IV. Water Quality Conditions

IV. 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. Primary reasons for the degradation of the waterways are storm drainage, urban runoff, agricultural returns and impacts, municipal and industrial discharges and others. These factors are not listed in order of magnitude of impact. The first section will present the most current water quality available for continuously flowing streams, rivers and canals in Salt Lake County with a short description of the quality and characteristics of each of these waterways. Intermittent streams and storm drainages are discussed in the second section.

Streams, rivers and canals and their associated drainage areas, are shown in Figure IV-1. The format for discussion and presentation of data will be to describe representative water quality and habitat conditions of streams from the north portion of the county, upstream to downstream, to the south portion of the county, then the Jordan River from south to north (the direction of the flow), and finally the major irrigation canals from south to north (the direction of flow). Locations for quality of County streams discussed in the following text are shown in Figure IV-2.

City Creek

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, located approximately three miles from the canyon mouth, 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.

Representative quality data (coliform MPN) for City Creek at the water treatment plant for low flow conditions is shown in Table IV-1.

Table IV-1 Total Coliform Numbers at City Creek Water Treatment Plant* (MPN/100 ml)

	Month		
Year	July	August	September
1973	258.0	222.0	91.0
1974	41.0	40.0	14.0
1975	21.0	21.0	15.0

*Monthly average for low flow conditions.

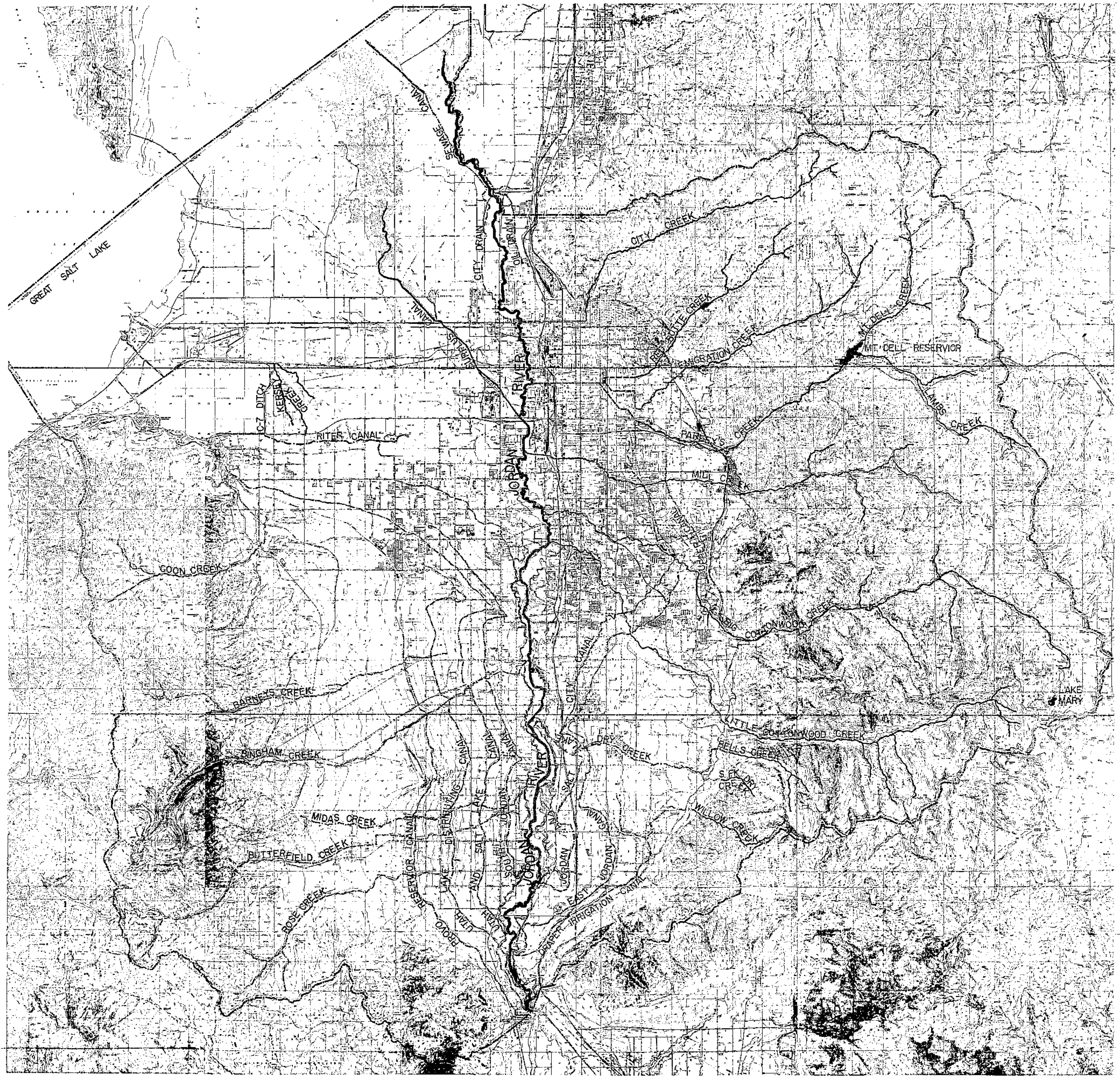
Red Butte Creek

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 canyon as a natural research area. Public access is controlled to the point where the only access is for research of the area, limited fishing for patients from the Veterans Administration Hospital at Salt Lake City, and limited deer hunting in the fall for herd control purposes. The restricted access provided the opportunity for a comparative evaluation of canyon stream uses and the impact upon water quality in Salt Lake County by the 208 staff.

The water in Red Butte Creek above the reservoir is of excellent quality and is the culinary water supply for Fort Douglas, located near the

FIGURE IV-1

MAJOR SALT LAKE VALLEY STREAMS AND CANALS



~~~ PERENNIAL

-·-·- INTERMITTENT AND CANALS

- - - - - STORM DRAIN

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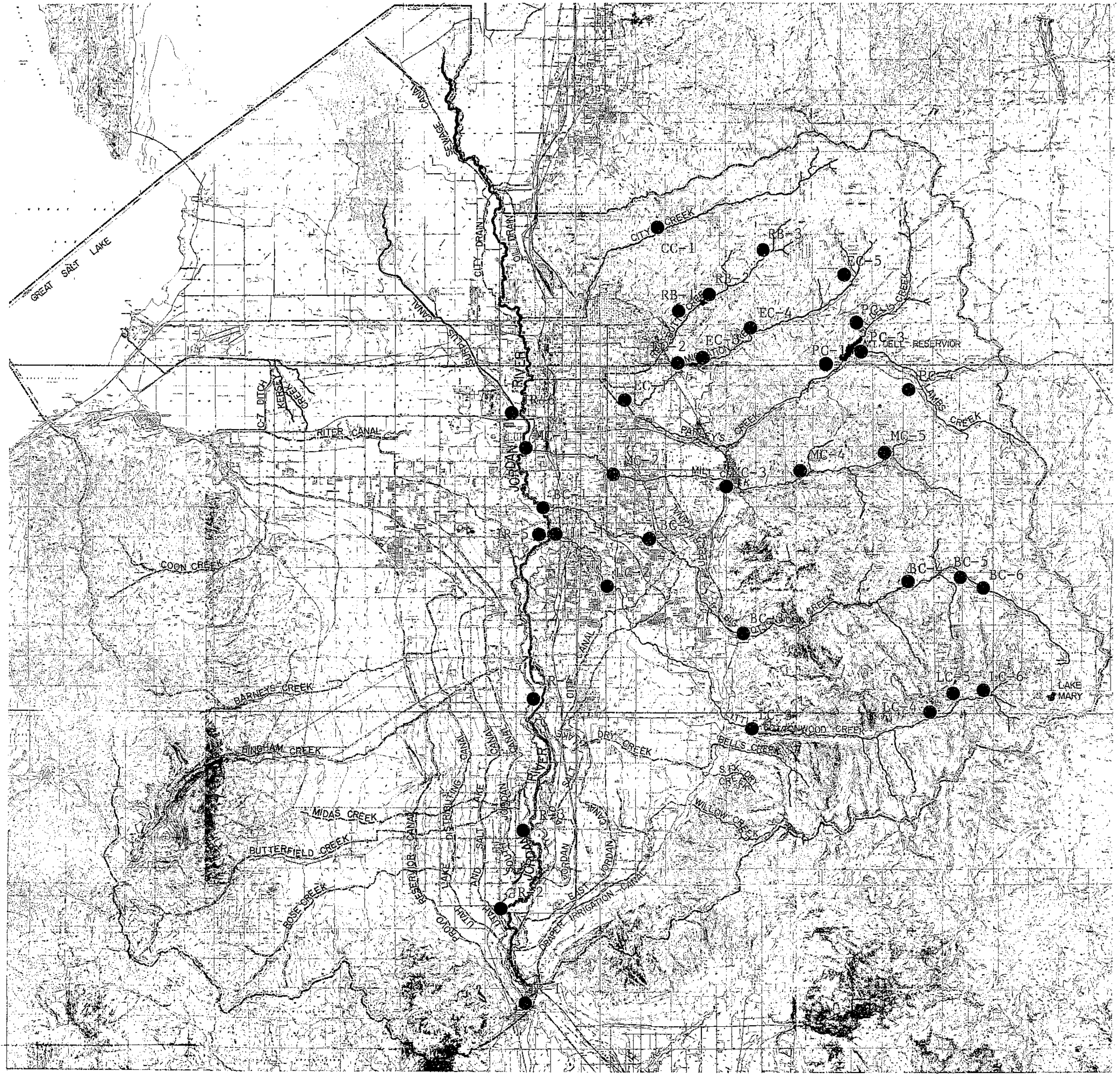

FIGURE IV-2
SAMPLE STATION LOCATIONS FOR GENERAL WATER QUALITY DISCUSSION

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Table IV-3. Water Quality in Emigration Creek*

Sample Station Date	Parameter Temp (°C)	Total Coliform (MPN/100)	Fecal Coliform (MPN/100	BOD_5 (mg/1	DO (mg/1)
EC-5 July 1976	11°-15°	3,316	763	1.0	8.0
Sept. 1976	9°-12°	1,778	717	1.3	8.2
EC-4 July 1976	13°-17°	2,303	813	<1.0	7.8
Sept. 1976	10°-13°	1,302	608	2.3	8.1
EC-3 July 1976	14°-18°	1,937	570	1.0	7.8
Sept. 1976	11°-14°	4,377	760	1.2	8.2
July 1977		2,300	430		6.9
EC-2 July 1976	15°-18°	7,264	1,493	1.2	7.8
Sept. 1976	11°-14°	25,411	1,517	2.0	8.1
EC-1 July 1976		9,300		<1.0	7.6
Sept. 1976		9,300		1.0	8.5
June 1977	No	Flow			

*Monthly averages for low flow conditions.

TABLE IV-4 COLIFORM (TOTAL) NUMBERS IN PARLEY'S CANYON STREAMS*

Sample Station	Date	Coliform (total) (MPN/100 ml)
Upper Lambs Canyon (PC-4)	7/74	53
	8/74	48
	9/74	39
	7/75	38
	8/75	33
	9/75	16
Lower Lambs Canyon (PC-3)	7/74	32
	8/74	33
	9/24	43
	7/75	61
	8/75	31
	9/75	24
Little Dell (PC-2)	7/74	55
	8/74	39
	9/74	60
	7/75	39
	8/75	32
	9/25	12
Parley's at WTP (PC-1)	7/74	8
	8/74	1
	9/74	1
	7/75	1
	8/75	1
	9/75	1

*Monthly averages for low flow conditions

Mill Creek

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 causes most of the bacterial counts in the valley portion of the stream. Additional reduced water quality impact is created by discharge of unused canal water originating in Utah Lake pumped by Salt Lake City to serve exchange agreements and urban and storm runoff.

Representative water quality data for this stream is shown in Table IV-5. This stream continuously flows year round throughout the entire length except for some isolated reaches where irrigation water rights deplete the flow. The depletion in this stream is not the rule but rather the exception.

Big Cottonwood Creek

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. Other summer activities include many hiking trails, camping, and the largest concentration of summer homes of all the Jordan River tributary streams. 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.

Table IV-5. Water Quality of Mill Creek*

Sample Station	Date	Temp (°C)	Total Coliform (MPN/100ml)	Fecal Coliform (MPN/100ml)	BOD_5 (mg/1)	DO (mg/1)
MC-5	7/76	9-13	63	13	<1.0	8.1
	9/76	8-9	199	46	1.3	8.5
MC-4	7/76	10-12	138	34	<1.0	8.1
	9/76	8-10	379	105	1.5	8.7
MC-3	7/74		67			
	8/74		67			
	9/74		18			
	7/75		56			
	8/75		86			
	9/75		33			
	7/76	11-15	193	63	<1.0	8.0
	8/76	9-12	94	14	<1.0	7.7
	9/76	9-10	673	196	1.4	8.3
MC-3	6/77	15	2,300**	430**	5.5	7.8
	7/77	13	2,300**	20**		7.5
MC-2	7/76		2,500**		2.0	7.9
	9/76		4,300**		4.5	7.8
	6/77	23	1,500**	230**	9.9	6.8
	7/77	22	2,300**	230**		8.0
MC-1	7/76		930**		<1.0	7.9
	9/76		9,300**		2.3	8.1
	6/77		9,300**	430**	2.2	8.8
	7/77		1,500**	23**		7.8

*Monthly mean for low flow conditions.

**Multiple Tube dilution method of analysis; all other coliform data is membrane filter.

Representative water quality data for Big Cottonwood Creek is shown in Table IV-6. The stream flows year round from the headwaters to the canyon mouth. Diversion of the stream for culinary purposes at the water treatment plant depletes the flow, usually taking all the flow during the low flow peak culinary demand times of the year (July to September).

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 responsible for the lower quality of water in the valley portion of the stream.

Little Cottonwood Creek

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. Two U.S. Forest Service camp grounds are located in the canyon portion of the stream, numerous hiking trails traverse the canyon, and 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

Table IV-6. Water Quality in Big Cottonwood Creek*

Sample Station	Date	Parameter				
		Temp (°C)	Total Coliform (MPN/100ml)	Fecal Coliform (MPN/100ml)	BOD_5 (mg/1)	DO (mg/1)
BC-6	7/75		55			
	8/75		82			
	9/75		23			
	7/76	13	240	240	<1.0	7.6
	8/76	9-13	59	6	1.2	7.8
	9/76	9	43	23	1.5	8.6
BC-5	7/75		1247	39		
	7/76	10	39	14	<1.0	8.0
	8/76	9-12	17	2	1.4	7.9
	9/76	9	43	4	1.6	8.5
BC-4	7/76	10	43	43	<1.0	7.8
	8/76	9-11	28	7	1.1	7.9
	9/76	9	23	4	1.4	8.6
BC-3	7/75		1187			
	7/76	12-13	25	6	<1.0	7.8
	8/76	11-12	29	<3	<1.0	7.7
	9/76	9-11	118	7	<1.0	8.2
	6/77	14	23	<3	1.2	7.9
	7/77	13	210	<3		7.3
BC-2	7/76	20	2400		<1.0	7.9
	8/76	19	4300		5.1	7.8
	9/76	17	7500		3.3	7.6
	6/77		230	23	2.0	7.5
	7/77		43	<3		7.9
BC-1	7/76	20	93		<1.0	7.8
	8/76	17	4300		4.2	7.8
	9/76	17	7500		2.6	8.2
	6/77		9300	230	2.5	6.9
	7/77		230	3		6.5

*Monthly averages for low flow conditions.

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. The valley portion of the stream has been somewhat channelized, especially in the lower reaches just above the confluence with the Jordan River at approximately 4800 South. Representative water quality of Little Cottonwood Creek is shown in Table IV-7.

The valley portion of Little Cottonwood Creek is dewatered and is impacted by point and non-point pollution. Institution of best management practices in the valley portion of this stream could reduce non-point pollutant loadings.

Intermittent Streams

Intermittent streams in Salt Lake County usually flow during spring snowmelt runoff and storm runoff. These streams, which are shown in Figure IV-1 sometimes convey emergency high flows from irrigation canal systems during storm events. This phenomena is brought about by the irrigation companies allowing storm drainage from new subdivisions to be diverted to the canal systems. This process has been developed by the Salt Lake County Flood Control Department.

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, if any except for storm runoff. It is expected that these streams will remain very small in magnitude of impact on Jordan River water quality. Determination of impacts from intermittent streams will be an ongoing effort to be handled by the Department.

Table IV-7. Water Quality of Little Cottonwood Creek*

Sample Station	Date	Total Coliform (MPN/100 ml)	Fecal Coliform (MPN/100 ml)	Temp. (°C)	BOD_5 (mg/1)	DO (mg/1)
LC-6	7/75	162				
	7/76	43	15	13	1.0	7.7
	8/76	<5	2	12	1.0	8.0
	9/76	23	1	6	1.3	8.5
LC-5	7/75	162				
	8/75	93				
	7/76	110	23	10	<1.0	7.6
	8/76	15	2	9-10	<1.0	7.9
	9/76	3	3	9-10	1.7	8.1
LC-4	7/76	7	7	10	<1	7.7
	8/76	8	<1	7	1.2	7.8
	9/76	4	<1	10	1.5	8.4
LC-3	7/75	68				
	8/75	93				
	7/76	15	2		<1.0	7.7
	8/76**	22	3		<1.0	7.6
	9/76**	29	10		1.3	8.3
	6/77	430	93		1.3	7.7
LC-2	8/76	4300		16	4.6	7.9
	9/76	24		18	7.6	7.7
LC-2	6/77	92	<3		2.0	7.6
	7/77	93	<3			7.2
LC-1	7/76	14000		22	1.1	7.5
	8/76	4300		17	4.1	8.2
	9/76	1500		18	6.4	7.3
	6/77	2300	230		2.9	6.4
	7/77	93	3			8.1

*Monthly averages for low flow conditions

**No flow at sample point (bridge at Wasatch Resort). Sample taken approximately 100 meters upstream at Metropolitan Water District WTP Diversion.

Jordan River

The Jordan River, the major waterway in Salt Lake County, 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. Along the 41 miles through Salt Lake County, 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. The locations of the present seven sewage treatment plants are shown in Figure IV-3. 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 is groundwater seepage. From this point downstream to the Great Salt Lake, water quality generally deteriorates and the natural channel has been substantially altered.

Representative quality data for the Jordan River is shown in Table IV-8. (See Figure IV-2, for sample station locations.)

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 closest to that of Utah Lake. This is expected because most of the major irrigation canals divert water directly from the upper Jordan River. Figure IV-1 shows the major valley irrigation canals and ditches. Figure IV-4 shows a more detailed illustration of the canal systems including beginning and terminus points.

