V. Point Source Management Plan

V. POINT SOURCES

INTRODUCTION

The point source plan is divided into two sections: municipal sewage treatment and industrial waste treatment. This part of the point source plan concentrates on the future of sewage treatment in Salt Lake County because the majority of industrial point dischargers are projected either to go to total containment to meet future effluent requirements, or they are of such small impact that they are not relatively significant. Industrial considerations are discussed in this section as well as in Section IV.

In this document, control and abatement of impacts from storm drainage (urban and storm runoff) is discussed as non-point source pollution (Section VI) even though a recent court decision has required that storm drainage discharges be considered point sources of pollution.

Present Wastewater Management

Entities involved with wastewater management in Salt Lake County are of two distinct types; multipurpose governments (incorporated cities) and single-purpose governments (sewage collection districts). Virtually all developed land in the county is serviced by one or the other. However, some developed land is not serviced by either. Wastewater management in unserviced areas primarily consists of septic and/or holding tanks. Two ways an area can obtain sewer service are;1) be annexed to an incorporated city with a collection service or 2) petition a sewage collection district for annexation to that district.

Planning for future sewage treatment needs has been left to individual collection districts and cities until P.L. 92-500 mandated that planning be integrated, first on a river basin basis (Section 303(e)) and then on a local area-wide basis (Section 208). The third step in this planning process is planning, designing and construction of individual treatment facilities.

At the present time there are 19 sewage collection districts in Salt Lake County. Of these 19 districts, five are incorporated cities, one is privately owned and operated (to be phased out), and 13 are special purpose districts, one of which is not presently operating. These are shown in Figure V-1. These 19 collection districts are serviced by 10 treatment plants, nine of which discharge to surface waters of the county. The location of these 10 treatment plants is shown in Figure V-2. Table V-1 lists the plants and their contributory districts.

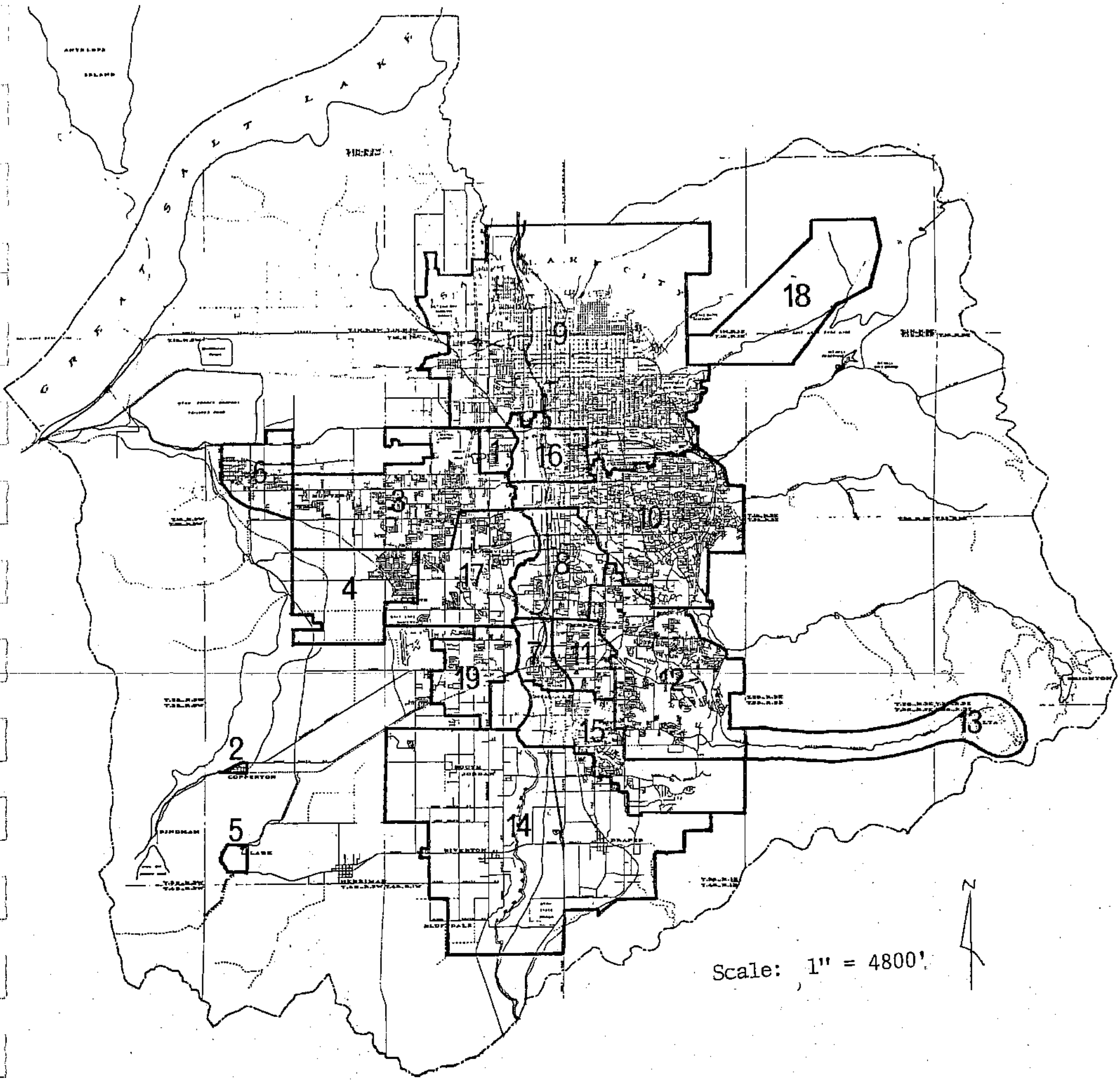
Facilities Planning Areas

Initially, facilities planning areas included the Salt Lake City Planning Area, the Magna Planning Area, and the Jordan Planning Area. After many boundary changes and exclusions/inclusions, the planning areas as shown in Figure V-3 were adopted. These planning areas are outlined in Table V-2.

