QUALITY OF WATER
COLORADO RIVER BASIN

PROGRESS REPORT NO. 12

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UNITED STATES
DEPARTMENT OF THE INTERIOR
William P. Clark, Secretary

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SUMMARY

The Quality of Water Progress Report for the Colorado River Basin is prepared and updated every 2 years to summarize the status of water quality in the Colorado River Basin. Although several water quality parameters are reviewed, salinity is by far the most serious and is allotted a major portion of this report. The report summarizes the past, present, and future projected salinities at various stations in the basin; discusses the causes of salinity; summarizes the development of the water supply of the basin and its impact on salinity; reviews the salinity control program; and summarizes special studies related to water quality in the basin.

Extremely high flows in the Colorado River, two to three times normal, have reduced salinity to its lowest level in 30 years. All of the main stem reservoirs were flushed by these high flows and now have in storage water with unusually low salinities. According to the latest salinity projections, the numeric criteria at Imperial Dam will be satisfied until 1993 by the salinity control units already in operation. Development in the basin, which reduces the flow of the river and its ability to dilute salinity, is projected to increase water depletions from 9.6 million acre-feet per year in 1983 to 12.8 million acre-feet per year by 2010. To maintain the numeric salinity criteria of 879 milligrams per liter (mg/L) at Imperial Dam, a 1.5-million-ton salt load reduction will be necessary to compensate for the development of this water.

Nutrient loading to the main stem reservoirs is becoming a problem as development and its associated pollution increase. Increases in phosphorus and nitrogen compounds which are essential to the growth of algae, the base of the food chain in reservoirs, are causing some portions of the reservoirs to become eutrophic (overly productive). Eutrophication of reservoirs can impair municipal, industrial, and recreational uses by causing taste and odor problems, creating toxins, and reducing the dissolved oxygen available for fish. While nutrients in some reservoirs are causing them to become eutrophic, reservoirs further downstream are becoming nutrient poor due to the trapping of nutrients in the upstream reservoirs. This has the effect of reducing the productivity of the fisheries by limiting their food supply. Studies are described which help define and resolve some of these problems in the Colorado River Basin.

PART I. INTRODUCTION

A. Authorization for Report

This is the 12th Biennial Progress Report on Quality of Water in the Colorado River Basin. The directive for preparing this report is contained in four separate public laws--Public Law 84-485, Public Law 87-483, Public Law 87-590, and Public Law 93-320.

Public Law 84-485 states:

"The Secretary of the Interior is directed to continue studies and make a report to the Congress and to the States of the Colorado River Basin on the quality of water of the Colorado River."

Public Law 87-483 states:

"The Secretary of the Interior is directed to continue his studies of the quality of water of the Colorado River system, to appraise its suitability for municipal, domestic, and industrial use and for irrigation in the various areas in the United States in which it is used or proposed to be used, to estimate the effect of additional developments involving its storage and use (whether heretofore authorized or contemplated for authorization) on the remaining water available for use in the United States, to study all possible means of improving the quality of such water and of alleviating the ill effects of water of poor quality, and to report the results of his studies and estimates to the 87th Congress and every 2 years thereafter."

Public Law 87-590 stipulates that January 3 would be the submission date for the report.

Public Law 93-320 states:

"Commencing on January 1, 1975, and every 2 years thereafter, the Secretary shall submit, simultaneously, to the President, the Congress, and the Advisory Council created in Section 204(a) of this title, a report on the Colorado River Salinity Control Program authorized by this title covering the progress of investigations, planning, and construction of salinity control units for the previous 2 fiscal years; the effectiveness of such units; anticipated work needed to be accomplished in the future to meet the objectives of this title, with emphasis on the needs during the 5 years immediately following the date of each report; and any special problems that may be impeding progress in attaining an effective salinity control program. Said report may be included in the biennial report on the quality of water of the Colorado River Basin prepared by the Secretary pursuant to section 15 of the Colorado River Storage Project Act (70 Stat. 111; 43 U.S.C. 602n), section 15 of the Navajo Indian Irrigation Project, and the initial stage of the San Juan-Chama Project Act (76 Stat. 102), and section 6 of the Fryingpan-Arkansas Project Act (76 Stat. 393)."

Nothing in this report is intended to interpret the provision of the Colorado River Compact (45 Stat. 1057), the Upper Colorado River Basin Compact (63 Stat. 31), the Water Treaty of 1944 with the United Mexican States (Treaty Series 994; 59 Stat. 1219), the decree entered by the Supreme Court of the United States in Arizona vs. California et al. (376 U.S. 340), the Boulder Canyon Project Act (45 Stat. 1057), the Boulder Canyon Project Adjustment Act (54 Stat. 774; 43 U.S.C. 618a), the Colorado River Storage Project Act (70 Stat. 105; 43 U.S.C. 620), or the Colorado River Basin Project Act (82 Stat. 885; 43 U.S.C. 1501).

B. Previous Reports and Cooperating Agencies

A series of 11 reports starting with the 1963 edition has been prepared prior to this report. Each succeeding report updated the previous report.

This report was prepared by the Bureau of Reclamation (Reclamation) and utilizes basic data provided primarily by the U.S. Geological Survey (USGS). A continuing cooperative program between Reclamation and USGS, in effect for a number of years, provides for the collection of streamflow data at stations other than basic data stations maintained by USGS in order to obtain additional information at key points in the basin.

In the Upper Basin, data are obtained at various points along the river and in drains cooperatively with the USGS and other agencies. Along the main stem in the Lower Basin, data are obtained on a regular basis at stations that include essentially all significant diversions, surface return flows, and major river points. Reclamation is the lead agency of an ongoing task force for coordinating the collection of other quality data in the Lower Basin. Other members of the task force include representatives from the USGS, International Boundary and Water Commission, and Environmental Protection Agency (EPA).

C. Legal Aspects

1. Water Quantity

Apportionment of Colorado River water has been accomplished by the Colorado River Compact of 1922, the Mexican Treaty of 1944, the Upper Colorado River Basin Compact of 1948, and the U.S. Supreme Court (State of Arizona vs. California et al., 1964).

The first of these, the Colorado River Compact, divided the Colorado River between the Upper and Lower Basins at Lee Ferry (just below the confluence of the Paria River), apportioned to each basin 7.5 million acre-feet annually, and contains provisions governing exportation and obligations to Indian Tribes. Further, the Mexican Treaty of 1944 obligates the United States to deliver to Mexico 1.5 million acre-feet of Colorado River water annually.

The Upper Colorado River Basin Compact of 1948 further apportioned Colorado River water, allocating to Arizona 50,000 acre-feet annually, with the remaining water allocated to Upper Basin States as follows: Colorado, 51.75 percent; New Mexico, 11.25 percent; Utah, 23 percent; and Wyoming, 14 percent. The compact permitted the authorization of Federal projects above Lee Ferry. States of the Lower Basin, however, did not agree to a compact for the apportionment of waters in the Lower Colorado River Basin; accordingly, a Supreme Court decree (Arizona vs. California et al.) in 1964 allocated use of the main stream of the river below Lee Ferry among California, Nevada, and Arizona and of the Gila River between the States of Arizona and New Mexico. The decree also permitted Federal water projects and the development of Indian tribal lands to proceed.

2. <u>Water Quality</u>

Although a number of water quality related legislative actions have been taken on the State and Federal levels, four Federal acts are of special significance to the Colorado River Basin--the Water Quality Act of 1965 and related amendments, the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500), the Colorado River Basin Salinity Control Act of 1974, and the Clean Water Act of 1977. Also central to water quality issues are agreements with Mexico on Colorado River system waters entering that country.

The first of these, the Water Quality Act of 1965 (Public Law 89-234), amended the Federal Water Pollution Control Act and established a Federal Water Pollution Control Administration (now EPA). Among other provisions, it required States to adopt water quality criteria for interstate waters inside their boundaries. The seven Basin States initially developed water quality standards which did not include numeric salinity criteria for the Colorado River, primarily because of technical constraints. In 1972, the States agreed to a policy which called for the maintenance of salinity concentrations in the Lower Colorado River system at or below existing levels, while the Upper Basin States continued to develop their compact-apportioned waters. The States suggested that Reclamation should have primary responsibility for investigating, planning, and implementing the proposed Colorado River Basin Salinity Control Program with the assistance of the Federal Office of Saline Water and EPA.

The late enactment of the Federal Water Pollution Control Act Amendment of 1972 affected salinity control in that the legislation was interpreted by EPA to require numerical standards for salinity in the Colorado River. In response, the Basin States founded the Colorado River Basin Salinity Control Forum (Forum) to develop numeric salinity criteria and a basinwide plan of implementation for salinity control. The Basin States held public meetings on the proposed standards as required by the enacting legislation. The Forum recommended that the individual Basin States adopt the report, Water Quality Standards for Salinity Including Numeric Criteria and Plan of Implementation for Salinity Control, Colorado River System. The proposed water quality standard called for maintenance of flow-weighted average total dissolved solids (TDS) concentrations of 723 mg/L below Hoover Dam, 747 mg/L below Parker Dam, and 879 mg/L below Imperial Dam. Included in the plan of implementation were four salinity control units and possibly additional units, the application of effluent limitations, the use of saline water whenever practicable, and future studies. The standards are to be reviewed at 3-year intervals. All of the Basin States adopted the 1975 Forum-recommended standards.

The Colorado River Basin Salinity Control Act of 1974 (Public Law 93-320) provided the means to comply with United States obligations to Mexico which included as a major feature a desalting plant and brine discharge canal. These facilities will enable the United States to deliver water to Mexico having an average salinity no greater than 115 parts per million (ppm) ± 30 ppm (United States count) over the annual average salinity of Colorado River waters at Imperial Dam. The act also authorized construction of 4 salinity control units and the expedited planning of 12 other salinity control projects above Imperial Dam as part of the basinwide salinity control plan.

In 1984, the Forum reviewed the salinity standards which were adopted by all of the 7 Basin States and recommended the construction of 3 of the 4 salinity control units and 10 of the 12 projects identified in the 1974 Act, the placing of effluent limitations on industrial and municipal discharges, and the reduction of the salt loading effects of irrigation return flows. The plan also called for the inclusion of water quality management plans to comply with Section 208 provisions after the adoption of the plans by the States and approval by EPA. It also contemplated the use of saline water for industrial purposes and future salinity use control methods.

The 98th Congress passed HR-2790 which amends Public Law 93-320, the Colorado River Basin Salinity Control Act. The President signed the bill on October 30, 1984, and the legislative initiative has become Public Law 98-569. This action is the culmination of a significant 2 1/2-year effort by the Colorado River Basin States working in close cooperation with the involved Federal agencies to amend, enhance, and update the 10-year-old Salinity Control Act.

The Colorado River Basin Salinity Control Act, as now amended, provides the authority for the pursuit of salinity control measures, primarily by the Department of the Interior and the Department of Agriculture, that will allow for the necessary salinity controls on the river to be put in place through the year 2000. It will insure, if implemented, the compliance with the numeric criteria at least through the year 2005.

Following are some of the highlights of the legislative amendments, basically in the order as they appear in the legislation.

Direction has been given to Federal agencies to use cost effectiveness as an underlying decisionmaking criteria as they determine which of the programs or salinity control units should be implemented.

Stage 1 of the Lower Gunnison Basin Unit in Colorado was authorized.

The portions of the McElmo Creek Unit in Colorado which will be constructed in concert with the Dolores Project were authorized.

The Bureau of Land Management was instructed to proceed with advance planning for the Sinbad Valley Unit in Colorado.

Feasibility studies with industrial water users were authorized as a part of ongoing Saline Water Use and Disposal Opportunities activities.

The Secretary of the Interior was given authority to enter into contracts with non-Federal entities to organize private canal and lateral owners into formal organization. The Secretary may enter into a grant or contract with owner organizations to construct, operate, and maintain the facilities of a unit.

Authority was given for funds to be spent on measures to replace incidental wildlife values foregone as the salinity control program is implemented.

The Secreatry of Agriculture was authorized to establish a major voluntary on-farm cooperative salinity control program. With time, the Department of Agriculture program has the potential of being as important as the program of the Department of the Interior in reducing the salinity in the Colorado River Basin.

The Bureau of Land Management was instructed to prepare a report by July 1, 1987, describing the program and recommended implementation actions to minimize salt contributions to the Colorado River from lands administered by the Bureau of Land Management.

Additional cost sharing for the agriculture program and the newly authorized Department of the Interior programs was also required by the Congress from the Basin States. The 1974 Act has required that there be repayment for the units authorized in Public Law 93-320 in the amount of 25 percent over 50 years without interest. The legislation directs the Secretary of Agriculture to target for 30 percent local cost sharing for the implementation of on-farm improvement programs. Additionally, 30 percent of the balance of the Department of Agriculture's cost-share program and 30 percent of the costs of the Department of the Interior's newly authorized programs will be reimbursed to the Federal treasury from the Upper and Lower Basin Funds.

The legislation deauthorized the Crystal Geyser Unit which was authorized in 1974. Studies by the Department of the Interior, Bureau of Reclamation, have indicated that this is not a cost-effective unit.

PART II. DESCRIPTION OF BASIN

A. Climate

Extremes of temperature in the Colorado River Basin range from -50 to 130° F. The northern portion of the basin is characterized by short, warm summers and long, cold winters; and many mountain areas are blanketed by deep snow all winter. Much of the Intermountain area consists of high basins or valleys with cold winters and hot dry summers. The southern desert portion of the basin has long, hot summers, practically continuous sunshine, and almost complete absence of freezing temperatures. Rainfall averages 2.5 inches per year in the southern end of the basin, while total precipitation in the mountains reaches 40 to 60 inches annually.

B. Hydrology

The Colorado River begins where peaks rise more than 14,000 feet in the northwest portion of Colorado's Rocky Mountain National Park, 70 miles northwest of Denver. It meanders southwest for 640 miles through the Upper Basin to Lee Ferry.

The Green River, the major tributary of the Colorado River, rises in western Wyoming and discharges into the river in southeastern Utah--730 river miles south of its origin and 220 miles above Lee Ferry. The Green River drains 70 percent more area than the Colorado River above their junction but produces only about three-fourths as much water. The Gunnison and San Juan Rivers are the other principal tributaries of the Colorado River in the Upper Basin.

The Colorado River Basin has a total area of approximately 244,000 square miles, carrying an average annual virgin flow of 13 to 15 million acre-feet at Lee Ferry. Of this flow, more than 5 million acre-feet per year are exported to the Arkansas and Missouri River Basins, the Great Basin, southern California, and the Rio Grande River Basin.

The Colorado River Basin is an arid or semiarid basin. Compared to others, such as the Columbia Basin, which drains approximately the same area, it carries a smaller flow, as shown in the following table. While the Colorado River is one of the major drainage basins in the continental United States, its runoff is about equal to that of the Delaware, which drains a much smaller area.

Comparison of river basin drainage

River basin	Area (1,000 square miles)	Runoff (million acre-feet per year)	Runoff per unit area (inches/years)
Colorado	244	15	1.15
Mississippi	1,234	440	6.7
Columbia	258	180	13.1
Delaware	12	14	20.9

The flow at various points in the Colorado River Basin for the 1941-83 period is given in Tables 1 through 20 at the end of this report. The records of flow depict characteristic-wide fluctuations month to month and considerable variation year to year. The storage reservoirs now reduce some of the fluctuation in the reaches below the major dams.