Table IV-8. Water Quality of the Jordan River*

Sample Station	Date	Parameter				
		Temp (°C)	Total Coliform (MPN/100 ml)	Fecal Coliform (MPN/100 ml)	BOD_5 (mg/1)	DO (mg/1)
JR-1	8/77	22	230	43	5.0	7.1
JR-2	8/72		406	279		9.2
	8/77	19	930	230	5.5	10.5
JR-3	6/77		150,000	2,300	4.2	6.3
	7/77		15,493	1,315	3.6	6.9
	8/77	17	4,300	930	4.3	7.8
JR-4	8/72		1,967	1,026		7.4
	6/77		23,000	430	4.5	7.5
	7/77		6,104	450	4.1	6.9
	8/77	20	7,500	2,300	4.5	7.5
JR-5	8/72		3,326	1,266		7.3
	6/77		93,000	2,300	4.6	6.1
	7/77		11,444	908	3.6	6.5
	8/77	19	4,300	930	5.1	8.1
JR-6	8/72		18,700	3,146		5.8
	6/77		2,300	430	8.8	6.2
	7/77		7,894	789	6.2	5.5

*Monthly averages for low flow conditions

Representative water quality data for selected canals is shown in Table IV-9. Sample station locations are shown in Figure IV-5.

As can be seen in Figure IV-4, the major east side canals terminate in smaller canals and in the valley portion of the Wasatch Mountain streams. The reason for flow from the canals to the stream channels is to satisfy water

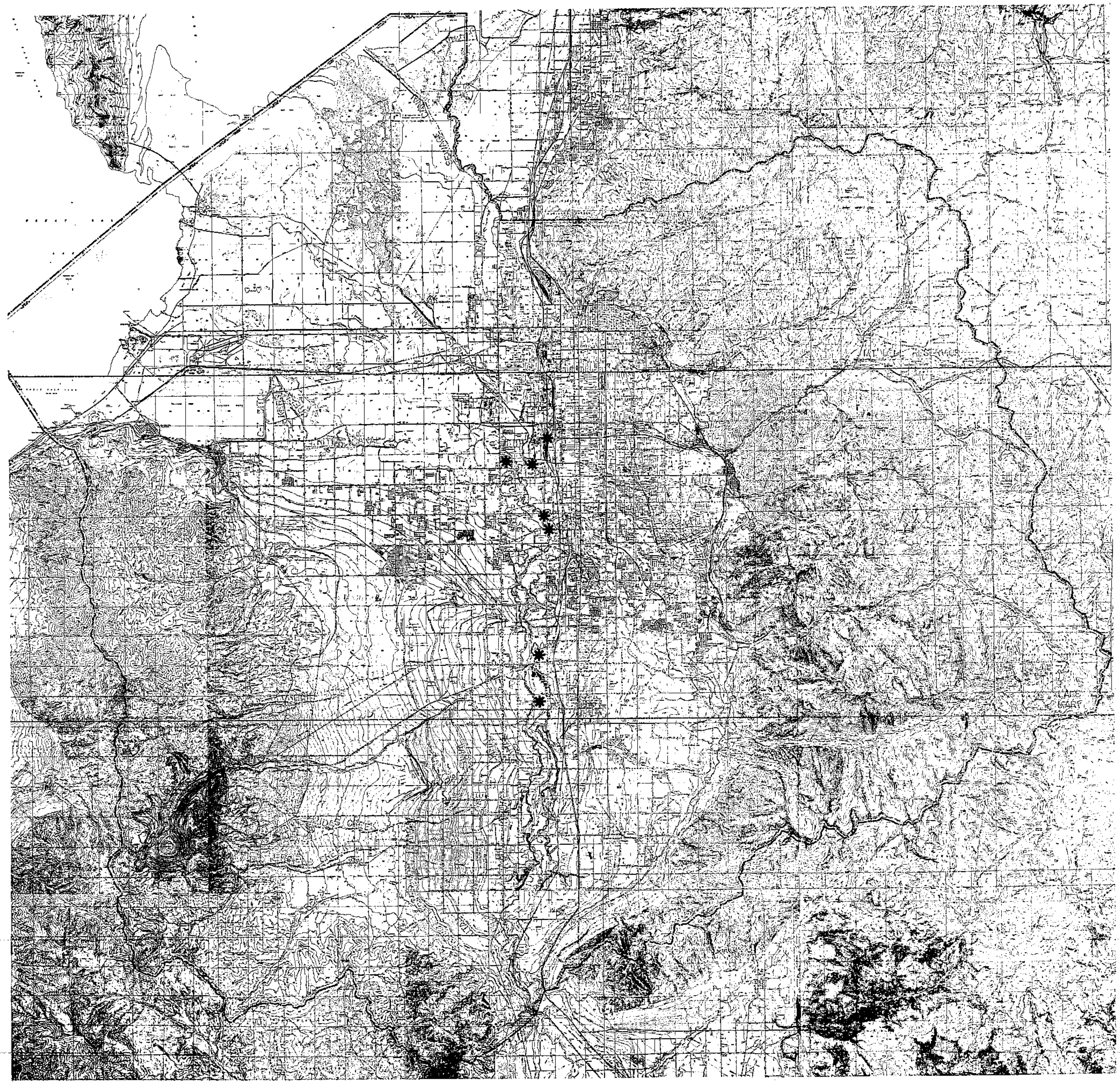

FIGURE IV-3. LOCATION OF SEWAGE TREATMENT PLANTS DISCHARGING TO THE JORDAN RIVER

* DESIGNATES LOCATION OF EXISTING TREATMENT PLANTS

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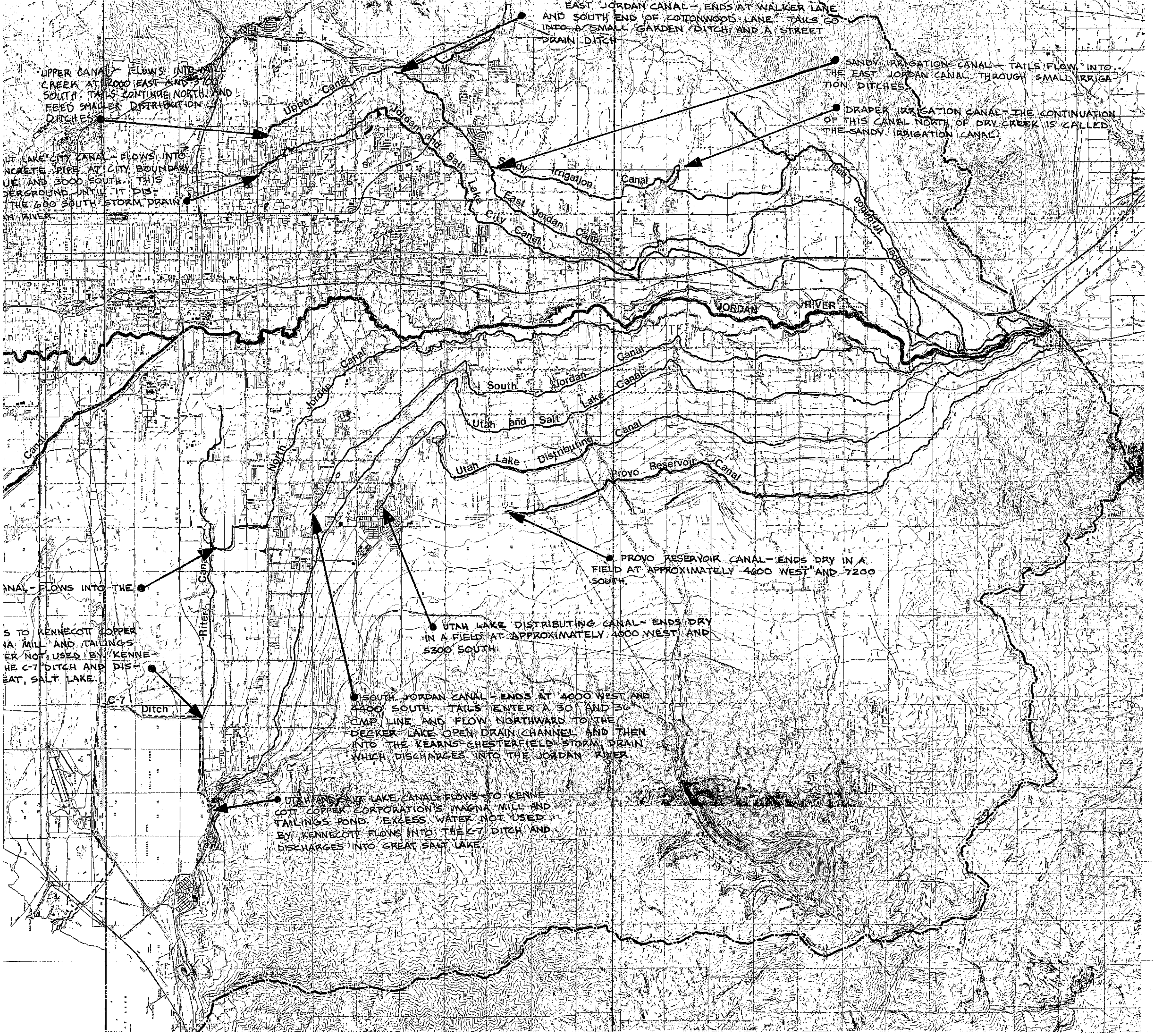
FIGURE IV-4.

SALT LAKE COUNTY MAIN CANALS AND THEIR TERMINUS POINTS



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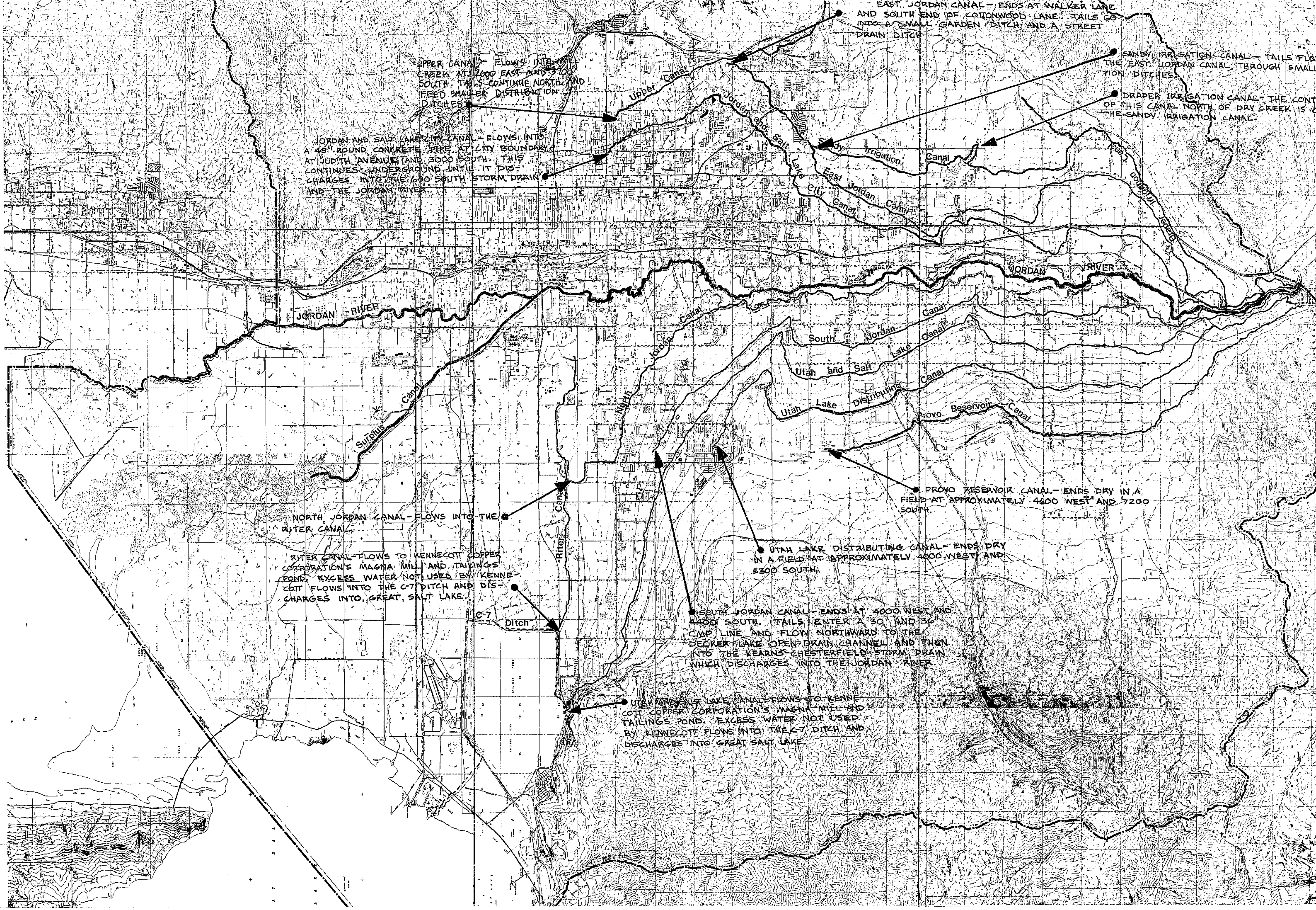

EAST JORDAN CANAL – ENDS AT WALKER LANE AND SOUTH END OF COTTONWOOD LANE. TAILS GO INTO A SMALL GARDEN DITCH AND A STREET DRAIN DITCH
SANDY IRRIGATION CANAL – TAILS FLO… THE EAST JORDAN CANAL THROUGH SMALL… TION DITCHES.
DRAPER IRRIGATION CANAL – THE CONT… OF THIS CANAL NORTH OF DRY CREEK IS … THE SANDY IRRIGATION CANAL.
UPPER CANAL – FLOWS INTO MILL CREEK AT 2000 EAST AND 3900 SOUTH. TAILS CONTINUE NORTH AND FEED SMALLER DISTRIBUTION DITCHES
JORDAN AND SALT LAKE CITY CANAL – FLOWS INTO A 48" ROUND CONCRETE PIPE AT CITY BOUNDARY AT JUDITH AVENUE AND 3000 SOUTH. THIS CONTINUES UNDERGROUND UNTIL IT DISCHARGES INTO THE 600 SOUTH STORM DRAIN AND THE JORDAN RIVER.
Upper Canal
Jordan and Salt Lake City Canal
Sandy Irrigation Canal
East Jordan Canal
Draper Irrigation Canal
JORDAN RIVER
JORDAN RIVER
North Jordan Canal
South Jordan Canal
Utah and Salt Lake Canal
Utah Lake Distributing Canal
Provo Reservoir Canal
Surplus Canal
Riter Canal
C-7 Ditch
PROVO RESERVOIR CANAL – ENDS DRY IN A FIELD AT APPROXIMATELY 4600 WEST AND 7200 SOUTH.
NORTH JORDAN CANAL – FLOWS INTO THE RITER CANAL.
RITER CANAL – FLOWS TO KENNECOTT COPPER CORPORATION'S MAGNA MILL AND TAILINGS POND. EXCESS WATER NOT USED BY KENNECOTT FLOWS INTO THE C-7 DITCH AND DISCHARGES INTO GREAT SALT LAKE.
UTAH LAKE DISTRIBUTING CANAL – ENDS DRY IN A FIELD AT APPROXIMATELY 4000 WEST AND 5300 SOUTH.
SOUTH JORDAN CANAL – ENDS AT 4000 WEST AND 4400 SOUTH. TAILS ENTER A 30" AND 36" CMP LINE AND FLOW NORTHWARD TO THE DECKER LAKE OPEN DRAIN CHANNEL AND THEN INTO THE KEARNS-CHESTERFIELD STORM DRAIN WHICH DISCHARGES INTO THE JORDAN RIVER.
UTAH AND SALT LAKE CANAL – FLOWS TO KENNECOTT COPPER CORPORATION'S MAGNA MILL AND TAILINGS POND. EXCESS WATER NOT USED BY KENNECOTT FLOWS INTO THE C-7 DITCH AND DISCHARGES INTO GREAT SALT LAKE.

rights that exist on the lower portions of the streams. Water from the upper canyons is of such quality that it is used for culinary purposes in Salt Lake Valley. To fulfill water rights on the valley portions of the streams, water is diverted from the Jordan River, conveyed to these streams via some east side canals, and released to the stream channels to augment the flows.

Table IV-9 Water Quality in Major Salt Lake Valley Irrigation Canal Systems*

Canal System	Sample Station	Date	Total Coliform (MPN/100 ml)	Fecal Coliform (MPN/100 ml)	BOD_5 (mg/1)	DO (mg/1)
Utah & Salt Lake	U-1	7/76	13,598		5.4	6.7
		8/76	930		5.8	5.5
		9/76	735	109	5.2	6.6
	U-2	8/76	9,300		7.1	6.8
	U-3	7/76	900	230	1.4	6.9
South Jordan	S-1	7/76	10,606		5.5	6.6
		8/76	1,857		7.0	5.5
		9/76	1,059	89	4.5	5.5
	S-2	8/76	43,000		8.3	6.3
North Jordan	N-1	7/76	19,998		7.8	6.7
		8/76	3,145		10.6	5.9
		9/76	5,212	494	3.9	7.4
	N-2	8/76	11,000	2,500	1.1	6.9
East Jordan	E-1	7/76	4,300		1.7	7.5

*Monthly averages for irrigation season

As more agricultural land is developed into urban land on both the east and west side of the Jordan River, less water is required to maintain water quantities that have historically been applied to irrigate parcels of land. Appropriate storage and continued diversions to urbanized areas, chiefly planned subdivisions, to be used as home irrigation water is a concept endorsed by the 208 Project. However, continued diversions of historic quantities of water to irrigate smaller amounts of agricultural land is a phenomena that needs more study. This is an area of major concern to the Department.

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. Table IV-10 shows quality of urban runoff for both dry-and wet- weather flows for the locations shown in Figure IV-6.