SEWAGE TREATMENT PLAN SUMMARY

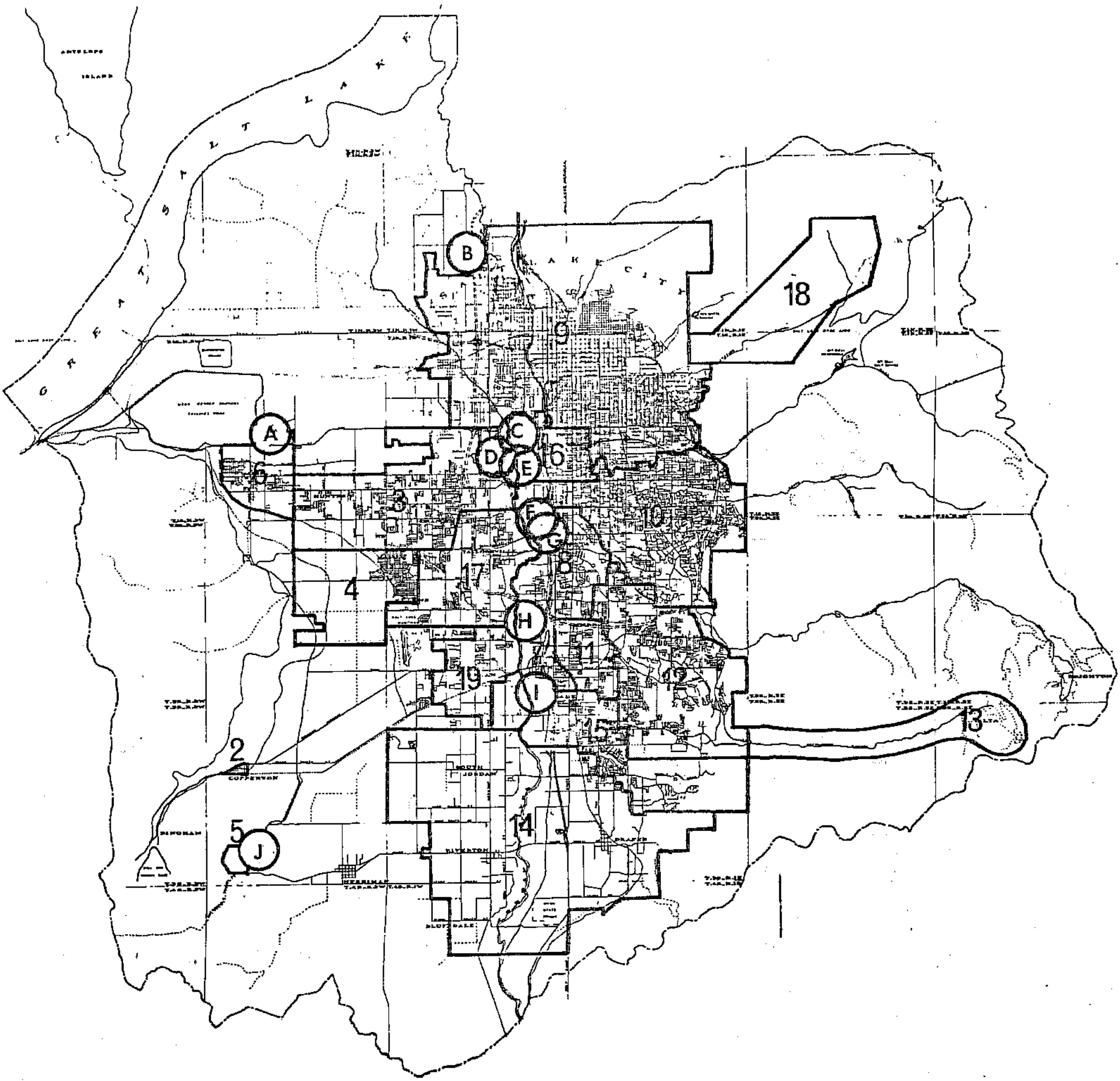
At the present time, there are nine sewage treatment plants in Salt Lake County discharging to surface waters (Figure V-21). The Magna STP discharges to Kersey Creek and the Salt Lake City STP discharges to the sewage canal while the other sewer discharge to the Jordan River.

In summary, the 208 plan for future sewage treatment in Salt Lake County will consolidate these nine treatment plants into four, two of which will discharge to the Jordan River. A summary description is given below.



1. Chesterfield Improvement District
2. Copperton Improvement District
3. Granger-Hunter Improvement District
4. Kearns Improvement District
5. Lark U. S. Mines
6. Magna Improvement District
7. Midvale City
8. Murray City
9. Salt Lake City
10. SLC Suburban #1
11. SLC Suburban #2
12. SL County Cottonwood District
13. SL County Service Area #3
14. SL County Sewer Improvement #1
15. Sandy Suburban Improvement District
16. South Salt Lake
17. Taylorsville-Bennion Improvement District
18. Emigration Canyon Improvement District
19. West Jordan

Figure V-1. Sewage Collection Districts.



Legend:

A. Magna
B. Salt Lake City
C. South Salt Lake City
D. Granger-Hunter
E. Salt Lake Suburban Sanitary District No. 1
F. Cottonwood
G. Murray
H. Midvale
I. Sandy
J. Lark

Scale: 1" = 4800'

N

Figure V-2. Location of Salt Lake County Sewage Treatment Facilities.

Table V-1. Existing Treatment Plants
And Contributory Areas

Plant	Location (Address)	Contributory Districts
Magna	7650 W. 2100 So. Magna, Ut	Magna Water and Sewer Improvement District
Salt Lake City	1850 N. Redwood Rd. SLC, Ut	Salt Lake City Chesterfield Improvement District
South Salt Lake City	2200 S. 500 W. So. SLC, Ut	South Salt Lake City
Granger-Hunter	1500 W. 3100 So. SLC, Ut	Granger-Hunter Improvement District Kearns Improvement District
Salt Lake City Suburban Sanitary District No. 1	650 W. 3300 So. SLC, Ut	Salt Lake City Suburban Sanitary District No. 1 Taylorsville-Bennion Improvement District
Salt Lake County Cottonwood	4100 So. 500 W. Murray, Ut	Salt Lake County Cottonwood Sewer District Salt Lake County Service Area No. 3
Murray City	4500 S. 500 W. Murray, Ut	Murray City
Midvale (Tri-Community)	985 W. 7030 S. Midvale, Ut	Midvale City West Jordan City Salt Lake City Suburban Sanitary District No. 2 Salt Lake County Sewer Improvement District No. 1
Sandy	8735 S. 700 W. Sandy, Ut	Sandy Suburban Sanitary District
Lark	8600 W. 12500 So. Lark, Ut	Lark U.S. Mines

