II. Summary

II. SUMMARY

introduction

Amendments to the Federal Water Pollution Control Act passed in 1972 (PL 92-500) require that studies recommending specific solutions to water pollution problems be conducted before Federal monies are released for funding of construction and management programs directed toward the improvement of water quality. These studies maintain an interdependent set of both congressional and local objectives in the development of an overall water quality management plan.

The first study, the 303(e) plan, developed a river basin plan that serves as the framework for later, more specific plans (i.e., the 208 plan).

The 208 plan, as defined in Section 208 of PL 92-500, is required to develop implementable solutions to area-wide water quality and pollution problems, from both point and non-point sources.

Part of the plan to be developed, according to stipulations set forth in Section 201 of the Act, describes specifics of municipal wastewater treatment facilities that are needed to attain the goal of substantially reduced pollution in the nations waterways.

The intent of Congress in enacting the Federal Water Pollution Control Act Amendments was to provide a process to identify the nature and extent of pollutants entering the surface waters with emphasis on impairment of beneficial uses resulting from such pollution.

In order to increase the beneficial use of the nation's waterways, the pollutants that reduce natural, therefore economic, - productivity must be eliminated or drastically reduced.

The far-reaching goals of PL 92-500 promise to produce new challenges between public and private sectors as well as within divisions of the public sector itself.

It is for this reason that local citizen goals and policies play a critical role in water quality planning and implementation.

Citizen participation in the Salt Lake County planning process consisted of a five step program:

1. Survey public opinion about water quality and use in Salt Lake County.

2. Formulate an initial workshop for the Citizen's Planning Advisory Committee which would articulate the goals and policies that would be reflected in the plan.

3. Provide a secondary citizen input phase based on the final progress and outcome of the planning process.

4. Hold county-wide public hearings on the water quality plan.

5. Provide the machinery for on-going citizen participation in the plan update and implementation.

The local population was scientifically surveyed for their opinions about water quality related issues and the Citizen's Advisory Committee participated in laying a framework by which water quality management would planning be carried out.

Many opportunities for the public to respond to the plan were provided. Nineteen public hearings and meetings were conducted and an on-going process was set up to insure adequate citizen involvement as programs for pollution control get under way.

The Water Quality Management Plan presents the details of how water pollution control will be implemented. Section III describes the Salt Lake

County study area, present and future. Section IV discusses water quality conditions in the Salt Lake Basin, present and future. Section V presents the plan for industrial and municipal wastewater facilities. Section VI discusses the implementing of programs for non-point water pollution abatement. Section VII describes how these plans will be implemented. Section VIII is an assessment of the environmental impact of plan recommendations.

present and future conditions

Salt Lake County is located in the northern portion of Utah flanked by the Wasatch Mountains to the east and the Oquirrh Range to the west. The Traverse Mountains join the Oquirrh and the Wasatch Mountains so as to close the southern end of the county except for the narrow gorge carved by the Jordan River entering the county. The northwestern end of the county opens out to the Great Salt Lake, a remnant of the ancient sea known as Bonneville.

The sub-setting of Salt Lake County is a product of the work of Lake Bonneville with both Wasatch and Oquirrh Mountains bearing the terraced scars of the ancient sea. Alluvium from the eroding mountains spreads out below the foot of Rose, Butterfield, Coon, Big and Little Cottonwood, Mill, Parleys, Emigration, City Creek and Red Butte Canyons forming plateaus overlooking the Jordan River.

A small party of Mormon pioneers led by Brigham Young entered the Salt Lake Valley on July 24, 1847, to establish a permanent settlement. In spite of the lateness of the season, crops were planted, gravity-flow irrigation systems established, and crops harvested that fall. Within two years, Salt Lake City had a population of 5,000 and became one of the fastest growing communities in the West.

As the valley was settled, new pressures were placed on the canyon water supply. Extensive growth experienced in the early half of the 20th century necessitated storage, treatment, and preservation of the water supply suddenly in high demand. As a result of continual urban growth, the Jordan River soon became the disposal line for the valley, receiving more and more sewage (both treated and untreated) and other pollution from urban and agricultural areas.

TOPOGRAPHY AND CLIMATE

The elevation of the Great Salt Lake is about 4200 feet above sea level. The Wasatch Front reaches elevations of over 11,000 feet and the Oquirrh Mountains reach altitudes of over 9200 feet. The land surface between these ranges of mountains consists of a series of benches, each of which slopes gradually away from the mountains and drops sharply to the next bench.

Salt Lake ~~County~~ VALLEY has a maximum length of 31 miles and an approximate width of 23 miles. Roughly 65 percent of the 764-square mile County lies within the valley itself with the remaining 35 percent in the surrounding mountainous areas.

The Great Salt Lake and the surrounding mountain ranges greatly influence the climatic conditions of Salt Lake County. The transitional climate of the area can best be described as semi-continental and semi-arid.

Approximately 60 percent of the annual precipitation falls in the winter and spring. Average annual precipitation varies from 12 to 15 inches at the Salt Lake Airport to 35 and 40 inches in the Wasatch Mountains.

Wind patterns in the County are highly variable depending upon location. The normal winds are determined by topography with essential up canyon winds during the warm part of the day and down canyon during the cool part.

Generally, the climate of the valley can be described as variable but not extreme with major factors affecting weather conditions being the topographic conditions of the valley.

EXISTING POPULATION AND LAND USE

Salt Lake Valley accomodates over half a million people living in approximately 168,000 homes. These homes occupy a total area of about 31,000 acres.

Since 1847, the County has steadily grown until it now serves the intermountain region as the center of commerce, industry, communication, medicine, education and finance.

Past and present figures concerning population and land use are shown below.

	1960	1970	1976
Population	383,035	458,607	521,500
Household Size	3.5	3.4	3.1
Occupied Dwelling Units	108,007	134,926	168,100
% Population Increase		19.73	13.71

The present land use conditions of Salt Lake County can be summarized in terms of past inefficient patterns of development. The present development pattern has generally resulted in:

1. loss of irreplaceable natural and recreational resources;
2. loss of the productive use of prime irrigated agricultural areas by the intermingling of subdivisions;
3. diversion of public and private investment to newly developing areas rather than upgrading of older areas;
4. existing service facilities being under-used while new facilities are being extended into new areas;
5. intense competition between jurisdictions for developments which generate revenues to pay for the needed urban services;
6. heavier reliance on the automobile for transportation at the expense of more efficient transit service (air pollution impacts).

ECOSYSTEMS

Terrestrial ecosystems in Salt Lake County range from subalpine systems in the eastern Wasatch Mountains to the Great Salt Lake desert in the northern portion of the country.

The Subalpine ecosystem in Salt Lake County is extremely limited. It can be characterized as having a very rugged terrain due to soils, topography, heavy snow accumulations and historic glacial action.

Englemann Spruce - Subalpine Fir form the dominant vegetation associations in the Upper Montane ecosystem. This spruce-fir association is limited to higher elevations and covers only very small portions of the County.

The Lower Montane ecosystem is characterized by a climax community of Ponderosa pine (yellow pine) - Douglas Fir - White Fir. Intermixed throughout this community are subclimax stands of quaking aspen and lodgepole pine. These montane regions range in elevation from 6000 to 9000 feet.

The Grass-Sagebrush ecosystem ranges in altitude from about 4300 to 6000 ft. Various communities within the Grass-Sagebrush ecosystem are grass-sagebrush, wet meadow-stream side willow, mountain brush and marsh. The various habitat communities adjacent to the Jordan River are predominantly agricultural lands. Through distrubance, the indigenous plant communities have been replaced by exotic types.

The Great Salt Lake Desert ecosystem is limited to the area surrounding the Great Salt Lake in the Study Area. Altitudinal limits of this ecosystem ranges below 4300 feet. The climate of this area can be described as desert but much of the land is marshland, a strip of land about seventy miles long and two to eighteen miles wide (total) on the southeastern shore of the Great Salt Lake.

The major aquatic ecosystems in the county consist of City Creek, Red Butte Creek, Emigration Creek, Parley's Creek, Mill Creek, Big Cottonwood Creek, Little Cottonwood Creek, and the Jordan River.

Upstream from the Salt Lake City Water Treatment Plant, City Creek runs over limestone substrate in a steep canyon. Streamside vegetation is primarily fir, maple, birch, dogwood, chokecherry, and currant.

Below the plant, the gradient decreases and slight meandering begins. Streamside vegetation includes cottonwood, elm, maple, birch and boxelder. The fish population is small and dominated by brown trout.

The watershed on Red Butte Creek above the reservoir is at low elevation with moderate side slopes vegetated with scrub oak and grasses. Streamside vegetation is birch, dogwood, elm, horsetail, wheatgrass, and thistle.

Red Butte Creek below Red Butte Reservoir is a foothill-type watershed vegetated by oaks and willows. Bank cover composition is elm, scrub oak, wheatgrass, rose, and June grass.

Emigration Creek flows entirely through private property. Above the Mount Olivet diversion ditch near the mouth of the canyon, the watershed is of moderate gradient. Bank vegetation is boxelder, cottonwood, mustard, clover, and June grass.

Below the diversion, Emigration Creek flows through foothills and residential areas, including Hogle Zoo and a golf course. Streamside vegetation is typically boxelder, scrub oak, and June grass.