Table IV-10. Water Quality of Storm/Urban Runoff[1]

Parameter - Units	Averages				High	
	Dry Weather Flows		Wet Weather Flows		Dry Weather Flows	Wet Weather Flows
	Value	No. of Samples	Value	No. of Samples		
DO (mg/1)	6.0	12	5.9	17	7.1	6.9
BOD_5 (mg/1)	16.8	15	46.5	17	53.0	271.0
Total Coliform Bacteria (MPN/100 ml)	>44,000	16	>152,000	17	>230,000	>230,000
Fecal Coliform Bacteria (MPN/100 ml)	> 850	16	> 11,600	17	23,000	93,000
TSS (mg/1)	50.0	15	1390.0	17	210.0	7886.0
NH_3-N (mg/1)	0.37	16	0.43	17	1.20	1.25

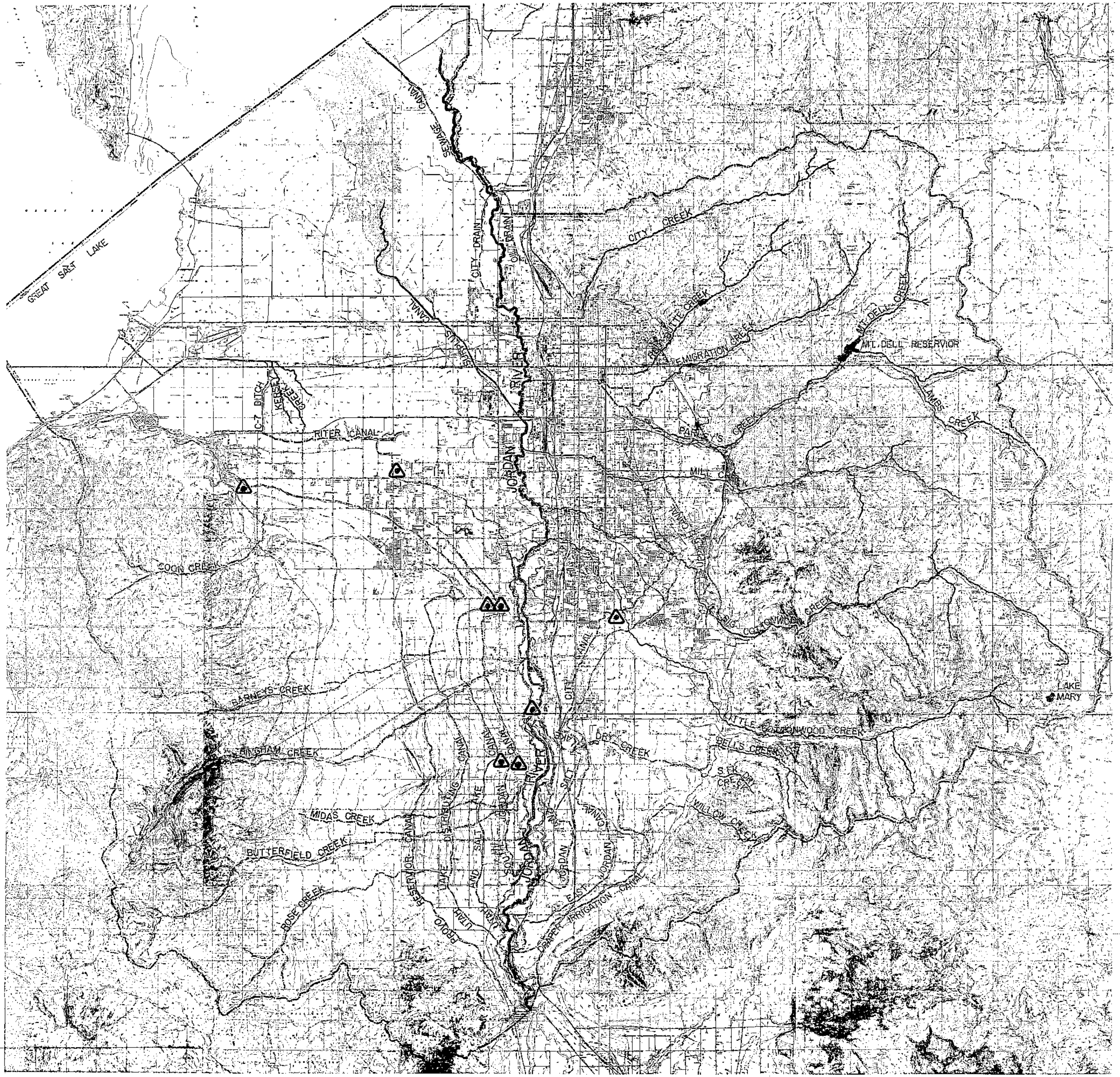
[1]From 208 Water Quality Sampling Program-Summer 1976.

Groundwater

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

In mountainous areas some of the ground water escapes to the atmosphere by evapotranspiration; some seeps into stream channels and flows to Jordan

FIGURE IV-5
LOCATION OF SAMPLE STATIONS ON MAJOR
SALT LAKE VALLEY IRRIGATION CANALS
AND DITCHES



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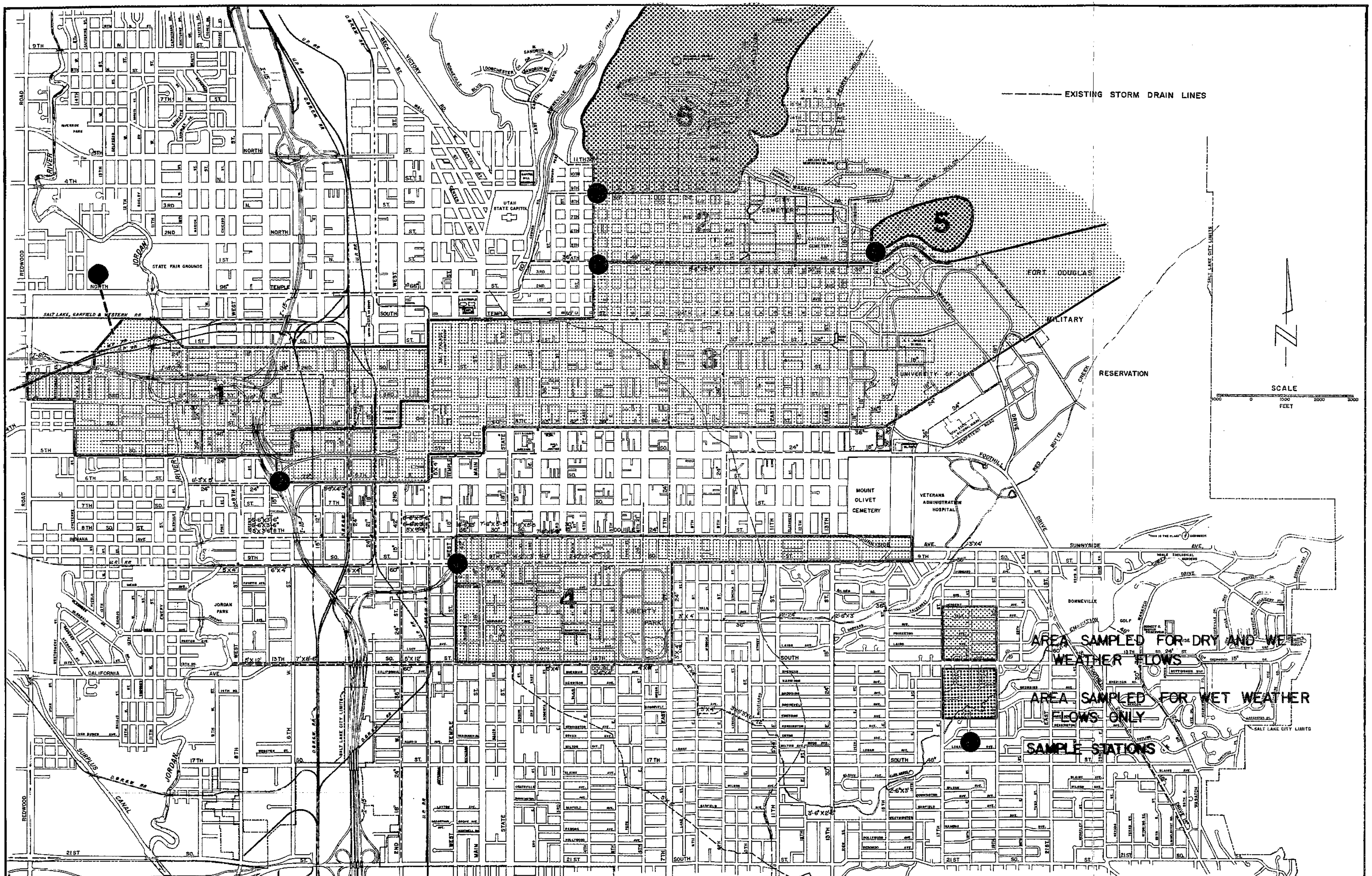

FIGURE IV-6. LOCATION OF SAMPLE STATIONS FOR URBAN/STORM RUNOFF

Valley; and the rest moves downward and laterally through openings in the bedrock into the valley fill. Thus, like surface water, most of the ground water eventually reaches the valley.

In the valley portion of the County, the unconsolidated deposits, ranging from coarse sand and gravel to fine silt and clay, rest on a bed of semiconsolidated deposits or solid rock. All the unconsolidated valley fill that is saturated is included in the ground water reservoir of the Jordan Valley.

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 contains many beds of low permeability that act collectively as a single bed and retard the vertical movement of water. The segment tends to confine water in the aquifer beneath it and is designated the confining bed. Because this bed divides the more permeable fill into segments, each of which is characterized by a different pattern of water movement, several distinct aquifers within the reservoir are recognized.

The approximate real extent of the aquifers is shown in Figure IV-7. The confining bed occurs in the areas designated as confined and shallow unconfined aquifers and also in the area designated as perched aquifer.

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. Although this segment of the fill consists of many beds with differences in permeability, the beds act collectively as a single aquifer.

The quality of ground water varies widely and depends on the sources of recharge and the nature of the materials through which it has percolated.

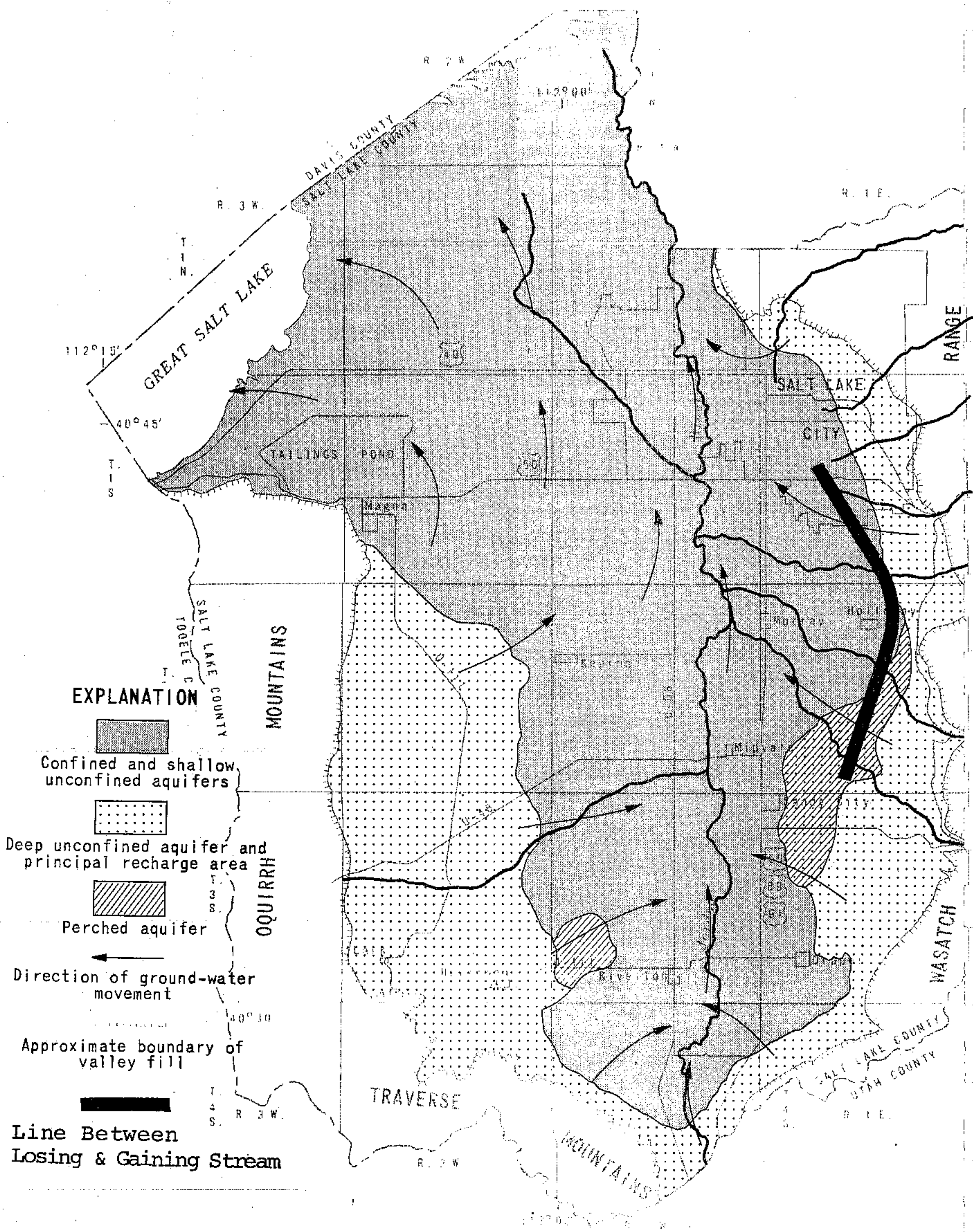

Figure IV-7. Approximate Extent of Various Aquifers in Salt Lake County.

From: Hely, et.al., 1971.

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. Ground water seepage from this aquifer into surface streams, especially the Jordan River, has a significant effect on water quality.

Limited water quality data is available for gound water in Salt Lake County. Figures IV-8 and IV-9 show a real distribution of total dissolved solids and temperatures, respectively, in the ground water in the principal aquifer.

Total dissolved solids concentrations for specific locations is given in Table IV-11 for wells shown in Figure IV-10.

Table IV-11. TDS in Shallow Aquifer (mg/l)

Well	TDS (calc.)
A	725
B	2583
C	1871
D	1469
E	827
F	1408
G	552
H	906
I	11010
J	1313
K	1462
L	1496

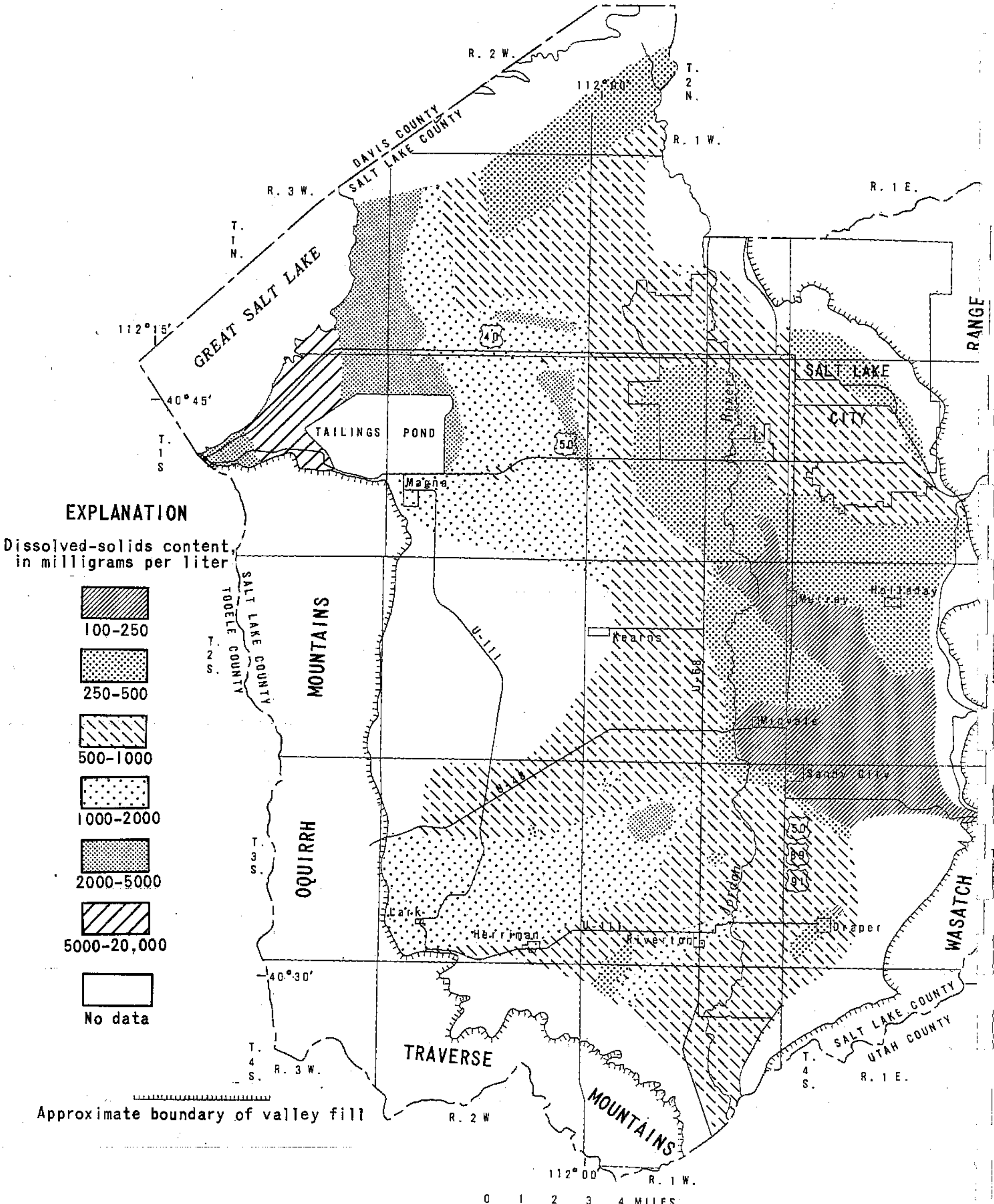

Figure IV- 8. Total Dissolved Solids in Water From the Principle Aquifer in Salt Lake County.

From: Hely, et.al., 1971.