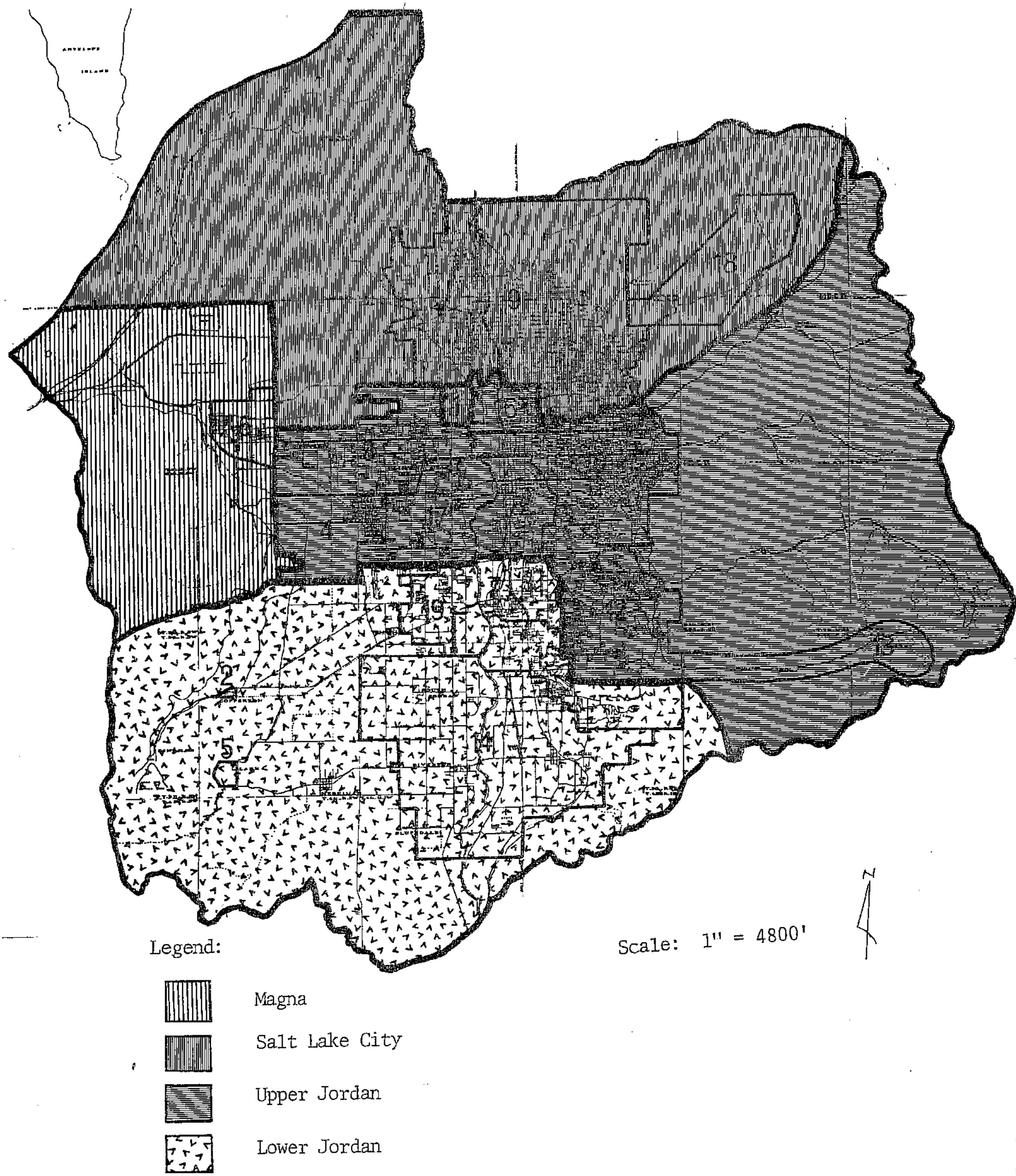


Figure V-3. Facilities Planning Areas.

Table V-2. Description of Facilities Planning Areas - Salt Lake County

Planning Area	Description
Magna	Serviced Area: Magna Water and Sewer Improvement District Unserviced Area: Bounded by southern ridge of Marker's Canyon on south Bounded by County line on west Bounded by North Temple Street on north Bounded by Granger-Hunter and Kearns Improvement Districts and line running north to North Temple Street from NE corner of Magna Water and Sewer Improvement District on the east
Salt Lake City	Serviced Area: Salt Lake City Chesterfield Improvement District Emigration Canyon Improvement District (inactive) Unserviced Area: Bounded by SE ridge of Emigration on the east Bounded by Granger-Hunter Improvement District, Salt Lake City Suburban Sanitary District No. 1, and South Salt Lake City on the south Bounded by County line on the north Bounded by Magna Planning Area on the west
Lower Jordan	Serviced Area: South Salt Lake City Granger-Hunter Improvement District Kearns Improvement District Salt Lake City Suburban Sanitary District No. 1 Murray City Taylorsville-Bennion Improvement District Salt Lake County Cottonwood Sewer District Salt Lake County Service Area No. 3 Unserviced Area: Bounded by County line and east ridge of Bell's Canyon on east Bounded by Salt Lake City Planning Area on north Bounded by Magna Planning Area on west Bounded by southern boundary of Kearns and Taylorsville-Bennion Improvement Districts, southern boundary of Salt Lake County

Table V-2. (Continued)

Planning Area	Description
Lower Jordan (cont'd)	Service Area No. 3, and northern boundaries of West Jordan and Midvale cities, Salt Lake City Suburban Sanitary District No. 2, and Sandy Suburban Improvement District on the south.
Upper Jordan	Serviced Area: Copperton Improvement District Lark U.S. Mines Midvale City West Jordan City Salt Lake City Suburban Sanitary District No. 2 Sandy Suburban Improvement District Salt Lake County Sewer Improvement District No. 1 Unserviced Area: Bounded by east ridge of Bell's Canyon on the east Bounded by County line on south Bounded by County line on west Bounded by Lower Jordan Planning Area on north

MUNICIPAL POINT SOURCE MANAGEMENT PLAN SUMMARY:

a) Phase out existing plants at Midvale and Sandy by approximately 1980.

b) Construct a regional plant at or near present site of Midvale plant to handle wastes from Midvale and Sandy areas by approximately 1980.

c) Phase out existing plants at Murray, Cottonwood, South Salt Lake, Granger-Hunter, and SLCSSD #1 by approximately 1995.

d) Construct a regional plant at or near the present site of SLCSSD #1 plant to handle wastes from Murray, Cottonwood, South Salt Lake, SLCSSD#1, and Granger-Hunter areas by approximately 1990.

e) Upgrade existing plant at Salt Lake City to handle future wastes.

f) Upgrade existing plant at Magna to handle future wastes.

g) Phase out Lark lagoon system as town is phased out.

h) Continue present arrangement at Copperton (convey wastes to Kennecott Copper Corporation waste stream for treatment).

EFFLUENT QUALITY

Two distinctly different sets of receiving water conditions and requirements exist in the county: those of the Jordan River and its anticipated high levels of recreation use, and those of the Salt Lake City Sewage Canal and Kersey Creek which are principally degraded by extensive quantities of background pollution. The 208 Project recommendations for discharge to the Jordan River include effluent quality requirements consistent with, but not limited to, the State's definition of polished secondary effluent, including implementation by the State's target date of June 30, 1980. (Note: New draft water quality standards proposed by the State change the target date to either June 30, 1983 or June 30, 1985 depending upon the receiving water's stream classification.)

On the other hand, effluent requirements for the Salt Lake City Planning Area and the Magna Planning Area are based on recommendations by the 208 Project to implement the Utah State effluent requirement of polished secondary treatment for all municipal wastewater. However, the 208 Project recommends delaying polished secondary treatment, while achieving consistent standard secondary treatment at the Salt Lake City and Magna facilities, until such time as comprehensive pollution abatement programs can be established for the Salt Lake City Sewage Canal and Kersey Creek.

Characteristics of polished secondary and standard secondary effluents are shown in Table V-3. Effluent requirements for the two subregional plants discharging to the Jordan River are shown in Table V-4. These effluent requirements are based on beneficial use classifications as discussed in Section IV.

