a clarifier. The activated sludge (active microorganisms) is returned from the clarifier back to the aeration tank. Brush aerators are used to supply oxygen and to retain solids in suspension in the aeration channel.

Internal sludge digestion occurs and eliminates the requirements for external sludge digestion facilities. Depending on land availability for sludge drying beds, it may be cost-effective to provide for external sludge digestion in plants having design flowrates greater than 0.5 mgd. Sludge also can be disposed of by other methods such as land treatment or liquid sanitary landfill.

The biological stability of the oxidation ditch process causes it to have one of the lowest operation and maintenance requirements of any of the controlled biological treatment processes such as activated sludge or bio-filters. This is a significant advantage for small communities where highly trained operators might not be readily available. Land requirements are typical of controlled biological processes.

8.2.2.3 Rotating Biological Contactor

A rotating biological contactor is similar in operation to a trickling filter plant. It is available in package form and can therefore be installed by a small community for much less money than can a trickling filter plant. This plant uses a rotating drum on which a biological slime layer grows. This slime layer is the BOD_5 removal mechanism. Remaining solids are settled in a clarifier prior to discharge.

8.2.3 Land Disposal

Land disposal can follow any of the previously mentioned alternatives. The most common land disposal technique is irrigation of a crop used as cattle feed, such as corn or alfalfa. Sufficient capacity to store the flow for 120 to 180 days is required for optimum irrigation systems. Less storage capacity is required if the goal is merely to dispose of the water on land. There are many warm winter days when irrigation equipment can be used without fear of freezing. Colorado water laws must be given serious attention while evaluating this alternative. Since the school produces very little wastewater during the irrigation season, this disposal alternative will be eliminated.

8.2.4 Septic Tank Systems

More dwellings in this region use septic tanks for wastewater disposal than all of the rest of the processes combined. Wastewater goes through the tank, where solids are settled, to a leach field. Wastewater is leached, or filtered, through the soil where impurities are removed.

8.2.5 Join Keenesburg Sanitation District

The final alternative to be considered is the option of having all wastewater treated at the Keenesburg wastewater facility. This would require the collection facilities to transport the waste to Keenesburg and paying an annual service charge to Keenesburg.

8.3 OPERATION AND MAINTENANCE

The State of Colorado requires that all wastewater treatment plants be operated by a certified operator. Different degrees of skill are required for various sizes and complexities of treatment plants.

Any of the lagoon alternatives would require a "D" operator, which is the lowest operator classification. Any mechanical plant would require a Class "C" operator, which is a more skilled class of operator.

8.4 SCREENING OF ALTERNATIVE PLANS

The alternatives discussed above are presented in large part to give the reader a better understanding of the decisions involved in choosing a best alternative. Table 8.4-A indicates the capital costs and the capital plus O&M costs for each of the applicable alternatives discussed.

TABLE 8.4-A. ESTIMATED COSTS OF ALTERNATIVE PLANS

PROCESS	CAPITAL COST	ANNUAL O&M	PRESENT WORTH (CAP. + O&M)
Unaerated Stabilization Pond	65,000	3,000	94,500
Aerated Stabilization Pond	70,000	4,000	110,000
Extended Aeration (a)	Negligible	6,800	67,000
Extended Aeration (b)	Negligible	10,000	98,000
Oxidation Ditch	120,000	7,000	189,000
Rotating Biological Filter	90,000	6,800	157,000
Septic Tank/Leach Field	60,000	Negligible	60,000
Treatment by Keenesburg	110,000	5,000	160,000

(a) Plant operation as shown on Figure 6.3-A.

(b) Plant operation as shown on Figure 6.3-B.

Table 8.4-A indicates that the present worth of the extended aeration and the septic tank/leach field alternatives are the least costly alternatives. These will be further explored.

9.0 BEST ALTERNATIVE PROJECTS

The present worth of operating the extended aeration plant ($67,000) for 20 years is very close to the present worth of installing a septic tank/leach field ($60,000). Either of these alternatives would be acceptable to the various enforcement agencies.

One alternative requires very little capital cost, but operating costs are relatively high. The other requires a fairly high capital cost, but operating costs are negligible. Each of these alternatives will be described so you can make a decision on which project most adequately meets your needs and circumstances.