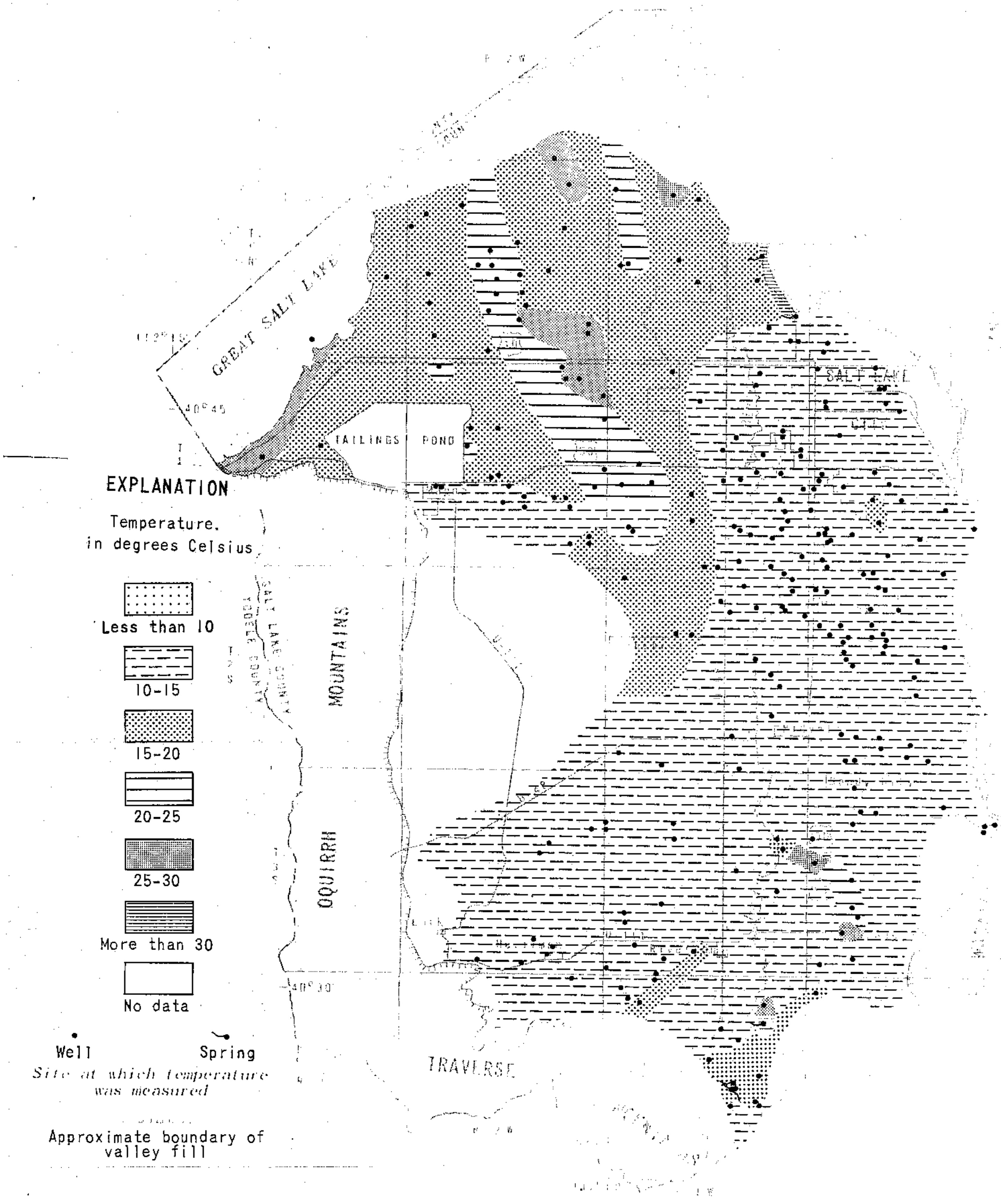

Figure IV-9. Water Temperature in the Principle Aquifer in Salt Lake County.

From: Hely, et.al., 1971.

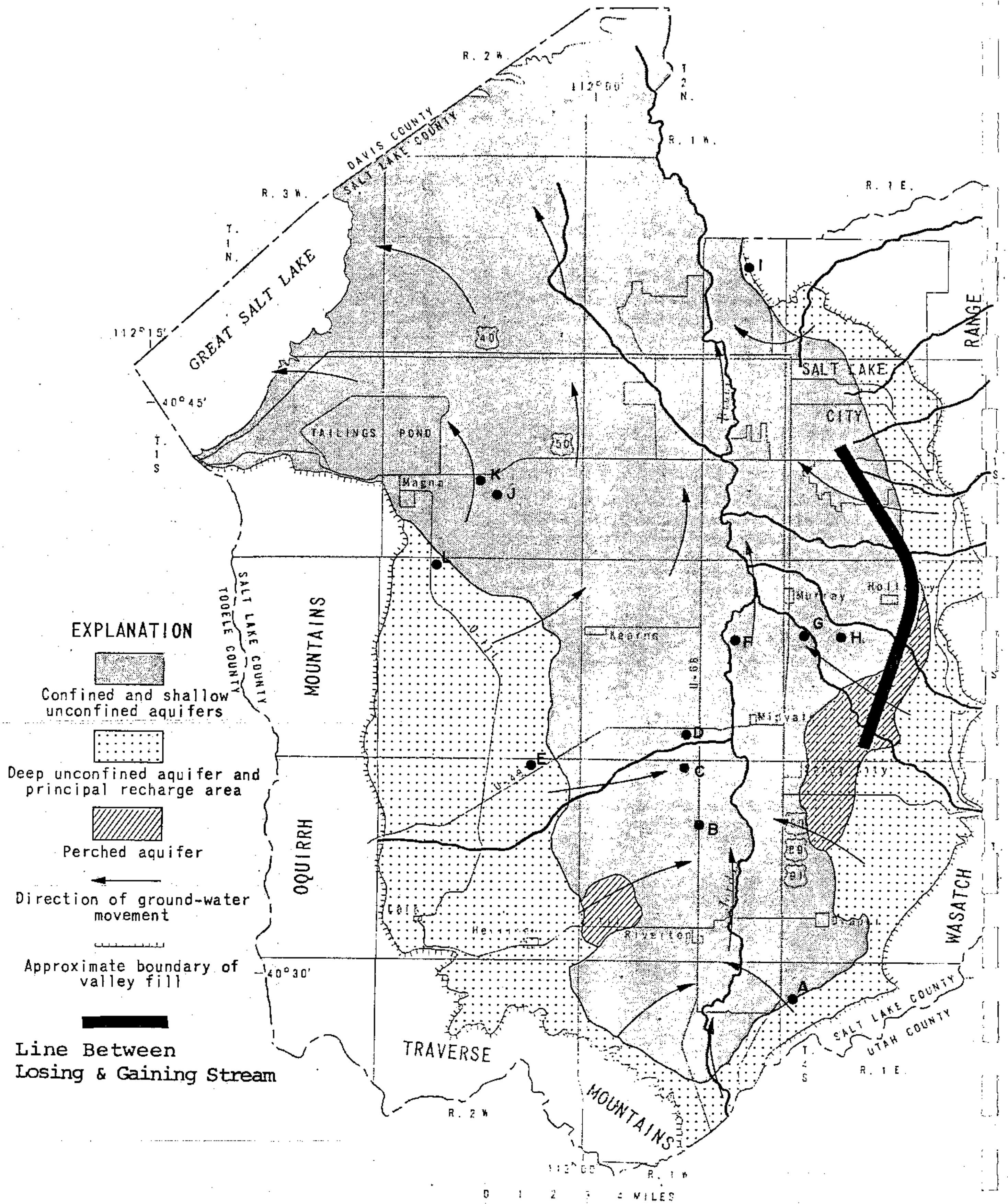

Figure IV-10. Well Locations for TDS Concentrations in Table IV-11.

From: Hely, et.al., 1971.

WATER QUALITY STANDARDS

Existing State water quality standards are worded to essentially protect all waters of the State for drinking water supplies. Protection of quality for other beneficial uses (e.g., aesthetics, recreation) is a secondary concern. To conform with Federal regulations, the State is currently in the process of developing new standards. The new standards set policy for protection of water quality for six beneficial use categories. Since it is apparent that the existing standards will be replaced by a version of the proposed standards, the existing standards and stream segmentation will not be discussed. This section will deal with the proposed standards.

Existing water quality standards and stream segmentation for Salt Lake County are shown in Appendices A-2-1 and A-2-2.

Proposed Water Quality Standards

The proposed water quality standards (dated 12 April 1978) are a giant step in the direction of a workable set of standards. The entire water quality management planning process is dependent upon the standards. It is imperative that a set of standards be adopted that will enable all entities involved with water quality to conform with the policy of the State.

Proposed State policy is to conserve water and to maintain and improve quality for public water supplies, wildlife, recreation, agriculture, and other legitimate beneficial uses.

The proposed scheme is to first determine the applicability of the anti-degradation policy (discussed below) then determine the beneficial use of a segment, and then assign a classification to the segment (also discussed below). The classification carries with it the numerical criteria that will apply to the segment.

The following is a short discussion of the "parts" of the standards (i.e., the anti-degradation policy, beneficial uses and classifications and general provisions). The draft standards (Part II) are shown in Appendix A-2-3. State proposed segmentation is shown in Appendix A-2-4 and Department comments on the draft standards are shown in Appendix A-2-5. Department proposed segmentation and classifications are shown in Table IV-12 and Figure IV-11 (discussed later).

Anti-degradation Policy

The intitial step in classifying waters of the county so that numerical criteria can be applied is to determine which segments are "anti-degradation segments". These are to be segments where there is allowed minimal, if any, degradation of water quality. Consideration for this classification should be given to National and State parks, monuments, recreation areas, etc. and other outstanding natural resource waters.

The proposed standards attaches this classification primarily to waters used for domestic supply. The policy allows for control of new point sources of discharge only. In Salt Lake County, the affected proposed segments (see Appendix A-2-4) are not presently greatly affected by point sources, except for storm drainage, but rather, are greatly impacted by non-point sources. The Department made a comment to the State in this regard (see Appendix A-2-5).

Use Designations

Beneficial uses of the waters of the State are broken down into six major categories. These are:

Class 1 - Raw water sources for domestic water supplies

Class 2 - In-stream recreational uses and aesthetics

Class 3 - In-stream uses by aquatic wildlife

Class 4 - Agricultural uses

Class 5 - Industrial uses

Class 6 - Special uses

The specific classifications 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 (swimming)

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

- Class 3A - protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain
- Class 3B - protected for warm water species of game fish and other warm water 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

General Provisions

Among the general provisions of the standards, the ones with the greatest impacts are:

- The classifications and numerical criteria (see Appendix A-2-3) shall apply to all waters of the State so designated and classified.

- Modifications of the standards are allowed to protect downstream designated uses.

- Intermittent waters are protected as per use designation.

- Public hearings will be held to review all changes, modifications, use classifications, etc.

- Public meetings will be held to determine the criteria for "case-by case" situations.

- A mixing zone definition has been included to more precisely delineate water quality sampling, etc.

STREAM SEGMENTATION

As a necessary part of the 208 plan and for management purposes, the major streams, rivers, and canals in Salt Lake County have been segmented as per the draft state water quality standards. 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. The river flows approximately 11 miles from the pumping station at Utah Lake before entering Salt Lake County through the Jordan Narrows.

Factors used to segment the waterways in Salt Lake County were:

1. Subbasin drainage areas: A stream segment includes the stream and the associated drainage area. Subbasin drainage areas are shown in Figure IV-11.
2. Land use within drainage area: Any significant change in the overall land use in the drainage area affects the stream segmentation. Major land usage (present and projected) is shown in Figure III-17.
3. Physical stream characteristics: Any significant change in the velocity, depth, amount of channelization, etc., affects the stream segmentation.
4. Discharges from point sources: Major discharges from WTP, STP, industrial discharge points, etc., affects the stream segmentation.
5. Present and proposed waterway usage: Usage of a waterway for water supply, recreation, etc., affects the stream

segmentation ("Beneficial uses" as in proposed State classification system).

Based on the above described factors, all waterways in Salt Lake County have been classified by (State Water Quality Standards definitions) and segmented.

Table IV-12 lists the stream segments in Salt Lake County. The segmentation is shown in Figure IV-12 The discussion of the stream segmentation analysis by subbasin drainage area and canal system follows.

City Creek

CC-1: City Creek from the headwaters downstream to the water treatment plant (about three miles above the canyon mouth) is primarily used for culinary water supply and recreation.

CC-2: City Creek from the water treatment plant downstream to the diversion to the North Temple storm drain is used primarily for recreation, primarily picnicking and fishing.

Red Butte Creek

RB-1: Red Butte Creek from the headwaters downstream to the reservoir (above canyon mouth) is used for culinary water supply and a natural study area.

RB-2: Red Butte Creek from the reservoir downstream to the 1300 So. storm drain diversion is used primarily for storm runoff.

Emigration Creek

EC-1: Emigration Creek from the headwaters downstream to the mouth (Rotary Glen) is used primarily for recreation, picnicking and esthetic enjoyment on private land (no improved recreation areas).

EC-2: Emigration Creek from the canyon mouth downstream to the 1300 So. storm drain diversion is used primarily for storm runoff.

FIGURE IV-11

SUBBASIN DRAINAGE AREAS

IN SALT LAKE COUNTY

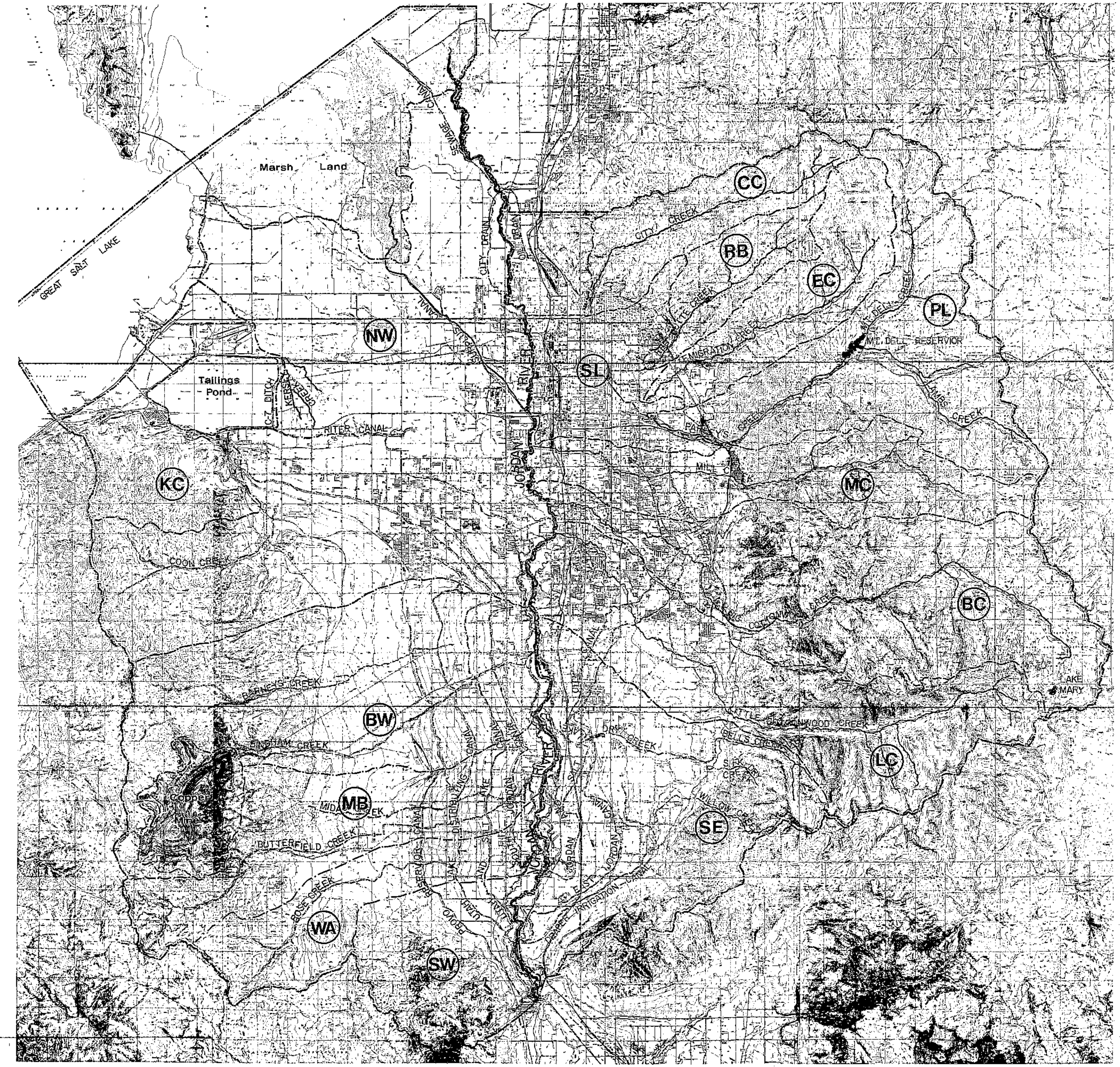

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Table IV-12. Stream Segmentation and Classification for Waters of Salt Lake County

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

Parley's Creek

PL-1: Parley's Creek (and tributaries) from the headwaters downstream to Mountain Dell Reservoir is used primarily for culinary water supply and recreation.

PL-2: Parley's Creek from the canyon mouth downstream to the 1300 So. storm drain diversion is used primarily for recreation.

Mill Creek

MC-1: Mill Creek from the headwaters downstream to the canyon mouth (S.L.C. Water Department gaging station) is used extensively for recreation and aesthetics.

MC-2: Mill Creek from the canyon mouth (S.L.C. Water Department gaging station) downstream to the Jordan River is used primarily for recreation.

Big Cottonwood Creek

BC-1: Big Cottonwood Creek from the headwaters downstream to the canyon mouth (water treatment plant) is used primarily for culinary water supply and recreation.

BC-2: Big Cottonwood Creek from the canyon mouth downstream to the Jordan River is used primarily for recreation and aesthetic enjoyment.