Table V-3. Utah State Definition of Polished Secondary and Standard Secondary Effluents

Parameter	Standard Secondary	Polished Secondary
BOD_5 (mg/1)[1]	25	10 [2]
SS (mg/1)[1]	25	10
Total Coliforms (MPN/100ml)[3]	2000	200
Fecal Coliforms (MPN/100ml)[3]	200	20
pH [4]	6.5-9.0	6.5-9.0

[1] Maximum monthly arithmetic mean.
[2] Subject to change - see Draft Standards in Appendix.
[3] Maximum monthly geometric mean.
[4] Range.

Table V-4. Effluent Requirements for Treatment Plants Discharging to the Jordan River.

Parameter	Criteria
BOD_5 (mg/1)	10[1]
SS (mg/1)	10[1]
NH_3-N (mg/1)	5.0 Summer[1] 10.0 Winter[1]
P	No Requirement
Inorganic N	No Requirement
Coliforms (MPN/100 ml)	200[1]
Fecal Coliforms (MPN/100 ml)	20[1]
DO (mg/1)	4.0[2]
Chlorine Residual (mg/1)	0.0[3]
pH (units)	6.5 to 9.0[4]

[1] Maximum allowable monthly mean.

[2] Minimum allowable monthly mean.

[3] Maximum allowable monthly mean. The State Division of Health does not require a minimum chlorine residual concentration. However, they recommend a residual of 1.0 mg/1 for disinfection (Paragraph III-82e, Code of Waste Disposal Regulations, adopted 5/19/65).

[4] Range.

The State has indicated that, although it is unlikely that polished secondary effluent values could be consistently attained where the method of secondary treatment is trickling filtration, the definition of polished secondary is intended to cover plants employing two-stage or single-stage low rate trickling filters followed by granular media filters, and that effluent from such plants is acceptable as a polished secondary effluent. (A plant employing single-stage low rate or two-stage trickling filters followed by granular media filters can be expected to consistently produce an effluent of 15 mg/1 BOD_5, 15 mg/1 SS. However, ammonia-nitrogen concentrations in this effluent would be greater than the recommended summer and winter effluent concentrations of 5.0 and 10.0 mg/1.) This is apparent in that the Draft Standards (Appendix A-2-3) proposed to change the polished secondary definition of BOD_5 limits from 10 mg/1 to 15 mg/1.

Analysis of alternatives resulted in the conclusion that the ultimate method of sludge disposal should be the same for all proposed treatment plants: A stabilized, sterile sludge cake will be made available for use to the private sector as a soil conditioner. Any sludge cake in excess of demand will be disposed of in sanitary landfill on other solid waste disposal system (FM-5, FM-9).

In a recent development, personnel from the State Bureau of Water Quality, City-County Board of Health, Kennecott Copper Corporation and the Department have engaged in a pilot study program for sludge disposal in the county. The concept is to mix sludge with tailings (to provide organics) and revegetate a small parcel of land located adjacent to the existing tailings pond near Magna. If successful, the program could be expanded into a revegetation program for the side slopes of the tailings pond. (See Figure III-1, north-west Salt Lake County). This could prove to be an effective alternative for sludge disposal for all county sewage treatment plants.

Following a discussion of alternative screening and selection, a short discussion of the proposed sewage treatment facilities will be presented. Greater detail can be found in Technical Reports FM-5 through FM-12.

ALTERNATIVE WASTEWATER TREATMENT SYSTEMS

To develop a comprehensive wastewater treatment plan, several alternative treatment processes were investigated to provide for the best practical treatment of wastewater in Salt Lake County. The evaluation (from FM-5) was carried out by 208 Project consultants in the following manner:

1. On the basis of data and analyses published in the Utah Lake - Jordan River 303e Basin Study, it was concluded that sewage treatment regionalization opportunities in Salt Lake County do not include Salt Lake City and Magna facilities and that the present arrangements at Lark and Copperton will be adequate through the planning period (hydraulics and distance).
2. Regional and subregional possibilities were screened and treatment plant siting alternatives were developed.
3. Further screening was carried out to determine best practicable treatment in a general manner. This led to the conclusion that treatment and discharge to surface waters is the best practicable treatment in all four planning areas (discussed later).
4. Preliminary present worth analyses were made of treatment plant siting alternatives in the Jordan area. This led to the conclusion that treatment of all municipal wastes from the Jordan planning area in

a single regional plant is the alternative with the least present value cost.

5. Socio-economic factors were assessed and applied to the conclusions above. The resultant recommendation of this plan reflects the most cost-effective, socio-economic and politically acceptable alternative.

TREATMENT PLANT SITING ALTERNATIVES

Salt Lake City Planning Area

In the preliminary analyses, and consistent with the 303(e) plan, Salt Lake City facilities were not included in the regionalization concept. Therefore, the alternative selected for further investigation was upgrading and expanding of existing plant.

Magna Planning Area

Magna facilities were also not included in the regionalization concept. Three alternatives selected for further study for treatment of Magna wastes were as follows:

1. Upgrade and expand existing facilities.
2. Phase out existing plant, convey Magna wastes to the Kennecott Copper Company combined sanitary-industrial plant for treatment.
3. Phase out existing plant, convey Magna wastes to the Jordan planning area for treatment.

Upper and Lower Jordan Planning Area

Regionalization in the Upper and Lower Jordan Planning Areas offered many alternatives for waste treatment. Five primary alternatives were selected for further investigation. They are as follows:

1. Upgrade and expand present plants.
2. Phase out existing plants and provide treatment at single regional plant at or near the present site of the Salt Lake City Suburban Sanitary District No. 1 plant. Three major interceptors are required:
   a. Interceptor from present Midvale plant to the regional plant site,
   b. Interceptor from present Granger-Hunter plant to regional plant site,
   c. Interceptor from present South Salt Lake plant to regional plant site.
3. Phase out existing plants and provide treatment at two subregional plants; one at or near the present site of the Salt Lake City Suburban Sanitary District No. 1 plant, one at or near the present site of the Midvale plant. Three major interceptors are required:
   a. Interceptor from present Murray plant to the present site of the SLC Suburban Sanitary District No. 1 plant,
   b. Interceptor from present Granger-Hunter plant to the present site of the SLC Suburban Sanitary District No. 1 plant,
   c. Interceptor from present South Salt Lake plant to the present site of the SLC Suburban Sanitary District No. 1 plant.
4. Phase out existing plants and provide treatment at three subregional plants; one at or near the present site of the Salt Lake City Suburban Sanitary District No. 1 plant, one at or near the present site of the Cottonwood (Tri-community) plant, one at or near the present site of the Midvale plant. Interceptors required for this alternative are as follows:

a. Interceptor from present Murray plant to the site of the Cottonwood plant,

b. Interceptors from the present Granger-Hunter plant and the present South Salt Lake plant to the site of the SLC Suburban Sanitary District No. 1 plant.