9.1 SEPTIC TANK ALTERNATIVE

It is visualized that one of the existing package plants would be converted to a two stage septic tank by covering the tank and making minor piping changes. Following these tanks would be a 13,200 square foot leach field. The cost estimate assumes the leach field can be placed on school property, so no land would have to be purchased. This cost estimate does include a large contingency fund to allow for unforeseen circumstances. For example, if it is decided to put the leach field across the road from the school, a road crossing is expensive. No salvage value was estimated for one of the existing plants, although it could possibly be sold.

There are two big benefits which can be achieved through this alternative. First, operational problems and costs are negligible. Second, because there is no surface discharge of pollutants, no permit is required and no certified operator is needed.

9.2 EXTENDED AERATION ALTERNATIVE

This alternative is not greatly different from the present system. Minor process changes are recommended. These changes are for the purpose of increasing operation efficiency and needs.

The largest single problem with this facility is the fluxuating influent load as discussed in a previous chapter. To offset this detrimental effect, it is recommended that the plant be artificially "fed" on weekends and during holidays. Fish food, such as is used in trout rearing units, has very nearly the same chemical parameters as does raw sewage. Feeding about 20 pounds of fish food per day during these periods will keep the plant operating over these slack periods.

In the summer, it is assumed the plant would be shut down and thoroughly cleaned. Sludge could be pumped out and disposed on farmland. About two weeks before school starts, the plant should be reactivated, again by artificially feeding fish food.

Two physical changes are needed. The Colorado Department of Health has required that a flow meter be installed. This can be achieved by using a V-notch weir just prior to the effluent pipe.

There has been a problem with high concentrations of chlorine. This is because the chlorine is added fairly close to the effluent pipe. When a new HTH chlorine tablet is added, there is not enough detention time to dissipate the chlorine prior to discharge. It is recommended that the point of chlorine addition be changed to the point where wastewater enters the clarifier in the second tank. This will increase wastewater detention time considerably, and should provide enough time for the chlorine to dissipate.

Another change which would be inexpensive and would ease operational problems considerably would be to convert the aeration basin in the smaller plant to an aerobic sludge digester. This can be done by installing a pipe and valve on the sludge return line so sludge can be put in the digester as desired. While this change is not absolutely necessary, it would certainly be beneficial because a small amount of sludge should be wasted daily for good operation.

A flow diagram indicating these recommended changes is shown on Figure 9.2-A.

The advantage of this alternative is that the front-end capital costs are negligible compared to any other alternatives. Operational requirements and costs are much greater than for the septic tank alternative. The State of Colorado requires that this plant be operated by a certified operator with at least a Class "C" license. Also, an NPDES permit is required as long as a discharge occurs.

9.3 PROJECT COST ESTIMATES

Construction costs were estimated on the basis of an engineering news record (ENR) construction cost index of 2200 which is expected to be reached by Fall, 1977. Operation costs are based on today's costs; no increase due to inflation has been assumed initially.

Although the long-term cost of both alternatives are very much the same, the probable choice will be to continue with the extended aeration plant, since the capital cost is so low.