Little Cottonwood Creek

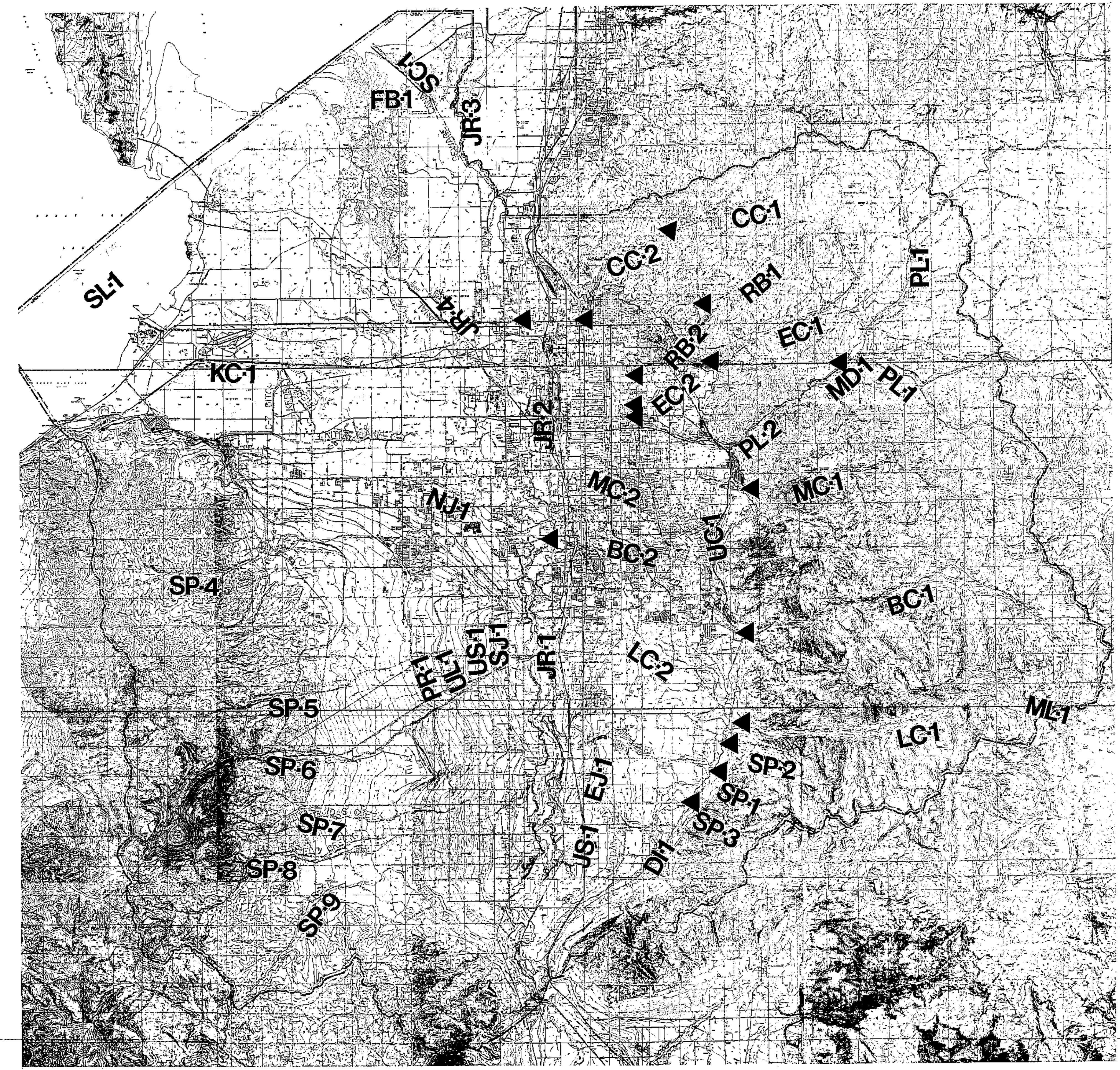
LC-1: Little Cottonwood Creek from the headwaters downstream to the canyon mouth (water treatment plant diversion) is used primarily for culinary water supply and recreation.

LC-2: Little Cottonwood Creek from the canyon mouth downstream to the Jordan River is used primarily for recreation and aesthetic enjoyment.

Southeast

SP-1: South Fork of Dry Creek from the headwaters downstream to the Draper

FIGURE IV-12
STREAM SEGMENTATION
FOR SALT LAKE COUNTY



TRIANGLE SIGNIFIES CHANGE IN SEGMENTATION ALONG A WATERWAY

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Division is intermittent - uses are culinary water supply, agricultural, and conveyance of storm runoff.

SP-2: Bell Canyon Creek from the headwaters downstream to the reservoir is intermittent - uses are culinary water supply, agricultural, and conveyance of storm runoff.

SP-3: Little Willow Creek from the headwaters downstream to the USFS boundary is intermittent - uses are culinary water supply, agricultural, conveyance of storm runoff.

Northwest

SP-4: Coon Creek from the headwaters downstream to the terminus near Magna is intermittent - some agricultural usage and conveyance of storm runoff.

Kennecott

No major waterways except Kersey Creek/C-7 Ditch (discussed later).

Barney's - Bingham

SP-5: Barney's Creek from the headwaters downstream to the Jordan River is intermittent - some agricultural usage and conveyance of storm runoff.

SP-6: Bingham Creek from the headwaters downstream to the Jordan River is intermittent - some agricultural usage and conveyance of storm runoff.

Midas - Butterfield

SP-7: Midas Creek from the headwaters downstream to the Jordan River is intermittent - some agricultural usage and conveyance of storm runoff.

SP-8: Butterfield Creek from the headwaters downstream to the Jordan River is intermittent - some agricultural usage and conveyance of storm runoff.

West - Ag

SP-9: Rose Creek from the headwaters downstream to the Jordan River is intermittent - some agricultural usage and conveyance of storm runoff.

Southwest

SP-4: Coon Creek;	from the headwaters
SP-5: Barney's Creek;	downstream to the
SP-6: Bingham Creek;	Jordan River are
SP-7: Midas Creek;	intermittent - uses are
SP-8: Butterfield Creek;	agricultural and
SP-9: Rose Creek;	conveyance of storm runoff

Jordan River

JR-1: The Jordan River from the Narrows (where it enters the county) downstream to the confluence with Little Cottonwood Creek is used for agriculture, conveyance of storm runoff, STP effluent receiving water, and recreation.

JR-2: The Jordan River from the confluence with Little Cottonwood Creek downstream to 400 North Street (Salt Lake City) is used for agriculture, conveyance of storm runoff, STP effluent receiving water, and recreation.

JR-3: The Jordan River from 400 North Street (SLC) downstream to the Great Salt Lake is used for agriculture, conveyance of storm runoff, and recreation.

Irrigation Canal Systems

These irrigation canals have somewhat limited access but they are not patrolled and many children from the surrounding areas play in them. The usual time for flow in the canals is from May or June through September or October. There is very limited usage of canal water for home irrigation.

PR-1: UL-1: SJ-1: DI-1: These canals are used almost exclusively for irrigation purposes.

US-1: NJ-1: These canals are used for irrigation and for industrial purposes

EJ-1: JS-1: UC-1: These canals were originally used for irrigation and now augment flow in the valley portions of Mill, Big Cottonwood and Little Cottonwood Creeks.

Drainage Canal Systems

JR-4: The Surplus Canal from the diversion from the Jordan River downstream to the Great Salt Lake marshes is used for conveyance of high flow waters around the heavily urbanized portion of Salt Lake County (Salt Lake City) - some agricultural usage.

SC-1: The sewage canal tributaries (the city drain and the oil drain) and the sewage canal itself are waste canals that convey wastes, both municipal and industrial, directly to the Great Salt Lake without any discharge into the Great Salt Lake marshes or the Jordan River.

KC-1: Kersey Creek and the C-7 waste ditch (Kennecott Copper Corp.) from the headwaters to the Great Salt Lake is used for conveyance of waste water.

Lakes (>20 acres)

ML-1: Mary's Lake is used for culinary water supply and recreation.

MD-1: Mountain Dell Reservoir is used for culinary water supply.

SL-1: Great Salt Lake is used for recreation and industrial purposes (mineral extraction).

FB-1: Farmington Bay Waterfowl Management area is used for recreation and wildlife management.

PROJECTED 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. In order to develop a management plan to abate pollution problems in the county, projections have been made concerning future water quality.

In order to continually refine projections of water quality, a comprehensive on-going monitoring program must be implemented. Current monitoring programs and sample points are shown in Figure IV-13. Specific sampling points are listed in Table IV-13. Discussions with the SLC Water Department, the Salt Lake City-County Health Department, the U.S. Forest Service, and the State Bureau of Water Quality have indicated that they are in favor of some consolidation of monitoring programs. The effects of a consolidation of many sampling programs into one comprehensive program would reduce costs, expand the scope of the programs, and make information more readily available to all interested parties. This action is being addressed by the Department.

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. Analyses of this sort are presented below on a stream by stream basis.

Projections for the future water quality in Salt Lake County are presented here, on a stream by stream basis, and are used to develop the management plan.

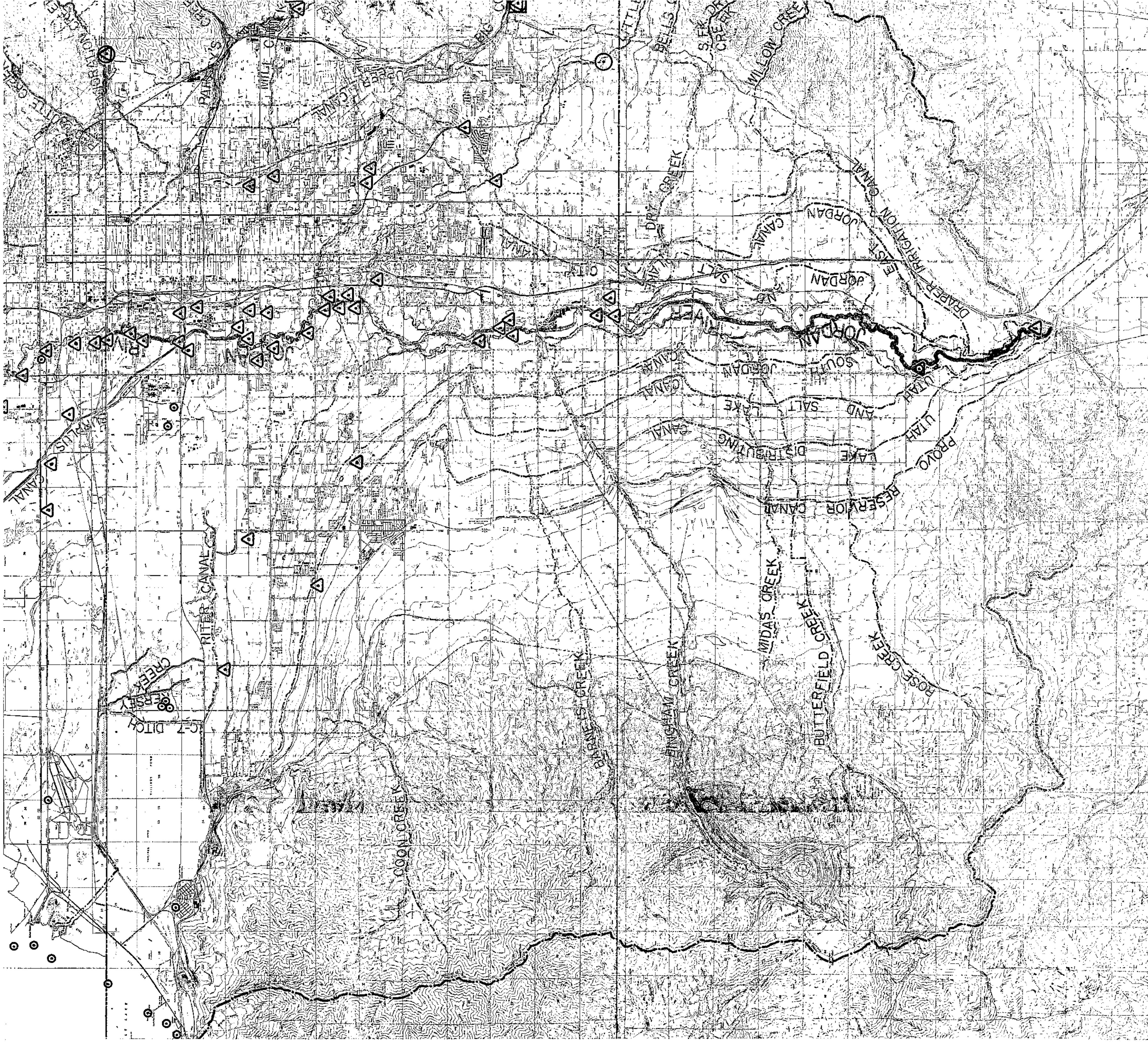

FIGURE IV-13
SAMPLE STATION LOCATIONS IN SALT LAKE COUNTY FOR VARIOUS MONITORING PROGRAMS

- ⊙ State Bureau of Water Quality
- △ City / County Health Department
- ⊙ Salt Lake City Water
- ⊡ Wasatch National Forest

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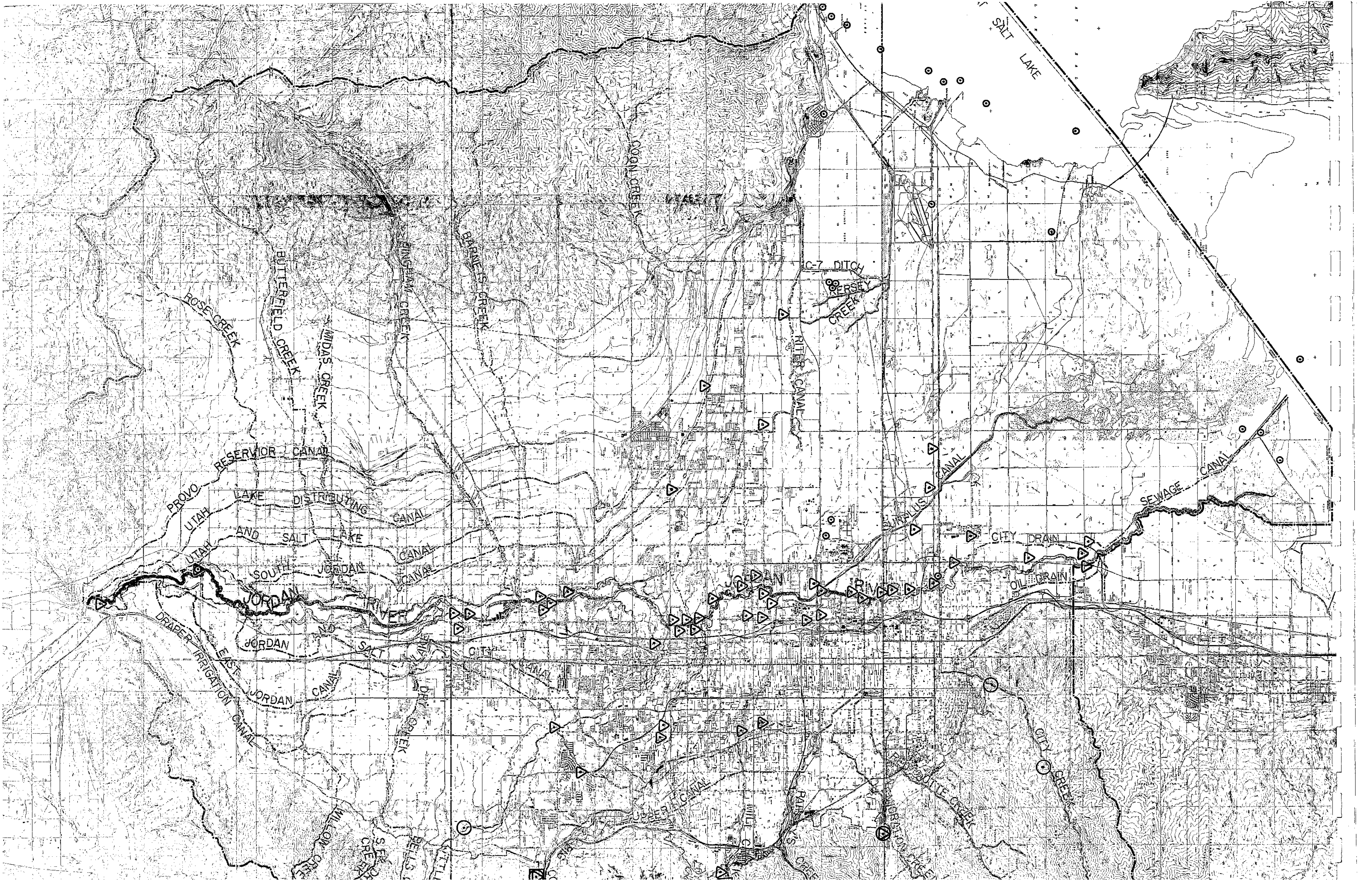

SALT LAKE
C-7 DITCH
KERSEY CREEK
RITER CANAL
COON CREEK
BARNEYS CREEK
BINGHAM CREEK
MIDAS CREEK
BUTTERFIELD CREEK
ROSE CREEK
PROVO RESERVIOR CANAL
UTAH LAKE DISTRIBUTING CANAL
UTAH AND SALT LAKE CANAL
SOUTH JORDAN CANAL
JORDAN RIVER
JORDAN AND SALT LAKE CITY CANAL
DRAPER IRRIGATION CANAL
EAST JORDAN CANAL
DRY CREEK
SURPLUS CANAL
CITY DRAIN
OIL DRAIN
SEWAGE CANAL
CITY CREEK
UPPER CANAL
BUTTE CREEK
WILLOW CREEK

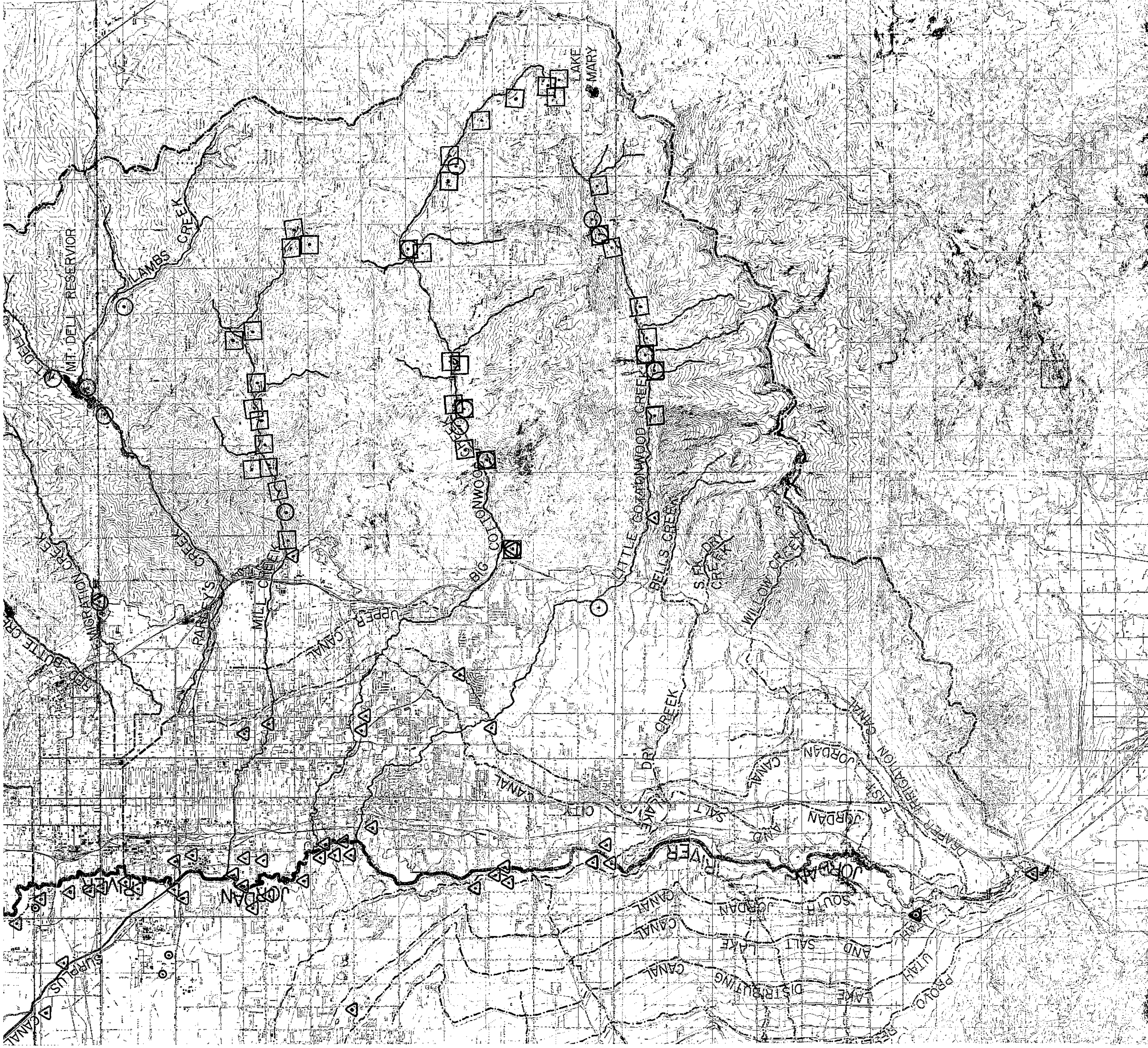

FIGURE IV-13
SAMPLE STATION LOCATIONS IN SALT LAKE COUNTY FOR VARIOUS MONITORING PROGRAMS

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- ⊡ Wasatch National Forest

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MILES

0 1 2 3 4

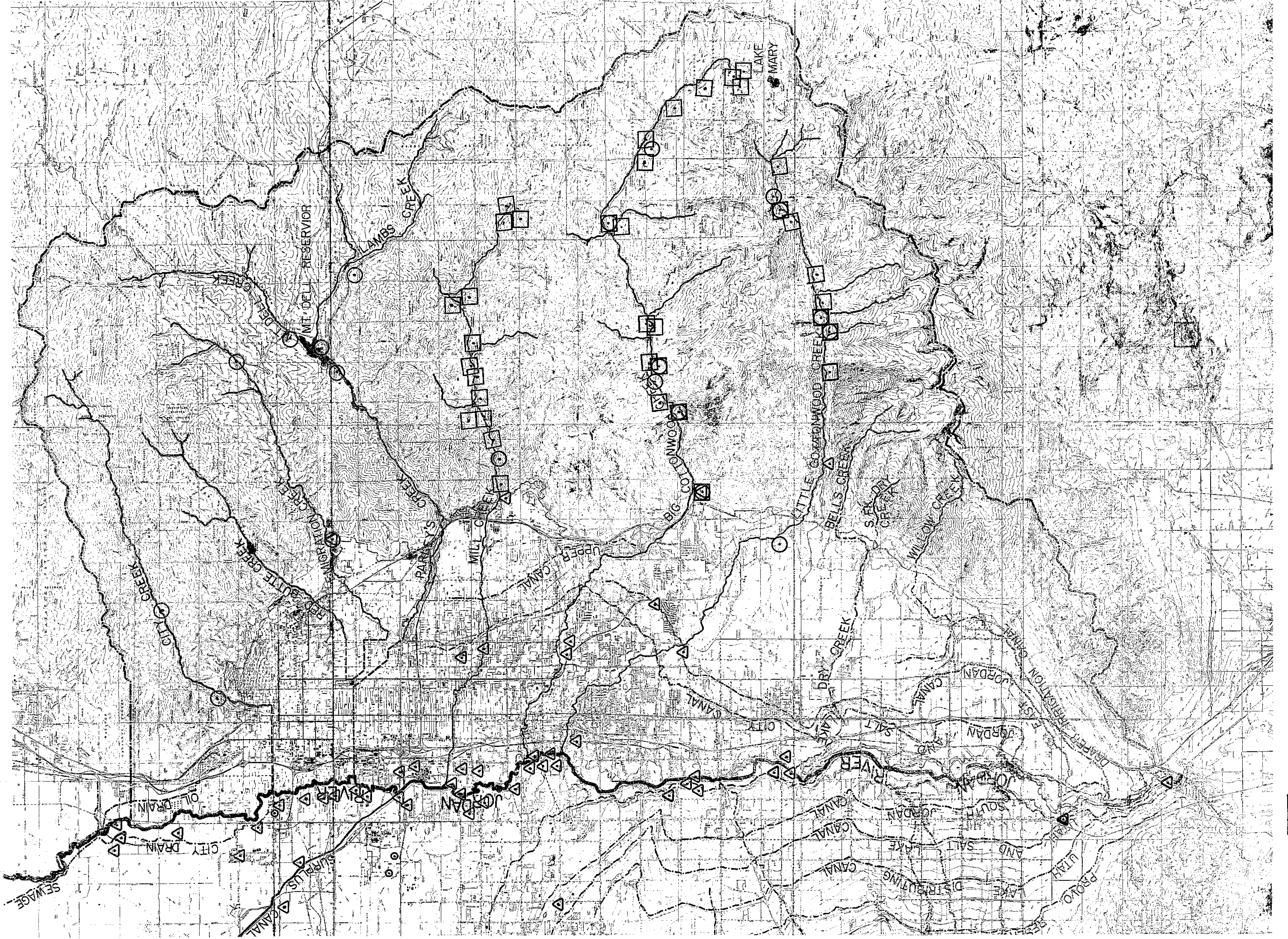
LAKE MARY
LAMBS CREEK
MT. DELL RESERVOIR
DELL CREEK
EMIGRATION CREEK
RED BUTTE CREEK
CITY CREEK
PARLEY'S CREEK
MILL CREEK
BIG COTTONWOOD CREEK
LITTLE COTTONWOOD CREEK
BELL'S CREEK
S. FK. DRY CREEK
WILLOW CREEK
DRY CREEK
UPPER CANAL
CITY CANAL
EAST JORDAN CANAL
DRAPER IRRIGATION CANAL
JORDAN RIVER
SOUTH JORDAN CANAL
UTAH AND SALT LAKE CANAL
UTAH LAKE DISTRIBUTING CANAL
PROVO
OIL DRAIN
CITY DRAIN
SURPLUS CANAL
SEWAGE

TABLE IV-13. SAMPLE STATIONS FOR MONITORING PROGRAMS IN SALT LAKE COUNTY*

A. Salt Lake City Water Department

Identification	Description
Old 20th Ward	Opposite canyon station house at entrance to City Creek Canyon
City Creek	Intake to City Creek Treatment Plant
Lower Emigration	Taken from stream at Emigration Tunnel Springs box, just up canyon at historical marker
Upper Emigration	Taken from stream at 6201 Emigration Canyon just up turnoff to Pinecrest
Little Dell	Bridge at Sheep Trail near Camp Grant Monument
Lower Lambs	Weir below golf course at Dell Reservoir
Upper Lambs	Golf course intake structure at Interstate turnoff to Lambs Canyon
Parley's	Intake to Parley's Treatment Plant
Millcreek	Taken from stream at Upper Boundary Springs in Millcreek Canyon
Big Cottonwood	Intake to Big Cottonwood Treatment Plant
Storm Mt.	Taken from stream at bridge in front of Mule Hollow
Mill B	Taken from tributary from Lake Blanche
Mill D	Taken from stream at bridge on road to Jordan Pines picnic area
Silver Fork	Off lower bridge below Silver Fork Lodge
Brighton	Entrance to loop road
Little Cottonwood	Intake to Metropolitan Treatment Plant
Red Pine	Taken from main stream just below intersection of Red Pine Stream in Tanner Flat Campground
White Pine	Taken from main stream below intersection of White Pine Stream in Tanner Flat Campground

Table IV-13 (cont'd)

Identification	Description
Snowbird	Taken from stream near Gad Ski Lift
Alta	Taken from stream at bypass road bridge

B. Utah Bureau of Water Quality

Identification (Storet No.)	Description
491-502	Bluffdale (Jordan River)
491-820	Goggin Drain at N. Temple St.
491-819	Lee Creek
491-815	C-7 Ditch
491-251	Sewage canal on bridge in Farmington Bay
491-781	Turpin Dike on Farmington Bay
491-782	Turpin Dike on Farmington Bay
491-800	Varian Eimac, 1678 Pioneer Road
491-799	Metal Processing, 1822 Industrial Road
	Kersey Creek
491-801	50 ft. above Magna Imp. Dist.
491-802	At outfall
491-803	Below outfall
	UP&L Gadsby Plant
491-321	Abatement canal above outfall
491-322	Abatement canal below outfall
491-323	Jordan River above outfall
491-324	Cooling Tower to Jordan River
491-325	Jordan River below UP&L at N. Temple

Table IV-13 (cont'd)

C. Salt Lake City/County Health Department

Identification	Description
506	Jordan River at Bridge on 9000 So. above Sandy STP
507	Sandy STP effluent at point of discharge from chlorination contact tank
508	Jordan River approximately 50 ft. above fur breeder's plant below Sandy STP plant effluent
510	Jordan River approximately 50 ft. above Midvale STP outfall
512	Midvale STP effluent at discharge end of outfall line.
872	4900 South 200 West - Little Cottonwood Creek 516A
518	Jordan River 50 ft. above Murray STP outfall
519	Murray STP effluent approximately 20 ft. above confluence with Jordan River.