5. Phase out existing plants and provide treatment at five subregional treatment plants; one at or near the present site of the Salt Lake City Suburban Sanitary District No. 1 plant, one at or near the present site of the Granger-Hunter plant, one at or near the present site of the South Salt Lake City plant, one at or near the Cottonwood (tri-community) plant, and one at or near the present site of the Midvale plant. The interceptor required for this alternative is as follows:

   a. Interceptor from present Murray Plant to the site of the Cottonwood plant.

Screening to Determine Best Practicable Treatment

There are three major possibilities for disposal of municipal wastewaters. They are treatment and discharge to surface waters, land application, treatment and reuse. Each of these alternatives was analyzed for disposal of wastes from each of the planning areas (FM-5). Analyses are summarized below.

Treatment and Discharge to Surface Waters

Secondary plants discharging to surface waters in Salt Lake County will have to meet the federal and particularly the state effluent requirements which are discussed above. Preliminary costs for the alternatives outlined above were developed for the three levels of treatment outlined below.

1. Secondary Treatment: Average effluent characteristics are:

BOD_5	25 mg/1
SS	25 mg/1
Total N	20 mg/1
Total P	12 mg/1
Coliforms	2,000 MPN/100 ml
Fecal Coliforms	200 MPN/100 ml

2. Polished Secondary Treatment (filtered secondary): Average effluent characteristics are:

BOD_5	10 mg/1
SS	10 mg/1
Total N	20 mg/1
Total P	12 mg/1
Coliforms	200 MPN/100 ml
Fecal Coliforms	20 MPN/100 ml

(*Subject to change to 15 mg/1 BOD_5)

3. Advanced Tertiary Treatment (filtered secondary with carbon adsorption and P and N removal). Average effluent characteristics are:

BOD_5	2 mg/1
SS	2 mg/1
Total N	2 mg/1
Total P	2 mg/1
Coliforms	200 MPN/100 ml
Fecal Coliforms	20 MPN/100 ml

Treatment plant cost estimates were based on various curves developed by Smith, Monti & Silberman and Black & Veatch and adjusted to an Engineering News Record Index of 2200 (approximate 1975 index in Salt Lake County). Also, since these curves were based on data which is several years old, a national telephone survey was made of recently constructed treatment plants. This survey showed that even after adjustment to current cost indexes, these curves under-estimate present plant capital costs by about half. Therefore, curve values for capital costs were doubled in this study to ensure estimates accurately reflect current costs. Interceptor costs were based on applying unit costs to quantities taken from preliminary layouts and sizes, at an ENR index of 2200.

Preliminary cost estimates for the three, four and five subregional plant alternatives were not included in the first cut cost estimates as the alternatives were not proposed until a later date. Tables V-5 and V-6 present initial cost estimates of total and local costs that were used in the alternative screening process.

Land Application

There are three major types of land application systems: irrigation, overland flow, infiltration-percolation. Alltypes were considered and apparently, a minimum of secondary treatment and a relaxation of State policy would be required prior to efficient land disposal of effluent.

Typical removal efficiencies are set out in Table V-7. Specific site analyses would be needed to refine these if land disposal is considered a likely alternative.

Storage during nongrowing season would be required for irrigation and overland flow. Infiltration-percolation can be carried out all year, but would have freezing problems in winter.

Area required for land disposal would be quite large. Basic requirements are:

1. Outside urbanizing area.
2. Down stream of potable groundwater use.
3. At least 5 feet to groundwater.

The closest land fulfilling these requirements for the Upper and Lower Jordan Planning Areas is west of Municipal Airport No. 2. The closest suitable land for Magna and Salt Lake City planning areas is west of the International Airport. Land requirements are indicated in Table V-8.

Cost estimates, which were based on the EPA publication "Costs of Land

Table V-5. Preliminary Estimated Costs for Treatment and Discharge - Total Costs*

Item	Treatment Level	Capital Cost $10^6	Annual O&M Cost at Design Flow $10^6	Total Annual** Cost at Design Flow $10^6
Salt Lake City Planning Area (Upgrade Existing Plant)	Secondary	15.0	0.8	2.1
	Pol. Secondary	21.4	1.2	3.0
	Tertiary	78.4	3.8	10.7
Jordan Planning Area*** Alternative I (Upgrade All Existing Plants)	Secondary	46.6	2.0	6.1
	Pol. Secondary	64.0	3.0	8.6
	Tertiary	180.8	7.3	23.3
Alternative II (Single Regional Plant)	Secondary	70.0	1.2	7.4
	Pol. Secondary	79.2	1.8	8.8
	Tertiary	150.2	4.9	18.1
Alternative III (Two Regional Plants)	Secondary	71.0	1.5	7.7
	Pol. Secondary	82.2	2.1	9.3
	Tertiary	160.6	5.6	19.7
Magna Planning Area Alternative I (Upgrade Existing Plant)	Secondary	0	0.2	0.2
	Pol. Secondary	0.7	0.2	0.3
	Tertiary	2.4	0.3	0.5
Alternative II (Joint Treatment with Jordan Plant)	Secondary	5.0	0.1	0.5
	Pol. Secondary	5.2	0.1	0.5
	Tertiary	6.7	0.1	0.7
Alternative III (Joint Treatment with Kennecott)	-	2.6	0.1	0.3

* Revised final cost estimates are presented later

** Capital cost amortized over 20 years at 6 1/8 percent interest rate.

*** Does not include costs of a three plant or more regionalization scheme in the Jordan Planning Area.

Note: This is a preliminary estimate of costs to determine best practicable treatment in a general manner. It does not include replacement, salvage values, O & M changes through planning period or interest during construction.

Table V-6. Preliminary Estimated Costs for Treatment and Discharge - Local Costs*

Item	Treatment Level	Capital Cost** 10^6	Annual O&M Cost at Design Flow 10^6	Total*** Annual Cost at Design Flow 10^6
Salt Lake City Planning Area (Upgrade Existing Plant)	Secondary	3.8	0.8	1.1
	Pol. Secondary	5.4	1.2	1.7
	Tertiary	19.6	3.8	5.5
Jordan Planning Area ****				
Alternative I (Upgrade All Existing Plants)	Secondary	11.6	2.0	3.0
	Pol. Secondary	16.0	3.0	4.4
	Tertiary	45.4	7.3	11.3
Alternative II (Single Regional Plant)	Secondary	17.6	1.2	2.8
	Pol. Secondary	20.0	1.8	3.6
	Tertiary	37.8	4.9	8.2
Alternative III (Two Regional Plants)	Secondary	19.8	1.5	3.2
	Pol. Secondary	22.6	2.1	4.1
	Tertiary	42.2	5.6	9.3
Magna Planning Area				
Alternative I (Upgrade Existing Plant)	Secondary	0	0.2	0.2
	Pol. Secondary	0.2	0.2	0.2
	Tertiary	0.7	0.3	0.4
Alternative II (Joint Treatment with Jordan Plant)	Secondary	1.2	0.1	0.2
	Pol. Secondary	1.3	0.1	0.2
	Tertiary	1.7	0.1	0.3
Alternative III (Joint Treatment with Kennecott)	-	0.7	0.1	0.2

*Revised final cost estimates are presented later.
**After 75 percent federal grant.
***Capital costs amortized over 20 years at 6 1/8 percent interest rate.
****Does not include costs of a three plant or more regionalization scheme in the Jordan Planning Area.