From the reservoir upstream to Lamb's Canyon Creek, Parley's Creek lies in a mid-altitude watershed. Streamside vegetation is primarily birch, willow, hawhtorne, and grasses. Below the reservoir, the creek is piped beneath the Freeway (I-80) to the canyon mouth.

From 1300 East upstream to the canyon mouth, Parley's Creek is a valley stream suffering from the extensive physical encroachment by development, espcially golf courses, parks, and freeways. Bank vegetation is cottonwood, hawthorne, Russian olive, and grasses.

These four creeks are diverted into storm drain systems in Salt Lake City and conveyed to the Jordan River. City Creek is diverted to the North

Temple storm drain while Red Butte, Emigration, and Parley's Creeks are diverted to the 1300 South storm drain system.

The valley segment of Mill Creek flows through heavily urbanized areas of Salt Lake City and County. The result is extensive encroachment on the stream habitat by man's influence. The natural stream channel has been altered greatly, being replaced by concrete in many instances.

The canyon segment of Mill Creek flows down a moderate gradient in a mid-elevation watershed vegetated with oak, aspen and conifers. Streamside vegetation is boxelder, birch, dogwood, maple, willow, grasses, white and Douglas fir, and cow parsnip.

There are moderate populations of rainbow and cutthroat trout sustained by natural reproduction and supplemental annual plants of catchable rainbow trout.

Most of the lower Big and Little Cottonwood Creek drainages, from the Jordan River upstream to the canyon mouths, are surrounded by Salt Lake County and other municipal residential areas. The ecosystems have been degraded by channelization, diffuse source pollution, dewatering, and litter.

The segment of Big Cottonwood Creek from the canyon mouth upstream to the Cardiff Flat Bridge is of steep gradient. Bank vegetation consists of birch, alder, cottonwood, dogwood, and grasses. The entire section has adequate flow year-round. The wild fish population, dominated by brown trout, is moderate and augmented with annual plants of catchable rainbow trout.

The segment extending from the bridge upstream to the stream termination at Mary's Lake is in a canyon of moderate gradient. Bank stabilization is provided by alder, willow, birch, and grasses. Mayflies and caddis flies are very abundant and are a major food source for rainbow, brown, and brook trout existing in this section.

Upstream from the mouth of Little Cottonwood Canyon, Little Cottonwood Creek flows through a steep, glaciated canyon. Streamside vegetation consists of aspen, fir, dogwood, cottonwood, and grasses. Because of the steep gradient and large boulder substrate, production of fish and other aquatic life is low. The existing populations of rainbow and cutthroat trout are very small and average fish size is small. Stream flow is good.

In the northern portion of the Jordan River, stream velocity and volume are suitable for a warm fishery. Water temperatures are suitable for warm water fish species, although present water pollution prevents establishment of game fish population.

The mid-section of the Jordan River is an area of moderate human development and poor aesthetics. Stream velocity, volume and percent of bottom covered during low flow is suitable for fishery maintenance. Channelization has destroyed much fish habitat.

In the upper reaches of the river in Salt Lake County, stream velocity is adequate for a fishery, but volume is often inadequate because of excessive diversions. The stream bottom type is good benthic invertebrate substrate and water temperatures are suitable for a warm or cold water fishery. However, water pollution slightly limits aquatic productivity.

GROUNDWATER AND WATER USE

The groundwater system in Salt Lake County consists primarily of confined aquifers recharged in areas along the east bench area of the valley. Groundwater withdrawals have been increasing at a rate of about 1.5% per annum and presently constitute 125,000 acre-feet per year. Total water diverted for use in Salt Lake County amounts to approximately 632,700 ac-ft per year.

SOLID WASTE

Presently Salt Lake County and Salt Lake City are operating separate landfills. Both landfills are located in areas of high groundwater (0.4 ft.)

and the leachate from these landfills is suspected to cause health and water quality problems. Surface water runoff from the landfills is also suspect. Additionally, two smaller landfills are operating in Salt Lake County. None of the existing landfills in Salt Lake County are operated according to standards specified by the City-County Health Department.

The total solid waste generation in the Salt Lake Valley is presently 1360 ton/working day (4.80 lbs. per capita per day). Future solid waste loadings in 1995 were based on applying a per capita waste generation multiplier of 1.56.

COUNTY GOVERNMENT

At the present time, there are 10 incorporated cities in Salt Lake County. These are: Salt Lake, South Salt Lake, Murray, Midvale, Sandy, Draper, Bluffdale, Riverton, South Jordan, West Jordan and the Town of Alta. The Salt Lake County Council of Governments, a voluntary membership organization, was formed to help work out problems created by this fragmentation of government. These problems center around the provision of services for residents within the County boundaries.

The initial 208 grant to finance this study was to the Council of Governments.

FUTURE POPULATION AND LAND USE

The population of Salt Lake ~~County~~ Valley is expected to increase 52% in the next 20 years at an annual average rate of about 5%. In two decades an additional 270,000 people will have to be housed. The impact of this growth on water quality will be increases in wastewater, stormwater, and decreased agricultural return flows.

Common statistical areas (drainage basins combined with sewer district boundaries) were used in initial population projections. Subsequent allocations were made by municipality and common sewage treatment areas. Although the total county projection is relatively stable since it is based on employment factors, the direction and intensity of growth in any one specific location is most difficult to assess.

Table II-1 indicates the required amount of land that will have to be developed as residential useage to house expected population increases.

In order to assess the impact of growth on water quality, the plan has been developed utilizing the most land consuming alternative providing a realistic effect of growth on local economy and water quality. The description of growth is divided into two elements; the Salt Lake Valley and the Wasatch Canyons.

Salt Lake Valley

The term "developed" refers to urbanization and includes all land use components except agricultural, open, and vacant land.

Development will have basically three impacts on future water quality:

1) Increased wastewater flows.

2) Increased urban and storm runoff.

3) Decreased agricultural return flows.

The causes for these impacts are summarized as follows:

	New Construction (116,000 new dwelling units)	Additional Impervious Areas (Homes, Roads, etc. -- 22,000 acres)	Added Waste Flows (31 million gallons/day)	Consumption of Irrigated Agriculture (12,928 acres)
1. Increased sewage flows	X		X	
2. Increased urban and storm runoff	X	X		X
3. Decreased agricultural return flows	X	X		X

TABLE II-1. ACREAGE ABSORPTION
BY STATISTICAL AREA

Salt Lake County Statistical Areas	ACRES				
	Total Available	Committed by 1995		Available after 1995	
		Residential	Non-Res.	Residential	Non-Res.
1					
2					
3					
4					
5	300			300	
6	90			90	
7					
8	1,960	1,510		150	
9	20,810	373	296	16,013	4,033
10					
11					
12	3,337	52	3,285		
13					
14	320		320		
15	205	89		116	
16	3,954	1,681	1,110	1,327	336
17	670	270	400		
18	6,435	1,656	990	3,024	
19	13,677	4,788	700	6,526	1,653
20	14,183	958	160	10,329	2,641
21	16,802	5,379	1,700	7,758	1,965
22	6,780	558	470	4,589	1,163
TOTAL	89,523	17,314	9,431	50,222	12,556

Wasatch Mountains

The planning process for the Wasatch Canyons began with an exhaustive inventory of natural constraints, assessing the relative suitability for development of large canyon sites, and proposing hypothetical levels of use in each canyon. Typical development densities were used where appropriate.

Table II-2 summarizes the land suitable for development in the Wasatch Front Canyons in Salt Lake County.

TABLE II-2
LAND SUITABLE FOR DEVELOPMENT (ACRES)

WATERSHED / LAND SUITABILITY	• Adjacent to existing development or road with Private ownership and No mapped constraints	• Adjacent to existing development or road with Private ownership and 1 mapped constraint	• TOTAL
City Creek Canyon	12	35	47
Red Butte Canyon	-- Not Measured --		
Emigration Canyon	2	201	203
Parley's Canyon	21	181	202
Mill Creek Canyon	0	46	46
Big Cottonwood Canyon	292	401	693
Little Cottonwood Canyon	6	254	260
Eastern Traverse Mountains	106	1,597	1,703

The population projections developed in the plan, therefore, are a composite of employment projections and land suitability as a base, then applying a density/specific use factor which, when carried through the projection process, arrives at figures for future population that are very reasonable and widely accepted.

AIR QUALITY

At this time, there exist no comprehensive air quality projections for Salt Lake County nor a State Implementation Plan (SIP) for the State. However, the State is required to produce an SIP by January 1, 1979. This discussion is limited to area sources of air pollution (analogous to non-point sources of water pollution).

Emissions growth due to population growth is at the discretion of the State. Traffic growth rates used in the Preliminary State Transportation Plan by the Wasatch Front Regional Council are 1% and 4% per year for the Salt Lake central and urbanized areas respectively.

Using this growth rate, it appears that standards for Sulphur dioxide (SO_2), nitrogen oxides (NO_x), Particulates, and carbon monoxide (CO) will be attained by 1982 in Salt Lake County. Salt Lake City will not attain 1982 CO standards and the entire county will not attain the 1982 photochemical oxidant (OX) standard. It is anticipated that the State will apply for and receive an extension to 1987 for these non-attainable standards.