520	Bridge on 4500 South below Murray STP further downstream to assure mixing
521	Big Cottonwood Creek at 4200 South 500 West approximately 100 ft. above Salt Lake County Cottonwood Sanitary District STP outfall
522	Salt Lake County Cottonwood Sanitary District STP effluent of discharge from secondary settling tanks
562	Jordan River at bridge on 3900 South Street
866	Bridge at Wasatch Blvd. - Little Cottonwood Creek
361	Old Mill Bridge - Big Cottonwood Creek
876	3550 Wasatch Blvd. - Mill Creek
864	At Monument Park above zoo at approximately Rotary Glen Park - Emigration Creek
530	Salt Lake County Suburban Sanitary District #1 STP effluent at chlorination pond discharge
532	South Branch Vitro waste ditch above confluence with main ditch

Table IV-13 (cont'd)

Identification	Description
524	Jordan River near 3300 South, at loop in river approximately 1300 ft. above 3300 South bridge, above Jordan Meat Company plant and feed yards
533	Vitro waste ditch at bridge approximately 300 ft. north of gate at end of pavement on 1100 West St. approximately 300 ft. south and approximately 50 ft. above confluence with Jordan River
526	Granger-Hunter Improvement District STP effluent at point of discharge from secondary settling tanks
535	Mill Creek at 900 West approximately 2900 South
537	South Salt Lake STP effluent at outfall of chlorinator tank
538	Jordan River at bridge on California Avenue (approximately 1350 ft.) below South Salt Lake City STP
411	Salt Lake City Treatment Plant; effluent 540A
541	Surplus canal at railroad bridge 1 block south of Highway 40 (North Temple Street at approximately 3500 West) below Utah Woolen Mills
544	Bridge over Jordan River at Redwood Road near 17th North
410	Sewage canal 50 ft. above Salt Lake City STP effluent outfall
412	Sewage canal 100 ft. below Salt Lake City STP effluent outfall

(Storet No.)	
331046	City Creek at storm drain outlet to Jordan River
331175	Jordan River at 400 North
331194	City Drain at 6th North & 1800 West
331173	Goggin drain at North Temple
331078	City drain 2nd South - South of airport
331174	Jordan River at 300 South

Table IV-13 (cont'd)

(Storet No.)	Description
331047	Sixth South Storm Sewer
331048	Eight South Storm Sewer
331049	Thirteenth South Storm Sewer
331079	City Drain at 21st South 6th West
331050	Twenty-First South Storm Sewer
331034	Ritter Canal at 2400 South 8300 West
331017	North Jordan Canal at 3100 South
331041	Utah and Salt Lake Canal at 4100 South
331038	South Jordan Canal at 4700 South
331042	East Jordan Canal at 6200 South 20th East 6400 South
331051	Holladay Storm Sewer Outlet Northwest of Cottonwood Mall
331028	Jordan & Salt Lake Canal at Elgin Avenue approximately 29th South 1150 East

D. Wasatch National Forest

Identification	Description
LC1	Little Cottonwood Creek at Forest Boundary
LC2	Little Cottonwood Creek above Lisa Falls
LC3	Little Cottonwood Creek above confluence with Red Pine Creek
LC4	Little Cottonwood Creek below confluence with White Pine Creek
LC5	White Pine Creek above confluence with Little Cottonwood Creek
LC6	Little Cottonwood Creek below Snowbird Recreation Area
LC7	Little Cottonwood Creek below Hellgate Spring
LC8	Little Cottonwood below Alta
LC9	Little Cottonwood above Alta and directly under crossing of Sunnyside Ski Lift

Table IV-13 (cont'd)

Identification	Description
BC1	Big Cottonwood Creek at Forest Boundary
BC2	Big Cottonwood Creek at Storm Mountain Pond inlet below bridge
BC3	Big Cottonwood Creek above Maxfield Lodge
BC4	Mill B South Fork above confluence with Big Cottonwood
BC5	Big Cottonwood Creek above confluence with Mill B South Fork
BC6	Mineral Fork Creek above confluence with Big Cottonwood Creek
BC7	Big Cottonwood Creek above confluence with Mineral Fork
BC8	Mill D South Fork above confluence with Big Cottonwood Creek
BC9	Big Cottonwood Creek above confluence with Mill D South Fork
BC10	Big Cottonwood Creek ½ mile below Silver Fork Lodge
BC11	Big Cottonwood Creek below confluence with Willow Creek at road
BC12	Big Cottonwood Creek ½ mile below Solitude
BC13	Big Cottonwood Creek at Guardsman Pass
BC14	Big Cottonwood Creek below Silver Lake outlet at old gaging
BC15	Unnamed Tributary (that runs through Brighton) above confluence with Big Cottonwood
BC16	Big Cottonwood above inlet to Silver Lake by LDS Church
MC1	Mill Creek at Forest Boundary
MC2	Mill Creek directly below Tracy Wigwam Camp
MC3	Church Fork above Church Fork Campground

Table IV-13 (cont'd)

Identification	Description
MC4	Mill Creek above Church Fork Campground
MC5	Mill Creek above Mill Creek Inn
MC6	Mill Creek below Log Haven Restaurant by bridge
MC7	Mill Creek above Log Haven's Restaurant Pond inlet
MC8	Mill Creek below Maple Cove Campground
MC9	Mill Creek below confluence of Elbow Fork and Mill Creek
MC10	Mill Creek below Clover Spring Picnic Area
MC11	Mill Creek below Soldier Fork confluence with Mill Creek
MC12	Mill Creek above confluence of Big Water Gulch with Mill Creek
MC13	Big Water Gulch - above confluence with Mill Creek

*Does not include sampling stations that were monitored by the 208 Project Staff. For those locations, see WQ-1.

City Creek. Present summer picnic usage in City Creek Canyon correlates to an increase in coliform bacteria organisms of about 17/100 ml/1000 picnickers/year/stream mile. Present coliform numbers in the canyon portion of City Creek range from 30 to 150/100 ml.

Projected canyon usage indicates a slight increase in the number of picnickers in the canyon but the increase is estimated to be slight. Therefore, projected coliform numbers in the stream should remain in this range.

Red Butte Creek. Due to the essentially non-existant day use of this canyon, no projections of future water quality have been made. However, it is expected that the present canyon usage, a natural study area, will not change in the future. Therefore, the water quality in the canyon should not show any appreciable change in the future.

Emigration Creek. Infiltration from septic tanks into Emigration Creek are a major cause of high bacterial numbers (coliform) in the Creek. However, at present there is a movement underway for annexation to Salt Lake City and the construction of a sanitary sewer to convey wastes to the Salt Lake City STP. Any construction in the canyon can be expected to result in degraded water quality, even the construction of a sewer system. After the primary impact of sewer construction lessens, a secondary impact (and probably a greater impact) caused by increased development potential (more people) will degrade water quality even more. This tradeoff, between construction of a sewer to abate septic seepage problems and accommodation of more human usage of the canyon, is being considered by the Department at the present time.

Parley's Creek. At present, there is no problem with the water quality in this canyon. A 30,000 acre-foot capacity reservoir is proposed to be constructed above the present 3,000 acre-foot capacity Mountain Dell Reservoir by the year 2000. Water related recreation is planned for this new reservoir (there is none at Mountain Dell) and based on past recreation and management practices would probably cause a lower quality of water in it and in Mountain Dell Reservoir. Increases in coliform levels in canyons for summer cabins correlate to an increase in coliform bacteria range of 2 to 7/100 ml./cabin/mile creek frontage. For construction activities, the increase is about ten fold. With the small number of cabins present and expected and the construction of the reservoir, coliform levels in this canyon can be expected to increase but by a small number.

Mill Creek. Mill Creek coliform bacteria numbers correlation to a range of 7/100 ml./cabin/mile creek frontage to 17/100 ml./1000 picnickers/year/stream mile. Future usage of the canyon is projected to be some minor cabin infilling and a slight increase in the number of picnickers per year (USFS development plan). Based upon this data, coliform numbers in Mill Creek are projected to increase but at a small scale. Expected values will range about 100-200 bacteria/100 ml. in the upper reaches.

Big Cottonwood Creek. Recreational usage of Big Cottonwood Canyon is the heaviest of all Wasatch Mountain Canyons in Salt Lake County. Coliform numbers are among the lowest, however. Correlation of increases in coliform bacteria from recreators is on the order of 9/100 ml./1000 visitors/year/stream mile. Contributions from cabins (some are year-round residents) correlates to only 2 bacteria/100 ml./cabin/mile creek frontage. There could be approximately 40% more cabins in existence in Big Cottonwood Creek by the year 2000. The construction of a new ski development has recently taken place. Expected coliform numbers in the future is estimated to range about 30 to 150/100 ml. with the average slightly more than 50/100 ml.

Little Cottonwood Creek. During past construction times, it has been found that coliform numbers increase ten fold due to construction activities. Other analyses have shown that winter sport activities contribute only a very small portion of total coliform numbers. Present coliform bacteria numbers range from about 27 to 70/100 ml. during construction activities and drop off slowly when construction is completed. Future steady state concentrations will probably average about 50/100 ml.

Intermittent Creeks. 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. However, some future monitoring will be carried out on these drainages and if the impacts are shown to be great enough, study of abatement procedures will be directed into this area.

Jordan River and Surplus Canal. 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 have been made for a range of regional STP configurations. A summary of Jordan River water quality projections is shown in Tables IV-14 through Table IV-17.

Minimum dissolved oxygen projections range from a 0.0 mg/l during storm events to 6.3 mg/l when projected with a 50% reduction in agricultural diversions from the Jordan Narrows. When projected with K_d values of 0.2/day and 1.0/day, DO concentrations differed by approximately 1 mg/l to 4 mg/l respectively when all other conditions were held constant.

For comparison purposes, minimum DO concentrations resulting from different levels of treatment are shown in Table IV-14 .