Note: This is a preliminary estimate of costs to determine best practicable treatment in a general manner. It does not include replacement, salvage values, O&M changes through planning period or interest during construction. Final cost estimates are shown on Tables V-7 and V-8.

Table V-7. Land Application Systems - Removal Efficiencies for Major Constituents

Constituent	Removal Efficiency Irrigation	Overland Flow	Infiltration-Percolation
BOD	98+	92+	85-99
COD	95+	80+	50+
SS	98+	92+	98+
Total N	85+	70-90	0-50
Total P	80-99	40-80	60-95
Metals	95+	50+	50-95
Microorganisms	98+	98+	98+

Table V-8. Land Requirements for Land Application Alternatives

Planning Area	Year 2000 Flow (mgd)	Type of System	Land Requirement Acres
Salt Lake City	45	Spray Irrigation	20,000
		Overland Flow	11,000
		Infiltration-Percolation*	2,000
Jordan	75	Spray Irrigation	31,000
		Overland Flow	19,000
		Infiltration-Percolation*	3,400
Magna	1.5	Spray Irrigation	650
		Overland Flow	400
		Infiltration-Percolation*	70

*Does not include winter storage. If freezing problems cannot be overcome, more land would be necessary.

Application Systems" and assume secondary treatment prior to disposal, are summarized in Tables V-9 and V-10. Table V-9 shows total costs, while Table V-10 shows local costs after 75 percent federal aid on capital costs.

However, with the development of the interest in sludge application to the Kennecott Copper tailings pile to provide organic content for revegatation (discussed above), the issue of land application of sludge is a viable alternative. Land application of effluent, however is not considered a viable alternative.

Treatment and Reuse

Wastewater Reuse Opportunities

Possible wastewater reuses are:

1. Potable municipal reuse
2. Nonpotable municipal reuse
3. Industrial use
4. Agricultural use
5. Recreational use
6. Ecological use
7. Recreation use

These reuse possibilities are considered below. Each, if feasible, would have its own water quality requirements. However, the minimum treatment would be the State effluent reuse requirements which have been set on general public health grounds. (See Sppendix A-2-3).

1. Potable Municipal Reuse

   This can be carried out in either of the following three ways:

   a. Return to surface supply reservoir.

   b. Recharge supply aquifer, upstream of municipal wells, by injection or surface spreading.

   c. Direct return to potable users.

   Wastewater is not presently reused for municipal potable purposes anywhere in the U.S. Chief problems are:

Table V-9. Preliminary Estimated Costs for Land Application - Total Costs

Item	Land Disposal Type	Capital Cost $\$10^6$	Annual O&M Cost $\$10^6$	Total Annual Cost $\$10^6$
Salt Lake City Planning Area (Upgrade Exisiting Plant	Spray	78.6	2.8	9.7
	Overland	70.6	2.0	9.2
	Infil-Percol	35.4	1.6	4.7
Jordan Planning Area*				
Alternative II (Single Regional Plant)	Spray	181.0	3.2	19.3
	Overland	166.0	2.5	17.1
	Infil-Percol	100.4	2.6	11.5
Alternative III (Two Regional Plants)	Spray	181.5	3.5	19.5
	Overland	171.0	2.9	18.0
	Infil-Percol	102.4	2.9	11.9
Magna Planning Area Alternative I (Upgrade Existing Plant)	Spray	4.9	0.2	0.7
	Overland	4.4	0.2	0.6
	Infil-Percol	2.0	0.2	0.4

*Costs not developed for Alternative I (upgrade existing plants) since it is clear that this would be more expensive than land disposal from regional plant.

Table V-10. Preliminary Estimated Costs for Land Application - Local Costs

Item	Land Disposal Type	Capital Cost $\$10^6$	Annual O&M Cost $\$10^6$	Total Annual Cost $\$10^6$
Salt Lake City Planning Area (Upgrade Existing Plant)	Spray	19.7	2.8	4.4
	Overland	17.7	2.0	3.5
	Infil-Percol	8.9	1.6	2.3
Jordan Planning Area*				
Alternative II (Single Regional Plant)	Spray	45.3	3.2	7.2
	Overland	41.5	2.5	6.2
	Infil-Percol	25.2	2.6	4.9
Alternative III (Two Regional Plants)	Spray	45.4	3.5	7.5
	Overland	42.8	2.9	6.7
	Infil-Percol	27.5	2.9	5.3
Magna Planning Area Alternative I (Upgrade Existing Plant)	Spray	1.3	0.2	0.3
	Overland	1.1	0.2	0.3
	Infil-Percol	0.5	0.2	0.3

*Costs not developed for Alternative I (upgrade existing plants) since it is clear that this would be more expensive than land disposal from regional plant.

1. Viruses - A high level of virus removal is not attained by standard wastewater disinfection.
2. Dissolved Solids - Salt Lake County already has high dissolved solids concentration in waters. Reuse would only tend to increase the problem.
3. Stable Organics - Some of these may be carcinogenic.
4. Freezing - Problems with surface spreading, the cheapest method of aquifer recharge, during the winter months.
5. Public Opinion.

2. Nonpotable Municipal Reuse

Wastewater could be used to conserve present water use by substituting it for:

a. Nonpotable household uses, such as toilet flushing or clothes washing.

Use of wastewater for nonpotable household uses is probably not publicly acceptable at present. Health hazards are involved since it would be available for unauthorized potable uses, and would involve duplication of present distribution facilities.

b. Lawn sprinkling, etc.

Use of wastewater for lawn sprinkling for private homes would also involve duplication of present water distribution facilities and is not considered feasible at present. However, a great part of water use in Salt Lake County is used for lawn sprinkling, and this constitutes a potential summer use for wastewater.

Duplication of facilities would be minimized if wastewater sprinkling were limited to large point users, such as public parks, institutional grounds, golf courses. This is considered below under Recreation.

3. Industrial Use

Most industries in Salt Lake County are fairly small water users and need water of high quality. General industrial use of municipal treatment plant effluent is not feasible.

There are two large users of low quality water - Kennecott Copper near Magna and Utah Power and Light in Salt Lake City. Use of reclaimed wastewater by either of these companies depends on their needs - they have both indicated that it would probably not be economical for them (they would have to pay for all treatment above that required for treatment and discharge, plus the cost of transmission). Industrial use does not appear to be a viable alternative at present.

4. Agricultural Use

There are two types of farming in Salt Lake County - dry land farming and irrigated land farming.

a. Irrigated Land Farming

There are two situations in which use of wastewater is feasible:

(a) increased need for low quality water or (b) substitution of low quality water for present use of high quality water (i.e. groundwater in eastern county) that can be switched to municipal use.

(b) The 303e and the 208 Studies indicate that irrigated land is expected to decrease, hence the first case is unlikely.

b. Dry Land Farming

Yield on agricultural land without water rights could be increased by irrigation. The present average irrigated land water allotment is about 4 acre ft/acre/year, therefore it is possible to irrigate 140 acres or more per mgd.