C. Reservoir Storage

Wet and dry cycles have played a significant role in bringing about the development of the Colorado River Reservoir complex. In the past, the annual flow of the river has varied from less than 6 million acre-feet to over 20 million acre-feet per year. The reservoir system allows storage of sufficient water to maintain the flows of the river to meet downstream needs during dry periods.

The construction and filling of the main stem reservoirs of the Colorado River Basin have brought about significant changes in the flow patterns of the river. In addition to the major reservoirs, numerous smaller reservoirs have been built on many of the tributaries. Since major storage began with Lake Mead in 1935 and concluded with the filling of Lake Powell in 1980, the Colorado River Basin reservoirs now have a combined storage capacity equal to approximately four times the total average annual virgin (undepleted) flow of the entire Colorado River.

The flows of the San Juan River are controlled by the Navajo Dam, the Green River by Fontenelle and Flaming Gorge Dams, and the Gunnison River by the Wayne N. Aspinall Unit Dams. Glen Canyon Dam is the only major dam on the main stem of the Colorado above Lee Ferry, but it will permit control of almost all flows leaving the Upper Basin.

Lake Mead, formed by Hoover Dam, provides most of the storage and regulation in the Lower Colorado River Basin, providing for irrigation, municipal and industrial (M&I) uses, power generation, flood control, recreation, and other beneficial uses.

Lake Mohave, the reservoir formed by Davis Dam, backs water at high stages about 67 miles upstream to the tailrace of Hoover Powerplant. Storage in Lake Mohave is used for some reregulation of releases from Hoover Dam, for meeting treaty requirements with Mexico, and for developing power head for the production of electrical energy at Davis Powerplant. The river flows through a natural channel for about 10 miles below Davis Dam at which point the river enters the broad Mohave Valley 33 miles above the upper end of Lake Havasu.

Lake Havasu backs up behind Parker Dam for about 45 miles and serves as a forebay from which the Metropolitan Water District of Southern California pumps water into the Colorado River Aqueduct. Lake Havasu also serves as forebay for the Central Arizona Project pumping plants and aqueducts. Lake Havasu and Alamo Dam and Reservoir, on the

Bill Williams River, are used to control floods originating below Davis Dam and above Parker Dam.

Headgate Rock Dam, Palo Verde Diversion Dam, and Imperial Dam all serve as diversion structures with practically no storage. Imperial Dam, located some 150 miles downstream from Parker Dam, is the major diversion structure to irrigation projects in the Imperial Valley and Yuma areas. It diverts water on the right bank to the All American Canal, which delivers water to the Yuma Project in Arizona and California and Imperial and Coachella Valleys in California. It diverts on the left bank to the Gila Gravity Main Canal.

The Senator Wash Dam, an offstream storage facility, also affords regulation in the vicinity of Imperial Dam and assists in the delivery of water to Mexico. This facility is used for pumpback storage, power generation, and recreation.

The Morelos Dam is located just below the Northern International Boundary with Mexico and is the last dam on the Colorado River. This small diversion dam diverts water into the Alamo Canal which delivers water to northern Mexico.

D. Geology and Soils

The geology of the Colorado River Basin is highly varied. Igneous, metamorphic, and sedimentary rock types are present and range in age from approximately 625 million years old to recent alluvial deposits. Structural features, including anticlines, domes, and faults contribute to both the topographic relief and the geohydrology of the region.

Several of the sedimentary formations in the basin were deposited in marine or brackish water environments. Occurrences of bedded and disseminated sodium chloride (halite) and calcium sulfate (gypsum) are observed, as are clays with high contents of exchangeable sodium and magnesium.

The soils of the Colorado River Basin closely resemble the geologic formations from which they were derived. Residual soils derived from shale or sandstone are generally shallow. These soils can contain appreciable soluble mineral content due to residuum and secondary mineral formation from the parent material. Upon weathering or irrigation, salts may accumulate on or near the surface due to evaporation or consumptive use by plants.

Soils derived from alluvial materials vary in composition and thickness. The deposits vary in origin and range from alluvial fans and terraces to outwash plains and lake sediments. Some soils are composed of material transported short distances. Soils that have been transported longer distances are well mixed with respect to texture and composition.

Extensive areas of wind-arranged eolian deposits (such as sand dunes) occur in parts of the basin. Soils derived from eolian materials are uniformly textured and generally reddish brown in color. These are excellent agricultural soils when topography does not make farming prohibitive.

PART III. CAUSES AND IMPACTS OF SALINITY

A. Increased Concentration from Salt Additions

1. Natural Sources of Salinity

Flow and quality records reveal that along certain reaches of the Colorado River there are large increases in the dissolved solids load that cannot be attributed to irrigation or other man-related activity. This increase is mainly due to natural diffuse sources and saline springs. Very little information was obtained prior to irrigation, making it difficult to identify the magnitude of specific natural sources of salinity in the Colorado River Basin.

Natural diffuse sources are those sources of salt contribution which occur gradually over long reaches of the river system. Salt pickup occurs over large surface areas, from underlying soils, and from stream channels and banks. It is difficult to identify, measure, or control. Diffuse sources contribute the largest overall share of the salts to the Colorado River. Natural point sources are mainly saline springs where the contribution of salt and water is easily identified, issuing from single or concentrated sources.

2. Agricultural Sources of Salinity

Irrigation development in the Upper Basin took place gradually from the beginning of settlement in about 1860 but was hastened by the purchase of land from the Indians in 1873. About 800,000 acres were being irrigated by 1905. Between 1905 and 1920 the development of irrigated land increased at a rapid rate, and by 1920 nearly 1.4 million acres were being irrigated. The development then leveled off, and increase since that time has been slow because of physical and economic limitations on the availability of water.

Irrigation development began in the Lower Basin at about the same time as in the Upper Basin but was slow due to the difficulty of diverting from the Colorado River with its widely fluctuating flows. Development of the Gila area began in 1875 and the Palo Verde area in 1879. Construction of the Boulder Canyon Project in the 1930's and other downstream projects since that time has provided for a continued expansion of the irrigated area. In 1970, an additional 21,800 acres were irrigated by private pumping either directly from the Colorado River or from wells in the flood plain. In 1974, nearly 849,000 acres were irrigated from Colorado River diversions below Hoover Dam.

Irrigation in the Colorado River Basin has increased the TDS in the Colorado River. Return flows from the irrigated lands dissolve salts from the soils and underlying aquifer material and transport them to the river. The development of future irrigation projects will further increase the salt load to the river.

Studies prior to irrigation would be helpful to determine contribution from irrigation, but they have not been made in most areas. The amount of salt from this source must, therefore, be estimated or determined by detailed investigations, possibly with the use of simulation models.

Salt balance conditions exist when the amount of dissolved solids carried off the land is equal to that amount added. Pickup of salt as used in this report represents an unbalanced condition shown by the increase of TDS load in the return flow over the total load in the applied water. Salt pickup attributed to irrigation is only that additional amount which occurs as a result of irrigation and does not include the amount resulting from natural sources.

3. Municipal and Industrial Sources of Salinity

Salt loads contributed to the Colorado River system by municipal and industrial sources are generally minor, totaling about 1 percent of the basin salt load. Future increases in salt loads from these sources are expected to be small relative to the total basin salt burden and will have only a minor effect on salinity levels.

Most municipal and industrial wastes are relatively low in total salt load in comparison with natural and agricultural sources, and complete elimination of such waste discharges would have little effect on salinity concentrations in the main river system. Since these wastes are point sources of salinity, control could be achieved if salinity levels in the waste being discharged (i.e., industrial brines) warrant such control.

Development of oil and gas, oil shale, and mineral resources in the basin also has the potential to increase salt loading. Many saline aquifers are static (very little water movement) until they are disturbed by drilling or mining activities. An example is the Meeker Dome Salinity Control Unit, described in Part VII, which came about as the result of deep ground water, high in dissolved salts, flowing to the surface through abandoned oil wells.

B. Increased Concentration from Water Depletions

Addition of salts to the river system is not the only cause of increased salinity concentrations. The depletion of water of better quality in the Upper Basin produces a concentrating effect on the waters of the downstream reaches. This concentrating effect occurs to a greater degree when the diverted salts return to the river than when they are depleted along with the water.

Since the Lower Basin has already developed most of its water supply with the exception of the Central Arizona Project, most of the additional future depletions will be developed in the Upper Basin. Depletions in the Upper Colorado Basin were 4 million acre-feet in 1983.

Assuming a yield of 5.8 million acre-feet for the Upper Basin, this leaves approximately 1.8 million acre-feet to be developed.

Consumptive use of water for irrigation within the basin and exports from the basin were responsible for the largest depletions of the Colorado River, while reservoir evaporation and municipal and industrial uses account for a lesser depletion.

Average water use of the Colorado River for 1976-80[1]
(Unit--1,000)

Type of use	Acre-feet
Reservoir evaporation	2,114
Irrigated agriculture	3,473
Municipal and industrial	271
Fish, wildlife, and recreation	50
Transbasin exports	3,525
Deliveries to Mexico	2,847
Total	12,280

The major part of the transbasin depletions in the Upper Basin is made at higher elevations where the salinity concentrations are very low. This removal of high quality water results in the remaining flows downstream becoming more concentrated even though some salts are removed by the water delivered to another basin. Many transbasin diversions have been made over the years and an additional number will occur in the future.

Water exported from the Upper Basin during the period 1941-72 averaged about 360,000 acre-feet per year. Completion of such large projects as the Colorado-Big Thompson, Duchesne Tunnel, and Roberts Tunnel and more recent projects such as the San Juan-Chama, Fryingpan-Arkansas, and Homestake resulted in increased exports to about 726,000 acre-feet per year for 1976-80, with a peak in 1978 of 852,000 acre-feet.

C. Effects of Water Quality on Water Users

1. Recreation, Esthetics, and Fisheries

The major instream uses in the Colorado River include hydroelectric power, propagation of fish and aquatic life, recreation (including swimming, water skiing, boating, rafting, etc.), and esthetics. A number of conflicts between water uses have become prominent issues in recent years.

There can be many tradeoffs in water quality, eutrophication, and esthetics both in the reservoir and downstream, depending on the depth of reservoir withdrawal and the flushing rate. The depth of withdrawal impacts the temperature and nutrient releases from a reservoir. These releases can now be controlled by the use of selective withdrawal structures; however, the optimum temperatures for cold water sport fisheries and warm water endemic or endangered species naturally are in conflict.[2]

In addition to downstream effects, the depth of withdrawal in reservoirs has become a significant issue concerning the productivity of reservoir fisheries, eutrophication, nutrient retention, salinity routing, esthetics, and evaporation.[3] At present, there are concerns about evaporation, temperature, and nutrient processes in Fontenelle and Flaming Gorge Reservoirs, Lake Powell, and Lake Mead.

2. Economic

In the Lower Basin, present peak TDS concentrations are approaching critical levels for some salt sensitive crops. While the water is suitable for irrigating most crops, TDS concentrations are high enough that special irrigation practices are used in some cases. At the present time, TDS concentrations are being maintained below the standards. Complete development of apportioned water by the States will result in increases in TDS that would be more detrimental to agriculture without salinity control measures.

A consortium of water resources centers in the States of Arizona, California, Colorado, and Utah cooperated in a study funded by the Office of Water Research and Technology and the Bureau of Reclamation to assess the economic damages caused by various salt concentrations to agricultural and municipal water users. This study is documented in a report, Salinity Management Options for the Colorado River, Water Resources Planning Series Report P-78-003, June 1978.[4]

Based upon the findings of that report, Reclamation has published a summary working document entitled, Colorado River Salinity--Economic Impacts on Agricultural, Municipal, and Industrial Users.[5] The estimated future annual damages to the Lower Basin water users in 1976 dollars were $343,000 for each 1 mg/L increase in TDS at Imperial Dam when concentrations reach the range of 875 mg/L to 1,225 mg/L. The damage figure is approximately $561,000 per mg/L in 1984 dollars. These annual damages were calculated using the 1972 salinity standard of 879 mg/L (approved by EPA in 1975) and a projected full development salinity concentration of 1,225 mg/L at Imperial Dam.

The annual municipal damages are divided as follows: Metropolitan Water District, 54 percent; Central Arizona Project, 8 percent; and lower main stem users, 8 percent. Total agriculture annual damages are 30 percent. Industrial impairments and Upper Basin damages were not evaluated.

PART IV. COLORADO RIVER WATER QUALITY ASSESSMENT

An important objective of this water quality investigation is to assess the suitability of Colorado River water for various beneficial uses. The Water Quality Office or Department of Health of each State was asked to submit an inventory of water pollution problems and/or priorities for users of the Colorado River water within its State.

A. Wyoming

Eutrophication of Flaming Gorge Reservoir.--Eutrophication of Flaming Gorge Reservoir is a major water quality problem. An overabundance of algae has resulted in use impairments in the Green River and Blacks Fork Arms of the reservoir. The impaired uses result from a shift from game to nongame fish species and decreased boating and fishing due to aquatic growth snagging propellers and fishing gear. Eutrophication has impaired the fishery, recreational, and esthetic value of the reservoir. Flaming Gorge Reservoir is the most important recreational area in southwestern Wyoming. The 1978 Clean Water Report for Southwestern Wyoming estimated the economic benefits derived from recreation at over $8 million.

Studies indicate that the reservoir is phosphorus limited. Geologic or natural erosion is estimated to contribute 50 to 60 percent of the total phosphorus load. Municipal and private wastewater treatment plants contribute an estimated 11 percent of the load, while nonpoint sources such as overgrazed rangeland, channel modification, and manure runoff were identified as significant.

Effective management strategies are limited by the lack of detailed knowledge regarding the limnology of the reservoir, conflicts between competing uses, and the fact that it may not be feasible to control the eutrophication rate so as to protect beneficial use. A task force has been established and a technical proposal developed involving the numerous State and Federal agencies involved with this problem.

Salinity of Green River Basin.--The primary impact of salinity loads and concentration in the Green River system is on water users on the Lower Colorado River. The salinity levels in the Green River Basin within the State of Wyoming are generally within acceptable criteria for existing uses. Most of the increased load comes from the area encompassing the Big Sandy River drainage. The salt loading is due to nonpoint sources associated with geologic erosion, overgrazing, irrigation return flows, and natural ground water discharges.

Although the water quality is generally adequate for industries, wildlife and livestock watering, and public water supplies, studies have identified some isolated problems and costs associated with these uses. Potential industrial and domestic benefits from salinity control are estimated to be $2 million per year. Impairment of wildlife and livestock watering is indicated in some reaches due to high chloride, sulfate, and TDS concentration. Impairment of public water supplies is indicated in several reaches due to sulfate concentration.

The State of Wyoming is a member of the Colorado River Salinity Control Forum and is seeking reduced salinity levels through (1) the Big Sandy River Unit, (2) implementation of Forum policy for control of salinity through an NPDES[1/] permit, (3) implementation of nonpoint source controls through the water quality management planning process, and (4) participation with the Forum in other measures to control salinity.

Other Water Quality Problems.--Although eutrophication of Flaming Gorge Reservoir and salinity loading are the major problems in the Green River Basin, there are other isolated impairments of use. Both secondary and primary contact recreation are impaired as a result of high fecal coliform concentrations, and the fishery is impacted by un-ionized ammonia, heavy metals, low temperatures, and turbidity.

B. Utah

Historically, Utah is the second driest State in the Nation. The water years from October 1981 through September 1983 had recordbreaking precipitation. The effects of a wetter climate on water quality are being identified as the available data are analyzed.