Ninety (90) percent of all CO emissions and 58% of Hydrocarbon (HC) emissions in Salt Lake County are due to transportation. (Hydrocarbons are the primary precursors of oxidant concentrations). To attain the CO standard, transportation emissions will need to be reduced by 40%. Based upon FMVCP, an inspection and maintenance program, and reasonable traffic control measures, the standard will be attained. To attain the photochemical oxidant standard, an estimation of the impact on oxidants through reduction of HC is necessary. It appears as though a 55% reduction in all HC emissions is necessary.

A reduction of approximately 25% in total HC emissions can be achieved through a transportation control program while a 30% reduction in total HC emissions is necessary from point sources.

The only control of air pollution sources that sewage treatment districts could impose, other than emissions from treatment plants themselves, is a limitation on sewer hook-ups. The result of this type action would be a change-over to septic and holding tanks, illegal hook-ups or illegal discharges (untreated) to surface waters of the county. The building of additional sewage treatment capacity is not a material contributor to growth, but provides a response to other pressures as long as growth subsidy is avoided in rate schedules and connection fees.

FUTURE WASTEWATER FLOWS

Increases in wastewater flows in Salt Lake County will result from increases in population and be decreased by sewer system rehabilitation. Coupled with increasing population will be an increase in industrial wastewater flows.

Projected domestic wastewater loading were calculated using the following factors:

1. Wastewater flow: 100 gallons per capita per day
2. BOD_5 load: 0.167 lbs. per capita per day
3. SS load: 0.167 lbs. per capita per day

It was assumed that increases in industrial employment will be approximately the same as increases in total employment. Industrial wastewater flow and load projections were made by increasing present flows and loads by the same proportion that total employment is projected to increase in the county.

Projected future flows generated in facilities planning areas is shown in Table II-3.

Table II-3. Projected Average Daily Flows

Planning Area		Year		
		1980	1990	2000
Salt Lake City	Flow (mgd)	36.0	36.6	37.1
	BOD_5 (lb/day)	37,000	37,800	39,500
Magna	Flow	1.2	1.5	1.7
	BOD_5	1,700	2,200	2,500
Upper Jordan	Flow	16.0	24.0	32.0
	BOD_5	23,500	35,300	47,000
Lower Jordan	Flow	40.0	45.0	51.0
	BOD_5	55,700	63,000	71,300

water quality conditions

PRESENT WATER QUALITY

Present water quality in Salt Lake County ranges from excellent in the upper Wasatch Mountains to poor in the lower reaches of the Jordan River, surplus irrigation and sewage canals, and Kersey Creek/C-7 Ditch. Primary reasons for the degradation of the waterways are storm drainage, urban runoff, agricultural returns and impacts, municipal and industrial discharges and others (not listed in order of magnitude of impact).

Wasatch Mountain Streams

City Creek is a high mountain stream in its upper reaches used primarily as culinary water supply for Salt Lake City. Below the water treatment plant the stream runs through a park and is then diverted to the city storm drain system (North Temple storm drain) and conveyed to the Jordan River. The water quality of the stream in the upper canyon is excellent because of restricted access to the canyon.

Red Butte Canyon has been closed to the public for over 70 years, first by the Fort Douglas Military Reservation and more recently by the U.S. Forest Service. The Forest Service now maintains the canyons as a natural research area.

The water in Red Butte Creek above the reservoir is of excellent quality. Below the reservoir (located approximately at the canyon mouth), the stream is dewatered a portion of the year and the majority of flow is groundwater seepage. The natural channel is used for storm runoff and is diverted to the 1300 South storm drain system near 1300 East in Salt Lake City.

The Emigration Creek drainage area is the most heavily developed of all the canyon stream areas in Salt Lake County. The stream follows the road for the greater part of the canyon length. Located at the mouth of the canyon is a small park, a zoo, and a golf course. The creek is dewatered during the summer months from near the golf course to where the natural channel is diverted to the 1300 South storm drain system near 1300 East. During summer months, the lower channel is used primarily for storm runoff.

Pollution from stream-side construction, sanitary wastes from improperly operated holding and septic tanks, and debris and litter in the channel have degraded the stream quality significantly.

Parley's Creek starts near the Salt Lake County line in the east portion of the county. The stream has two major tributary streams, Lamb's Creek and Little Dell Creek, which join in Mountain Dell Reservoir. The developments in this water system include Interstate 80 East and West through the length of the canyon, some summer cabin sites located in upper Lamb's Canyon, and a golf course and park located upstream from the reservoir.

Below the reservoir the stream is diverted to a conduit that runs beneath the freeway to the mouth of the canyon. From the canyon mouth to the diversion of the stream into the 1300 South storm drain system near 1300 East, the stream runs parallel to the freeway through another golf course and another park. The channel is used primarily for storm drainage. There is a detention pond on the stream located in the lower park.

Mill Creek Canyon is used extensively for summer recreation and less intensively for winter recreation. There are many U.S. Forest Service picnic grounds located adjacent to the stream throughout the length of the canyon, two commercial developments, and some summer cabins in the upper reaches of the stream. From the mouth of the canyon to the Jordan River, the stream has been channelized extensively and receives numerous discharges from storm drains and canal return flows. Recreational usage in the canyon is one cause of high bacterial counts in the valley portion of the stream. Additional water quality impact is created by the discharge into the stream of unused canal water to serve exchange agreements and urban and storm runoff.

Big Cottonwood Creek is the longest tributary stream of the Jordan River. The canyon is used extensively for winter and summer recreation in addition to year-round housing. Two U.S. Forest Service campgrounds in addition to other picnic areas are located in the canyon adjacent to the stream. Winter recreation activities include two ski resorts, snowmobile and cross country skiing trails, and some commercial establishments. The stream is culinary water supply for Salt Lake Valley and therefore water quality is monitored closely.

Below the WTP at the canyon mouth, the stream is dewatered for the summer low flow months. The stream channel passes through a moderately urbanized area of Salt Lake County for the rest of the way to its confluence with the Jordan River. Stream flow is augmented by urban and storm runoff, groundwater seepage, and canal waters (through existing exchange water rights). Urban and storm runoff and unused canal waters originating in Utah Lake pumped by Salt Lake City to serve exchange agreements are partially responsible for the lower quality of water in the valley portion of the stream.

Of all the Wasatch Mountain streams, the water quality of Little Cottonwood Creek has been studied the most intensively. This canyon has seen recent development of Snowbird, a major ski resort, just below the town of Alta, located at the head of the canyon. A wilderness area has been designated in the lower portion of the canyon (the only designated wilderness area in Utah). The stream is the southernmost continuously flowing stream in Salt Lake County and flows through the least amount of urbanized area. The canyon water is used as culinary water supply for Salt Lake Valley, causing the stream to be completely dewatered at the canyon mouth during the low flow high culinary demand period of the year. Below the canyon mouth, stream flow is augmented by groundwater seepage, urban runoff, and irrigation flows and canal inflows. Urban runoff, canal water pumped by Salt Lake City from Utah Lake to serve exchange agreements and irrigation flows create lower water quality in the valley portion of the stream.

Intermittent Streams

Intermittent streams in Salt Lake County usually flow during spring snow-melt runoff and storm runoff. These streams, sometimes convey emergency high flows from irrigation canal systems during storm events.

Water quality of these streams has not been intensively monitored in the past and will probably not be in the future. Because of very low flow volumes, the impact on the Jordan River caused by these intermittent streams is very small.

Jordan River

The Jordan River is the only natural outlet from Utah Lake in Utah County. After leaving Utah Lake, the river flows northward approximately 15 miles before entering Salt Lake County through what is known as the Jordan Narrows. The river then continues northward through Salt Lake County approximately 41 miles before entering a marshland at the inlet to Great Salt Lake. Seven sewage treatment plants, five major tributaries, numerous agricultural return flows and storm drainage augment the flow, but major irrigation diversions substantially deplete the flow. About 16 miles upstream from the Great Salt Lake a major portion of the river flow is diverted into the surplus canal which conveys high flow waters directly to the Great Salt Lake in order to alleviate flooding problems on the lower Jordan River.

Between Utah Lake and the Jordan Narrows (approximately the Utah-Salt Lake County line), the water is very turbid. Proceeding farther north, to approximately 12400 South (Salt Lake County), turbidity lessens. Reduction of turbidity results from the high proportion of groundwater in the flow. During the heavy irrigation diversion season, the entire flow in this portion is groundwater seepage. From this point downstream to the Great Salt Lake, water quality generally deteriorates and the natural channel has been substantially altered.

Canals

The water quality of the major Salt Lake Valley irrigation canal systems has only been lightly investigated. Available data indicates that the quality of canal water is close to that of Utah Lake. This is expected because most of the major irrigation canals divert water directly from the upper Jordan River.

The major east-side canals terminate in smaller canals and in the valley portions of the Wasatch Mountain streams to satisfy water rights exchanges.

Storm/Urban Runoff

Quality of urban storm and urban runoff has been investigated in the heavily urbanized portions of Salt Lake County. The results of a summer monitoring program conducted by the 208 Project staff showed that in some instances, pollution in storm runoff was greater than that of raw sewage.

Groundwater

Groundwater occurs in subsurface materials throughout Salt Lake County but only the water in the valley fill is a major source for wells.