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Jordan 201 area.

b. Water requirements of Farmington Bird Refuge or other marshes on lower Jordan. This need applies to Jordan and Salt Lake City 201 areas.

Both of these may affect effluent quality, but are essentially treatment and discharge.

7. Recreational Use

Possible needs are:

a. Maintaining minimum flow for uses of South Jordan River Parkway. This is essentially treatment and discharge.

b. Irrigation of park lands and golf courses.

This would be associated with treatment and discharge during winter and probably during summer too, since demand for this purpose would be less that total wastewater flows in the County. Specific demands are required before this alternative can be further evaluated.

Conclusion

There appears to be no major acceptable reuse opportunities in Salt Lake County which does not involve treatment and discharge. If reuse does become a viable alternative in the future, two key issues need to be addressed. They are:

1. The legality of diverting wastewater from present receiving streams must be determined.
2. If diversions legal, discussions with Kennecott Copper and Utah Power and Light (major non-potable reuse opportunities) needs to take place to determine quality of reclaimed water they need, and price they are prepared to pay for it.

FINAL COST ESTIMATES

The selected plan for municipal point source pollution abatement in Salt Lake County is to upgrade existing plants at Salt Lake City and Magna, continue present arrangement at Copperton, phase out Lark system as Lark is phased out, and regionalize seven small area treatment plants along to the Jordan River into two subregional treatment plants.

A summary of present worth estimates for the Upper and Lower Jordan Planning Areas alternatives are shown in Table V-11. Table V-12 shows construction and O & M cost estimates for the upgrading of the Salt Lake City and Magna treatment plants. (See FM-5 through FM-12 for additional information).

SPECIFIC PLANS

Salt Lake City Planning Area

Wastewater flows from the present contributory population of incorporated Salt Lake City of 180,000 are collected and treated in a two-stage trickling filtration plant prior to discharge to the Salt Lake City Sewage Canal.

Existing average annual flows and loads are as follows:

Flow:	36 mgd
BOD_5:	123 mg/1
	37,000 lbs/day
SS:	120 mg/1
	36,000 lbs/day

TABLE V-11. UPPER AND LOWER JORDAN PLANNING AREAS - SUMMARY OF WASTEWATER TREATMENT COST - EFFECTIVENESS ANALYSIS (Millions of $)

REPORT - DATE

(See Notes Below)

ALTERNATIVE	A. 6/75	B. 10/76		C. 3/77		D. 8/77		E. 12/77		F. 12/77		G.	
	TEAC[1]	TEAC	LEAC[2]	TEAC	LEAC	TEAC	LEAC	TEAC	LEAC	TEAC	LEAC	TEAC	LEAC
1 Plant	(6.72)[3]	(8.6)	(3.2)	(7.5)	(2.2)	(9.8)	(3.5)	3.1	(3.7)	6.3	(3.5)		
2 Plant	6.4[4]	5.8	15.6	(7.5)	4.5	3.1	5.7	(9.8)	8.1	10.2	7.2		
3 Plant	11.0			6.7	13.6	10.2	14.3	1.0	8.1	(9.2)	15.3	2.7	(3.3)
5 Plant												(8.6)	1.8
7 Plant	16.1	4.7	50.0										

[1] Total Equivalent Annual Cost
[2] Local Equivalent Annual Cost
[3] Numbers in parentheses indicate least cost alternative in millions of $.
[4] Numbers not in parentheses indicate cost as percentage above least cost alternative.

NOTES:

A. Includes costs for S.L. City - not included in other cost estimates - projected flows very low in South, somewhat high in Central.

B. "Polished Secondary" treatment - Interim report - projected flows very low in South, high in Central.

C. Population projection errors - staffing and staff salaries unrealistically low - inadequate design criteria - preliminary report - some costs not included - projected flows very low in South, somewhat high in Central.

D. Revision of Report "C" - some errors - some costs not included - EPA rejected "3 Plant" based on this report - flows consistent with 208 projections.

E. Revision of Report "D" but by another firm - several errors - alternatives not compared on common basis - some costs not included - staffing unrealistically low - some costs unrealistic - economies of scale not achieved - land costs not reported accurately - flows consistent with 208 projections.

F. Some errors - based on combination of facilities reports and PW analyses, 1 and 2 Plant alternatives from PW analysis (Report D) while 3 Plant alternative based on facility report - inconsistent comparison - projected 208 flows.

G. North & Central costs from facilities reports, South costs from PW analysis - flows from North area lower than projected flows - Central costs using STR basis costs - inconsistent comparisons - several errors - economies of scale not achieved. Some costs are not included.

Table V-12. Salt Lake City and Magna Construction and Operating and Maintenance Cost Estimates

	Construction Costs*		O&M Costs*		Total*	
	Total	Local**	Total	Local**	Total	Local**
Salt Lake City	16.0	4.0	27.2	27.2	43.2	10.8
Magna	3.5	0.9	4.4	4.4	7.9	4.4

*1977 Dollars

**75% Federal construction grant

Existing flows are made up of the following components:

Component	Avg. Daily Flow mgd	Avg. Daily BOD_5 lbs/day
Domestic	18.0	30,000
Wet Industrial	3.0	6,000
Institutional	2.0	1,000
Infiltration	13.0	
	36.0	37,000

Population projections are as follows:

Year	Resident Population	Employment
1975	180,953	135,839
1985	183,294	151,499
1995	186,471	182,622
2005	188,310	

Average daily flows are summarized below

Year	Flow (mgd)	BOD_5 & SS (lbs/day)
1980	36.0	37,000
1990	36.6	37,800
2000	37.1	39,500

A review of monthly summaries and infiltration/inflow studies now in progress indicate that extreme situations will be adequately provided for by applying the following multiplication factors to average flow and load projections:

Item	Factor
Minimum Flow and Load	0.40
Maximum Daily Flow and Peak Load	1.40
Peak Flow	1.75

As discussed earlier, an analysis of Best Practicable Treatment (BPT) led to the conclusion that upgrading and expanding the existing Salt Lake City facility with discharge to the Salt Lake City Sewage Canal is the most cost-effective method of treating wastewater in the Salt Lake City Planning Area over the planning period.

Magna Planning Area

Wastewater flows from the present population of 8,000 served by the Magna Sewer Improvement District are collected and treated in a standard rate trickling filtration plant prior to discharge to Kersey Creek.

Existing average annual flows and loads are as follows:

Flow:	1.0 mgd
BOD5:	155 mg/1
	1,300 lbs/day
SS:	155 mg/1
	1,300 lbs/day

There are no major industrial or institutional flows in Magna. Existing flow of 1 mgd is 80 percent domestic (including associated minor commercial and institutional flows) and 20 percent infiltration.