FIGURE 9.2-A RECOMMENDED FLOW DIAGRAM FOR ACTIVATED SLUDGE ALTERNATIVE

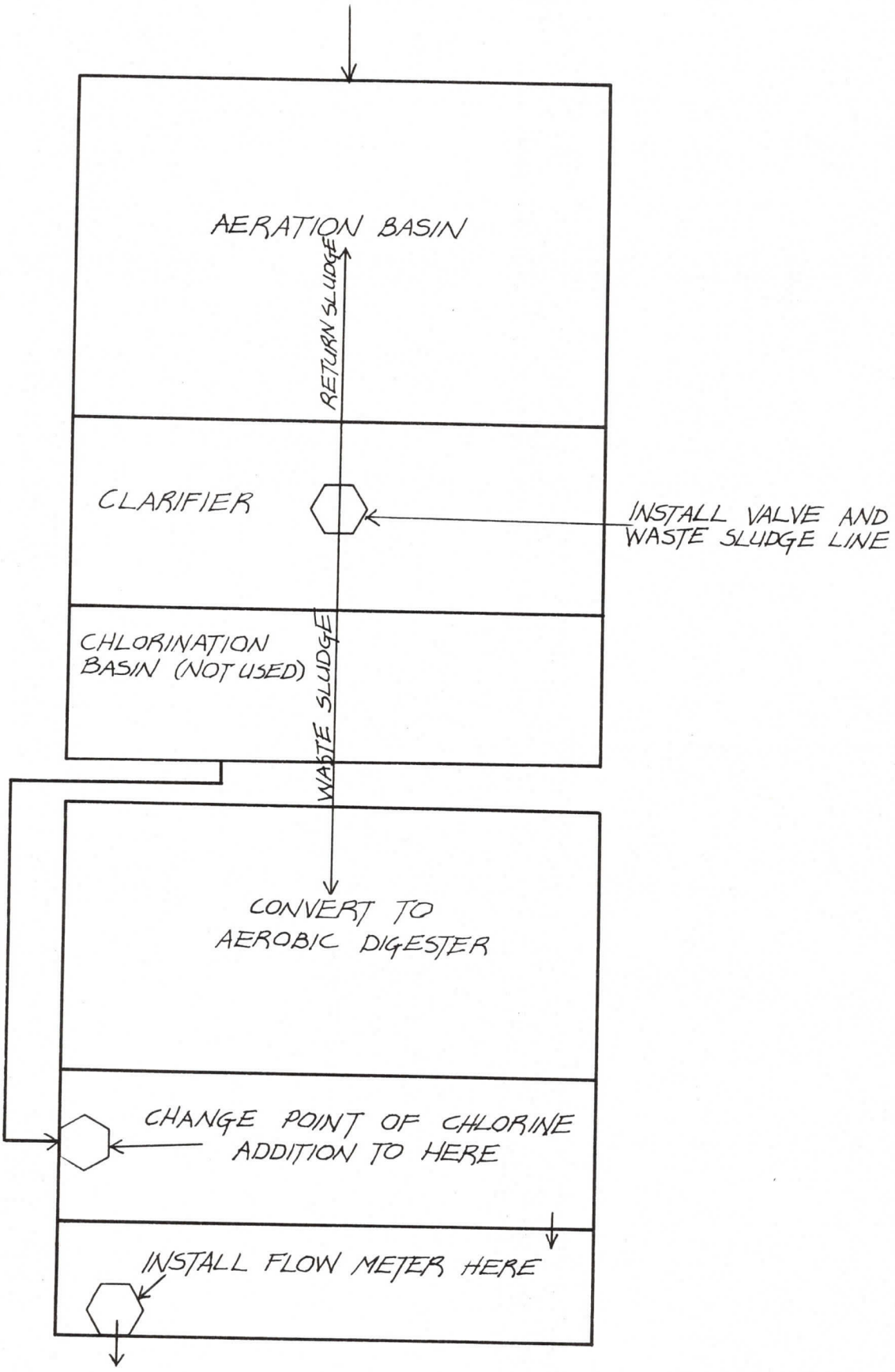


Table 9.3-A. ESTIMATED COST OF SEPTIC TANK SYSTEM

ITEM	COST
Convert Plant to Septic Tanks	$ 2,000
Install Leach Field	41,000
Legal and Engineering Fees	6,000
Contingencies	11,000
Subtotal	$ 60,000
Present Worth of 20-Years of O&M	Negligible
TOTAL 20-YEAR COSTS	$ 60,000

Table 9.3-B. ESTIMATED COST OF UPGRADING EXTENDED AERATION

ITEM	COST
Modify Existing Plant	$ 1,000
Subtotal	$ 1,000
Present Worth of 20-Years of O&M	66,000
TOTAL 20-YEAR COSTS	$ 67,000

9.4 IMPLEMENTATION PROGRAM

The NPDES permit requires that effluent standards be met immediately. With good operation, most of them can be met immediately. However, it is doubtful that the chlorine limitation can be met immediately as specified, nor is it possible to measure flow.

It is suggested that the School District decide which of the alternatives it wants to use. After making this decision, the Colorado Department of Health should be requested to allow a delay in implementation of the chlorine limitation and of the flow measuring requirement until August. Since no sewage will be discharged in the summer, this will allow the entire summer to make the desired changes. Either alternative can be completed this coming summer.