In the northern and central parts of the Jordan Valley, a segment of the valley fill 40 to 100 feet thick and 50 to 150 feet beneath the land surface confine water in the aquifer beneath it and is designated the confining bed. Several distinct aquifers within the reservoir are recognized.

Near the mountains at the edges of Jordan Valley (except at the north end of the Oquirrh Mountains), there is no effective confining bed and the top of the saturated zone (generally known as the water table) is a few hundred feet below the land surface. Near the center of the valley, all the valley fill beneath the confining bed is saturated.

The quality of groundwater varies widely and depends on the sources of recharge and the nature of the materials through which it has percolated. Water in the shallow aquifer in Jordan Valley generally contains more dissolved solids and is more subject to contamination by wastes than water in the principle aquifer. Groundwater seepage from this aquifer into surface streams has a significant effect on water quality.

Representative water quality in the major waterways in the county is shown in Table II- 4 .

STREAM SEGMENTATION/CLASSIFICATION

Stream classification for water quality management purposes is a task required of the State by EPA. The process for stream classification seems fairly simple from the outside but is, in reality, very complex. Federal regulations require that existing beneficial uses of a stream be, at a minimum, maintained. All other uses that can be achieved, as per the goals of the Act (and amendments), must also be included as beneficial uses.

The beneficial uses (multiple) of a particular stream segment determine the quality of water necessary to achieve that use (expressed numerically - referred to as "water quality criteria"). The process usually progresses from use to criteria but in many instances, the criteria determines, or limits, uses.

Note that waters must be protected for downstream uses. If there exists a higher downstream use (i.e., coldwater fishery downstream of a warmwater fishery), then the management scheme would be to manage for the downstream use.

Table II- 4. General Water Quality in Salt Lake County Streams and Canals[1]

Water	Temp (°C)	Total Coliforms (MPN/100 ml)	Fecal Coliforms (MPN/100 ml)	BOD_5 (mg/1)	DO (mg/1)
Jordan River Tributaries					
City Creek[2]		15-200			
Red Butte Creek[2]	7-12	68-227	14-67	<1.0	6.4-8.6
Red Butte Creek[3]	11-14	13-45	2-5	1.0	7.5
Emigration Creek[2]	10-17	1300-2300	600-800	1.0-2.3	8.0
Emigration Creek[3]	11-18	7000-25500	1500	1.2-2.0	8.0
Parley's Creek[2]		1-60			
Mill Creek[2]	8-12	140-380	35-105	<1.0-1.5	8.4
Mill Creek[3]	17-19	930-9300	23-430	<1.0-2.3	7.9-8.8
Big Cottonwood Crk[2]	9-12	43-1250	2-40	<1.0-1.6	7.9-8.5
Big Cottonwood Crk[3]	17-20	90-9300	3-230	2.5-4.2	6.5-7.8
Little Cottonwood Creek[2]	9-10	3-162	2-23	<1.0-1.7	7.6-8.1
Little Cottonwood Creek[3]	18-22	90-14000	3-230	1.1-6.4	7.3-8.1
Jordan River					
Narrows (Utah-Salt Lake County Line)	22	230	43	5.0	7.1
9000 South Street	20	1970-23000	430-2300	4.1-4.5	6.9-7.5
2100 South Street	19	8000-18700	800-3150	6.2-8.8	5.5-6.2
Canals					
Utah and Salt Lake		730-13600	100-230	5.2-5.8	5.5-6.7
South Jordan		1060-10600	90	4.5-8.3	5.5-6.6
North Jordan		3150-20000	500	1.1-10.6	5.9-7.4
East Jordan		4300		1.7	7.5

[1]Monthly averages for low flow conditions, 1976-1977.
[2]Canyon portion of stream.
[3]Valley portion of stream.

At the time of this writing, the committee is in the process of developing new water quality standards. This plan is based upon these new standards as it appears that they will be adopted as written (perhaps with minor modifications).

Specific stream classifications as per draft state water quality standards are listed below.

Class 1 - protected for use as a raw water source for domestic water systems

- Class 1A - protected for domestic purposes without treatment
- Class 1B - protected for domestic purposes with prior disinfection
- Class 1C - protected for domestic purposes with prior treatment by standard complete treatment processes as required by the Utah State Division of Health

Class 2 - protected for in-stream recreational use and aesthetics

- Class 2A - protected for recreational bathing (swimming)
- Class 2B - protected for boating, water skiing and similar uses, excluding recreational bathing.

Class 3 - protected for in-stream use by beneficial aquatic wildlife

- Class 3A - protected for coldwater species of game fish and other coldwater aquatic life, including the necessary aquatic organisms in their food chain
- Class 3B - protected for warmwater species of game fish and other warmwater aquatic life, including the necessary aquatic organisms in their food chain
- Class 3C - protected for non-game fish and other aquatic life, including the necessary aquatic organisms in their food chain. Standards for this class will be determined on a case-by-case basis
- Class 3D - protected for waterfowl, shorebirds and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain

Class 4 - protected for agricultural uses, including irrigation of crops and stock watering

Class 5 - protected for industrial uses, including cooling, boiler makeup, and other with potential for human contact or exposure. Standards for this class will be determined on a case-by-case basis

Class 6 - protected for uses of waters not generally suitable for the uses identified in Classes 1 through 5 above. Standards for this class will be determined on a case-by-case basis

The drainage basin in Salt Lake County is somewhat unique in that the entire Jordan River drainage basin (downstream from Utah Lake) coincides with the county boundaries except for unconfined drainage in the northeast portion of the county.

Stream segmentation and classification is listed in Table II-5. Criteria for these classifications can be found in the Appendix.

FUTURE WATER QUALITY

Water quality impacts from various activities have been projected for the Wasatch Mountain streams and the Jordan River. When considered in conjunction with projected land usage and associated activities in the canyons and valleys, first estimates of future water quality can be made.

Correlation analyses were made on certain canyon uses to define relative influences of use. Correlation analyses do not show cause and effect, rather they indicate a parameter that can be used to relate an observable factor to whatever actual factors are the cause of the effect being investigated.

Results of correlation anaylses for the Wasatch Front streams is shown in Table II-6.

Future water quality of intermittent drainages has not been projected. Lack of data and small impact (due to small amount of flow) are the reasons for this lack of projection.

Future water quality of the Jordan River has been projected more rigorously than that of the Jordan River tributaries. Factors that affect future water quality that have been investigated are consolidation of sewage treatment facilities, sewage treatment plant effluent quality, improvement of irrigation efficiency, east-side urbanization, low flow conditions, and response to storm runoff. Projections were made for a range of regional STP configurations.

Table II-5. Stream Segmentation and Classification for Waters of Salt Lake County

Subbasin Drainage Area	Segment I. D.	Segment Description[1]	Classification[2]
CC	CC-1	City Creek, from WTP to headwaters	1C, 2B, 3A
	CC-2	City Creek, from No. Temple Storm Drain (SLC) Diversion to City Creek Water Treatment Plant (WTP)	2B, 3A
RB	RB-1	Red Butte Creek from reservoir to headwaters	1C, 2B, 3A
	RB-2	Red Butte Creek, from 1300 E. Storm Drain Diversion (SLC) to Reservoir	2B, 3A
EC	EC-1	Emigration Creek, from Rotary Glen to headwaters	2B, 3A
	EC-2	Emigration Creek, from 1300 E. Storm Drain Diversion (SLC) to Rotary Glen	2B, 3A
PL	PL-1	Parley's Creek, from Mountain Dell Reservoir to headwaters	1C, 2B, 3A
	PL-2	Parley's Creek, from 1300 E. Storm Drain Diversion (SLC) to Mountain Dell Reservoir	2B, 3A
MC	MC-1	Mill Creek, from canyon mouth (SLC Water Department gaging station) to headwaters	2B, 3A
	MC-2	Mill Creek, from confluence with Jordan River to canyon mouth (SLC Water Department gaging station)	2B, 3A, 4
BC	BC-1	Big Cottonwood Creek, from Big Cottonwood WTP to headwaters	1C, 2B, 3A
	BC-2	Big Cottonwood Creek, from confluence with Jordan River to Big Cottonwood WTP	2B, 3A, 4
LC	LC-1	Little Cottonwood Creek from Little Cottonwood WTP to headwaters	1C, 2B, 3A
	LC-2	Little Cottonwood Creek, from confluence with Jordan River to Little Cottonwood WTP	2B, 3A, 4
SE	SP-1	South Fork of Dry Creek, from Draper Diversion to headwaters	1C, 2B, 3A
	SP-2	Bell Canyon Creek, from Reservoir to headwaters	1C, 2B, 3A
	SP-3	Little Willow Creek, from U.S. Forest Service Boundary to headwaters	1C, 2B, 3A
NW, KC, BW, MB, WA, SW	SP-4 thru SP-9	All Permanent Creeks on east slope of Oquirrh Mountains	2B, 3A, 4
S.L.Co.	JR-1	Jordan River, from confluence with Little Cottonwood Creek to Narrows Diversion	2B, 3A, 4
	JR-2	Jordan River, from 400 N Street, SLC to confluence with Little Cottonwood Creek	2B, 3B, 4
	JR-3	Jordan River, from Farmington Bay to 400 N St. Salt Lake City (SLC)	2B, 3C, 3D, 4
S.L.Co.	PR-1	Provo Reservoir Canal	4
	UL-1	Utah Lake Distributing Canal	4
	SJ-1	South Jordan Canal	4
	DI-1	Draper/Sandy Irrigation Canals	4
	US-1	Utah and Salt Lake Canal	4, 5
	NJ-1	North Jordan/Ritter Canal	4, 5
	EJ-1	East Jordan Canal	2B, 3A, 4
	JS-1	Jordan and Salt Lake City Canal	2B, 3A, 4
	UC-1	Upper Canal	2B, 3A, 4
S.L.Co.	JR-4	Surplus Canal	4, 6
	SC-1	Sewage Canal	6
	KC-1	Kersey Creek/C-7 Ditch	6
BC	ML-1	Mary's Lake (>20 ac.)	1C, 2B, 3A
PL	MD-1	Mountain Dell Reservoir (>20 ac.)	1C, 2B
S.L.Co.	SL-1	Great Salt Lake	6, 2B
	FB-1	Farmington Bay Waterfowl Management Area	3C, 3D, 2B