Population projections are as follows:

Year	Population
1975	7,532
1977	8,000
1985	11,476
1995	14,328
2005	15,020

Average daily flows are set out below:

Year	Flow (mdg)	BOD_5 & SS (lbs/day)
1980	1.2	1,700
1985	1.4	2,000
1990	1.5	2,200
1995	1.6	2,300
2000	1.7	2,500

A review of monthly summaries indicate that extreme situations will be adequately provided for by applying the following multiplication factors to average flow and load projections.

Item	Factor
Minimum flow and load	0.4
Maximum daily flow and peak load	1.4
Peak flow	2.5

As discussed earlier, an analysis of BPT led to the conclusion that upgrading and expanding the existing Magna facility with discharge to surface waters is the most cost-effective method of treating wastewater in the Magna Planning area over the planning period.

Upper Jordan Planning Area

Within the Upper Jordan Planning Area there exist three treatment plants (Lark, Sandy, Midvale) and a collection system that collects wastewater and conveys it out of the planning area (Copperton). The future plan for each of these situations is discussed below.

Lark

The detail of future wastewater arrangements at Lark are moot in that the town, on "lease" from Kennecott Copper Corporation, is being phased out. There will be no town of Lark (presently unincorporated) after approximately summer 1979.

Therefore, wastewater treatment facilities at Lark will be abandoned by approximately August 1979.

Copperton

The existing arrangement at Copperton is conveyance of wastewater to Kennecott Copper Corporation for treatment in their waste stream. This arrangement is adequate for treatment of Copperton wastewater throughout the planning period.

South Valley Water Reclamation Facility

The Sandy and Midvale wastewater treatment plants will be regionalized to form the South Valley Water Reclamination Facility located at or near the site of the present Midvale facility. For short, this plant is referred to as the "South Plant."

Contributory collection districts to the South Plant are listed below.

Midvale City
Salt Lake County Sewer Improvement District No. 1
Salt Lake City Suburban Sanitary District No. 2
West Jordan
Sandy Suburban Improvement District *

* Includes area previously served by Sandy City.

Population projections for the Upper and Lower Jordan Planning Areas on which early reports were based were revised by the 208 staff. Revised flows for the Upper Jordan Planning Area, based on the revised populations, are as follows:

Item	Projected Average Daily Flow (mgd) 1990	2000
Residential	17-20	22-29
Industrial	1.2	1.5
Infiltration	1.2	1.2
	22-23	25-32

Reviewing the range of projections, the 208 staff concluded that the following values should be used:

Item	1990	2000
Average Daily Flow (mgd)	24	32

Review of exisiting flows in Salt Lake County indicates that extreme situations will be adequately provided for by applying the following multiplication factors to average flow projections.

Item	Factor
Minimum Daily Flow	0.4
Maximum Daily Flow	1.4
Peak Flow	2.0

Wastes are typically domestic. Projected strengths of average annual and maximum daily flows are as follows:

Item	Concentration
BOD_5	200 mg/1
SS	200 mg/1
TKN	32 mg/1

Effluent from the Midvale regional plant will be discharged to the Jordan River.

LOWER JORDAN PLANNING AREA

Within the Lower Jordan Planning Area there are five sewage treatment plants (Murray, Cottonwood, Salt Lake City Suburban Sanitary District No.1, South Salt Lake and Granger-Hunter) served by 8 collection districts. The plants and contributory collection districts which are listed below are to be regionalized to form the Jordan Valley Wastewater Reclamation Facility (or for short, the "North Plant") at or near the present site of the District No. 1 plant.

Plant	Contributory Collection District
Murray	Murray City
Cottonwood	Salt Lake County Cottonwood Sewer District
	Salt Lake County Service Area No.3
Granger-Hunter	Granger-Hunter Improvement District
	Kearns Improvement District
South Salt Lake	South Salt Lake City
SLCSSD#1	Salt Lake City Suburban District No. 1
	Taylorsville-Bennion Improvement District

Revised population projections for the Lower Jordan Planning Area by contributory plant are shown below:

Plant Contributory To:	1980	1990	2000
Cottonwood	67,500	79,900	89,100
Murray	25,200	28,100	31,200
South Salt Lake	11,800	14,000	15,300
SLCSSD#1	121,300	138,300	155,200
Granger-Hunter	82,300	97,100	109,400
Total	308,100	357,400	400,200

Based upon revised population figures presented above and industrial and infiltration flow projections, plant sizing will be based upon the following flow projections:

Plant Contributory To	Flow (mgd) 1980	1990	2000
Cottonwood	8.0	9.5	11.0
Murray	3.0	3.5	4.0
South Salt Lake	4.3	5.0	5.7
SLCSSD#1	15.7	17.5	19.0
Granger-Hunter	8.7	10.0	11.5
Total	39.7	45.5	51.2

Reviewing the range of projections, the 208 staff concluded that the following values should be used:

Item	1990	2000
Average Daily Flow (mgd)	45	51

Review of existing flows in Salt Lake County indicates that extreme situations will be adequately provided for by applying the following multiplication factors to average flow projections:

Item	Factor
Minimum Daily Flow	0.4
Maximum Daily Flow	1.4
Peak Flow	2.0

Wastes are typically domestic (except those contributory to the present South Salt Lake Plant). Projected strengths of average annual and maximum daily flows are as follows:

Item	Concentration
BOD_5	200 mg/l
SS	200 mg/l
TKN	32 mg/l

Effluent from the Jordan Valley Water Reclamation Facility will be discharged to the Jordan River.

INDUSTRIAL POINT SOURCES

As was discussed earlier in this section and in the preceding section (Section IV), point source pollution from industrial dischargers in Salt Lake County has not been addressed in much detail. The principal reason for this is the fact that of the present 20 industries that have permits to discharge directly to surface waters of the county, it is projected that 7 will go to total containment to meet "10/10" standards and the quantity of discharge will remain constant for another 10. The increase in quantity of discharge for the remaining three discharges is projected to be about 38% each. (See Tables IV-14, IV-15, and IV-16.)

It is projected that by enforcement of NPDES discharge permit conditions, a function that could possibly be delegated to the State Division of Health when and if enabling legislation is passed by the State legislature, pollution impact on the Jordan River and the Great Salt Lake will be minimal.

Estimated costs to industry to meet future standards are on the order of $18,605,000 as shown in Table V-13.

Table V-13. Cost Estimate:

Industrial Upgrading for BAT

Permit Holder	Process or Equipment Needed	Total Cost
Concrete Products	Pipeline, pump station, and enlarging ponds. Based on NMW estimate.	$ 150,000
Draper Irrigation Company	Pipeline to head of plant for backwash, pump station. Based on NMW estimate	35,000
Kennecott Copper Corporation	Total recycle on tailing ponds and treatment and discharge for balance of wastewater. Based on information from their engineers.	17,000,000
Key Industries	Pipeline, pump station, and enlarging ponds. Based on NMW estimate.	80,000
Utah Power & Light Company, Gadsby Plant	Treatment and discharge to Abatement Canal until 1980 after that date discharge to the Jordan River. Ash water recirculation. Based on information from their engineers.	
	Total	$18,605,000

From: Nielsen, Maxwell & Wangsgard - 208 Project Consultants