The comparison of the 1984 water quality assessment to the 1982 water quality assessment shows that concentrations of total suspended solids (TSS) are greater, while concentrations of other parameters such as TDS and nitrite-nitrate nitrogen are lower. When the holding capacity of the soils is approached, overland flow increases, thus increasing the erosion potential and increasing the concentration of TSS in waters. Examples include the Price, Green, and Colorado Rivers.

Stream damage was found to be more extensive in areas where riparian vegetation had been removed and stream channels had been dredged, disturbing the stable substrate. The result is increased streamflows, increased erosion, and greater scouring of streambeds. Further erosion occurs when silt and debris clog natural stream channels causing new channels to be cut. The overall effect on water quality is a loss or degradation of established beneficial stream uses, especially fisheries.

Concentrations of total phosphorus have increased in most streams as a result of the wetter climate. These increases are due to the increased amounts of overland flow and inundation of vegetated areas. Phosphorus is easily leached from soils and decaying organic matter and can be carried in organic and inorganic colloids, thus the increased concentrations of suspended sediments create an efficient carrier for phosphorus.

1/ National Pollutant Discharge Elimination System.

Higher surface and ground waters tend to reduce wastewater treatment plant efficiencies. Problems associated with this are line breakage, infiltration into sewer lines through cracks or joints, excessive flow rates, and flooding of the facility. High ground water creates problems by filling septic tanks and drain fields, thus reducing the capability of sewage disposal by overloading. This may result in contaminated ground water flowing into streams.

Point sources present a geographically limited problem to water quality but are obviously more significant in the highly populated areas. Wastewater treatment facilities, concentrated in certain drainages because of the population loads, seriously impact the receiving streams. Most water quality problems in Utah result from nonpoint sources rather than point source discharges. Nonpoint sources of pollutants include runoff from natural geologic formations, agriculture, urban sources, hydrologic modification, mining, septic tanks, construction, and silviculture. Natural sandstone formations in eastern and southern Utah contribute significant amounts of sediments through erosion. Natural deposits of salts, phosphates, fluorides, nitrates, and arsenic also contribute to decreasing water quality in certain areas of the State.

Most of the water allocated in Utah is for agricultural use. As a result, this is one of the primary sources of man-induced nonpoint pollution. Diversion of waters for irrigation tends to concentrate salts and solids in original stream channels. Also, return flow discharges add salts, nutrients, and sediments from croplands into stream channels. Overland runoff contributes salts and sediments from nonirrigated croplands and coliform bacteria from pasture land. Salinity will remain a problem in Utah. High runoff has decreased TDS concentrations, but increased flows have increased total loadings to the Colorado.

C. Colorado

The most significant water quality problems in the basin are to maintain the existing high quality waters in streams and lakes that may be threatened by wastewater from growing communities and to rehabilitate several streams that have been contaminated by heavy metals from drainage from inactive mine tunnels, mill wastes, tailing piles, and natural sources. Wastewater treatment plants for most communities in the basin have been expanded during the last several years to accommodate the increasing population brought about by growth in the recreation and energy sectors of the economy. An important pollutant in domestic wastewater is ammonia. Ammonia in the un-ionized ammonia form occurs in low concentrations, particularly in the winter time, in several tributary streams including the Yampa, Roaring Fork, San Miguel, Fraser, and East Rivers. If population continues to grow in these basins, the un-ionized ammonia standard for aquatic life may not be met without advanced wastewater treatment levels.

The San Miguel River below Uravan and the Dolores River below the San Miguel confluence have not consistently met the water quality standard for un-ionized ammonia. These river segments downstream from Union Carbide's Uravan uranium milling site are the only instance of un-ionized ammonia attributable to an industrial source in Colorado.

Several headwater streams in the basin, located in the Colorado mineral belt, are contaminated with high concentrations of heavy metals, especially lead, copper, zinc, and cadmium. Drainage from inactive mine tunnels, mill wastes, and tailing piles is responsible for much of the contamination. The major streams that do not currently meet water quality standards for metals within the basin include segments of the Eagle, Blue, Crystal, Dolores, Slate, Yampa, Animas, and Uncompahgre Rivers. Improvement to the quality of Coal Creek by treating wastewaters of the abandoned Keystone Mine by the AMAX Corporation has resulted in the restoration of aquatic life in Coal Creek. The quality of water in the Slate River below Coal Creek has also been improved as a result of this treatment.

Two new reservoirs are now under construction--Ridgway in the Gunnison drainage and McPhee on the Dolores River. Reclamation is monitoring the inflow to these reservoirs and has agreed to install an aeration system to prevent Ridgway Reservoir from becoming anaerobic if a condition is found which allows heavy metals and trace elements to reenter the water in solution.

Depending on the biological availability of the pollutants from the sediments into the food chain, the fisheries, or at least the edibility of the fish flesh, may be impaired in Ridgway Reservoir and, to a lesser extent, possibly in McPhee Reservoir. If these reservoirs act as permanent traps for heavy metals, downstream water quality could benefit. Municipal and industrial water from Dallas Creek Project's Ridgway Reservoir will be provided by an exchange of the irrigation water for a higher quality source. This will reduce the impacts from metal pollutants.

There are several major sources of salt loadings to the Colorado River that are found within Colorado. They include saline springs on the Dolores River in the Paradox Valley, Glenwood-Dotsero Springs, and agricultural return flows in the Grand Valley, McElmo Creek, and Lower Gunnison areas.

D. Arizona

Water quality along the Colorado River is protected for agriculture, aquatic life, drinking water supply, fishing, full body contact recreation, and wildlife uses by Arizona Water Quality Standards. To insure that these standards are being met, a sampling program has been implemented. In 1982 and 1983, 150 locations were sampled in the Colorado River Main Stream Basin in Arizona. The sampling program has not revealed any deterioration in the quality of water in the basin insofar as

State standards are concerned, but the program has helped identify some areas of concern.

There is some concern about secondary drinking water quality criteria. The Colorado main stem is high in dissolved salts, particularly sulfates. At Parker Dam, average concentrations of sulfates and TDS exceed the U.S. Public Health Service drinking water recommendations.

The threat of trihalomethane production when Colorado River water is chlorinated may require changes in the treatment process for the drinking water systems within Arizona, which plan to utilize Colorado River water.

Another area of concern is the high levels of fecal coliform bacteria found in some areas along the river. The high bacterial levels were probably caused by high river flows which caused the overflow of septic tanks. Although this situation may only be temporary, there is concern that sewage disposal problems will increase as development and recreation increase.

E. Nevada

The Colorado River met water quality standards, provided for protection and propagation of fish and wildlife, and allowed recreational activities in and on the water. The high water level in Lake Mead continues to contribute to improved water quality by diluting the high pollutant loads entering Lake Mead via Las Vegas Wash. Since July 1981, the municipal dischargers in the Las Vegas area have installed chemical addition, reducing the phosphate load to the wash by 90 percent. Attainment of this phosphate reduction has resulted in the associated reduction of biochemical oxygen demand (BOD) and suspended solids loading from these municipal sources to the wash and the lake. Monitoring conducted during 1983 indicated high concentration of chlorophyll-a in the inner Las Vegas Bay despite cutbacks in the phosphorus loading. The Virgin River, a tributary to Lake Mead, exhibited poor water quality in terms of bacteria, esthetics, and solids, and very minimal fish life.

Phosphorus is of concern, chiefly, with respect to present and future domestic use and, secondarily, with respect to recreation and fisheries. Studies have indicated that in-lake concentrations greater than 0.013 mg/L as phosphorus will produce algae concentrations which will have adverse effects on recreation, whereas other studies have implied that more phosphorus is necessary for fisheries. In view of this, Nevada adopted and implemented the requirements of no more than 1 mg/L as phosphorus for all point sources. The major point sources are the three large municipal facilities along the Las Vegas Wash.

TDS, hardness, sulfates, and chlorides are of concern with respect to domestic use of water from Lake Mead. The present levels appear to be accepted by the public, although an economic impact is felt as a result of additional treatment at the point of use and damage to plumbing. Nevada is doing its part in maintaining present levels by applying the salinity control policy of the Forum to control the industrial and municipal sources.

F. California

The salinity of the Colorado River is a matter of great concern to California. Southern California receives about 65 percent of its total water supply from the Colorado River, which provides a full water supply to about 800,000 irrigated acres and a full or supplemental supply to about 12 million people. Because California is located at the lower end of the Colorado River Basin, the water that it diverts contains all of the dissolved salts that have entered the river upstream.

Colorado River water is used in California to grow many specialized high value crops such as avocados, dates, citrus, grapes, and winter vegetables, as well as basic crops such as cotton, alfalfa, wheat, and sugar beets. Because of its high salinity, Colorado River water requires special management so that crop yields may be maintained and low-salt-tolerant plants will not be damaged or killed. Agricultural areas of California are already suffering significant economic detriments in their utilization of Colorado River water. Those detriments will increase if Colorado River salinity levels are allowed to increase with development of the Colorado River Basin.

The heavily urbanized areas of southern California receive Colorado River water distributed by the Metropolitan Water District. Urban water users of Colorado River water have been experiencing economic detriments due to both its high salinity and its high hardness.

Several hundred thousand water users have installed individual water softeners on their plumbing facilities, but this process aggravates the already existing salt balance problems in ground water basins of southern California. Blending with other imported supplies of lower salinity is practiced; however, increased demand on those other supplies for additional blending to offset Colorado River water salinity increases would have serious adverse effects. Further, as the salinity of the Colorado River water for urban use increases, the potential for water reuse decreases, thus increasing the demand for additional water supplies.

Most of the salinity in the Colorado River derives from sources upstream from California, but there are local contributions in the Palo Verde Region. The Bureau of Reclamation, in cooperation with the U.S. Department of Agriculture and the Palo Verde Irrigation District, has initiated a detailed study of the sources of salinity and possible control schemes for the Palo Verde Valley. The Colorado River Basin Salinity Control Forum has developed a plan for salinity control of the Colorado River. The California Regional Water Quality Control Board

(Region 7), which borders the river, closely monitors any developments which might impose additional salt loads on the river.

The primary water quality concern of California is to ensure that the salinity objectives of the Forum are met. It is, therefore, essential that the fiscal and institutional problems be solved so that water quality improvement projects adequate to maintain the standards are brought on line.

G. New Mexico

New Mexico did not specifically identify any problems within the Colorado River Basin. Water quality monitoring throughout New Mexico indicates that stream water quality is good and is consistent with standards in over 90 percent of the perennial streams in New Mexico.

In 1981 the NPDES permit to the Public Service Company of New Mexico for its San Juan Powerplant was reissued. The reissued permit contained a schedule for implementation of a compliance program satisfactory to EPA and the State to meet the requirements of the Colorado River Basin Salinity Control Forum zero discharge policy. Zero discharge was achieved on May 13, 1983; and on February 17, 1984, a no discharge permit was issued to the company. The permit became effective March 30, 1984.

PART V. HISTORICAL AND PRESENT SALINITY CONDITIONS

The Bureau of Reclamation is continuing to develop methods to evaluate long-term salinity and specific ion trends. The analysis of trends contained in water quality records is possible with the extensive use of computers. Accordingly, the past several years have been devoted to developing computer programs to reanalyze the entire record. This computerization, which is still in progress, is essential to understanding the long-term salinity trends throughout the recorded water quality history of the basin. This section of the report provides a 2-year update of observed conditions in the basin.

A. Quality of Water Records

The evaluations of the historical salinity in the Colorado River Basin are based on streamflow records at selected stations. The average concentrations and loads were determined on a flow-weighted basis using daily data whenever possible. Salt loads and concentrations were generally calculated from daily conductivity and flow records using correlations.

Historical streamflow, salinity concentrations, and salt load data for the 20 key stations for the 1941-83 period of record are presented in Tables 1 through 20 at the end of this report.

B. Historical Salinity

Salinity concentrations at Imperial Dam (Figure 1) decreased steadily from 1970-79, dropped notably in 1980, increased sharply in 1981-82, and dropped again in 1983 and 1984. The 1970-80 salinity concentrations show the buffering of annual fluctuations in salinities due to the effect of nearly 50 million acre-feet of reservoir storage. With the reservoir storage in the Colorado at near capacity, discharges from Hoover Dam increased from 7.7 million acre-feet in 1979 to 11.1 million acre-feet in 1980, diluting the salinity at Imperial Dam temporarily. With more normal flows in 1981 and 1982, the salinity rebounded. Higher releases from Hoover and Glen Canyon Dams in 1983 and 1984, combined with lower salinities in storage, caused salinity at Imperial Dam to drop again. With the nearly 50 million acre-feet of high quality water in storage, salinities at Imperial Dam should remain low through 1985.

C. Factors in Salinity Trends

The downward fluctuation of salinity at Imperial Dam during the 1970's is within the expected range and was in fact simulated using a computer model of the Colorado River Basin (see Part VIII for a description of the model, Colorado River Simulation System (CRSS)). Several factors complicate the analysis of the decline and leveling off of

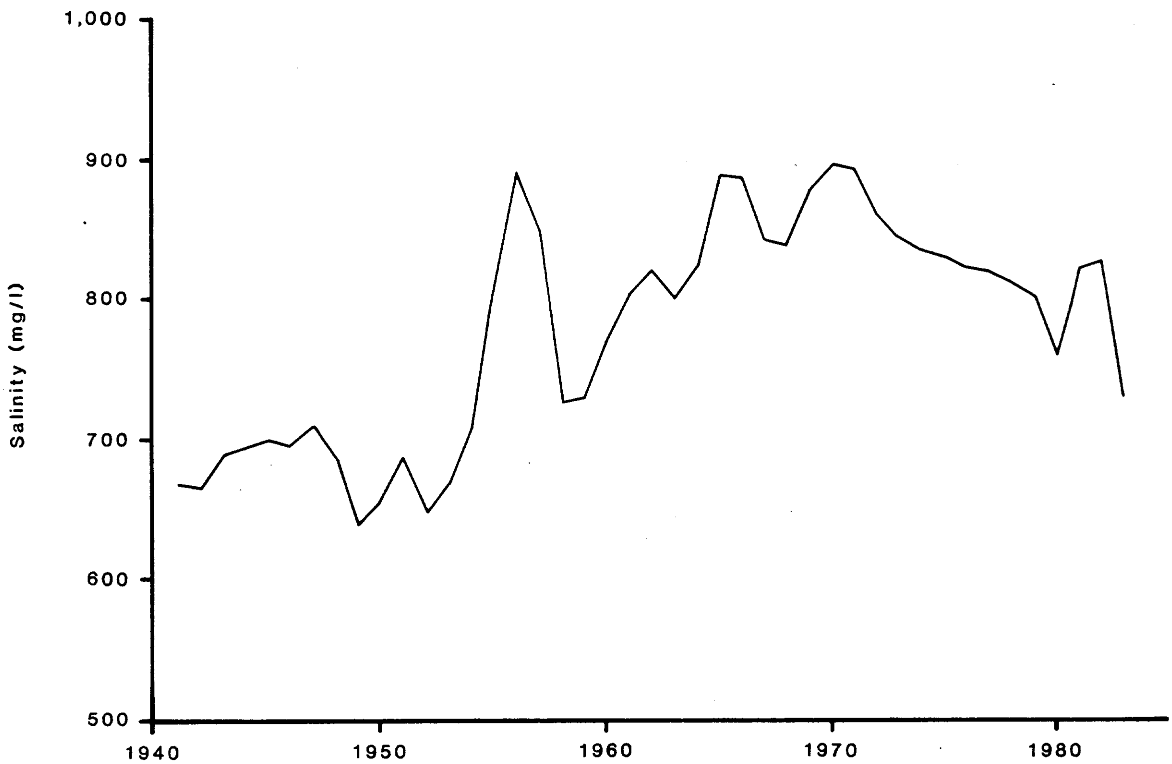

Figure 1. Historical Salinity at Imperial Dam.

salinity concentrations. Most of these are modeled using CRSS and include variations in runoff, reservoir storage, reservoir operations, salt pickup, and depletions due to development of the basin. These and other factors, which may cause shifts in salinity, are discussed in the following sections.