[1]Stream segment includes the segment described and all tributaries to that segment.
[2]As per Proposed State Water Quality Standards

Table II-6. Results of Correlation Analyses for Wasatch Front Streams

Segment	Present Usage[1]	Projected Usage	Correlation[2]	Projected Quality[3]	Remarks
City Creek	Culinary watershed Recreation	Same Slight increase	17 MPN[4]/100 ml/1000 picnickers/year/stream mile	30-150 MPN/100 ml	High quality - canyon patrolled regular;
Red Butte Creek	Culinary watershed Natural research area	Same Same		Very small change from present	High quality - restricted access
Emigration Creek	Residential	Increased residential		Some degradation from present	Could be sewered - high erosion hazard area, NPS problems
Parley's Creek	Culinary watershed Recreation Residential	Same Slight increase Slight increase	2-7 MPN/100 ml/cabin/mile creek frontage	Slight increase in bacteria	Only in upper canyon
Mill Creek	Recreation Residential	Slight increase Slight increase	7 MPN/100 ml/cabin/mile creek frontage 17/100 ml/picnickers/year/stream mile	100-200 MPN/100 ml	Based on USFS plan
Big Cottonwood Creek	Culinary watershed Recreation Residential	Same Increase Increase	9 MPN/100 ml/1000 visitors/year/stream mile 2 MPN/100 ml/cabin/mile creek frontage	30-150 MPN/100 ml (range) 50 MPN/100 ml (average)	Heaviest recreational usage of all Wasatch Mtn. streams
Little Cottonwood Creek	Culinary watershed Recreation Residential	Same Slight increase Increase	Bacteria 10X Aug. during construction times	50 MPN/100 ml Aug.	High quality - heavy recreational usage

[1]Usage listed in order of importance

[2]Correlation of bacteria numbers to present usage

[3]Quality in upper reaches unless otherwise noted in remarks

[4]MPN = Most Probable Number of bacteria organisms per 100 milliliters

Minimum dissolved oxygen (DO) projections range from a 0.0 mg/l during storm events to 6.3 mg/l when projected with a 50% reduction in agricultural diversons from the Jordan Narrows. When projected with various decay coefficients, DO concentrations differed by approximately 1. mg/l to 4. mg/l when all other conditions were held constant.

For the case of polished secondary level of treatment centralized at one regional treatment plant with the removal of coliform and BOD loads from dry weather storm drain discharges, ammonia concentrations are expected to exceed 6.0 mg/l in the lower river which is about four times the toxic concentration for aquatic life at Jordan River temperature and pH.

Ammonia projections are in the range of 6. mg/l to 7. mg/l without ammonia removal during low flow periods of the year. Projections for the case of 90% ammonia removal resulted in total ammonia concentrations of less than 1. mg/l. A 50% reduction in agricultural water diversion resulted in projected ammonia concentrations of about 4. mg/l. Low flow conditions with one regional treatment plant resulted in the highest total ammonia concentrations of all projections (greater than 9. mg/l).

Chlorine concentrations in the Jordan River were projected on a first estimate basis. Projections resulted in toxic total chlorine concentrations except for the case of chlorine removal.

Coliform bacteria projections generally fall in the vicinity of acceptability (5000 organisms/100 ml). Storm events are projected to increase levels about 40 to 60 times, to levels that are totally unacceptable (360,000 organisms/100 ml). Control of storm runoff discharge could most effectively reduce this excessively high concentration.

Storm events are expected to increase suspended solids concentrations to over 800 mg/l. Stormwater treatment is also indicated here. Control of storm runoff is discussed in the Non-Point Plan section.

Future water quality in the irrigation canal systems in Salt Lake County is very closely linked to that in the Jordan River at the Narrows (Utah-Salt Lake County line). Mountainland Association of Government's 208 Project (MAG 208) is projecting a 15% decrease in coliform and BOD levels by the year 2000 at this point (to 7.0 mg/1 BOD_5 and 1400 MPN/100 ml coliforms). Future water quality in canals will approximate what it is now, but will be affected by future developments in Utah County.

Without any further improvement of the conditions leading to the low quality of water in the sewage canal, it can be expected that water quality will change slightly, if any. Oil and grease problems plague the sewage canal.

Kersey Creek, the receiving water for the Magna STP, and the C-7 Ditch join and flow to the Great Salt Lake in the northwestern portion of the county. Man-induced background conditions in this system degrades the quality of the water greatly. The situation here is different from that of the sewage canal in that the system discharges to the Lake very near the developing Great Salt Lake swimming beaches. The benefits to be derived from abatement of the pollution generated in this system outweigh the costs greatly, especially in public health and safety aspects.

WASTE LOADS

All of the Wasatch Mountain streams can be classified as effluent limited streams (EL) in the mountain segments. An effluent limited stream is defined as one which is presently meeting water quality standards or one which could meet standards if effluent quality limitations were imposed and adhered to.

The valley segments of Emigration, Mill, Big Cottonwood and Little Cottonwood Creeks are classified as water quality limited (WQL). A water quality limited stream is one which is not presently meeting water quality standards or will not meet water quality standards even with imposition of stringent effluent limitations. Additionally, the valley segments of City Creek, Red Butte Creek, South Fork of Dry Creek, Bell Creek, Little Willow Creek, and all permanent creeks on the east slope of the Oquirrh's could be WQL segments but data necessary for this determination is incomplete.

The Jordan River is a water quality limited stream (WQL) for the entire length of Salt Lake County.

It was determined that polished secondary levels of sewage treatment (BOD_5=10 mg/1, SS=10 mg/1) and nitrification (90% N reduction to 5.0 mg/1) at sewage treatment plants discharging to the Jordan River is necessary to maintain instream ammonia and dissolved oxygen concentrations at acceptable levels. With these effluent requirements and an emphasis put on control of urban runoffs through stormwater detention and best management practices, pollutant levels in the Jordan River could be lessened to where the river may be classified as EL.

Future waste load contributions from industrial discharges have been projected for the increase in loads to future sewage treatment facilities but have not been projected for those industries that are and will be discharging directly to surface waters (especially the Jordan River) in Salt Lake Valley. Discharges to surface waters are termed "discrete discharges".

Of those discrete industrial dischargers that are not projected to go to total containment or a sewer discharge to meet "10/10" standards, the increase in quantity of discharges was linked to employment increases in the manufacturing industry. An overall increase of about 38% in the manufacturing industry employment is expected by 1995. Therefore, increases in flows from industrial point sources discharging to surface waters (especially the Jordan River system) are expected to be in this range.

The major irrigation canals in Salt Lake County can be grouped into two major categories, those that are used for irrigation and industrial purposes (the west-side canals) and those that are used for irrigation and flow augmentation in the valley portions of the Wasatch Mountain streams (the east-side canals).

The major west-side and one east-side canal are classified as EL. These are the Provo Reservoir Canal, the Utah Lake Distributing Canal, the South Jordan Canal, the Draper Irrigation Canal, the Utah and Salt Lake Canal, and the North Jordan Canal.

The major east-side canals except the Draper Irrigation Canal are classified WQL. The cause of a water quality limited classification is for the protection of downstream water uses. These canals carry flows for the purpose of meeting water rights exchange requirements on the valley portions of some Wasatch Mountain streams.

The sewage canal is classified as a WQL segment. The canal, over the years, has been the conveyor of great amounts of raw wastes from industrial and urbanized areas in Salt Lake City. This canal was constructed for the purpose of waste disposal.

The Kersey Creek/C-7 Ditch system is classified WQL now but that situation needs to be changed. The system must be upgraded for public health and safety reasons.

The surplus canal is classified as WQL. However a major problem encountered in stream segmentation is the fact that there are no quality criteria set as standards for Class 3C, 5 or 6 waters. Without numerical criteria to compare an exisitng quality, a meaningful classification cannot be developed.

point sources

The point source plan discusses abatement of pollution from municipal and industrial wastewater. Control and abatement of impacts from storm drainage (urban and storm runoff) is discussed as non-point source pollution even though a recent court decision has required that storm drainage discharges be considered point sources of pollution.

PRESENT MUNICIPAL 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.

Planning for 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).

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 19 collection districts are serviced by 10 treatment plants, nine of which discharge to surface waters of the county.

FUTURE MUNICIPAL WASTEWATER MANAGEMENT

The ~~208~~ plan for future sewage treatment in Salt Lake ~~County~~ Valley will consolidate nine treatment plants into four, two of which will discharge to the

Jordan River. A summary description is given below.