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).

Table IV-14. Projected Dissolved Oxygen Concentrations in the Jordan River

Effluent Conditions (mg/1)			Minimum Instream DO (mg/1)						Remarks
DO	CBOD	NBOD	Present Locations	One Plant	Two Plant	Three Plant	Four Plant	Five Plant	
5.0[1]	25	90	3.8	4.1	4.1				Summer conditions, includes SDS STP, NBOD of 90 mg/1 corresponds to STP NH_3 effluent of 22 mg/1, NBOD of 90 mg/1 corresponds to STP NH_3 effluent of 2.5 mg/1.
		9	4.7	4.8	4.9				
	10	90	4.9	5.0	5.0				
		9	5.8	5.8	5.8				
	5	90	5.3	5.4	5.3				
		9	6.1	6.2	6.1				
4.9[2]	27	91			3.0	3.1	3.0	3.0	Summer conditions, does not include SDS STP, CBOD and NBOD are utlimate values. STP effluents: NBOD 91 = NH_3 20.5 NBOD 46 = NH_3 10.3 NBOD 23 = NH_3 5.2 NBOD 12 = NH_3 2.5 T = 20°C
		46			3.3	3.4	3.3	3.3	
		23			3.4	3.6	3.4	3.4	
		12			3.5	3.6	3.5	3.5	
6.5[2]	27	91			6.0	6.0	5.9	6.0	Winter conditions, does not include SDS STP, CBOD and NBOD are ultimate values. T=7°C
		46			6.1	6.2	6.0	5.9	
3.9[3]	27	110	2.9						Summer conditions, does not include SDS STP, NBOD 110 = $NH_3$30, T=16°, 20°, & 24°C respectively. CBOD and NBOD are ultimate values.
			1.8						
			0.8						
		12		4.1		4.3			Summer conditions, does not include SDS STP, T=16°C, CBOD and NBOD are ultimate values, NH_3 = 2.5 and 5.0 mg/1 respectively.
		23		4.1		4.2			
		12		3.2		3.4			Summer conditions, does not include SDS STP, T=20°C, CBOD and NBOD are ultimate values, NH_3 = 2.5 and 5.0 mg/1 respectively.
		23		3.2		3.3			
		12		2.4	2.5	2.5			Summer conditions, does not include SDS STP, T=24°C, CBOD and NBOD are ultimate values, NH_3 = 2.5, 5.0, and 30 mg/1 respectively.
		23		2.3	2.4	2.5			
		110		1.7	1.9	1.9			
5.0[4]	10			5.5					Baseline, TKN=22 mg/1, Pol. Sec. at both regional and SDS STP
				6.2					Baseline, TKN=2 mg/1, Pol. Sec. at both regional and SDS STP
				5.4					37% more urbanization on east side of Jordan, TKN=22 mg/1
				6.3					Irrigation efficiency increased by 50%, TKN=22 mg/1
				4.9					Low flow conditions, TKN=22 mg/1
				0.0					Response to storm areal distribution #1, Kd=1.0/day and 0.2/day respectively
				3.8					
				2.7					Response to storm areal distribution #2, Kd=1.0/day and 0.2/day respectively.
				5.7					

[1]From: WQ-5.

[2]From: Way, T., The Jordan River: Ammonia/Chlorine Projections, Salt Lake County Department of Water Quality and Water Pollution Control, 101 pp., April 1978.

[3]From: Contant, C., Stream Response Simulation to Pollution Loadings for the Jordan River, University of Utah, Department of Civil Engineering, 68 pp., December 1977.

[4]From: WQ-12.

Table IV-15. Projected Ammonia Concentrations in the Jordan River

Effluent Conditions mg/1)			Maximum Instream NH_3 (mg/1)						Remarks
DO	CBOD	NBOD	Present Locations	One Plant	Two Plant	Three Plant	Four Plant	Five Plant	
3.9[1]	27	110	3.22 3.21 3.20						Summer conditions, doesn't include SDS STP, NBOD 110=NH_3 30 mg/1, T=16°, 20°, and 24°C respectively. CBOD & NBOD are ultimate values.
		12 23		(1.25)* 0.80 1.39		(1.25)* 0.90 1.37			Summer conditions, does not include SDS STP, T=16°C, CBOD and NBOD are ultimate values, NH_3 =2.5 and 5.0 mg/1 respectively.
		12 23		(1.25)* 0.80 1.39		(1.25)* 0.90 1.45			Summer conditions, does not include SDS STP, T=20°C, CBOD & NBOD are ultimate values, NH_3 =2.5 and 5.0 mg/1 respectively.
		12 23 110		(1.25)* 0.79 1.34 7.62	(1.25)* 0.90 1.45 7.49	(1.25)* 0.90 1.45 7.45			Summer conditions does not include SDS STP, T=24°C, CBOD and NBOD are ultimate values, NH_3 =2.5, 5.0, and 30.0 mg/1 respectively
4.9[2]	27	91 46 23 12			6.64 3.33 1.78 (1.17)* 0.97	6.51 3.33 1.74 (1.17)* 0.96	6.18 3.29 1.71 (1.17)* 0.96	6.17 3.17 1.71 (1.17)* 0.96	Summer conditions, does not include SDS STP, CBOD and NBOD are ultimate values, T=20°C NBOD 91=NH_3 20.5 46=NH_3 10.3 23=NH_3 5.2 12=NH_3 2.5
6.5[2]	27	91 46			5.66 3.11	5.57 3.07	5.48 2.94	5.48 2.94	Winter conditions, does not include SDS STP, CBOD and NBOD are ultimate values. T=7°C
5.0[3]	10			6.0					Summer conditions, TKN=22 mg/1, Pol. Sec. at both regional and SDS STP
				0.8					Summer conditions, TKN=2 mg/1, Pol. Sec. at both regional and SDS STP
				6.8					37% more urbanization on east side of Jordan, TKN=22 mg/1
				3.8					Irrigation efficiency increased by 50%, TKN=22 mg/1
				9.5					Low flow conditions, TKN=22 mg/1
5.0[4]	10		6.70 0.86		6.60 0.68				Summer conditions, TKN=22 and 2 mg/1 respectively, does not include SDS STP, T=21°C

*Numbers in parentheses indicate that projected maximum concentrations (in brackets) occur above first STP effluent outfall.

[1]From: Contant, C., Stream Response Simulation to Pollution Loadings for the Jordan River, University of Utah, Department of Civil Engineering, 68 pp., December 1977.

[2]From: Way, T., The Jordan River: Ammonia/Chlorine Projections, Salt Lake County Department of Water Quality & Water Pollution Control, 101 pp., April 1978.

[3]From: WQ-12.

[4]From: WQ-14.

Table IV-16. Projected Chlorine Concentrations in the Jordan River

Effluent Concentration CL_2 (mg/l)	Decay Coefficient (/day)	Maximum Instream CL_2 (mg/l)						Remarks
		Present Locations	One Plant	Two Plant	Three Plant	Four Plant	Five Plant	
1.00[1]	0.0			0.310	0.310	0.313	0.313	Summer Conditions
	1.0			0.266	0.258	0.240	0.240	
	5.0			0.187	0.205	0.205	0.205	
0.40[1]	0.0			0.124	0.124	0.125	0.125	
	1.0			0.106	0.103	0.096	0.096	
	5.0			0.082	0.082	0.082	0.082	
0.04[1]	0.0			0.012	0.012	0.013	0.013	
	1.0			0.011	0.010	0.010	0.010	
	5.0			0.008	0.008	0.008	0.008	
1.00[1]	0.0			0.252	0.252	0.255	0.255	Winter Conditions
	1.0			0.213	0.207	0.192	0.192	
	5.0			0.144	0.128	0.128	0.128	
0.40[1]	0.0			0.101	0.101	0.102	0.102	
	1.0			0.085	0.083	0.077	0.077	
	5.0			0.058	0.051	0.051	0.051	
0.04[1]	0.0			0.010	0.010	0.010	0.010	
	1.0			0.009	0.008	0.008	0.008	
	5.0			0.006	0.005	0.005	0.005	
0.40[2]	0.0	0.16	0.12	0.13				Summer Conditions
	1.0	0.11	0.12	0.11				

[1] From: Way, T., The Jordan River: Ammonia/Chlorine Projections, Salt Lake County Department of Water Quality and Water Pollution Control, 101 pp., April 1978.

[2] From: WQ-14.

Table IV-17. Summary of Bacteria
And Solids Projections for the Jordan River*

Ref.	Total Coliform Bacteria Max. No./100 ml	Total Dissolved Solids Max. Conc. (mg/1)	Total Suspended Solids Max. Conc. (mg/1)	Remarks
1	5200	1490		Baseline projection TKN=20 mg/1
2	4300	1440		37% more urbanization on east side of Jordan
	2230	1160		50% irrigation efficiency increase
	6640	1660		Low flow conditions
	360,000		880	Response to storm areal distribution #1, see WQ-12
	230,000		810	Response to storm areal distribution #2, see WQ-12

*Effluent BOD_5=10 mg/1 and TKN=22 mg/1 unless otherwise noted in "remarks" column.

Ref 1: WQ-5
Ref 2: WQ-12

Chlorine concentrations in the Jordan River were projected on a first estimate basis using decay coefficients of 0.0/day, 1.0/day and 5.0/day. Decay coefficients were used to account for the reduction of free chlorine to other non-toxic forms when it oxidizes organic matter. Most 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/1. Storm water treatment is also indicated here. Control of storm runoff is discussed in the Non-Point Plan section. Additionally, discussions with the Corps of Engineers has indicated that they will incorporate water quality consideration into their development plans for the lower Jordan River. (See Appendix A-4 and Jordan River Parkway: An Alternative, UTA, 1971).

More detailed information on water quality projections can be found in WQ-10, WQ-11, WQ-12, WQ-13, and WQ-14.

Irrigation Canals. 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 and by the practice of allowing new subdivisions to discharge storm runoff directly to the canals. This practice warrants future study by the Department. Projection of future water quality in the canal systems at this point in time would be misleading.

Sewage Canal. 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. It has been estimated that since the benefits derived from the improvement of the canal are far outweighed by the costs that would be incurred, improvement of the water quality will be a distant project, if it ever is.

Kersey Creek/C-7 Ditch. 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. 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. Therefore, abatement of the pollution problems in this system is high on the priority list of the new Department.

WASTE LOAD ANALYSIS

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. Non-point source pollution is minimal in the canyon portions of the streams except for Emigration Creek. Otherwise, point source contribution is negligible.

The waste loads presently generated from septic seepage and non-point sources in Emigration Canyon are severe enough to merit abatement. Any new construction in the canyon will produce an increase in pollution. The trade-off between installation of a sanitary sewer and the upgrading of septic tanks is being considered by the Department.

The valley segments of the Wasatch Mountain streams receive diffuse pollution loadings, principally from storm and urban runoff and water transfers from canals. The valley segments of Emigration, Mill, Big Cottonwood and Little Cottonwood Creeks are therefore 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. Pollutant loadings from point and non-point sources degrades the water quality to below proposed standards in many instances.

In many reports for the 208 Project, it was determined that polished secondary levels of sewage treatment (BOD_5=10 mg/1, SS=10 mg/1) and nitrification (90% N reduction) at sewage treatment plants are necessary to maintain ammonia and dissolved oxygen concentrations at acceptable levels in the Jordan River (WQ-6, FM-5, WQ-14, and others).

Wastewater CBOD and assimilation curves for the Jordan River are shown in Figure IV-14. Advanced nitrification (90% N reduction) increased DO concentrations by about 0.5 to 0.2 mg/1 in all cases.

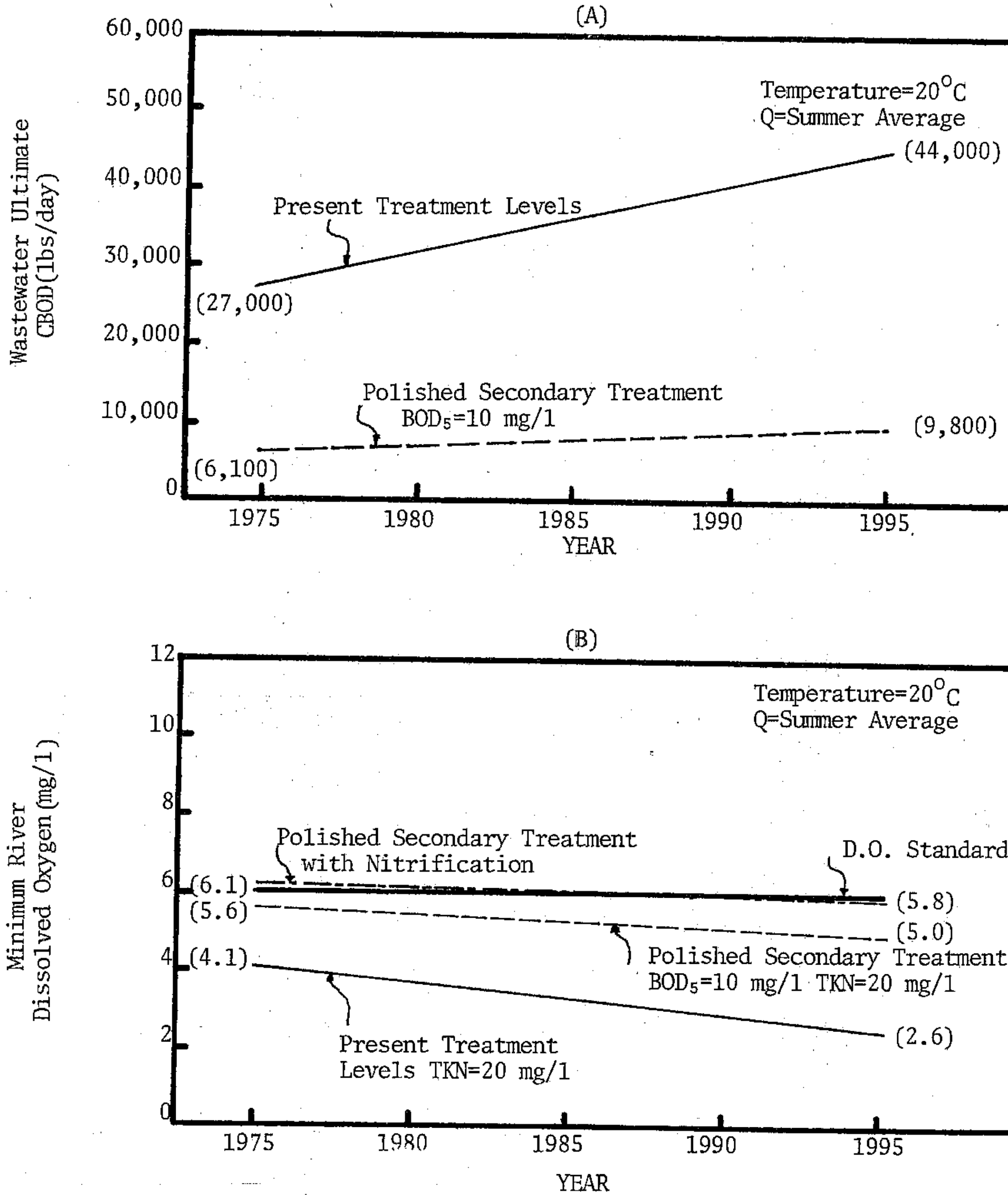

Figure IV-14 . Wastewater CBOD and Jordan River Assimilation Curves

Future municipal point discharges (STP effluents) will not degrade the water quality of the river to the extent that they do now. Polished secondary treatment will enable the STP's to meet future discharge requirements of 10 mg/1 BOD_5 and 10 mg/1 suspended solids and better. With 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. Control of point discharges will keep the quality high enough to attain desired in-stream concentrations. Just now much NPS reduction is needed to meet future stream standards should not be expressed as an overall percentage or other non-meaningful measure but should be evaluated on a section by section basis. The proposed plan for reducing NPS pollution, particularly from urban and storm runoff, is discussed in the Non-Point Plan section (Section VI).

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. Future loads to sewage treatment facilities are discussed in Section V and will not be discussed here. Future loads to surface waters have not been projected in detail due to inherent difficulties in projecting this impact. However, based upon present industrial patterns and present discharges from these industries, preliminary projections of the amounts of waste loads from present dischargers have been compiled.

An inventory of present industrial dischargers was undertaken and permit data compiled for those dischargers who have NPDES permits. Locations of existing NPDES dischargers that discharge to surface waters (discrete discharges) are shown in Figure IV-15 and are listed in Table IV-18. These dischargers have been evaluated as to the proposed "10/10" state standards (FM-1) that are to be enforced in the near future. The evaluation for present dischargers is listed in Table IV-19. (Note that the State now proposes to change the "10/10" standards to "15/10" standards - see Appendix A-2-3).

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 has been linked to employment increases in the manufacturing industry. Table IV-20 lists projected increases in this category by statistical areas.

As can be seen, 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. It is also projected that no new large water intensive industry will locate in Salt Lake County by 1995.

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). This flow augmentation/exchange situation has been discussed earlier in this section.