APPENDIX A

NPDES PERMIT
WELD CENTRAL JUNIOR-SENIOR HIGH SCHOOL

205

JAN 18 1977

COLORADO DEPARTMENT OF HEALTH

4210 E. 11TH AVENUE DENVER 80220 PHONE 388-6111

ANTHONY ROBBINS, M.D., M.P.A. EXECUTIVE DIRECTOR

January 10, 1977

CERTIFIED MAIL:

418350

Weld Central Jr.-Sr. High School
95 South Main Street
Keenesburg, Colorado 80643

Re: Final Permit, NPDES Permit Number: CO-0026298 (Weld County)

Gentlemen:

Enclosed please find a copy of the permit issued under the Federal Water Pollution Control Act and Colorado Water Quality Control Act.

Issuance of this permit constitutes a final determination by the Division of Administration of the Colorado Department of Health, in conjunction with the U.S. Environmental Protection Agency and may be subject to administrative review proceedings pursuant to the State Administrative Procedure Act, including an adjudicatory hearing. You are advised to consult this act and particularly to consult Sections 24-4-104, 24-4-105, 24-4-102(7), and 25-8-401, C.R.S. 1973 for more information. In addition, the Regulations for the State Discharge Permit System contains material that is pertinent to any administrative review of the issuance of this permit.

Your NPDES Waste Discharge Permit requires that specific action be performed at designated times. Failure to meet these requirements constitutes a violation of this permit and can result in civil and/or criminal actions(s). Please read the permit very thoroughly.

1. All municipal and industrial facilities are required to submit self-monitoring information. (PART I. B. Monitoring and Reporting.) Frequencies and types of self-monitoring are summarized in PART I A. Effluent Limitations and Monitoring Requirements.

2. Monitoring and reporting requirements for feedlots are described in PART I. A. Effluent Limitations and Monitoring Requirements (see 2.c.) and in PART I. B. Monitoring and Reporting.

3. In some instances a schedule of compliance is to be submitted if required by your permit. Please note that the required date of submittal as specified in PART I, Page , is none

Re: Final Permit (Continued) Weld Central Jr.-Sr. High School

4. PART II A. Management Requirements and B. Responsibilities, contain information that explains further requirements which are enforceable as are all other provisions of the permit.

5. PART III Other Requirements specify certain reports that are required and/or notifications that are necessary.

If you have any questions, please contact the Permits Program, Water Quality Control Division of the Colorado Department of Health at 303+388-6111, Ext. 231, or write to this office.

Very truly yours,

FOR DIRECTOR, WATER QUALITY CONTROL DIVISION

Paul E. Williamson

Paul E. Williamson, P.E.
Acting Chief
Monitoring & Enforcement Section

PEW: mgc

enc.

cc: U.S. Environmental Protection Agency
District Engineer - Mr. Boyd Hanzon
Health Department - Weld County Health Department
208 Planning Area - Larimer-Weld Council of Governments

Renewal
Permit No. CO-0026298

County: Weld

AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et. seq; the "Act"), and the Colorado Water Quality Control Act (25-8-101 et. seq., CRS, 1973 as amended)

Weld Central Jr.-Sr. High School

is authorized to discharge from their wastewater treatment facilities,

located two miles south and one mile east of Keenesburg,

to the Low Line Canal,

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, and III hereof.

This permit shall become effective thirty (30) days after the date of receipt of this permit by the Applicant. Should the Applicant choose to contest any of the effluent limitations, monitoring requirements or other conditions contained herein, he must comply with Section 24-4-104 CRS 1973 and the Regulations for the State Discharge Permit System. Failure to contest any such effluent limitation, monitoring requirement, or other condition is consent to the condition by the Applicant.

This permit and the authorization to discharge shall expire at midnight, December 31, 1979.

Signed this 10 day of January, 1977

COLORADO DEPARTMENT OF HEALTH
Division of Administration

Robert D. Siek
Assistant Director, Department of Health
Environmental Health

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - SEE ANY ADDITIONAL REQUIREMENTS UNDER PART III.

1. Effluent Limitations

During the period beginning no later than immediately and lasting through December 31, 1979 , the permittee is authorized to discharge from outfall( ) serial number( ): 001

Effluent Parameter	Discharge Limitations Maximum Concentrations mg/l 30-day avg.		mg/l 7-day avg.		mg/l Daily Max.	
Flow - m^3/Day(MGD)	N/A		N/A		N/A	
BOD_5	30	a/	45	b/		
Total Suspended Solids	30	a/	45	b/		
Fecal Coliforms-Number/100ml	6000	c/	12,000	c/		
Total Residual Chlorine					0.5	d/h/

pH - units shall remain between 6.0 and 9.0 d/.