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 1990.

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).

Estimated 20 year costs for municipal sewage treatment management is on the order of $105 million.

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.

Effluent requirements for the Upper and Lower Jordan Planning Areas are consistent with, but not limited to, the State's definition of polished secondary effluent, including implementation by the State's proposed target date of June 30, 1985. 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.

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.

REGIONALIZATION ALTERNATIVES

In preliminary analyses, and consistent with the 303(e) plan, Salt Lake City facilities were not included in a valley-wide regionalization concept.

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.
3. Phase out existing plant, convey Magna wastes to the 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.
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.
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 plant, one at or near the present site of the Midvale 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 plant, and one at or near the present site of the Midvale plant.

EFFLUENT DISPOSAL

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.

Treatment and Discharge to Surface Waters

Secondary plants discharging to surface waters in Salt Lake County will have to meet Federal and particularly State effluent requirements, which are more stringent then Federal requirements. This was the selected alternative based upon land availability and costs.

Land Application

All three major types of land application systems, irrigation, overland flow, and infiltration-percolation, 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.

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.

Treatment and Reuse

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 seven reuse possibilities were considered. 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.

Conclusion

There are no major acceptable reuse opportunities in Salt Lake County which does not involve treatment and discharge to surface waters.

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. Population projections are as follows:

Year	Resident Population
1975	180,953
1985	183,294
1995	186,471
2005	188,310

Average daily flows are summarized below

Year	Flow (mgd)
1980	36.0
1990	36.6
2000	37.1

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. 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 (mgd)
1980	1.2
1985	1.4
1990	1.5
1995	1.6
2000	1.7

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 exists 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 summarized 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.

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. Projected daily flows are shown below:

Item	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

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.

These five treatment plants will be regionalized to form the Jordan Valley Water Reclamation Facility located at or near the present site of the District No.1 Plant.

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

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

Item	1990	2000
Average Daily Flow (mgd)	45	51

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

INDUSTRIAL POINT SOURCES

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 (1975) 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.

It is projected that by enforcement of NPDES discharge permit conditions, pollution impacts on the Jordan River and the Great Salt Lake from industrial discharges will be minimal.

Estimated costs to industry to meet future standards are on the order of $18,605,000.

non-point sources

Point discharges impact the Jordan River at a higher level of magnitude over non-point discharges. The extent of non-point pollution in Salt Lake County is widely distributed. The 208 Project was not able to specifically qualify or quantify the exact impact of mine tailings leaching or over-irrigation on groundwater quality; of total cabin construction impact on streams in the Wasatch Canyons; or of total animal concentration influence on irrigation waterways. It has, however, been able to assign relative influences of land use to water quality and has prioritized the most important non-point impacts in Salt Lake County.

Urban runoff, forest recreation/watershed runoff, and agricultural runoff are the three highest priority problems for non-point water quality management in Salt Lake County.

Non-point Source categories that must be identified or assessed are summarized in Table II- 7 . For each of these categories, there are one of three definitions of problem identification:

1. Certification that no water quality problem exists or is likely to develop within 20 years.
2. Identification of the nature and extent of the NPS water quality problem.
3. A statement that no evidence exists that a water quality problem is present or is likely to develop within 20 years.

Table II- 7. Identification of Non-Point Sources Within Salt Lake County

SALT LAKE COUNTY NON-POINT SOURCE CATEGORY	A. No Water Quality Problem Exists	B. Identified Water Quality Problem	C. Unidentified Water Quality Problem	D. Regulatory Program Needed	E. Non-Regulatory Program Needed
Urban Storm Runoff		X		X	
Construction Runoff		X		X	
Recreation Use		X		X	
Home Disposal (septic tanks)		X		X	
Hazardous Materials			X	X	
Irrigated Agriculture			X		X
Livestock Grazing			X		X
Feedlots			X		X
Mining - Non-coal			X	X	
Groundwater			X	X	
Solid Wastes-Residuals			X	X	
Hydrologic Modification			X	X	
Non-Irrigated Agriculture	X				
Mining - Coal	X				
Silviculture	X				

A. A determination of no problem implys that resources or conditions necessary for the problem to develop are not present in the County.
B. An identified problem is that which is supported by historical water quality monitoring and analysis.
C. An unidentified problem has no supporting water quality data or analysis, but manifests resources, conditions, or characteristics which make a problem likely or probable.
D. A regulatory program involves requirements for performance standards, monitor and inspection, enforcement against compliance, management agency designation, technical assistance, educational programming/reporting.
E. A non-regulatory program includes the above elements excluding those associated with requirements and enforcement.

Table II-7 also indicates whether or not a regulatory or non-regulatory program is necessary. The difference between the two being whether or not requirements and enforcement are necessary. Unidentified problems will entail additional monitoring and research in further assessing their impact before implementation of a management problem takes place.

URBAN RUNOFF

Urban storm runoff in Salt Lake County is characterized by three subelements:

1. Dry-weather discharges
2. Wet-weather or stormwater discharge
3. Stormwater discharge from construction sites

Although limited data has been compiled regarding urban runoff impact, the data available justify the stormwater problem as one to be considered seriously.

Dry-weather Discharge

The storm sewer system in Salt Lake County is responsible for the discharge of diffuse non-point source pollutants to surface waters.

The implications surrounding this dry-weather discharge condition are compounded when a consideration of wet-weather or stormwater discharges are included.

Stormwater Discharge

The addition of stormwater loadings in the lower Jordan River have been projected to violate minimum stream standards. Projected water quality indicates that stormwater impacts will be most severe in the stream segment north of 2100 South, while high but less severe impacts occur in the southern stream segment.

The implications of both dry- and wet-weather impact of urban runoff are that:

1. The application of methods to reduce quantity and increase quality on a site specific basis is justified for drainage sectors, both north and south of 2100 South.

2. Application of these methods alone will not ensure reduction of stormwater pollutants in areas already densely urbanized. Therefore, the need for stormwater detention facilities in capturing flows prior to discharge to the Jordan River is important if the goals for improvement and enhancement of the Jordan are to be met. This need is obviously demonstrated, particularly in light of the danger of volatile materials entering the Jordan through storm systems, and the unavailability of sites for intermediately located facilities in the urban core area.

Construction Runoff

The impact of excessive sediment on water quality during storm events on foothill construction sites in Salt Lake County was documented by the 208 Project during the summer of 1977. Impacts from canyon or foothill construction have summoned the drafting of local ordinances that set performance standards for more effective management practices on development of hillsides. Specific performance standards for slope stabilization and erosion/sediment control are necessary not only for the reduction of water pollution loadings, but for the protection of public health, safety, and welfare.

Both high erosion and runoff potential factors are directly related to stormwater generation and pollution, particularly due to the soil structure and slope influence. Almost every major stream segment in Salt Lake County is impacted by urban runoff either directy or indirectly or confine runoff to their site.

Where storm drains do exist, most discharge directly into the Jordan without any detention time. Detention facilities currently in place merely slow runoff, allowing temporary detention, but without the utilization of riser pipes, straining barriers, or other sediment settling features.

CANYON WATERSHED/RECREATION

The protection of pristine conditions for ecologic and watershed resource values in the canyons of the Wasatch Mountains is a recognized goal of most Salt Lake County residents. It was shown that increased use and development in the canyons produce increases in canyon stream pollution. Intensive summer recreation use and construction are the non-point pollution sources needing additional management for the reduction of pollutants or maintenance of the pristine water quality conditions.

One stream segment, the canyon segment of Emigration Creek, exceeds the pollution levels of other canyon segments with similar ecologic and biotic characteristics. The reason is the presence of approximately 250-300 year-round residences without a sewage system. Emigration canyon is unique in this respect since residential use in other canyons is mainly seasonal and/or and comparatively small in numbers.

Antidegradation

The proposed anti-degradation policy for the State of Utah specifies that no new point sources of wastewater treatment or otherwise will be allowed to discharge into anti-degradation stream segments. This policy ignores non-point sources that enter the streams in a diffuse manner. Because of the potential non-point source impact on canyon watershed, the mandatory institution of best management practices for the control of diffuse non-point sources is necessary. Best Management Practices (BMPs) essentially involve precautions or improvements that reduce both quantity and quality of surface runoff.

Recreation/Construction Sites and Anti-Degradation

A significant impact on water quality in the Wasatch Front Canyons originates from construction of public and private recreationally oriented facilities (cabins, lodges, campgrounds, etc.) and overuse of public recreational areas.

Any new recreational development should assess its impact on water quality, and that impact will be influenced by factors relating to total pervious and impervious coverage and destruction or maintenance of ecologic relationships; particularly with regard to vegetative coverage and its influence on water absorption, soil stabilization, floral and faunal succession. Wherever any construction takes place, the developer should be required to monitor the effects of the operation on the stream, regardless of what procedures or safeguards are.

Septic Groundwater Seepage and Anti-Degradation

The 208 Project found that the quality of all canyon streams is high enough to merit pristine quality preservation with the exception of one: Emigration Creek. Emigration Canyon with the largest permanent dwelling concentration in all canyons, many of which utilize septic tanks with filter fields for sanitary disposal has extradordinarily high coliform concentrations.