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. These canals receive numerous storm/urban runoff discharges from the many new subdivisions that are being constructed in that

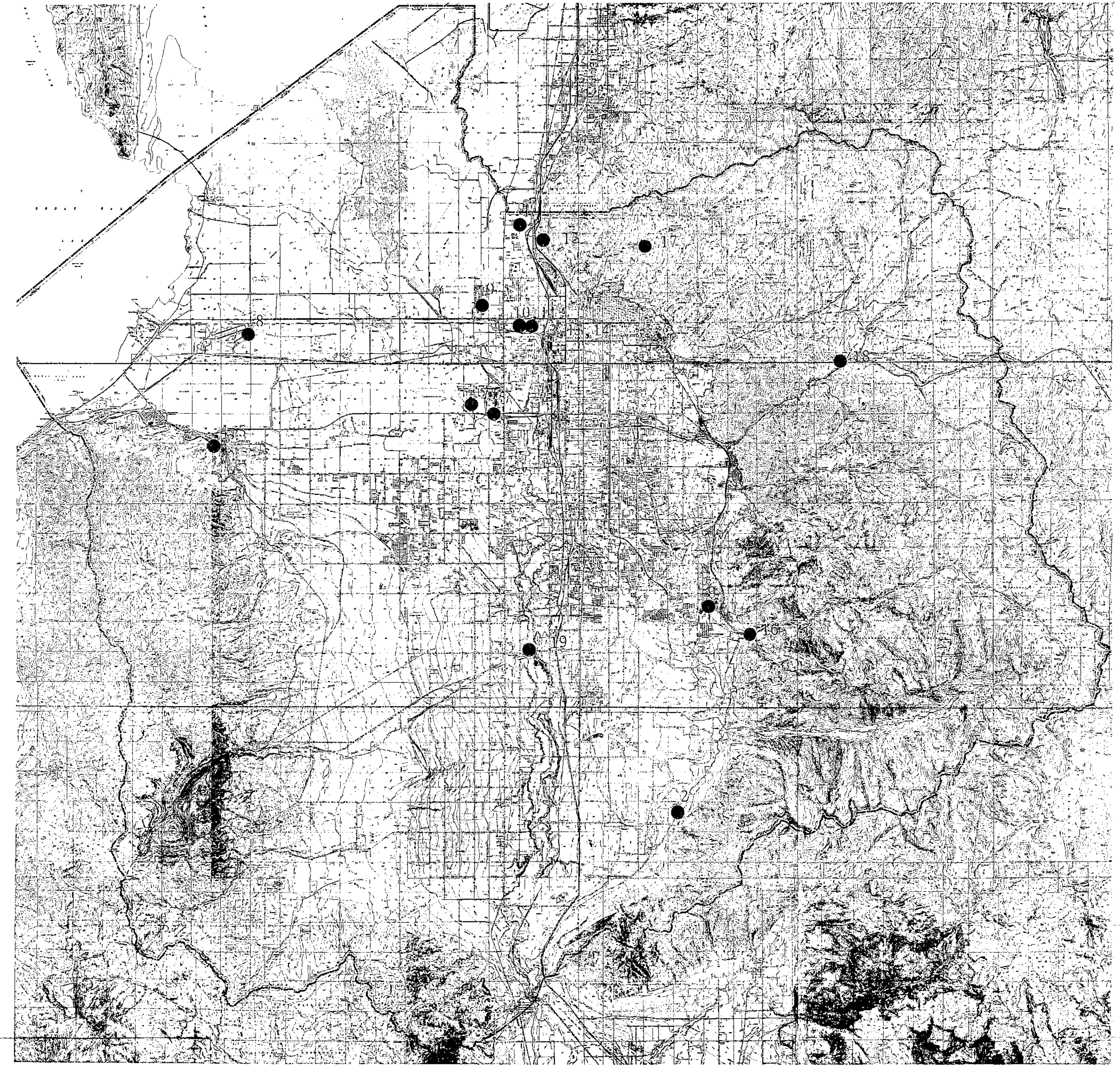

FIGURE IV-15

LOCATION OF EXISTING DISCRETE INDUSTRIAL NPDES DISCHARGES

1 CONCRETE PRODUCTS
2 DRAPER IRRIGATION CO.
3 EIMAC, DIV. OF VARIAN
4 KENNECOTT COPPER
5 KENNECOTT COPPER
6 KEY INDUSTRIES SE SAND & GRAVEL
7 METALS PROCESSING
8 MORTON SALT CO.
9 SPERRY UNIVAC
10 UTAH POWER & LIGHT
11 UTAH POWER & LIGHT
12 UTAH POWER & LIGHT
13 UTAH POWER & LIGHT
14 UTAH POWER & LIGHT
15 MONROC
16 BIG COTTONWOOD WATER PURIFICATION PLANT
17 CITY CREEK WATER PURIFICATION PLANT
18 PARLEY'S CANYON WATER PURIFICATION PLANT
19 MICHAEL'S FOOD MART

Salt Lake County Water Quality & Pollution Control

208 Water Quality Plan

Financed Under Section 208 of the Federal Water Pollution Control Act of 1972, as amended.

Sq. Miles 9 1

miles 0 1 2 3 4 5

NORTH

Table IV-18. Salt Lake County Industrial NPDES Permit Inventory

Name of Discharger	Location	SIC No	Activity	Receiving Water	Permit No / Exp'n Date	USO No	Source of Wastewater / Type of Current Treatment	Discharge Immediate / Future	Average Discharge (MGD)	Effective Date	BOD (mg/l)	Coliform Fecal (#/100ml)	Coliform Total (#/100ml)	COD (mg/l)	Sulfide (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	pH	Temp °C	Phosphorus (mg/l)	Nitrogen (mg/l)	TSS (mg/l)	TDS (mg/l)	Chlorine Residual (mg/l)	Oil & Grease (mg/l)	Miscellaneous	Remarks
AMERICAN OIL CO	SALT LAKE CITY	2911	MFG OF GASOLINES & OILS	S.L.C. STP	UT000006 6-30-81	001	PROCESS WATER	IMMEDIATE	0.0	6-28-76																	4-16-74 ALL DISCHARGE NOW DIVERTED TO S.L.C. STP
CLARK TANK LINES	1450 BECK ST SALT LAKE CITY	7538	TRUCKING TERMINAL MAINT & CLEAN	S.L.C. STP	UT0022390 12-31-80	001	PROCESS WATER SETTLING TANKS	IMMEDIATE FUTURE		1-1-76 7-1-80	25 10							6.5-9.0 6.5-9.0				25 10			10 10		ALL DISCHARGE NOW DIVERTED TO S.L.C. SEWAGE TREATMENT PLANT
CONCRETE PRODUCTS	2200 NO 1200 W SALT LAKE CITY	1442	WASHING & CLARIFYING SAND & GRAVEL	S.L.C. SEWAGE CANAL TO GREAT S.L.	UT0000663 6-30-81	001	PROCESS WATER SETTLING POND	DISCHARGE IMMEDIATE FUTURE	0.4	7-8-76 7-1-77 7-1-80		200 20	2000 200					7.5 6.5-9.0 6.5-9.0	21*			30 25 10			10		
DRAPER IRRIGATION CO	12590 SO 950 E DRAPER		CULINARY WATER PURIFICATION	BIG WILLOW CREEK	UT0022179 6-30-78	001	BACKWASH & INLET OVERFLOW SETTLING POND	IMMEDIATE FUTURE		(NOTE 1) 12-1-75 7-1-77								6.5-9.0				30 25		0.5		(Al = 1.0mg/l) (Al = 1.0mg/l)	APPLYING FOR RENEWAL
EIMAC DIVISION OF VARIAN	1678 PIONEER ROAD SALT LAKE CITY		ELECTRONICS	C7 DITCH TO GREAT SALT LAKE	UT000070[illegible] 12-31-81		PROCESS & STORMWATER PHYSICAL - CHEMICAL PLANT FOR PROCESS	DISCHARGE IMMEDIATE FUTURE	0.35	(NOTE 2) 6-30-80								6.5-9.0 6.5-9.0				20 10			10 10	(Cu=2.0mg/l)(Fe=0.25) (CN=0.50mg/l)	PERMIT OUT FOR PUBLIC COMMENT
KENNECOTT COPPER	MAGNA	1021	PRODUCTION OF COPPER ORE	C7 DITCH TO GREAT SALT LAKE	UT000005[illegible] 12-31-81	002	PROCESS WATER SETTLING POND	IMMEDIATE FUTURE		7-1-77 7-1-80	20 10	200 20	2000 200	30				6.5-9.0				20 10			10	(Cu=.15mg/l)(Fe=.3 mg/l) (CN=.03mg/l)(Pb=.2mg/l) (Mn=.15mg/l)(Hg=.001mg/l)	(Phenols=.1mg/l) (Zn=.3mg/l)
"	"	"	"	"	" "	006	PROCESS & SANITARY WASTEWATER PHYSICAL-CHEMICAL PLANT	IMMEDIATE FUTURE		7-1-77 7-1-80	10 10	200 20	2000 200		1.0			6.5-9.0				20 10			10	(Cu=.15mg/l)(Fe=.3mg/l) (Ag=.05mg/l)(CN=.03mg/l) (Pb=.2mg/l)(Phenols=.1mg/l)	(Mn=.3mg/l) (Zn=.3mg/l)
KEY INDUSTRIES SO. E. SAND & GRAVEL	6500 HOLIDAY BLVD HOLIDAY	1442	WASHING & CLARIFYING SAND & GRAVEL	BIG COTTONWOOD CREEK	UT000055[illegible] 9-30-81	001	PROCESS WATER SETTLING PONDS	IMMEDIATE FUTURE	0.28 0.0	10-1-76 7-1-77								7.8 6.5-9.0				25 30			4 10		NO DISCHARGE ALLOWED
CHRISTENSEN DIAMONDS	SALT LAKE CITY		INDUSTRIAL DIAMONDS & ELECTRO-PLATING	CITY STORM DRAIN	UT0000531 6-30-81	001	PROCESS WATER HOLDING TANK	IMMEDIATE FUTURE	0.02 0.02	7-1-76 7-1-81	25							6.5-9.0 6.5-9.0				25 10				(Cu=0.5)(Cr6+=.05)(Cd=.05) (Fe=1.0)(Cr=.1)(Pb=0.1) (Zn=1)(Ba=1.0)(Phenols=.1)	ALL FIGURES GIVEN IN MISCELLANEOUS COLUMN ARE IN (mg/l)
MORTON SALT CO	SALTAIR		SALT BY SOLAR EVAPORATION	RITTER CANAL	UT000038[illegible] 11-1-81	001 THRU 008	PROCESS WATER		2.64									6.5-9.0									
WERNELI REFRIGERATION CO.	264 GLENDALE SALT LAKE CITY	7538	SOFT DRINKS PROCESSING	JORDAN RIVER	UT0000752 9-30-81	001	VEHICLE CLEANING WASTEWATER GREASE TRAP	DISCHARGE IMMEDIATE FUTURE	10 GAL/DAY	10-1-76 7-1-80	38.5 25 10							6.93 6.5-9.0 6.5-9.0				4.5 10 10			2.3 10 10		ALL DISCHARGE NOW DIVERTED TO SALT LAKE CITY SEWAGE TREATMENT PLANT
SPERRY UNIVAC	322 NO 2200 W SALT LAKE CITY	3823	COMPUTER MFG.	BRIGHTON CANAL	UT0020397 6-30-79		STORMWATER RUNOFF & AIR CONDITIONER BLOW-DN.	IMMEDIATE										6.5-9.0									
STAUFFER CHEMICAL	MAGNA	281	FERTILIZER MFG.	C7 DITCH TO GREAT SALT LAKE	UT0000477 7-1-83	001 002	WATER SOFTENER REGENERANT SETTLING POND	DISCHARGE IMMEDIATE FUTURE	0.005	(NOTE 2) 7-1-80								6.5-9.0 6.5-9.0				25 10					PERMIT OUT FOR PUBLIC COMMENT
UTAH POWER & LIGHT (GADSBY PLANT)	SALT LAKE CITY	4911	PRODUCTION OF ELECTRIC POWER	JORDAN RIVER	UT000016 12-31-80	001	WATER TREATMENT	IMMEDIATE FUTURE	1.8 1.8	1-1-76 7-1-80								6.5-9.0 6.5-9.0	32.2 32.2			25 10		0.2 0.2	10 10	(Fe=1.0mg/l)(Cu=1.0mg/l)	
"	"	"	"	ABATEMENT CANAL	" "	004 005 006	NON-CONTACT BEARING COOLING WATER SETTLING POND	IMMEDIATE FUTURE		1-1-76 7-1-80								6.5-9.0 6.5-9.0	35 35			25 10		0.2 0.2	10 10	(Fe=1.0mg/l)(Cu=1.0mg/l)	
UTAH POWER & LIGHT (JORDAN PLANT)	SALT LAKE CITY	4911	PRODUCING ELECTRICAL POWER	JORDAN RIVER	UT000010[illegible] 12-31-80	001	CONDENSOR CLG. WATER	IMMEDIATE	27 55 (MAX)	1-1-76								6.5-9.0	32.2					0.2	10	(Cu=1.0mg/l) (Fe=1.0mg/l)	NORMALLY ON STANDBY— USED ONLY OCCASIONALLY
"	"	"	"	"	"	002	NON-CONTACT BEARING COOLING WATER	IMMEDIATE	0.005	1-1-76								6.5-9.0	32.2								
MONROC	1730 BECK ST. SALT LAKE CITY	1442	WASHED SAND & GRAVEL	"	UT000056[illegible] 6-30-81	001	PROCESS WATER SETTLING POND	IMMEDIATE		7-1-77 7-1-80								6.5-9.0 6.5-9.0				25 10			10		NO DISCHARGE
HUNTSMAN OIL & CHEMICAL CO.	1979 SO 600 W. SALT LAKE CITY	281	COMPOUND & MIXED CHEMICALS		UT00002[illegible] 9-30-78	001		(NOTE 3)	0	10-5-73																	ZERO DISCHARGE
BIG COTTONWOOD WATER PURIFICATION PL.	BIG COTTONWOOD CANYON		CULINARY WATER TREATMENT	BIG COTTONWOOD CREEK	UT0000680 6-30-82	001	CLARIFIER OVERFLOW NONE	IMMEDIATE		10-22-77 7-1-80								6.5-9.0				25 10		0.5		(Al=1.5mg/l)	
"	"		"	"	" "	[illegible]	SLUDGE BED OVERFLOW NONE	IMMEDIATE	0.15	10-22-77 7-1-80												25 10		0.5		(Al=1.5mg/l)	
CITY CREEK WATER PURIFICATION PL.	CITY CREEK CANYON		CULINARY WATER TREATMENT	CITY CREEK	UT0000671 6-30-82	002	CLARIFIER & INLET OVERFLOW NONE	IMMEDIATE										6.5-9.0				25 10				(AL=1.5 mg/l)	
"	"		"	"	" "	003	SLUDGE PUMPWELL DRAIN NONE	IMMEDIATE										6.5-9.0				25 10				(Al=1.5 mg/l)	
PARLEYS CANYON WATER PURIFICATION PL.	PARLEYS CANYON		CULINARY WATER TREATMENT	PARLEYS CREEK	UT0000698 6-30-82	004 005	EFFLUENT & PLANT OVERFLOW NONE	IMMEDIATE										6.5-9.0				25 10				(Al=1.5 mg/l)	
"	"		"	MOUNTAIN DELL RESERVOIR	" "	[illegible]	SLUDGE BED DISCHARGE NONE	IMMEDIATE	0.15									6.5-9.0				25 10				(Al=1.5mg/l)	
MICHEAL'S FOOD MART	1550 W 7800 SO.		FOOD MARKET	IRRIGATION DITCH JORDAN RIVER	UT0022900 12-31-80	001	AIR CONDITIONING COOLANT NONE	IMMEDIATE	.001									6.5-9.0	32								NOTHING OTHER THAN HEAT TO BE ADDED TO THE DISCHARGE

UPDATED 7-21-78 by T.W.
NOTE 1: IN PROCESS OF REAPPLYING TO EPA a/o 7-21-78.
NOTE 2: EFFECTIVE DATE 30 DAYS FOLLOWING RECEIPT OF APPROVED PERMIT.
NOTE 3: FORMALLY WASATCH CHEMICAL CO. - MAY CHANGE NATURE OF FACILITY AND NOT REAPPLY FOR NEW PERMIT.

Table IV-19. Evaluation of Present Industrial Dischargers as to Processes Necessary to Meet Proposed "10/10" Standards and Increases in Loads Where "10/10" Standards are Expected to be Satisfied (Discrete Dischargers)

Discharge Number	Name of Discharger	Receiving Water	Processes or Loads
1	Concrete Products	SLC Sewage Canal	Total confinement to meet 10/10 standards
2	Draper Irrigation Company	Big Willow Creek	Total confinement to meet 10/10 standards
3	EIMAC	C7 Ditch	Quantity increases at rate of employment in manufacturing industry
4,5	Kennecott	C7 Ditch	Quantity will remain constant or decline somewhat
6	Key Industries	Big Cottonwood Cr.	Total confinement to meet 10/10 standards
7	Christensen Diamonds	City Storm Drain	Quantity increases at rate of employment in manufacturing industry
8	Morton Salt Co.	Ritter Canal	Quantity increases at rate of employment in manufacturing industry
9	Sperry UNIVAC	Brighton Canal	Quantity will remain same
10,11	Utah Power & Light Co. (Gadsby Plant)	Jordan River	Quantity will remain the same-filters and/or other treatment will be necessary to meet 10 mg/1 TDS
12,13,14	Utah Power & Light Co. (Jordan Plant)	Jordan River	Quantity will remain the same (Plant not presently in operation)
15	Monroc	SLC Sewage Canal	Total confinement to meet 10/10 standards (at present)
16	Big Cottonwood Water Purification Plant	Big Cottonwood Creek	Total confinement to meet 10/10 standards
17	City Creek Water Purificat. Plant	City Creek	Total confinement to meet 10/10 standards
18	Parley's Water Purificat. Plant	Mt. Dell Reservoir	Total confinement to meet 10/10 standards
19	Michael's Food Mart	Irrigation Ditch-Jordan River	Quantity will remain the same

See Figure IV-14.

Table IV-20. 1975-1985-1995 Located Employment in Manufacturing Industry by Statistical Area Group

Statistical Area	Year	Employment	Percent Change
TOTAL CENTRAL AREA	1975	14,010	-5
	1985	13,342	4
Central Salt Lake City	1995	13,874	
TOTAL INNER FRINGE	1975	14,433	33
	1985	19,232	38
Salt Lake Airport, Big Cottonwood, Murray, So. Salt Lake	1995	26,627	
TOTAL SUBURBAN FRINGE	1975	4,050	3
Little Cottonwood, Hunter-Granger, Kearns, Midvale, Draper, W. Jordan, S. Jordan, Riverton	1985	4,167	36
	1995	5,662	
TOTAL WEST MOUNTAINS	1975	3,735	-11
Oquirrh Mount. W. Salt Lake Smaller Airport, Coppermine Refining Tailings Pond	1985	3,326	46
	1995	4,846	
TOTAL WASATCH MOUNTAINS	1975	0	0
Wasatch Mountains, Alta, Traverse Mountains	1985	0	0
	1995	0	
COUNTY TOTALS	1975	36,228	11
	1985	40,067	27
	1995	51,009	

area. This practice is discouraged by the Department. These canals also receive numerous agricultural returns. The extent of these returns is not precisely known.

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 segment will probably retain a WQL classification for quite some time as the economics of the situation do not favor the "cleaning up" of the canal. This canal was constructed for the purpose of waste disposal. However, the canal cannot remain an "open sewer".

As before, the situation in the Kersey Creek/C-7 Ditch system is different. The 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 existing quality, a meaningful classification cannot be developed.

Proposed State water quality standards are not stringent enough in the anti-degradation policy area. Only new point discharges of wastewater are disallowed. Consistent with the antidegradation policy, the quality of designated streams should not be degraded. However, without some release from this policy, it would become, in essence, a no development policy. Costs of protecting designated streams would be less than the increased costs of water treatment that would be incurred. The requirement of developers to institute best management practices and to carry out water quality monitoring attendent with construction should enable the State Water Pollution Control Committee and the Department Council to review conditions of degradation and make any variances or requirements necessary for abatement of non-point pollution. Culinary water supply in Salt Lake County is now at a premium and should not be wasted or destroyed.