1. Hydrologic Conditions

The salinity concentration in rivers generally decreases with increased flow on an annual basis. Years of lower flows are characterized by higher TDS concentrations than years of higher flows. Combining this characteristic with the lag time in the reservoir system because of storage suggests the decline of TDS concentrations may have been in part caused by the transition from a relatively drier period (1955-65) with an annual virgin (undepleted) flow of 13.23 million acre-feet at Lees Ferry, to a relatively wetter period (1965-75) with an annual virgin flow of 14.76 million acre-feet. This is an increase in the flow of approximately 10 percent and may be responsible for a significant portion of the 9 percent decrease in TDS concentration observed at Imperial Dam.

2. Reservoir Effects

One of the most significant changes which has occurred to the salinity of the Colorado River is due to the regulation of the natural flow of the river basin. Due to the effects of dilution, the natural, annual variation of the river flow caused salinity to vary inversely to flow. Low flow periods have much higher salinities than high flow periods. This seasonal variation in both flow and salinity has been greatly reduced by the regulation of the basin.

The period of 1963-80 represents the most significant period of reservoir storage in the history of water development on the Colorado River. Storage in Flaming Gorge Reservoir, Lake Powell, and Lake Mead increased from less than 20 million acre-feet in 1963 to over 50 million acre-feet by 1980. The spill of Glen Canyon Dam in 1980 ended the initial filling of the major reservoirs on the Colorado River.

During the initial filling, significant leaching of gypsum (calcium sulfate) was documented at Flaming Gorge[6] and Ruedi Reservoirs[7] and at Lake Mead,[8] but gypsum leaching at Lake Mead and Ruedi Reservoir has diminished. Final documentation of the long-term salt leaching at Flaming Gorge Reservoir is part of the ongoing reservoir studies.

In addition to salt leaching, the reservoirs may play an important part in other major factors which influence TDS. There is strong evidence that Flaming Gorge Reservoir and Lake Powell have stored higher TDS water and routed the lower TDS spring runoff downstream from 1965 through 1980. These higher TDS waters were subject to bank storage, chemical precipitation, ion exchange, oxidation-reduction, and various biological activities.

Sedimentation in reservoirs may influence both TDS and the ratio of dissolved ions. Suspended sediment which is subject to mechanical degradation in a river environment may continue to release salts and exchange ions (sodium exchanged for calcium); however, once settled out in the reservoir, these salts and ion exchange capabilities may be isolated. Sediment stored in reservoirs may contain salts which would have been released with continued mechanical breakdown in a riverine environment.

3. Irrigation and Increased Depletions

Most of the irrigation projects that deplete water and increase salt pickup to the river were largely in place before 1965. Moreover, like the newly inundated soils in reservoirs, newly irrigated lands are subject to a leach-out period. In cases where lands with poor drainage stored salt, these areas were taken out of production. In addition, irrigation practices changed significantly during the 1960-80 period, with canal and lateral lining, sprinkling systems, gated pipe, and trickle systems being introduced. These changes should result in reduced return flows and salt pickup. Projected water depletions through the 1965-80 period were largely unrealized; total depletions increased by approximately 12 percent.

Average annual depletions by basin
(1,000 acre-feet)

Years	Upper Basin	Lower Basin
1970-79	3,565	6,136
1960-69	2,538	6,119
1950-59	2,043	4,757
1940-49	1,894	3,776
1930-39	1,712	3,676
1920-29	1,998	3,662
1910-19	1,656	3,643
1900-09	1,001	3,373

Previous Reclamation salinity projections have been too high, largely because the depletion projections were also too high. Transbasin diversions and increased reservoir evaporation account for most of the increased depletions from 1960-80; however, no additional salt pickup or loading occurred with these depletions.

The large quantities of water expected to be depleted for steam power generation, coal gasification, oil shale, and mineral development have not been realized in the past decade. Even where new coal-fired powerplants have been constructed, some of the water has been obtained from existing agricultural rights. While water uses have often changed, the total depletions have increased only slightly.

In cases where powerplant water was obtained from existing agricultural supplies, salt pickup may have been reduced since irrigated lands in areas of coal deposits are often saline soils of Mancos Shale origin.

Powerplants and new industries are no longer allowed to discharge saline cooling tower blowdown waters back to the river. This total containment policy resulted in some decreased salt loading during the 1970's. Leakage from evaporation ponds and other disposal methods may eventually allow some of these salts to reenter the river.

4. Reduced Flood Plains

The reservoirs have also significantly reduced the peak flood flows downstream. The consequent reductions in the downstream flood plains result in decreased bank storage and possibly reduced salt flushing. At least temporarily, the area between the old and new flood plains may act as a salt sink, but the long-term salinity effects of the changes in the flood plains are not known.

5. Potential New Sources of Salt Loading

Many of the geologic formations of the Colorado River Basin were deposited in marine (salt water) or brackish water environments. Sulfates and sodium chloride are prevalent salts in most of these formations. Many of the sediments deposited in drier periods are capable of transmitting water, but these aquifers are frequently sandwiched between hundreds or even thousands of feet of impermeable shales (aquicludes). These aquifers are, therefore, static and often saline. Many static and saline aquifers are present in the Colorado River Basin. Drilling and mining activities can disrupt aquicludes and mobilize these saline static aquifers. When a path of flow is provided by drilling or mining, these aquifers are mobilized, and brackish or saline waters flow back to the surface.

Some States have enacted drilling and ground water laws to protect water quality. In the Colorado River Basin, ground water laws and strict enforcement are essential to prevent further saline aquifer movement and salt loading. Many small saline ground water springs and/or flowing wells that probably are linked to drilling activities have been identified in the basin and listed in previous progress reports. Seismograph drilling activities may be particularly disruptive to shallow ground water systems, and stricter regulation and enforcement should be considered.

The Meeker Dome Salinity Project described in Part VII is one area where Reclamation has plugged abandoned oil exploration drilling holes anticipating that the aquifers are static and the saline water would not find another path back to the surface.

6. Method of Chemical Analysis

It has been found that water samples high in calcium sulfate salts retain water when evaporated at 180° C and thus yield high TDS results. TDS was changed from a measurement of 180° C residue to the sum of ionic constituents for some of the USGS records used in past reports. Since the Colorado River waters are high in sulfates, this may have produced a slight downward shift in the TDS data when the sum of the constituents was used.

7. Salinity Control Projects

The implementation of salinity control units as described in Part VII has prevented some salts from reaching the river in the 1980-82 period. While the local impacts of these projects are still being evaluated, no significant effects are likely to have occurred as yet below Lake Mead because of the 5- to 7-year actual flow hydraulic detention time of the reservoirs.

8. Erosion

Several researchers[9,10,11,12] have shown that erosion of saline shales and dissolution of efflorescence increase dissolved solids concentrations during runoff events. These and previous studies have primarily focused on conditions caused by summer and fall thundershowers. Lower elevation snowmelt events associated with saline marine formations may contribute a greater portion of the salinity budgets. Analyses of the Green River near the Green River station indicate that electrical conductivity remains high or may increase with flow peaks associated with snowmelt runoff events in January through April.

During the Bureau of Reclamation studies of the McElmo Creek Salinity Control Unit (described in Part VII), it was found that approximately 32 percent of the total salt load could be related to runoff events. Similarly, recent salinity control investigations by Reclamation show that 21 percent of the Price River salt budget and 14 percent of the San Rafael River salt budget are related to natural runoff.

Bureau of Land Management (BLM) salinity/erosion studies in the Price River Basin show that at least one drainage yielded significantly reduced salt loads where experimental contour plowing and gully plugs were used for erosion control. The feasibility of erosion control as a mechanism to control salinity (including snowmelt runoff events) needs further investigation based on the BLM Price River studies.

9. Geochemistry

Water quality in the Colorado River Basin varies greatly. Most surface runoff originates from precipitation and is very low in TDS. TDS concentration steadily increases in its downgradient course due to natural and man-induced activity.

Dissolution of efflorescence on the surface or minerals in subsurface formations is a major source of TDS. Runoff from snowmelt and thunderstorms, which cause alluvial, bank, and gully erosion, suspends solids from barren marine shales. The increased concentrations of calcium, magnesium, and sulfate in these waters are due to dissolution of gypsum (calcium sulfate) and dolomite (calcium or magnesium carbonate). Much of the sodium is contributed by exchange of calcium for sodium on clays found in saline marine shales.

Point sources of salinity contribute chemical constituents that reflect the mineralogy and the chemical reactions which occur in the rock formations through which the ground waters flow. Natural springs are composed of waters whose subsurface flow paths are often deep, and movement of the water is relatively slow. TDS concentration can, therefore, be very high, often exceeding 10,000 mg/L. Such spring waters vary in composition in the basin. The waters of highest TDS concentrations are of sodium chloride character due to highly soluble halite. Other springs are high in concentrations of calcium and sulfate due to contact with gypsum (hydrated calcium sulfate).

The water quality of many seeps throughout the Colorado River Basin often reflects relatively shallow geology and mineralogy. Sodium, calcium, and sulfate concentrations can be fairly high (4,000 to 10,000 mg/L TDS). The chemical makeup is due to a variety of reactions, including dissolution of gypsum, partial reprecipitation of carbonate minerals, and adsorption of calcium onto clays that have high amounts of exchangeable sodium and magnesium.

Due to the extremely hot and arid conditions throughout the basin, extensive evaporation can cause TDS of the surface waters to increase greatly. Under such conditions, carbonate and hydrated sulfate minerals can precipitate out along the streambeds. These characteristically white and often fluffy minerals are highly soluble. A snowmelt or rainstorm event can quickly flush these minerals back into the water, causing a temporary but large increase in TDS concentration.

PART VI. FUTURE DEVELOPMENT

This section of the report summarizes the project depletions and salt pickups used by the Colorado River Simulation System (CRSS) to estimate the impacts of depletions and salt pickups caused by development at selected stations within the basin. Part VIII summarizes the results of the computer modeling.

Table A on pages 57 through 59 presents a summary of the estimated present and projected future depletion of water through the year 2010 for both the Upper and Lower Basins of the Colorado River. The projections for the years 1983 through 2010 represent the best estimate by the Bureau of Reclamation of how water use will be developed over the next 30 years. The projections were made after consultation with individual States within the Colorado Basin; however, the projections adopted by Reclamation for planning purposes are not necessarily concurred with by the States.

Table B on page 60 lists the salt pickups used by the CRSS model for the calculation of salinities in the Upper Basin. The Lower Basin salinities are calculated on a reach-by-reach basis using cumulative depletions and pickups, instead of on a project-by-project basis as in the Upper Basin, and are not listed. The salt pickups listed are the actual figures used in the model to calculate the salinity changes projected by CRSS. Irrigation and transbasin diversions show salt gains and losses, respectively; other uses (municipal, industrial, evaporation, mineral, etc.), with the exception of the Las Vegas Wash, show no gains in loading due to salt pickup.

A. Upper Basin Depletions[13]

Table A summarizes estimates of depletions due to the activities of man in the Upper Colorado River Basin. These estimates were made by the Bureau of Reclamation in consultation with the water resource agencies of the Upper Basin States and have been reviewed by the States. The values shown herein do not necessarily have the concurrence of the States.

Estimates of use in 1983 were developed by updating depletions reported in the Upper Colorado Region Comprehensive Framework Study published in June 1971. Projections of water use beyond 1983 were developed from information supplied by State water resource agencies and from construction schedules of projects authorized for construction or already under construction.

In Table A the entry under each State labeled "Evaporation, Storage Units" represents that State's share of total evaporation from Flaming Gorge Reservoir, Lake Powell, and the Aspinall Unit Reservoirs which will be charged to that State when total Upper Basin water development is reached. This is provided for in Article V of the Upper Colorado River Basin Compact.

The Upper Colorado River Basin Compact provides that the States of Colorado, New Mexico, Utah, and Wyoming will share in the consumptive use of water available in the Upper Basin in the following proportions.

Arizona (acre-feet)	50,000
Colorado (percent of remainder)	51.75
New Mexico (percent of remainder)	11.25
Utah (percent of remainder)	23.00
Wyoming (percent of remainder)	14.00

To be conservative in making its estimate of water supply and depletions in the Upper Basin, the Department of the Interior has assumed that the river flow will be 75 million acre-feet every 10 years at Lee Ferry, plus 750,000 acre-feet annually for Mexican Treaty deliveries. This would require an average annual water delivery at Lee Ferry of 8.25 million acre-feet. Using this assumption, the Department of the Interior estimates that the long-term dependable yield of water available in the Upper Basin for consumptive use by man is 5.8 million acre-feet per year. This assumption is not to be considered an interpretation of the obligation of the Upper Division States for water delivery at Lee Ferry under the Colorado River Compact, nor is it in accord with the view of the Upper Division States. It is the position of the Upper Colorado River Commission and the Upper Division States that, with the delivery at Lee Ferry of 75 million acre-feet of water in each period of 10 consecutive years, the water supply available in the Colorado River system below Lee Ferry is sufficient to meet the apportionments to the Lower Basin provided for in Article III (a) and (b) of the Colorado River Compact and the entire Mexican Treaty delivery. The Upper Division States submit that the long-term dependable yield of water available in the Upper Basin would be at least 6.3 million acre-feet.

The value of "State Share" and "Remaining Water Available" which appear in Table A is based on the assumption of the Department of the Interior that a dependable yield of 5.8 million acre-feet of water is available for consumptive use in the Upper Basin. The negative values of remaining water which appear in the New Mexico projections represent uses of water above that available under the conservative water supply and are assumed by the Department to be permitted under the Upper Colorado River Basin Compact.

1. Arizona

a. Miscellaneous Additional Depletions

Consumptive uses due to irrigation and stockpond evaporation have increased by about 2,000 acre-feet since the Comprehensive Framework Study estimates were prepared. Municipal and domestic uses have increased by about 1,000 acre-feet. It is expected that an additional 3,000 acre-feet will be used for municipal purposes for the Navajo Indian Nation and for the city of Page, Ariz. Water for Page is reserved by The Reclamation Development Act of 1974, Public Law 93-493, which among other actions provided for the incorporation of the city.

b. Navajo Powerplant

Consumptive uses according to records provided by the Navajo Generating Station averaged 20,600 acre-feet over the 1980 to 1983 period. The contract for sale of water out of Lake Powell allows for annual uses of up to 34,100 acre-feet. Salt River Project personnel feel that this ultimate use will be realized in future years.

c. Gallup-Navajo Indian Water Supply Project

See discussion under New Mexico on page 39. The project will supply 7,000 acre-feet to the Arizona communities of Teec Nos Pos, Sawmill, Fort Defiance, Window Rock, and St. Michaels. Water could be made available on a temporary basis from the unused Navajo Powerplant allocation until either the powerplant uses the full contractual amount or the contract is renegotiated to a lesser amount.