Oil and Grease shall not exceed 10 mg/l d/ in any grab sample nor shall there be a visible sheen.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Continued)

2. Monitoring Requirements

In order to obtain an indication of the probable compliance or non-compliance with the effluent limitations specified in Part I, the permittee shall monitor and report all effluent parameters at the following required frequencies.

Effluent Parameter	Measurement Frequency e/i/	Sample Type f/
Flow - m^3/Day (MGD)	Weekly	Instantaneous or continuous
BOD_5 g/	Quarterly	Composite
Total Suspended Solids g/	Quarterly	Composite
Fecal Coliforms-Number/100 ml	Quarterly	Composite
pH	Weekly	Grab
Oil and Grease	Weekly	Visual observation
Total Residual Chlorine	Weekly	Grab

Self-monitoring samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): 001, prior to mixing with the receiving waters.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (Continued)

3. Footnotes

a/ This limitation shall be determined by the arithmetic mean of a minimum of three (3) consecutive samples taken on separate weeks in a 30-day period (minimum total of three (3) samples); not applicable to fecal coliforms - see footnote c/.

b/ This limitation shall be determined by the arithmetic mean of a minimum of three (3) consecutive samples taken on separate days in a 7-day period (minimum total of three (3) samples); not applicable to fecal coliforms - see footnote c/.

c/ Averages for fecal coliforms shall be determined by the geometric mean of a minimum of three (3) consecutive grab samples taken during separate weeks in a 30-day period for the 30-day average, and during separate days in a 7-day period for the 7-day average. (minimum total of three (3) samples).

d/ Any discharge beyond this limitation as indicated by any single analysis and/or measurement shall be considered a violation of the condition of this permit.

e/ Quarterly samples shall be collected during the months of March, June, September, December, if a continual discharge occurs. If the discharge occurs on an intermittent basis, all the samples shall be collected during the period when that intermittent discharge occurs.

f/ See definitions, Part B.

g/ In addition to monitoring the final discharge, influent samples shall be taken and analyzed for this parameter at the same frequency as required as for this parameter in the discharge.

h/ Monitoring is required only when chlorine is used for disinfection.

i/ Monitoring is required only during periods of discharge. If "no discharge" occurs, this shall be reported at the specified frequency. (See Part B).

B. MONITORING AND REPORTING

1. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

2. Reporting

Monitoring results obtained during the previous 3 months shall be summarized for each month and reported on applicable discharge monitoring report forms, postmarked no later than the 28th day of the month following the completed reporting period. The first report is due on April 28, 1977.
If no discharge occurs, "No Discharge" shall be reported. Duplicate signed copies of these, and all other reports required herein, shall be submitted to the Regional Administrator and the State at the following addresses:

Colorado Department of Health
Water Quality Control Division
4210 East 11th Avenue
Denver, Colorado 80220

U.S. Environmental Protection Agency
1860 Lincoln Street - Suite 900
Denver, Colorado 80203
Attention: Enforcement - Permit Program

3. Definitions

a. A "composite" sample, for monitoring requirements, is defined as a minimum of four (4) grab samples collected at equally spaced two (2) hour intervals and proportioned according to flow.

b. A "grab" sample, for monitoring requirements, is defined as a single "dip and take" sample collected at a representative point in the discharge stream.

c. An "instantaneous" measurement, for monitoring requirements, is defining as a single reading, observation, or measurement using existing monitoring facilities.

d. "Discharge" includes but is not limited to, any spilling, leaking, pumping, pouring, emitting, emptying or dumping.

4. Test Procedures

Test procedures for the analysis of pollutants shall conform to regulations published pursuant to Section 304(g) of the Act, and Colorado State Effluent Limitations (400), under which such procedures may be required.

5. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The exact place, date, and time of sampling;

b. The dates the analyses were performed;

d. The analytical techniques or methods used; and

e. The results of all required analyses.

6. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report Form (EPA No. 3320-1), or other forms as required by the Division. Such increased frequency shall also be indicated.

7. Records Retention

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation shall be retained for a minimum of three (3) years, or longer if requested by the Regional Administrator or the State Water Quality Control Division.