The alternatives for abatement of this condition are limited to:

1. Installation of sealed sanitary vaults to replace

existing drainage vaults (i.e., holding tanks) and proper operation of such.

2. Installation of a sanitary sewer along the length of Emigration Canyon.

The installation of sewer facilities will undoubtedly produce an expansion of residential growth potential in the canyon, with accompanying storm runoff increases. A tradeoff exists between the effect of sewer facilities on water quality and the long term effect of a sewer on growth in this watershed.

AGRICULTURAL RUNOFF

Agriculture is on the rapid decline in Salt Lake County due to heavy trends toward full urbanization. Most of the present irrigated farmland will be absorbed by urbanization within twenty years: either through new construction, replacement or fragmentation of access and irrigation systems.

Any impacts from irrigation return flows will lessen due to total reduction of agricultural chemicals, herbicides, and animal wastes. However, new stormwater runoff will replace these pollutants with equal or more severe impacts.

Irrigated Agricultural Effects

The primary souce of irrigation water in Salt Lake County is water from Utah Lake. Utah Lake has high concentrations of total dissolved solids, algae, and coliform bacteria. Most of the water pumped into the Salt Lake County irrigation system is polluted as a result of these conditions in Utah Lake. Much of this water is unused and flows through the system either to dissipate as perched aquifer recharge or to discharge directly into the Jordan River or Great Salt Lake.

Non-Irrigated Agricultural Effects

No identification has been made of the nature and extent of non-irrigated agriculture on water quality.

Animal Concentrations/Feedlot Effects

Animal concentrations, with the exception of Hogle Zoo, have not been directly monitored so as to determine the impact on receiving streams.

MINING

Kennecott

Significantly large mining impacts on water quality are possible due to the size of the Kennecott Copper operation. Non-point sources from the Kennecott mine would originate mainly from two sources:

1. Surface runoff into intermittent streams flowing seasonally into the Jordan River and the Great Salt Lake and its marshes.
2. Subsurface leaching of trace materials from tailings dumps and leaching operations into underground wells and perched acquifer.

It is emphasized that non-point loads due to mining operations probably go unnoticed and have been in the past.

Sand and Gravel

Mining operations in Salt Lake County include extensive sand and gravel extraction along ancient lake shore deposits on the east and west sides of Salt Lake Valley. The nature and extent of water pollution from these sources is not known.

South Hecla - Zinc

There are countless old mining claims in Little and Big Cottonwood Canyons especially in the vicinity of the Town of Alta. These claims are generally inoperable but some serious mining activity has taken place within the last year. The South Hecla Mining Company has commenced a small operation close to the main ski lift area in Alta, where small quantities of zinc are extracted. The Salt Lake City-County Health Department conducted an investigation of the water quality of natural springwater discharges from the mine and has found no degradation of quality. (Since the writing of the Non-point Section, the mining operations at the South Hecla mine have ceased.)

Vitro Tailings

The radioactive Vitro tailings adjacent to the Salt Lake Suburban Sanitary District No. 1 sewage treatment plant remain as potential hazardous material in the form of an excavation. A number of studies regarding the level of radioactivity have been performed but no comprehensive reports on water quality have been completed. Surface water quality monitoring has been carried out in the vicinity as the Vitro Ditch is the receiving water for the District #1 plant.

GROUNDWATER

Groundwater conditions are the poorest in the southwestern part of the Jordan Valley principal acquifer. The principle reasons are:

1. Lesser amounts of bedrock recharge from the Oquirrh Mountains.

2. Poorer quality of recharge water from surface intermittent streams.

3. Recharge from poor quality Utah Lake water.

4. Contamination from mining operations.

SOILD WASTE

Little data has appeared that specifically document the impact of landfill operations to either shallow or deep acquifers.

The results of a recent report indicate that the quality of shallow groundwater in the landfill vicinity of the Salt Lake City landfill has been degraded. The reason for this condition is two-fold:

1. "Previous disposal practices of placing wastes in contact with the water."

2. "The limited horizontal migration of leachate from the disposal site."

Since consolidation of county landfill operations with Salt Lake City appears likely only two solid waste sites will remain in the County. These are the Salt Lake County sites adjacent to the east of the Kennecott tailings and the Trans-Jordan site west of Copperton.

HYDROLOGIC MODIFICATIONS

There are two areas where hydrologic modifications may impact water quality in Salt Lake County. The first is in the construction of storm drains, the second from the importation of additional culinary water and the potential for resultant decrease of Utah Lake irrigation water.

The construction of additional storm drains to facilitate increasing urbanization would increase the volume of storm runoff to the Jordan River. The catchment and transportation of storm-water from more impermeable urban development adversely effects water table levels and recharge into the acquifers of Salt Lake Valley.

The transportation of new culinary water resources into Salt Lake Valley is estimated at 70,000 acre feet annually. Most of this water will be used to satisfy municipal and industrial needs.

As agricultural acreage is urbanized water rights presently allocated can be forfeited, traded or otherwise acquired. The potential that re-arrangement of water use has on the quality of return flows into the Jordan River is unknown.

SILVICULTURE

No water quality problem exists or is likely to develop in Salt Lake County within the next twenty years as a result of silvicultural activity.

COAL MINING

It is anticipated that due to the lack of coal resources, no water quality problem relating to coal mining exists or is likely to ever exist.

NON-POINT MANAGEMENT ALTERNATIVES

There is a broad range of solutions non-point water quality problems in Salt Lake County, from non-regulatory programs with educational emphasis to others critical enough to merit regulatory programs with emphasis on control and enforcement. Most water quality problems will require regulatory approaches in the long run.

Greater population places pressure on recreational areas. The U.S. Forest Service and the municipalities interpret this condition in the form of increasing costs for the treatment of culinary water supply that may become more polluted with increasing use of the watershed. Pristine water quality has been a standard for most Wasatch Canyon streams and should remain that way.

As urbanization increases, the agricultural resources in the county can be expected to decrasse. Agricultural runoff will be replaced with urban runoff. The long-term effects of pollution from irrigated land, pasture, and feedlots are anticipated to be minor if not non-existent. Agricultural use currently predominates approximately 50,000 acres of land on the valley floor.

These non-point sources represent the highest priorities for pollution control:

1. Urban Runoff (including construction sites)
2. Recreation impact on canyon watershed (including abatement of septic tank seepage)
3. Agricultural runoff

The first two sources (urban runoff and recreation impact) can best be controlled through regulatory programs while the third source (agricultural runoff) can best be controlled through non-regulatory programs.

The impacts of non-coal mining, hazardous materials (Vitro tailings), solid waste, hydrologic modifications, and other groundwater pollutants are long term. Table II- 8 summarizes both primary and secondary non-point management needs.

Table II- 8 . Non-Point Management Needs

Sources	Implementation		Planning		
	Regulatory	Non-regulatory	Initial	Additional	On-going
Urban Runoff	X			X	X
Recreation	X			X	X
Septic Tanks	X			X	X
Irrigated Ag.		X	X		X
Grazing		X	X		X
Feedlots		X	X		X
Non-irrigated Ag.		X	X		X
Non-coal Mining	X			X	X
Hazardous Waste	X		X		X
Solid Waste	X			X	X
Groundwater	X			X	X
Hydrologic Mod.	X		X		X

Urban Runoff Management

There are two approaches that may be taken in solving non-point pollution problems generated by urban runoff:

1. The "End of the Pipe" treatment which utilizes detention ponds or basins for the settling of suspended solids.
2. The implementation of on-site methods (Best Management Practices) to reduce runoff quantity and quality.

The need for retention of stormwater runoff within the main acquifer recharge areas of the county can be initially satisfied by the utilization of both "End of the Pipe" and site-specific control measures.

Stormwater Facilities

County stormwater quality improvement is limited to the installation of detention basins that can enable treatment of both dry and wet-weather discharges. Where stormwater pollution is most critical, north of 2100 South, the greatest opportunity that exists for location of stormwater detention facilities is at the "end of the pipe," just before the stormwater flows into the Jordan River. Where foothill development in Salt Lake City occurs, such facilities are both recommended and in place. The southern portion of the County affords wider opportunities, where intermediately located detention facilities can be constructed as part of, and in conjunction with, community and neighborhood recreational facilities.

Several detention basin locations have been proposed. Based upon a detention time of 2.5 minutes, approximately 60 to 80 percent of the silt material would be settled out at a flow-through velocity of 1.0 fps. However, only coarse sand and larger particles could be removed. The 208 Project recommended doubling the detention time to remove particles of silt size and larger.

The concept of stormwater detention and water quality impacts includes the construction of two reservoirs on the Jordan River in the southern portion of the county. These reservoirs, the Lampton and Riverton Reservoirs, would act as large detention facilities located directly on the River.

Cost estimates include a total cost of constructing the proposed flood protection plan and a cost per acre which would be required to construct the regional detention basins within these areas.

The cost per acre for detention basins north of 2100 South Street is approximated at $2,000 while it is approximately $1,000 south of 2100 South Street. Costs for detension basins in both areas totals at about $95 million. Added to the costs for the lower Jordan River development, for the Lampton and Riverton dams, for the Dry Creek flood control project and for the Jordan River Parkway Development, the total cost runs about $147 million. The 208 Plan costs excludes the $52 million extra for Jordan River Parkway and dams development.