2. Wyoming

a. Miscellaneous Additional Depletions

Values shown in the 1983 column of Table A represent additional depletions that have developed since the Comprehensive Framework Study (1965 level) estimates were prepared. These values and the projections to 2000 were provided by the Wyoming State Engineer's Office. The projections of irrigation beyond 2000 were made by Reclamation and assume a declining increase in new irrigated lands. The projections of municipal use beyond 2000 were made by Reclamation and assume the same rate of increase as that estimated for 1983 to 2000.

b. Seedskadee Project

Fontenelle Dam is the only feature of the project that has been constructed. Irrigation facilities have not been built, and there are no plans to reactivate studies to identify an irrigation project.

By contract of June 14, 1962, the State of Wyoming purchased 60,000 acre-feet of capacity in Fontenelle Reservoir. The United States notified the State that the yield from the 60,000-acre-foot capacity would be available on January 1, 1969. The State optioned 25,000 acre-feet to Sun Oil Company and 35,000 acre-feet to Pacific Power and Light Company with 25,000 acre-feet as firm supply and 10,000 acre-feet when available.

A second contract, dated December 27, 1974, was signed with the State of Wyoming which would yield up to 125,000 acre-feet additional for Wyoming's use. Also, 135,000 acre-feet would be reserved for use of the United States, with 109,000 acre-feet marketable below the I-80 Highway Bridge and above the Green River water measurement gage. The total marketable yield from the reservoir is estimated at 281,000 acre-feet; however, present restrictions on reservoir drawdown imposed by the limits of riprap on the upstream face of the dam limit the maximum potential yield to 241,200 acre-feet. Existing and projected uses of water under these contracts are discussed under "Industrial Uses" on the following page.

The Seedskadee Project provided for the development of the Seedskadee National Wildlife Refuge located on the Green River below the dam. In 1983, about 6,000 acre-feet were diverted from the river and used to maintain numerous ponds within the refuge. It is estimated that when the refuge is fully developed, 20,000 acre-feet per year of depletion will result.

c. Lyman Project

Lyman Project provides supplemental irrigation water for users in the Smith Fork and Blacks Fork areas. In 1983, the project was essentially complete, and depletion of project water is estimated to average 10,300 acre-feet annually.

d. Savery-Pot Hook Project

This project was authorized as a participating project of the Colorado River Storage Project by Public Law 88-568. The Definite Plan Report dated May 1977 identified a plan which would result in 11,900 acre-feet and 10,500 acre-feet of depletions annually in Colorado and Wyoming, respectively. The President's Water Project Review in 1977 resulted in reduced funding for the project, and no construction funding has been provided. The project has not been deauthorized and is considered on a deferred status until funding is provided. For planning purposes an administrative decision was made by the Bureau of Reclamation to show depletions deferred until after 2030.

e. La Barge Project

The La Barge Project was authorized as a participating project under Public Law 84-485, the Colorado River Storage Project Act. A Definite Plan Report was completed in June 1961. It was estimated that consumptive use would be 3,700 acre-feet (rounded to 4,000). Project construction has not begun and no immediate plans are contemplated. The project has not been deauthorized and is considered on deferred status until funding is provided. For planning purposes an administrative decision was made by the Bureau of Reclamation to show depletions deferred until after 2030.

f. Transmountain Diversions

Three diversions presently export water out of the Colorado River Basin in Wyoming.

(1) Ranger Ditch

Ranger Ditch diverts water from North Savery Creek for delivery to Willow Creek in the North Platte River Basin. Estimates made in 1974 indicate that annual deliveries average about 500 acre-feet.

(2) Continental Divide Ditch

Continental Divide Ditch diverts water from Little Sandy Creek to the Platte River Basin. Estimates made in 1974 indicate that annual deliveries average about 1,040 acre-feet.

(3) North Fork of Little Snake River to Cheyenne

Diversions from the North Fork of the Little Snake River to the city of Cheyenne were 5,027 acre-feet in 1983. Over the period 1971-83, however, deliveries averaged 6,616 acre-feet. The total diversion in 1983 was estimated to be about 8,000 acre-feet.

In 1980 the State Engineer of Wyoming stated that he anticipated that out-of-basin diversions will increase to 50,000 acre-feet by 2030. The 20,000-acre-foot depletion to the Little Snake River will occur not only as a result of the Cheyenne-Laramie Diversion but also as a result of the development of Stage III of the proposed Little Snake River Management Project which would divert water over the Continental Divide to the North Platte River for the use of downstream communities such as Casper, Glenrock, and Douglas.

g. Industrial Uses

The State of Wyoming feels that there is considerable potential for increased use of water for industrial purposes such as thermal-electric generation, trona mining and processing, coal gasification, coal coking, and oil shale development.

Most of the water that is and will be used for industrial purposes will be provided by contracting with the State or Reclamation for water out of Fontenelle Reservoir. See the discussion for Seedskadee Project on page 32.

(1) Thermal Electric Power

Major thermal-electric powerplants in operation in 1983 are as listed below.

Powerplant	Megawatt (MW)
Naughton No. 1	160
Naughton No. 2	220
Naughton No. 3	330
Jim Bridger No. 1	500
Jim Bridger No. 2	500
Jim Bridger No. 3	500
Jim Bridger No. 4	500

The Naughton No. 1 unit was in operation in 1965 and its water use is included in the Comprehensive Framework Study value for thermal-electric power. Records supplied by Utah Power & Light Company show an average annual net use (diversion less return flow) of 5,670 acre-feet over a 7-year period (1977-83) for all three units at Naughton. About 4,000 acre-feet of this amount are used by Unit Nos. 2 and 3. Records provided by Pacific Power and Light Company indicate a level of use of about 25,000 acre-feet for all four units at the Jim Bridger Powerplant. Depletions in 1983 for thermal-electric units built since 1965 are estimated to be 29,000 acre-feet a year.

The Wyoming State Engineer's Office estimates that water uses for new thermal-electric power generation will increase by 15,000 and 37,000 acre-feet in 1990 and 2000, respectively. Also, an additional 10,000 acre-feet of depletion will develop at the Jim Bridger Powerplant when transmission restrictions are lifted. Water for the Jim Bridger Powerplant is provided out of Fontenelle Reservoir by contract with the State. Water for the Naughton Powerplant is developed from a private water right.

(2) Mineral

Considerable development of the trona, oil, and natural gas industries has occurred in the Green River Basin since the Comprehensive Framework Study was made. In 1982, the Wyoming State Engineer's Office estimated that 23,700 acre-feet of additional depletions had occurred in the mineral industry.

It also projects that depletions will increase by 10,000 and 26,000 acre-feet by the years 1990 and 2000, respectively. Part of this increase could result from a proposed fertilizer plant to be built by Chevron. Chevron has signed a contract with the State of Wyoming to purchase water from the State's allocation in Fontenelle Reservoir or from the Big Sandy River Unit for use in a phosphate fertilizer plant. A slurry pipeline will carry phosphate ore from the mining area near Vernal, Utah, to the plant located near Rock Springs where the slurry water will be used as processed water.

(3) Coal Gasification

The Wyoming State Engineer's Office estimates that by the year 2000 the coal gasification industry will deplete about 10,000 acre-feet yearly.

(4) Oil Shale

Predictions on the future development of the oil shale industry always involve a high degree of uncertainty. The Wyoming State Engineer's Office estimates a depletion by this use of about 3,000 acre-feet in 2000.

Projections of industrial uses beyond 2000 were made by Reclamation. These include 5,000 acre-feet of private rights developed for M&I purposes. Values shown are largely arbitrary and reflect a growing use until the year 2040 when it is assumed that the State will have reached its total Colorado River water allocation under the Department of the Interior's present interpretation of total water availability. No attempt has been made to identify individual industrial uses.

3. New Mexico

a. Adjusted Comprehensive Framework Study

Several water uses listed in Table A were included in the Comprehensive Framework Study. The Comprehensive Framework Study values were, therefore, subtracted out to avoid double counting and are shown below.

Navajo Reservoir evaporation	31,000
Hammond Project irrigation	10,000
Four Corners Powerplant	15,000
Total	56,000

b. Miscellaneous Additional Depletions

These are depletions that have come into being since the Comprehensive Framework Study estimates were prepared. These include 5,000 acre-feet of private rights developed for municipal and industrial purposes. Values shown were developed from data provided by the New Mexico Interstate Stream Commission.

c. Navajo Reservoir Evaporation

Reservoir evaporation is based upon a 60-year Colorado River Storage Project sequence study made in 1973.

d. Animas-La Plata Project (Colorado-New Mexico)

See discussion under Colorado on page 40. The New Mexico Interstate Stream Commission estimates a depletion level of 14,000 acre-feet by 2000. It is assumed the full authorized depletion of 34,000 acre-feet will be reached by 2010.

e. San Juan-Chama Project

The San Juan-Chama Project was authorized by Public Law 87-483. Transbasin diversions began in 1971. The May 1957 Supplemental Project Report indicates that diversions are expected to average about 110,000 acre-feet a year, although more recent hydrologic studies performed by the Southwest Regional Office indicate that the long-term average annual yield may be closer to 104,000 acre-feet. Historical (1971-83) average diversion has been 99,640 acre-feet a year. For purposes of this report 110,000 acre-feet have been selected as the level of existing and future average depletions.

f. Navajo Indian Irrigation Project

Various estimates for projected agricultural use depletions have been prepared, including the studies for the all-sprinkler irrigation system for the Navajo Indian Irrigation Project prepared by the Southwest Region of the Bureau of Reclamation. This study estimated agricultural consumptive use of 226,000 acre-feet. Several other estimates have been made, and a 5-year field study to determine actual consumptive use on the project was begun in 1978 and recently concluded. Recent technical estimates reported by the Secretary of the Department of the Interior Report, Economic Study, May 1980, are 254,000 acre-feet for agricultural depletions. In November 1981 it was concluded and agreed by the Assistant Secretary, Department of the Interior, Land and Water Resources, and Assistant Secretary, Department of the Interior, Indian Affairs, that the productive acreage of the project should be 110,630 acres, rather than the 105,000 acres which had been assumed in the past. Correspondingly, the annual depletion estimate has been revised from 254,000 acre-feet to 267,000 acre-feet.

The first block of land (about 9,300 acres) was irrigated in 1976. In 1983, Blocks 1 through 5 were in production. Historical net diversion from Navajo Reservoir in 1983 was 128,523 acre-feet, rounded to 129,000 acre-feet for the report. To date only small amounts of return flow from the project have been observed. It has, therefore, been assumed that the depletion of river flow is, as yet, very nearly equal to the water diverted from Navajo Reservoir. Return flow to the river will increase as deep percolation from irrigation charges the aquifer.

It was originally expected that water deliveries could be made to Blocks 1 through 9 by 1990 and to the remaining blocks by 2000. Recent funding constraints have delayed development of the project, but if funding were restored, it is assumed that up to one additional block could be developed each year. Based on this assumption, Table A shows a 208,000-acre-foot depletion in 1990 and the full 267,000-acre-foot depletion in 2000.

g. Hammond Project

The New Mexico Interstate Stream Commission estimates that depletions on the nearly fully developed Hammond Project currently average 8,000 acre-feet a year and that fully developed depletions of 10,000 acre-feet a year will be occurring by 1985.

h. Hogback Expansion

Minor increases in depletions are expected to occur between now and 1990. Studies are underway by the Bureau of Indian Affairs and the Navajo Tribe to determine additional water requirements in this area. Present uses are estimated to be 5,000 acre-feet a year, with a projected ultimate level of 10,000 acre-feet a year by 1990.

i. Jicarilla Apache Indian Uses

This depletion is based upon preliminary results of planning studies. Results, to date, indicate that about 3,000 acre-feet could be depleted under present proposals. Studies are continuing to develop plans for additional depletions, but no more feasible uses have developed. In a letter of July 9, 1976, to Mr. S. E. Reynolds, Secretary, New Mexico Interstate Stream Commission, the Secretary of the Interior indicated that there may be 26,000 acre-feet available annually for use on the Jicarilla Apache Indian Reservation, but such an amount cannot be guaranteed unconditionally. This water would have to be contracted for. Such a contract would require certification by the Secretary of the Interior as to the availability of such supplies and receive subsequent approval by Congress. Also, shortages may develop induced by a Lee Ferry call. The July 9, 1976, letter also proposed the necessary engineering, environmental, and economic feasibility studies. Thus, a 3,000-acre-foot development is estimated to take place within 10 years, with any remaining amounts dependent upon results of continued feasibility studies.

j. Utah International, Inc. (Private Right)

The primary use under this right is the sale of water to the Arizona Public Service Company for the five units of the Four Corners Powerplant. Average historical use over the past 12 years has been 19,000 acre-feet. As indicated under the discussion on the Public Service Company of New Mexico, approximately 8,000 acre-feet of water were purchased from Utah International, Inc. (UII) for use in Unit 4 of the San Juan Powerplant. This results in a 1983 level of total use under this right of 27,000 acre-feet. It is expected that increased use of the five units at Four Corners, plus the transfer of up to 8,000 acre-feet to the San Juan Powerplant, will fully utilize the total right of 39,000 acre-feet by 1990.

k. Navajo Reservoir Contracts

(1) Public Service Company of New Mexico

This contract provides water deliveries from Navajo Reservoir for use at the San Juan Powerplant. In 1983, all four generating units were in operation. Water use at this level is about 24,000 acre-feet a year. The contract provides for delivery of 16,200 acre-feet. The remaining water used at the plant is purchased from the private right of Utah International, Inc. Thus, in Table A, a value of 16,000 is shown for the Public Service Company of New Mexico and an additional value of 8,000 acre-feet has been included in the total for Utah International, Inc. (private right). The contract for water delivery from Navajo Reservoir terminates December 31, 2005.

(2) Utah International, Inc.

Utah International, Inc., will furnish water to potential customers for industrial uses in the area. A UII official indicated the contract amount of 35,000 acre-feet was expected to be utilized by 1990 and continued through the year 2030. At present the contract for water delivery terminates December 31, 2005. Table A assumes that the Secretary of the Interior will present a hydrologic determination to Congress showing that the contract can be extended to 2039 without jeopardizing other water uses in the San Juan and Colorado River Basins.

(3) Gallup-Navajo Indian Water Supply Project

The Bureau of Reclamation, Southwest Region, is currently conducting project investigations to supply water to Gallup and Navajo Indian communities in New Mexico, Arizona, and Utah. Present estimates indicate a requirement of 29,000 acre-feet of depletions for New Mexico. This requirement includes approximately 5,000 acre-feet for the Shiprock area. The Animas-La Plata Project includes a 7,600-acre-foot delivery to the Indian communities near Shiprock with 3,800 acre-feet of annual depletion. The ultimate Gallup-Navajo depletion in New Mexico without Shiprock would be approximately 24,000 acre-feet, of which 1990 requirements would be 10,000 acre-feet, 2000 requirements would be 14,000 acre-feet, and 2010 requirements would be 18,000 acre-feet. Sufficient water is available within the Navajo municipal and industrial contracts to cover these requirements, and water is physically available within the San Juan Basin. Table A assumes that a water supply will be available until 2040.

(4) Not Identified

The remaining block of Navajo Reservoir water supply will be marketed by the United States and will be allocated in consultation with the New Mexico Interstate Stream Commission.