A. MANAGEMENT REQUIREMENTS

1. Change in Discharge

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit. Any anticipated change in discharge location and/or facility expansions, production increases, or process modifications which will result in new, different, or increased discharges or pollutants must be reported by submission of a new NPDES application or, if such changes will not violate the effluent limitations specified in this permit, by notice to the State Water Quality Control Division of such changes. Process modifications include, but are not limited to, the introduction of any new pollutant not previously identified in the permit, or any other modifications which may result in a discharge of a quantity or quality different from that which was applied for. Following such notice, the permit may be modified to specify and limit any pollutants not previously limited.

2. Noncompliance Notification

a. If, for any reason, the permittee does not comply with any maximum effluent limitation specified in this permit the permittee shall provide the Regional Administrator and the State Water Quality Control Division with the following information, in writing, within five (5) days of becoming aware of such condition:

(1) A description of the discharge and cause of noncompliance; and

(2) The period of noncompliance, including exact dates and time; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate and prevent recurrence of the noncomplying discharge.

b. The permittee, as soon as it has knowledge thereof, shall notify the State Water Quality Control Division of any spill or discharge of any pollutant, not otherwise authorized in this permit, which may cause pollution of waters of the State.

3. Facilities Operation

The permittee shall at all times maintain in good working order and operate as efficiently as possible all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit.

4. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to waters of the State resulting from noncompliance with any effluent limitations specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

5. Bypassing (see additional requirements under Part III)

Any diversion from or bypass of facilities necessary to maintain compliance with the terms and conditions of this permit, or any activity that results in the avoidance of any required treatment for any process or run-off water, is prohibited, except (i) where unavoidable to prevent loss of life or severe property damage, or (ii) where excessive storm drainage or runoff would damage any facilities necessary for compliance with the effluent limitations and prohibitions of this permit. The permittee shall promptly notify the Regional Administrator and the State Water Quality Control Division in writing of each such diversion or bypass.

6. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment of control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering waters of the State.

7. Power Failures

In order to maintain compliance with the effluent limitations and prohibitions of this permit, the permittee shall either:

a. Provide an alternative power source sufficient to operate the wastewater control facilities;

or, if such alternative power source is not in existence, and no date for its implementation appears in Part I,

b. Halt, reduce or otherwise control production and/or all discharges upon the reduction, loss, or failure of the primary source of power to the wastewater control facilities.

8. Any discharge to the waters of the State from a point source other than specifically authorized is prohibited.

B. RESPONSIBILITIES

1. Right of Entry

The permittee shall allow the Director of the State Water Quality Control Division, the EPA Regional Administrator, and/or their authorized representative, upon the presentation of credentials:

a. To enter upon the permittee's premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this permit; and

b. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit and to inspect any monitoring equipment or monitoring method required in the permit.

c. To enter upon the permittee's premises to reasonably investigate any actual, suspected, or potential source of water pollution, or any violation of the Colorado Water Quality Control Act. The investigation shall

not limited to, the following: sampling of any discharge and/or process waters, the taking of photographs, interviewing of any persons having any knowledge related to the discharge, permit, or alleged violation, and access to any and all facilities or areas within the permittee's premises that may have any affect on the discharge, permit, or alleged violation.

2. Transfer of Ownership or Control

In the event of any change in control or ownership of facilites from which the authorized discharges emanate, the permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to the Regional Administrator and the State Water Quality Control Division.

3. Availability of Reports

Except for data determined to be confidential under Section 308 of the Act and Regulations for the State discharge permit system (506), all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the State Water Quality Control Division and the Regional Administrator.

As required by the Act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the Act, and CRS (1973) 25-8-610.

4. Permit Modification

After notice and opportunity for a hearing, the permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:

a. Violation of any terms or conditions of this permit;

b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or

c. A change in any condition that required either a temporary or permanent reduction of elimination of the authorized discharge. Changes in water quality standards, control regulation or duly promulgated plans would qualify as "a change in any condition."

5. Toxic Pollutants

Notwithstanding Part II, B-4 above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307 (a) of the Act for a toxic pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be revised or modified in accordance with the toxic effluent standard or prohibition and the permittee so notified.

6. Civil and Criminal Liability

Except as provided in permit conditions on "Bypassing" (Part II, A-5) and "Power Failures" (Part II, A-7), nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

7. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act. Any violation of an approved SPCC Plan shall be a violation of this permit.

8. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority by Section 510 of the Act.

9. Permit Violations

Failure to comply with any terms and/or conditions of this permit shall be a violation of this permit.

10. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

11. Severability

The provision of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

PART III

OTHER REQUIREMENTS

Additional Bypassing Requirements

If, for other reasons, a partial or complete bypass is considered necessary, a request for such bypass shall be submitted to the State Water Quality Control Division and to the Environmental Protection Agency at least sixty (60) days prior to the proposed bypass. If the proposed bypass is judged acceptable to the State Water Quality Control Division and by the Environmental Protection Agency, the bypass will be allowed subject to limitations imposed by the State Water Quality Control Division and the Environmental Protection Agency.

If, after review and consideration, the proposed is determined to be unacceptable by the State Water Quality Control Division and the Environmental Protection Agency, or if limitations imposed on an approved bypass are violated, such bypass shall be considered a violation of this permit; and the fact that application was made, or that a partial bypass was approved, shall not be defense to any action brought thereunder.

Testing

Test procedures shall conform with those procedures specified in the Federal Register, Volume 38, Number 199, October 16, 1973. These procedures involve the use of the latest edition of one of the following references:

1. "Standard Methods for the Examination of Water and Waste Water",

2. "ASTM", Annual Book of Standards, Part 23, Water, Atmosphere Analysis,

3. "Methods for Chemical Analysis of Waters and Wastes", Environmental Protection Agency.

OTHER REQUIREMENTS (Continued)

Within three (3) months after the date of permit issuance, a flow-measuring device shall be installed to give representative values of effluent volume at some point in the plant circuit, if not already a part of the wastewater plant.

At the request of the Regional Administrator of the Environmental Protection Agency or the Director of the State Water Quality Control Division, the permittee must be able to show proof of the accuracy of any flow-measuring device used in obtaining data submitted in the monitoring report. The flow-measuring device must indicate values within ten (10) percent of the actual flow being measured.

The limitations stated in PART I, Section A, are calculated on the basis of gross measurements of each parameter in the designated discharge regardless of the quantity and quality of these parameters in the plant inflow, unless otherwise specified.

If the permittee desires to continue to discharge, he shall reapply at least one hundred-eighty (180) days before this permit expires.

Within sixty (60) days of the issuance of this permit, the permittee shall file a statement with the Environmental Protection Agency and the State Water Quality Control Division which shall contain the names of the person or persons who are designated to report conditions as noted in PART II, Section A, Paragraph 2a (Noncompliance Notification), and as noted in PART II, Section B, Paragraph 7 (Oil and Hazardous Substance Liability). The permittee shall continually update this list as changes occur at the facility.

The permittee is required to submit an annual fee as set forth in Section 25-8-502 C.R.S. 1973 as amended. Failure to submit the required fee is a violation of this permit and will result in the suspension of said permit and enforcement action pursuant to Section 25-8-601 et. seq., 1973 as amended.

OTHER REQUIREMENTS (Continued)

Percentage Removal Requirements (Applies to Sewage Treatment Plants only)

If not presently being complied with, effective as soon as reasonable and practical, but no later than July 1, 1977, the arithmetic mean of the total BOD_5 and the Total Suspended Solids concentrations for effluent samples collected in a period of 30 consecutive days shall not exceed 15 percent of the arithmetic mean of the concentrations for influent samples collected at approximately the same times during the same period (85 percent removal). This is in addition to the concentration limitations on Total BOD_5 and Total Suspended Solids.

Expansion Requirements

Pursuant to Colorado Law, C.R.S. 1973 25-8-501(6), the permittee is required to initiate engineering and financial planning for expansion of the treatment works whenever throughput and treatment reaches eighty (80) percent of design capacity. Whenever ninety-five (95) percent of either the hydraulic or organic capacity of the treatment works is met, the permittee shall commence construction of the necessary treatment expansion.

In the case of a municipality, construction may be commenced, or building permit issuance may be terminated, until such construction is initiated, except that building permits may continue to be issued for any construction which would not have the effect of increasing the input of sewage to the municipal treatment works.

APPENDIX B

BIBLIOGRAPHY

Colorado Department of Health, Criteria Used in the Review of Wastewater Treatment Facilities, Frank J. Rozich, June, 1973.

Environmental Protection Agency, EPA 430/9-75-013, Alternative Waste Management Techniques for Best Practicable Waste Treatment, Office of Water Program Operations, October, 1975.

South Platte Water Quality Management Plan, Toups Corporation, 1974.