Dry-Weather Discharges

There are basically two structural alternatives available to control this situation: (1) collection system controls, and (2) storage and treatment. Collection system controls involve a survey to determine the source and some action to eliminate it. Storage and treatment would involve either on-site treatment at each storm drain or intercepting the flow to be treated at a treatment plant (combined sewers). Individual treatment at each drain would not be cost-effective. Elimination would be less costly because the violators, as they are identified, would be responsible for correcting the situation. The second alternative (interception) is unattractive from the treatment plant standpoint.

Federal funding may not be available for either alternative. The 208 Project recommendation is to survey the drains to locate the sources. If this is unsuccessful, interception and treatment may have to be implemented.

Permits

In the 1974 case of the U.S. EPA vs. Natural Resources Defense Council, a legal determination was made that permits issued under the National Pollutant Discharge Elimination System (NPDES) apply to stormwater discharges.

Due to the number of outfall lines to the Jordan, it would be more administratively efficient to allow issuance of a general permit for the specific types of discharge and location that distinguishes the degree of the problem. Separate permits should apply to dry-weather discharges, and two permits issued to govern discharges north of 2100 South, and south of 2100 South.

Best Management Practices

The approach that should be taken in implementation of best management practices involves mainly erosion/sediment control which entails coordination with implementing agencies and public and private developers. Slope stabilization in areas of 10% - 30% slopes can be carried out at a cost of $1500 per acre. Slopes of 30% and steeper require extra stabilization. Structures for steep slopes add an increased average cost of about $5000 per acre.

It is doubtful that coordination alone will achieve the goal of effective erosion and sediment control. Many public agencies do not administer effectively programs dealing with problems not clearly perceived. Agencies in Salt Lake County are faced with shortages of staff that do not enable adequate administration.

The private section has its share of problems. Subdivisions established in sensitive foothill and canyon areas are often left for years with barren, unstabilized cuts and fills with the hope that private owners will incur the cost for problem correction. Public developers in Salt Lake County can be cited in several areas for this condition where grading and excavation of roads has taken place.

Strong guidelines are needed in Salt Lake County that will insure that attention is paid to this important area. Enforcement provisions can be attained through a requirement of performance bonding ("front end" bonding) for erosion and slope stabilizing improvements.

The long term improvement of our surface waters by BMPs can best be served by:

(1) Adoption of a revegetation and slope stabilization program for all public and private development. Requiring implementation of Chapter 70, Uniform Building Code.

(2) Emphasize application of these measures in areas of A) the Wasatch Canyon, B) the Valley Foothills, and C) other soil deposits with extreme erosion and high runoff potential.

(3) Bonding public or private developers for the cost of on-site erosion and slope stabilization improvements together with improvements for flood runoff control.

Forest Recreation/Watershed Management

Implementation of water quality management in the watersheds of the Wasatch Canyons can take place mainly through coordination of management agencies. Major areas that will be requiring coordination for maintenance of an anti-degradation policy include:

1. Obtaining agreements with designated management agencies with jurisdiction in watershed management.
2. Review of grading (cut/fill) and slope stabilization plans by these agencies.
3. Provision of performance bonds.

4. Deposition of a specified dollar amount for water quality monitoring (before, during and after construction) into an escrow account.

Septic Tank Discharges: There are two alternatives to abate the pollution in Emigration Creek:

1. Removal and/or renovation of faulty septic tank conditions from those sites identified as pollution sources.

2. Provision of sewer utilities for all housing in the canyon for the removal of faulty septic tank conditions.

However, a closer definition of pollution sources seems apparent before an abatement program is designed. It is probable that the high resident population of people, dogs, and other home disposal practices are combining to produce high pollutant levels.

Tradeoffs in environmental quality will occur with sewering Emigration Canyon. Some of these appear below as outlined by canyon residents, most of whom are opposed to sewering the canyon.

1. A dramatic increase in traffic generation.

2. Possible road widening to accommodate traffic volume.

3. More problems relating to construction-cut, fill, etc.

4. A general depletion of the aesthetic values of canyon living due to over-crowding.

5. The replacement of septic tank pollution with pollution from urban storm runoff.

The substitution of one pollution problem for another is a legitimate argument that deserves the attention of additional study.

Agricultural Runoff Management

The implementation of water quality management in Salt Lake County for agricultural activities rests with the local Soil Conservation District (SCD).

The local SCD can assume responsibility for the implementation of the 208 Program by:

1. Recommending water quality standards and water pollution control policies to appropriate federal, state, and local agencies.

2. Recommend, adopt and enforce limited land use regulations.

3. Recommend, adopt and enforce Best Management Practices for agricultural activities.

4. Finance water resource, conservation and pollution control activities related to agriculture as funds are available.

5. Provide technical assistance for agricultural related activities.

6. Coordinate water quality control projects in agricultural areas.

7. Aid in the inventory, assessment, monitoring, correction and abatement of non-point sources of water pollution.

8. Aid in soil surveys and interpretative information for land disposal of wastes, suitability of soils to absorb and treat wastes and practices for erosion and sediment control treatment.

9. Review construction and conservation plans for agriculture activities that affect soil and water conservation and water pollution control.

10. Provide periodic follow-up checks and inspections on all applied practices and implementation of conservation plans.

Other NPS Management

Implementation of water pollution abatement programs for other areas such as forestry, mining, construction, recreation, and flood control activities on privately owned lands can be handled in ways similar to those outlined above. Another method would be by initiation of a memorandum of understanding between land administering agencies for state and federally owned lands.

implementation

A unique facet of 208 water quality planning is that the plan developed must be implementable. By developing a plan with implementation as an overriding requirement, implementation can be realized.

To insure implementation of the plan, The Salt Lake County Commission established, through ordinance, the Salt Lake County Department of Water Quality and Water Pollution Control. The responsibilities of the Department include implementing, updating and recertifying the 208 plan. Implementation of specific facets of the plan is to be accomplished by designated management agencies. Most of these agencies already exist in local, State, and Federal government and regulatory/advisory agencies.

Department policy is established by the Water Quality Council consisting of one representative from each of nine Program Evaluation and Policy Development Committees. The committees, listed below, were chosen so as to include all sectors in the county, both public and private.

Program Evaluation and Policy Development Committees

Wastewater Treatment
Real Estate/ Construction
Agriculture
Watershed and Supply
Flood Control/Stormwater
Industrial Discharges
General Public Interest
Planning
Recreational Development

NON-POINT SOURCE IMPLEMENTATION

Implementation of non-point source pollution abatement programs is to be accomplished through existing structures. Agencies, to be designated by the Governor, will sign contractual agreements with the department which will spell out specifics of plan implementation.

POINT SOURCE IMPLEMENTATION

Implementation of point source pollution abatement programs (municipal sewage treatment) will be handled by methods analogous to those outlined above. However, due to regionalization of some facilities, new management agencies have been created. These management agencies are actually a consolidation of existing agencies that are presently involved in wastewater treatment. Other than this twist, implementation of the point source plan will be handled as the non-point source plan is: by contractual agreement and designation by the Governor.

environmental assessment

The following information provides an assessment of the possible impacts resulting from implementation and construction of the water quality plan components. The components addressed by the assessment include only those involving structures or facilities and where sufficient data exists to support need for the facilities. Figure II -1 summarizes in which assessment category positive and negative impacts are likely. Negative impacts may require further analysis to determine their severity or whether or not they can be overcome. Positive impacts indicate a relative enhancement or improvement over existing conditions.

The assessment was prepared in accordance with guidance provided by the U.S. Environmental Protection Agency in the publication, Environmental Assessment of Water Quality Management Plans (October, 1976). The impact categories of economic, land use, social, physical, and ecologic provide a useful framework for addressing a broad spectrum of impacts and issues that components of a water quality plan may raise. The assessment hopes to provide a rational method of weighing trade-offs and benefits resulting from the implementation of the water quality plan.

Plan Components		ECONOMIC					LAND USE							PHYSICAL			SOCIAL				ECOLOGIC: Non-Living				ECOLOGIC: Living	
		EMPLOYMENT	POPULATION	INCOME	PUBLIC REVENUES	PUBLIC EXPENDITURES	RESIDENTIAL	INDUSTRIAL	COMMERCIAL	INSTITUTIONAL	PARKS	AGRICULTURAL	TRANSPORTATION	VISUAL	TOPOGRAPHIC	FLOODWAYS	RECREATION	EDUCATION	HEALTH	SAFETY	SOILS	GEOLOGY	AIR QUALITY	WATER QUALITY	WILDLIFE	VEGETATION
Point Facilities	SOUTH VALLEY	+	+	+	-	+	-	+	+	+	-	+	+	+	+	-	-	+	-	-	-	-	+	+	-	-
	CENTRAL VALLEY	+	+	+	-	+	+	+	+	+	-	+	+	+	+	-	-	+	-	-	-	-	+	+	-	-
	SALT LAKE CITY	+	+	+	-	+	-	+	+	+	+	+	+	+	+	-	+	+	-	-	-	-	+	+	+	+
	MAGNA	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+
Non-Point Facilities	DETENTION FACILITIES	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	+	+	+	+
	EROSION CONTROL	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

FIGURE II-1. SUMMARY OF ENVIRONMENTAL IMPACTS RESULTING FROM IMPLEMENTING THE WATER QUALITY PLAN.