4. Colorado

a. Miscellaneous Additional Depletions

Values shown in the 1983 column of Table A represent additional depletions that have been assumed to develop since the Comprehensive Framework Study (1965 level) estimates were prepared. They have not been specifically identified but are included to bring the Bureau of Reclamation estimates of present uses more in line with State estimates. The 1983 values of "Miscellaneous Additional Depletions" may be either real additions or else differences resulting from new depletion accounting procedures.

b. Denver Expansion

Water for expanded Denver needs since 1965 has been met by increased diversions through Moffat and Roberts Tunnels. The average annual recorded diversion through both tunnels for the period 1977-82 was 141,000 acre-feet. The combined 1965 normalized diversion was 93,000 acre-feet, yielding an increase of 48,000 acre-feet. Projections were provided by the Colorado Water Conservation Board.

c. Homestake Expansion

Present uses average about 28,000 acre-feet annually. Phase II of the expansion is expected to be on line by 1990 and yield an additional 20,000 acre-feet annually. Values were supplied by the Colorado Water Conservation Board.

d. Independence Pass, Pueblo, and Colorado Springs Expansions and Englewood

Present and projected values for these exports were supplied by the Colorado Water Conservation Board in a July 28, 1980, letter to Reclamation.

e. Fryingpan-Arkansas Project

Diversions through Boustead Tunnel began in 1971. The average annual diversion during the 1971-83 period was 44,000 acre-feet. The diversion in 1983 was 90,800 acre-feet. The operating principles for the project state that diversions will not exceed 120,000 acre-feet in any 1 year and will not exceed a total aggregate of 2,352,800 acre-feet in any consecutive 34-year period. The latter requirement would mean a long-time average diversion of 69,200 acre-feet. Since the historical (1971-83) average diversion has been much less than this, it is likely that in the coming decade or so annual diversions will be much higher than 69,200 acre-feet (provided that water is available for diversion) to bring the historical average back up.

f. Windy Gap

Construction on the dam began in 1981 and is scheduled for completion in 1985. Facilities of the Colorado-Big Thompson Project will be used to divert up to 54,000 acre-feet per year for domestic use by the cities of Longmont, Loveland, Estes Park, Greeley, and the Platte River Power Authority. The Colorado Water Conservation Board estimates that the full depletions will be on line by 1990.

g. Animas-La Plata Project

A Feasibility Report was prepared in 1962, and the project was authorized by Public Law 90-537, September 30, 1968. A Definite Plan Report was approved in August 1980. The plan provides for large amounts of water for irrigation and municipal and industrial use and totals a 154,800-acre-foot depletion--120,700 acre-feet in Colorado and 34,100 acre-feet in New Mexico. Construction will not likely start before fiscal year 1986. Depletions will not begin until the early part of the 1990's when Ridges Basin Reservoir is completed. Uses will build up rapidly as other project facilities are constructed. The ultimate depletion of 121,000 acre-feet would be possible by 2000.

h. Bostwick Park Project

Construction of Silver Jack Dam commenced in late 1966 and was completed in 1971. Project water became available beginning in 1971, and all facilities were completed by 1974. Project depletions average 4,200 acre-feet annually.

i. Dallas Creek Project

The project was authorized by Public Law 90-537 on September 30, 1968. A Definite Plan Report was completed in November 1976 which indicated a total depletion of 17,100 acre-feet, with the water being used for agricultural and municipal and industrial purposes. Estimated depletions are 5,100 acre-feet for irrigation, 10,400 acre-feet for municipal and industrial uses, and 1,600 acre-feet for reservoir evaporation. The control schedule of January 6, 1984, shows that initial storage will commence July 1986. Distribution facilities now exist for use of the project water. It is estimated by the Bureau of Reclamation that the combination of reservoir evaporation, irrigation use, and municipal and industrial use will deplete about 10,800 acre-feet by 1990, 12,800 acre-feet by 2000, and 17,100 acre-feet by 2010.

j. Dolores Project

A Feasibility Report was prepared in 1963, and the project was authorized by Public Law 90-537 on September 30, 1968. A Definite Plan Report was completed in April 1977 with modifications to the original plan to meet Indian requirements. Total depletions are estimated to be 80,900 acre-feet annually. The control schedule dated January 6, 1984, indicates that delivery of project water will begin in 1987. Average annual consumptive use will be 70,250 acre-feet for irrigation, 4,350 acre-feet for municipal and industrial use, and 6,300 acre-feet for evaporation.

It is estimated by the Bureau of Reclamation that reservoir evaporation and the bulk of the irrigation uses will be depleting the Colorado River system by 61,000 acre-feet in 1990 and that by 2000 the project will be fully operational.

k. Fruitland Mesa Project

The project was authorized as a participating project of the Colorado River Storage Project by Public Law 88-568 on September 2, 1964. The authorization was based on a Feasibility Report prepared in 1963. A Definite Plan Report was prepared in June 1967 and a repayment contract executed in June 1969. Minor construction work was completed on the existing Gould Canal in 1973, but no other construction has been accomplished. The project plan was substantially revised as described in the Definite Plan Report of August 1977. Depletions then totaled 21,300 acre-feet. The President's Water Project Review in 1977 resulted in deletion of funding for the project, and no construction funding has been provided. The project has not been deauthorized. It is, therefore, considered on a deferred status until funding is provided. For planning purposes an administration decision was made by the Bureau of Reclamation to defer depletions until after 2030.

l. Savery-Pot Hook Project

The project was authorized as a participating project of the Colorado River Storage Project by Public Law 88-568 on September 2, 1964. The authorization was based upon a Feasibility Report prepared in 1962. A Definite Plan Report was prepared in June 1971, revised in January 1972, and updated by an Advance Definite Plan Report dated May 1977. Stream depletions in the 1977 report are 11,900 acre-feet for Colorado and 10,500 acre-feet for Wyoming. The President's Water Project Review in 1977 resulted in deletion of funding for the project, and no construction funding has been provided. The project was not deauthorized. It is, therefore, considered on a deferred status until funding is provided. For planning purposes an administrative decision was made by the Bureau of Reclamation to defer depletions until after 2030.

m. San Miguel Project

A Feasibility Report was prepared in 1966, and the project was authorized as a participating project of the Colorado River Storage Project by the Colorado River Basin Project Act (Public Law 90-537) on September 30, 1968. Advance planning studies have continued and various plans have been considered, but none is feasible based upon current policies and procedures for planning water and related land resources. A wide array of development plans has been investigated including a mix of agricultural, municipal, and industrial uses. A Concluding Report has been prepared summarizing data available. This included data from a large acreage alternative, a small acreage alternative, and a conservation alternative. Figures for depletion were selected from the small acreage alternative which included depletions of 12,000 acre-feet for irrigation, 12,000 acre-feet for industrial use, and 1,000 acre-feet for municipal use. For planning purposes, an administrative decision was made by the Bureau of Reclamation to defer depletions until after 2030.

n. Upper Gunnison River Basin Projects

Water rights with a priority date of November 13, 1957, for the Wayne N. Aspinall Unit (formerly Curecanti Unit) of the Colorado River Storage Project were granted by the State of Colorado to the Colorado River Water Conservation District. These rights were assigned by the district to the United States in January 1962 subject to the condition that the unit would be developed and operated in a manner consistent with beneficial use of the waters in the Gunnison River Basin. In order that future developments in the Upper Gunnison Basin would be assured of rights to use of water, a formal contract was developed for execution among the United States Government, the Upper Gunnison River Water Conservancy District, and water users in the Upper Basin whereby the diversion and storage rights of the Aspinall Unit were subordinated to future developments upstream, both private and Federal, even though the rights of the upstream developments might be junior to the Aspinall Unit right. The aggregate amount of upstream depletions for which the priority of the Aspinall right may be waived has not yet been determined.

The authorizing legislation of the Colorado River Storage Project listed the five projects in the Upper Gunnison River Basin for priority of investigations: (1) Bostwick Park, (2) East River, (3) Fruitland Mesa, (4) Ohio Creek, and (5) Tomichi Creek.

The total depletion by these five projects was estimated to be about 60,000 acre-feet annually of which 40,000 acre-feet would be depleted above Blue Mesa Dam. An additional 10,000 acre-feet would be depleted between Morrow Point and Blue Mesa Dams, and another 10,000 acre-feet would be depleted between Crystal and Morrow Point Dams. An increased upstream depletion of 60,000 acre-feet was assumed in the operation studies for the Aspinall Unit in the determination of the water supply available for power generation.

In 1973, Reclamation issued a Concluding Report on its Upper Gunnison Project investigations which included the East River, Ohio Creek, and Tomichi Creek Units. Although it was concluded that there were limited potentialities for Federal water resource development under existing evaluation criteria and projected economic conditions, Reclamation still recognizes its commitment to allow beneficial development of waters of the Upper Gunnison River Basin up to an amount of about 60,000 acre-feet. Allowing for an existing 4,000-acre-foot depletion of the Bostwick Park Project and assuming the depletion of 21,000 acre-feet is realized on Fruitland Mesa Project by 2040, there would be a remainder of 35,000 acre-feet available for depletion. Table A shows arbitrary levels of development during the period 1990 to 2010.

o. <u>West Divide Project</u>

A Feasibility Report was prepared in 1966, and the project was authorized by Public Law 90-537 on September 30, 1968, as a participating project of the Colorado River Storage Project. Advance planning studies have continued and various plans have been considered, but none is feasible based upon current policies and procedures for planning water and related land resources. Plans include a mix of water for irrigation and municipal use. A Concluding Report has been drafted to summarize data available. A plan is presented which is not economically justified but totals a 38,200-acre-foot depletion. For planning purposes, an administrative decision was made by Reclamation to defer depletions until after 2030.

p. <u>Taylor Draw Reservoir Project</u>

Taylor Draw Dam is under construction a few miles east of Rangely, Colo. Financing was approved by the electorate in August 1980 and bonds have been issued. Construction commenced August 1982. Depletion values were supplied by the Colorado Water Conservation Board.

q. Stagecoach Project

The Stagecoach Project of the Upper Yampa Water Conservancy District involves construction of a dam on the Yampa River near Steamboat Springs and exchange agreements for water out of Yamcola Reservoir. The project would supply about 4,000 acre-feet of water for irrigation, 1,000 acre-feet for municipal uses, and 10,000 acre-feet for thermal powerplant uses. Depletion values for the irrigation and municipal components were supplied by Reclamation. Depletion values for thermal powerplant uses are discussed under Colorado Ute-Southwest Project on the following page.

r. Ruedi Contracts

Estimates of projected depletions from water contracts out of Ruedi Reservoir were provided by the Lower Missouri Regional Office of the Bureau of Reclamation. They are 0 in 1982, 16,000 acre-feet in 1990, and the ultimate yield of contracted water of 49,000 acre-feet in 2000. Depletions were computed assuming 100 percent consumption of industrial water and 40 percent consumption of water delivered to municipal and domestic users. Ruedi water would go primarily to the oil shale industry.

s. Blue Mesa Contracts

The Upper Colorado Regional Office of the Bureau of Reclamation has determined that up to 10,000 acre-feet of water can be contracted for out of Blue Mesa Reservoir for industrial purposes. It has been assumed that this water will be contracted by 1990 and that it will be 100 percent consumed.

t. Oil Shale

Projections of depletions of water for oil shale development contain a high degree of uncertainty. Values shown through 2020 were provided by the Colorado Water Conservation Board. These values do not include water contracted out of Ruedi Reservoir for the oil shale industry.

u. Craig-Hayden Powerplants

In 1983, the following units were on line.

Powerplant	Megawatts (MW)
Hayden No. 1	165
Hayden No. 2	250
Craig No. 1	410
Craig No. 2	410

Average annual use of water over the 1981-83 period at the Hayden Powerplant was 4,525 acre-feet. Average use at the Craig

Powerplant for the same period was 8,038 acre-feet. Combined use was 12,563 acre-feet rounded to 13,000. Plans call for Craig No. 3 to go on line sometime in 1984, which would increase depletions by about 4,000 acre-feet.

Colorado-Ute is planning to upgrade its Nucla plant from 36 to 100 megawatts (MW) by 1990. This is expected to result in about a 1,000-acre-foot increase in depletions.

v. Colorado Ute-Southwest Project

Colorado-Ute Electric Association is planning two 400-MW units in western Colorado. Two years ago, start up dates of 1987 and 1989 were projected, but recent discussions with association officials indicate that plans to go forward have been delayed indefinitely. For purposes of this table, Reclamation has assumed that one unit will be constructed and on line by 2000 depleting 5,000 acre-feet of water and the other unit will be on line in 2020, making a total depletion then of 10,000 acre-feet.

5. Utah

a. Miscellaneous Additional Depletions

Values shown in the 1983 column of Table A represent additional depletions that have developed since the Comprehensive Framework Study (1965 level) estimates were prepared. These values and the projections to 2010 were provided by the Utah Division of Water Resources.

b. Bonneville Unit, Central Utah Project

Present depletions from the Bonneville Unit include reservoir evaporation, storage accrual, and irrigation uses from Currant Creek, Strawberry, Soldier Creek, and Starvation Reservoirs. Project storage which was accruing in Strawberry Reservoir was spilled into Soldier Creek Reservoir in 1983 because of high runoff conditions and prior storage rights of the Strawberry Valley Water Users in Strawberry Reservoir. Reservoir water surface elevation limitations in Soldier Creek Reservoir further reduced the capability of storing water for project purposes. Net depletions to the Colorado River System in 1983, including the initial filling of Currant Creek Reservoir, are estimated to be 32,300 acre-feet.

Based upon the present construction schedule, the depletions to the Colorado River are expected to rise to 136,000 acre-feet by 1990 and 166,000 acre-feet by 2000. The latter figure is correct if replacement of an increased fishery bypass for maintenance of fishery flows for streams along the Strawberry Aqueduct of up to 37,000 acre-feet is developed in the Uinta Basin. If alternate supplies are developed in the Bonneville Basin, the depletion from the Uinta Basin will ultimately be about 128,000 acre-feet rather than 166,000 acre-feet.

c. Upalco Unit, Central Utah Project

The March 1980 Definite Plan Report and the May 1981 Supplement thereof estimated total depletion of 11,900 acre-feet. The control schedule dated August 1983 indicates Taskeech Dam completion in 1990 and initial filling to occur at that time. Primary uses are for municipal, industrial, and supplemental water for irrigation. All of the project depletion is expected to occur by 2000.

d. Jensen Unit, Central Utah Project

The Definite Plan Report was revised in 1976. The plan provided irrigation water primarily for supplemental service and water for municipal and industrial use. Evaporation and irrigation consumptive use totaled 4,000 acre-feet in 1983. Total depletion is estimated at 15,000 acre-feet. The project depletion would gradually increase to the full amount by 1990.

e. Uintah Unit, Central Utah Project

A report for certification of physical, economic, and financial feasibility dated April 1975 was certified by the Acting Secretary of the Interior on August 22, 1975; approved by the Office of Management and Budget on March 25, 1976; and forwarded to Congress on April 6, 1976. Project water supply uses are primarily for supplemental irrigation service to Indian and non-Indian lands, full service to Indian lands, and a minor amount for municipal and industrial use. Total depletions would be 28,000 acre-feet. Over the past few years, the Ute Tribal Business Committee has expressed various levels of interest for the Uintah Unit, potential developments on Leland Bench, and the Bonneville Unit mitigation package. On November 9, 1982, the Ute tribe submitted to the Bureau of Reclamation an "Interim Exploration and Planning Agreement Regarding Ute Water Resources." This agreement, which allows for further development of a study and a plan for construction of Uintah Unit, has been agreed to by Reclamation. Since tribal attitude to development of a recommended plan is nonsupportive at this time and for the purpose of this report, depletions to the Colorado River System are those which were determined for the 1978 Definite Plan Report. It is unlikely that major facilities can be completed before the late 1980's. It is estimated the project depletion would occur by 2000.

f. Emery County Project

The Emery County Project as originally constituted depleted about 14,000 acre-feet. Utah Power & Light Company has contracted for 6,000 acre-feet of the project water for the Huntington Powerplant. Negotiations are underway between Reclamation, the power company, and the water district for the purchase of 6,000 acre-feet of additional project water by 1990. It is estimated that this has and will result in a decrease of Emery County depletions to 11,000 acre-feet in 1983 and 8,000 acre-feet in 1990. This assumes a 2 to 1 conversion rate, i.e., 6,000 acre-feet of project water sold to Utah Power & Light Company will result in a 3,000-acre-foot reduction in irrigation depletion.

g. Gallup-Navajo Indian Water Supply Project

See discussion under Navajo Reservoir Contracts, New Mexico on page 39. The project will supply 1,180 acre-feet to the Utah community of White Mesa Village.

h. Ute Indian Lands

Under the Deferral Agreement of September 20, 1965, the Ute Indians agreed to defer development of 15,242 acres of land, but not beyond January 1, 2005. On August 13, 1975, the Ute Indian Tribe passed a resolution requesting that development of Indian facilities proceed concurrently with development of non-Indian facilities. The Secretary agreed on August 21, 1975. Leland Bench was recognized as a means of developing 15,242 acres of land. This plan, as with the Uintah Unit, is not being strongly supported by the Ute Indian Tribe and has been included for further study with the Interim Agreement. For purposes of this report, depletions are based on the previous Leland Bench Development Plan. No construction schedule is available, and it does not appear that significant uses of water will be made by 1990. Total ultimate depletions are estimated to be about 45,000 acre-feet.

The Ute Indian Compact (yet to be ratified) recognizes Indian rights to irrigate 12,845 acres of Class 6 and 7 lands in the White River drainage and 4,068 acres of Class 7 lands along the Green River, which would result in depletions of approximately 30,000 and 9,000 acre-feet, respectively. The State of Utah estimates that the latter will materialize by about 2000, with depletions in 1990 at about a level of 20,000 acre-feet.

It is estimated that about 1,500 acres of Indian lands near the White River have come under irrigation since the Comprehensive Framework Study determinations. Depletion is about 4,000 acre-feet.

i. Division of Water Resources Projects

In August 1983 the Division of Water Resources (DWR) of the State of Utah made a determination which showed that 11,400 acre-feet of water were being depleted in 1983 by DWR-sponsored projects. The division estimates that depletions will increase to 24,000 acre-feet by 2010.

j. Emery County Powerplants

Both units of the Huntington Powerplant of Utah Power & Light Company were in service in 1983. Water use records indicate that the powerplant uses up to 12,000 acre-feet a year. Two units of the Hunter Powerplant of Utah Power & Light Company, located near Castledale, were on line in 1983. Water use records for this plant also indicate a maximum annual use of about 12,000 acre-feet. One additional unit began operation in March 1983. The fourth unit is projected to be in operation in 1991. It was assumed that each new unit will require 6,000 acre-feet a year. These figures result in an estimated 1983 use of 24,000 acre-feet and a projected use of 30,000 acre-feet in 1990 and 36,000 acre-feet in 2000.

Water from these two powerplants is and will come from (1) the purchase of 12,000 acre-feet of Emery County Project water, (2) purchase of up to 24,000 acre-feet of private irrigation water rights, and (3) the development of 3,000 to 5,000 acre-feet of new water made possible by construction of Electric Lake Dam. Water surplus to powerplant needs is leased back to the irrigation users.

k. Conversion of Irrigation to Power

Most of the water developed for the Emery County powerplants comes from the purchase of irrigation water rights. It is assumed that for every thousand acre-feet of diversion rights purchased and used by the power company, irrigation consumptive use will decrease by 500 acre-feet.[1/]

It is estimated that 14,000 acre-feet of diversion rights were used by the plants in 1983 and 20,000 acre-feet of diversion rights will be used by 2000. This translates into a decrease in irrigation depletion of 7,000 and 10,000 acre-feet, respectively.

Conversions of irrigation water to powerplant consumption were not increased beyond 2000. It was assumed that State policy would favor retaining an agricultural economic base and new development would come from the State's unused allotment of Colorado River water.

l. Other Utah Power & Light Company Powerplants

The Utah Division of Water Resources, after consultation with Utah Power & Light Company, has estimated that beginning in the year 2000 about one new 400- to 500-MW unit will come on line every 5 to 7 years somewhere in the Colorado River Basin. Exact locations for these new units will depend on how load demands develop. Assuming a depletion of 6,000 acre-feet per unit, Table A shows an increase of a 6,000-acre-foot depletion each decade beginning in 2000.

m. Deseret Generation and Transmission Co-op

Deseret Generation and Transmission Co-op has begun construction of a 400-MW unit east of Green River near Bonanza, Utah. Commercial operation is scheduled for December 1984. Water depletion is estimated at 6,000 acre-feet with pumping from the Green River. Unit 2, also 400 MW, is scheduled for operation in 1992.

1/ There are some reasons to believe that irrigation use may not be declining by this high rate. Additional data and analysis are needed to refine these estimates.

n. White River Dam

Evaporation from the White River Reservoir is estimated to be 5,500 acre-feet, rounded to 6,000 acre-feet. It was assumed that the dam will be in place by 1990.

o. Oil Shale

Present planning indicates that the White River Dam and Reservoir may be capable of yielding up to 75,000 acre-feet of water annually.

Projections of water use for the oil shale industry are down considerably from projections made 2 years ago. Values shown through the year 2010 were supplied by the Utah Division of Water Resources. It should be realized that all of the projected oil shale depletion values contain a high degree of uncertainty.

p. Tar Sands

In November 1983, the Bureau of Land Management issued a Draft Environmental Impact Statement describing development alternatives for special tar sand areas in Utah. Two development alternatives were presented--high commercial production and low commercial production--which would result in 88,295 and 22,200 acre-feet per year of depletion, respectively, by the year 2005. The Utah Division of Water Resources has requested that for purposes of Table A a level of development midway between the low commercial and high commercial production scenarios be assumed through the year 2010, which results in the numbers shown.

B. Lower Basin Depletions

Estimates of future consumptive use by Lower Basin States of main stem Colorado River water were derived from (1) quantities recommended by the Decree of the Supreme Court of the United States in Arizona vs. California (March 9, 1964) and (2) lists of present perfected rights filed with the court. Rates of development have been estimated in those cases where a particular use is not yet fully developed. Certain other existing uses are presumed to be curtailed when the Central Arizona Project becomes fully operational (assumed to be in 1988). In California, the Seven Party Agreement (August 18, 1931) also serves as a basis for estimates of future use within that State.

1. Nevada

a. Southern Nevada Water Project

The Las Vegas Valley which includes the diversions to Las Vegas, North Las Vegas, Henderson, and Nellis Air Force Base consumed about 78,500 acre-feet of water from the Southern Nevada Water Project in 1982, and it is estimated the valley will consume about 143,000, 203,000, and 225,000 acre-feet in 1990, 2000, and 2010, respectively.

Boulder City's maximum allowable diversion from the Boulder City Act of 1958 was 3,650 gallons per minute or 5,890 acre-feet per year. Under the First Stage of the Southern Nevada Water Project, Boulder City has obtained the right for an additional 8,000 acre-feet of water from Lake Mead. In 1982, Boulder City diverted about 4,500 acre-feet through a combination of its older separate federally constructed system and the more recent Southern Nevada Water Project Facilities.

b. Lake Mead Recreation Area

The Lake Mead Recreation Area is entitled to that quantity of water that is reasonably necessary to fulfill the purpose for which the recreation area has been set aside. In 1982, about 1,000 acre-feet were diverted to the recreation area from Lake Mead. It is also projected that 1,000 acre-feet will continue to be diverted to the area through the year 2010.

c. Miscellaneous Users Above Hoover Dam

Two corporations have contracts permitting diversion of 1,048 acre-feet per year of Lake Mead water. In 1982, only 559 acre-feet were diverted. It was projected that 1,000 acre-feet, on the average, will be consumed through the year 2010.

d. Mohave Steamplant, Southern California Edison Company

A portion of the Southern Nevada Water Project allotment has been obtained via contractual arrangements by the Southern California Edison Company for diverting up to 23,000 acre-feet annually from the Colorado River for thermal power production purposes at a site about 3 miles downstream from Davis Dam. Use of water until July 1, 2006, by the Southern California Edison Company is in accordance with two contracts--one between the State of Nevada and the Southern California Edison Company and one between the Bureau of Reclamation and the State of Nevada. The depletion for 1982 was about 17,000 acre-feet. It is estimated the depletions for the years 1983, 1990, and 2000 will be 15,000, 18,000, and 22,000 acre-feet, respectively. The diversion is not shown under the Southern Nevada Water Project since the point of diversion is below Hoover Dam.

e. Fort Mohave Indian Reservation

There are 1,939 acres of Fort Mohave Indian Reservation land located in Nevada. In 1982, no water was diverted to these lands. It has been estimated that the portion of the reservation located in Nevada will use 4,000 acre-feet by 1990 and 8,000 acre-feet by 2000.

f. Laughlin and Miscellaneous Users below Hoover Dam

Uses in the Laughlin area were negligible until recently, but it is projected the area will use 5,000 acre-feet in 1990 and 7,000 acre-feet in the years 2000 and 2010.

2. Arizona

a. Imperial Wildlife Refuge

The Imperial Wildlife Refuge is entitled to divert 28,000 acre-feet per year or consumptively use 23,000 acre-feet per year, whichever is less. In 1982, it was estimated the refuge diverted 144 acre-feet. By 1990 it is projected the Imperial Refuge will have a depletion of 13,000 acre-feet.

b. Lake Havasu Wildlife Refuge

The Lake Havasu Wildlife Refuge is entitled to divert 41,839 acre-feet or consumptively use 37,339 acre-feet per year, whichever is less. In 1982, it was estimated the refuge diverted 39,000 acre-feet. By 1990, it is projected the Lake Havasu Refuge will have a depletion of 37,000 acre-feet.

c. Fort Mohave Indian Reservation

The Fort Mohave Indian Reservation, located below Davis Dam, is allocated water by the Supreme Court Decree to irrigate 18,974 acres of land of which 14,916 acres are in Arizona, 2,119 acres are in California, and 1,939 acres are in Nevada, with a maximum annual diversion from the Colorado River of 122,648 acre-feet. The consumptive use required for irrigation of these lands is estimated to be 4 acre-feet per acre, which would result in a main stream depletion of about 75,900 acre-feet annually.

In 1982, the estimated consumptive use for that portion of the Fort Mohave Indian Reservation located in Arizona was 35,000 acre-feet.

d. Kingman, Boulder Canyon Project

A contract was signed with the city of Kingman, Ariz., for an annual diversion of 18,500 acre-feet. At the present time, the city does not divert Colorado River water nor are there any plans to divert Colorado River water in the near future. It has been anticipated there will be no use of its contract water until 2000. It was assumed the use will be fully developed by 2010.

e. Mohave Valley Irrigation and Drainage District

A contract was signed between the Department of the Interior and the Mohave Valley Irrigation and Drainage District for an annual diversion of 51,000 acre-feet. As a result of terms in the contract, the district lost 10,000 acre-feet of its diversion in June 1979. The 10,000 acre-feet will be used for municipal, industrial, and irrigation purposes on lands not part of the Mohave Valley Irrigation and Drainage District.

The 1982 decree accounting[1/] shows that the Mohave Valley Irrigation and Drainage District diverted 31,000 acre-feet of main stream water. It is anticipated the district will use its full entitlement of 41,000 acre-feet by the year 2000.

f. Lake Havasu Irrigation and Drainage District

A contract was signed with Lake Havasu Irrigation and Drainage District for an annual diversion of 14,500 acre-feet.

The Lake Havasu Irrigation and Drainage District diverted 8,000 acre-feet from the Colorado River in 1982. It is anticipated the district will use its full entitlement of Colorado River water, 14,500 acre-feet, by the year 1990.

g. Central Arizona Project

The Colorado River Basin Project Act authorizes the Central Arizona Project for the purpose of furnishing irrigation and municipal water supplies to the water-deficient areas of Arizona and western New Mexico through direct diversion or exchange of water. This project is now under construction with water deliveries expected in 1985 to Phoenix and 1988 to Tucson. This project will provide water to Indian lands and a supplemental water supply to lands now being irrigated. Water made available to non-Indian lands can be used only on lands having a recent irrigation history. The Central Arizona Project must withstand shortages up to its full allocation if there is insufficient main stream water to satisfy an annual consumptive use of 7.5 million acre-feet allocated under the Supreme Court Decree of March 1964 to the States of Nevada, Arizona, and California. When shortages occur, diversions to the Central Arizona Project will be limited to assure prior water users of their entitled diversions from the Colorado River main stream water. A maximum of 2.2 million acre-feet of Colorado River water is all that could be diverted with a canal capacity of 3,000 cubic feet per second (ft^3/s).

h. Colorado River Indian Reservation

The Colorado River Indian Reservation is located along the Colorado River, just below Parker Dam, with most of the land in Arizona and the remainder in California. The Supreme Court Decree allocated 717,148 acre-feet of diversions to the Colorado River Indian Reservation for irrigation of 107,588 acres of land.

1/ The decree accounting is in accordance with Article V of the Supreme Court Decree in Arizona vs. California.

There are 99,375 acres of land in Arizona, of which about 76,000 acres have been developed. The consumptive use requirement for irrigation of these lands is estimated to be 4 acre-feet per acre which would result in an annual main stream depletion of 397,500 acre-feet.

The Bureau of Indian Affairs has reported a general 2,000-acre-per-year land development rate on the reservation in the past. The land development rate of 2,000 acres per year was assumed for the future even though the Bureau of Indian Affairs feels the land development rate may slow down in the near future.

i. Cibola Wildlife Refuge

The Cibola Wildlife Refuge has a water right reserved by Secretarial notice in the Federal Register, December 9, 1982, for 16,973 acre-feet of consumptive use per year. In 1982, the refuge used 8,250 acre-feet. By 1990 it is projected to be fully developed.

j. Gila Project

The Gila Project was originally authorized to develop up to 600,000 acre-feet of consumptive use. It is now estimated that the acreage likely to be developed will consume about 450,000 acre-feet per year. The Gila Project includes the Welton-Mohawk and Yuma Mesa Divisions.

The Welton-Mohawk Division, which is now authorized to develop 65,000 acres, is anticipated to consume 300,000 acre-feet.

The North Gila, Yuma Mesa, and Yuma (South Gila) Irrigation Districts are included under the Yuma Mesa Division of the Gila Project. A total of 37,500 acres is estimated to be the average acreage developed by the districts within this division. Consumptive use would average 150,000 acre-feet per year.

k. City of Yuma

The city of Yuma consumptively used 8,223 acre-feet of water in 1982 and is expected to use 12,500 acre-feet by the year 1990.

l. Yuma Project and Yuma Auxiliary Project

The Valley Division of the Yuma Project and adjacent land of the Yuma Auxiliary Project are anticipated to supply water to about 53,000 acres of land. About 50,000 acres are within the boundaries of the Valley Division (Yuma County Water Users Association) and about 3,000 acres are within Unit B Irrigation District (the Yuma Auxiliary Project). Estimated consumptive use will amount to 212,000 acre-feet per year.

The measured return flow from lands of the Gila Project, Yuma Mesa Division, and Yuma Project, Valley Division and Unit B is commingled to some extent. At this time, no attempt to assign commingled or unmeasured return flow is made in the decree accounting for the water users within those projects. This is reflected in the figures assigned for 1982.

m. Cocopah Indian Reservation

The tribe has a water right to irrigate 431 acres of land or about 1,700 acre-feet of consumptive use. In 1982, its water use amounted to about 1,000 acre-feet.

n. Other Uses

It is estimated that the many small users with water use contracts will have a consumptive use ranging from about 54,000 acre-feet in 1990 to 51,000 in 2010.

o. Protective and Regulatory Pumping Unit

The United States and Mexico signed a treaty in 1944 that allotted Mexico 1,500,000 acre-feet of water annually. Of this, approximately 1,360,000 acre-feet will be delivered annually to Mexico in the limitrophe section of the Colorado River upstream from Morelos Dam. The remaining 140,000 acre-feet annually are delivered to the Southerly International Boundary and in the limitrophe section of the Colorado River below Morelos Dam.

In 1961, the Mexican Government protested the increasing salinity of the Colorado River water entering Mexico. With the approval of both governments, Minute 242 was signed on August 30, 1973, as a permanent solution to the salinity problem.

The Protective and Regulatory Pumping Unit is one of the provisions of Minute 242 to accomplish this. Each country is allowed to pump a maximum of 160,000 acre-feet annually from the ground water within 5 miles of the Arizona-Sonora Boundary. To meet our treaty obligations, 125,000 acre-feet per year are delivered to Mexico at the Southerly International Boundary as part of this agreement, and the remaining 35,000 acre-feet are for agriculture and municipal and industrial uses in the area.

3. California

a. City of Needles

The city of Needles has a present perfected right to a consumptive use of 950 acre-feet per year. In 1982 it was estimated the city consumptively used 2,288 acre-feet. At this time, Needles does not have a water use contract with the Secretary of the Interior, so no attempt was made to indicate a source for its future water supply except for its present perfected right.

b. Metropolitan Water District

In 1982 the Metropolitan Water District used approximately 713,000 acre-feet. Future use may be reduced as indicated in the tables so that California's use does not exceed 4.4 million acre-feet after the Central Arizona Project comes on line.

c. Fort Mohave Indian Reservation

There are 2,119 acres of Fort Mohave Indian Reservation land located in California. Using an estimated consumptive use of 4 acre-feet per acre, this land is entitled to approximately 9,000 acre-feet of consumptive use per year. In 1982, its consumptive use was about 14,000 acre-feet but will be reduced when the Central Arizona Project comes on line.

d. Chemehuevi Indian Reservation

The Chemehuevi Indian Reservation, located above Parker Dam, is allocated water by the Supreme Court Decree to irrigate 1,900 acres of land in California, with a maximum annual diversion from the main stream of the Colorado River of 11,340 acre-feet. The consumptive use required for irrigation of these lands is estimated to be 4 acre-feet per acre, which would result in a main stream depletion of about 7,600 acre-feet annually. The lands that are irrigable are above the river and not feasible for farming at this time. It is anticipated that the reservation will develop 7,600 acre-feet of consumptive use for municipal and industrial and/or irrigation purposes by the year 2000.

e. Colorado River Indian Reservation

The Colorado River Indian Reservation is located along the Colorado River, just below Parker Dam, with most of the land in Arizona and the remainder in California. The Supreme Court Decree allocated 717,148 acre-feet of diversion to the Colorado River Indian Reservation for irrigation of 107,588 acres of land.

There are 8,213 acres of land in California that are partially developed. They will eventually consume about 33,000 acre-feet.

f. Palo Verde Irrigation District

The Palo Verde Irrigation District has the number one priority in California for Colorado River water under the Seven Party Agreement to irrigate a total of 104,500 acres with an estimated consumptive use of 423,000 acre-feet per year.

g. Yuma Project, Reservation Division

California lands within the Yuma Project fall under the second priority according to the Seven Party Agreement. In the Indian Unit, Arizona vs. California reserves water for 7,743 acres of land which would require an approximate consumptive use of 31,000 acre-feet. The Bard Unit has about 7,000 acres of land that have an approximate consumptive use of 28,000 acre-feet.

h. Imperial Irrigation District

For this report, the Imperial Irrigation District and the Coachella Valley Water District consume all remaining water within priorities one, two, and three according to the Seven Party Agreement. The total apportioned to these three priorities is 3,850,000 acre-feet per year. In 1982, the Imperial Irrigation District diverted about 2,600,000 acre-feet. Its projected diversions will reach 3,033,000 acre-feet in 1990.

i. Coachella Valley Water District

In 1982 the District diverted about 532,000 acre-feet.

j. Imperial and Coachella Return Flow

It is estimated that some of the seepage from portions of the All-American Canal may eventually reach the Colorado River. The seepage is estimated to be 18,000 acre-feet per year and is credited to the districts.

k. Coachella Canal Lining

After 1985, it was assumed that other uses in California would be limited to holders of present perfected rights and their rights would not total more than 1,000 acre-feet per year.

l. Other uses

The beginning 48 miles of the Coachella Canal from the All-American Canal turnout to Drop 7 was lined and put into service in November 1980. Lining this segment of the canal saves about 132,000 acre-feet per year.

Sheet 1 of 3

Table A
CRSS projected depletions
(Unit--1,000 acre-feet/year)

Upper Basin projects	1983	1990	2000	2010
Arizona				
Comprehensive Framework Study	10	10	10	10
Miscellaneous additional depletions				
Irrigation	2	2	2	2
Municipal and domestic	1	4	4	4
Navajo Powerplant	21	34	34	34
Gallup-Navajo Indian Water Supply Project (temporary)	0	(5)	(7)	(7)
Total depletions	34	50	50	50
Compact apportionment	50	50	50	50
Remaining water available	16	0	0	0
Wyoming				
Comprehensive Framework Study	282	282	282	282
Miscellaneous additional depletions				
Irrigation and livestock	6	17	27	35
Municipal	3	5	8	11
Reclamation projects				
Seedskadee	6	20	20	20
Lyman	10	10	10	10
Savery-Pot Hook	0	0	0	0
La Barge	0	0	0	0
Transmountain diversions	8	8	28	50
Industrial uses1/				180
Thermal electric	29	54	76	
Mineral	24	34	50	
Coal gasification	0	0	10	
Oil shale	0	0	3	
Total depletions	368	430	514	588
Evaporation, storage units	73	73	73	73
Total	441	503	587	661
State share of 5.8 million acre-foot yield	805	805	805	805
Remaining water available	364	302	218	144
Colorado				
Comprehensive Framework Study	1,707	1,707	1,707	1,707
Miscellaneous additional depletions				
Irrigation	24	24	24	24
Municipal and industrial	5	6	7	10
Fish and wildlife	1	1	1	1
Minerals	1	1	1	1
Exports				
Denver Expansion	48	70	100	130
Homestake Expansion	28	48	48	48
Independence Pass Expansion	7	7	7	7
Pueblo Expansion	3	3	3	3
Colorado Springs Expansion	0	0	5	5
Englewood	10	10	10	10
Fryingpan-Arkansas	69	69	69	69
Windy Gap	0	54	54	54
Reclamation projects				
Animas-La Plata	0	0	121	121
Bostwick Park	4	4	4	4
Dallas Creek	0	11	13	17
Dolores	0	61	81	81
Fruitland Mesa	0	0	0	0
San Miguel	0	0	0	0
Savery-Pot Hook	0	0	0	0
Upper Gunnison River Basin	0	5	10	15
West Divide	0	0	0	0
Municipal, industrial, and domestic				
Taylor Draw Reservoir	0	2	6	7
Stagecoach Project	0	2	4	4
Ruedi contracts	0	16	49	49
Blue Mesa contracts	0	10	10	10
Oil shale	0	2	8	42
Thermal-electric powerplants				
Craig-Hayden	13	18	18	18
Colorado Ute-Southwest Project	0	0	5	5
Total depletions	1,920	2,131	2,365	2,442
Evaporation, storage units	269	269	269	269
Total	2,189	2,400	2,634	2,711
State share of 5.8 million acre-foot yield	2,976	2,976	2,976	2,976
Remaining water available	787	576	342	265

1/ 2010 types of uses were not itemized.

Sheet 2 of 3

Table A
CRSS projected depletions
(Unit--1,000 acre-feet/year)

Upper Basin projects	1983	1990	2000	2010
New Mexico				
Adjusted Comprehensive Framework Study	89	89	89	89
Miscellaneous additional depletions	12	12	12	12
Reclamation projects				
Navajo Reservoir evaporation	26	26	26	26
Animas-La Plata	0	0	14	34
San Juan-Chama	110	110	110	110
Navajo Indian irrigation	127	208	267	267
Hammond	8	10	10	10
Hogback Extension	5	10	10	10
Jicarilla Apache	0	3	3	3
Utah International, Inc. (private right)	27	39	39	39
Navajo Reservoir contracts (temporary)				
Public Service Company of New Mexico	16	16	16	0
Utah International, Inc.	0	35	35	35
Gallup-Navajo Indian	0	10	14	18
Not identified	0	10	10	10
Total depletions	420	578	655	663
Evaporation, storage units	58	58	58	58
Total	478	636	713	721
State share of 5.8 million acre-foot yield	647	647	647	647
Remaining water available	169	11	-66	-74
Utah				
Comprehensive Framework Study	664	664	664	664
Miscellaneous additional depletions				
Irrigation and stock	1	1	1	1
Municipal	2	3	5	7
Minerals	1	1	1	1
Reclamation projects				
Central Utah Project				
Bonneville Unit	32	136	166	166
Upalco Unit	0	3	12	12
Jensen Unit	4	15	15	15
Uintah Unit	0	0	28	28
Emery County	11	8	8	8
Gallup-Navajo Indian	0	1	1	1
Ute Indian lands	4	20	84	84
Division of Water Resources projects	11	16	20	24
Thermal electric powerplants				
Emery County	24	30	36	36
Conversion of irrigation to power	-7	-7	-10	-10
Other Utah Power & Light Company plants	0	0	6	12
Deseret Generation Co-op	0	6	12	12
Municipal and industrial				
White River Dam	0	6	6	6
Oil shale	0	1	20	30
Tar sands	0	6	18	30
Total depletions	747	910	1,093	1,127
Evaporation, storage units	120	120	120	120
Total	867	1,030	1,213	1,247
State share of 5.8 million acre-foot yield	1,322	1,322	1,322	1,322
Remaining water available	455	292	109	75
Upper Colorado River Basin totals				
Total depletions	3,489	4,099	4,677	4,870
Evaporation, storage units	520	520	520	520
Total	4,009	4,619	5,197	5,390
5.8 million acre-foot yield	5,800	5,800	5,800	5,800
Remaining water available	1,791	1,181	603	410

Sheet 3 of 3

Table A
CRSS projected depletions1/
(Unit--1,000 acre-feet/year)

Lower Basin projects	1983	1990	2000	2010
Nevada				
Southern Nevada Water Project				
Las Vegas Valley	79	143	203	225
Boulder City, Nev.	4	6	7	8
Lake Mead National Recreation Area	1	1	1	1
Miscellaneous users above Hoover Dam	1	1	1	1
Mohave Steamplant, Southern California Edison Company	17	18	22	0
Fort Mohave Indian Reservation	0	4	8	8
Laughlin and miscellaneous users below Hoover Dam	.0	5	7	7
Total	102	178	249	250
Arizona				
Imperial Wildlife Refuge	0	13	13	13
Havasu Wildlife Refuge	39	37	37	37
Fort Mohave Indian Reservation	53	60	60	60
Kingman, Boulder Canyon Project	0	0	9	18
Mohave Valley Irrigation and Drainage District	31	30	41	41
Lake Havasu Irrigation and Drainage District	8	14	14	14
Central Arizona Project	0	1,515	1,488	1,464
Colorado River Indian Reservation	333	383	398	398
Cibola Wildlife Refuge	8	17	17	17
Gila Project	511	450	450	450
Welton-Mohawk Division				
Yuma Mesa Division				
City of Yuma	8	13	18	23
Yuma Project and Yuma Auxiliary Project	237	212	212	212
Cocopah Indian Reservation	1	2	2	2
Other uses	62	54	41	51
Protective and Regulatory Pumping Unit2/	-24	0	0	0
Yuma Mesa Outlet Drain2/	-27	0	0	0
Total	1,240	2,800	2,800	2,800
California				
City of Needles	2	1	1	1
Metropolitan Water District	713	519	498	498
Fort Mohave Indian Reservation	31	9	9	9
Chemehuevi Indian Reservation	0	5	8	8
Colorado River Indian Reservation	6	15	33	33
Palo Verde Irrigation District	457	423	423	423
Yuma Project				
Indian Unit	40	31	31	31
Bard Unit	48	28	28	28
Return flow	-28	0	0	0
Imperial Irrigation District	2,596	3,033	3,033	3,033
Coachella Valley Water District	425	485	485	485
Imperial and Coachella return flow	0	-18	-18	-18
Coachella Canal lining		-132	-132	-132
Other uses	21	1	1	1
Total	4,311	4,400	4,400	4,400

1/ From the 1982 Supreme Court Decree Accounting (Arizona vs. California, March 9, 1964). The figures represent measured diversions less measured return flow which can be assigned to a specific project. The figures do not include commingled or unmeasured return flows, thus may not be consistent with estimates of future consumptive use.

2/ Commingled return flow from the Yuma Mesa Division, Gila Project; Valley Division, Yuma Project; and Unit B, Yuma Auxiliary Project.

Table B
CRSS projected salt pickup

	Type of use2/	TDS pickup1/ (1,000 tons/year) 1983	1990	2000	2010
Wyoming					
Base condition		443.5	443.5	443.5	443.5
Transbasin diversions	Ex	-1.1	-1.1	-3.8	-6.8
Total		442.4	442.4	439.7	436.7
Colorado					
Base condition		2,410.3	2,410.3	2,410.3	2,410.3
Animas-La Plata Project	Ir	0	0	5.0	5.0
Dallas Creek Project	Ir	0	6.5	5.9	10.0
Dolores Project	Ir	0	1.4	1.4	1.4
Denver Expansion	Ex	-2.4	-2.9	-4.2	-6.1
Colorado Springs Expansion	Ex	0	0	-.3	-.3
Homestake Expansion	'x	-1.5	-2.5	-2.5	-2.5
Windy Gap	Ex	0	-2.7	-2.7	-2.7
Total		2,406.4	2,410.1	2,412.9	2,415.1
Utah					
Base condition		2,353.8	2,353.8	2,353.8	2,353.8
Central Utah Project					
Bonneville Unit	Ir, Ex	-4.2	-15.5	-21.6	-21.6
Upalco Unit	Ir	0	1.5	6.2	6.2
Jensen Unit	Ir	8.6	33.2	33.2	33.2
Uintah Unit	Ir	0	0	14.5	14.5
Utah Department of Water Resources projects	Ir	9.7	14.1	14.1	20.3
Deferred Indian lands	Ir	2.1	10.3	43.4	43.4
Total		2,370.0	2,397.4	2,437.4	2,449.8
New Mexico					
Base condition		96.5	96.5	96.5	96.5
Animas-La Plata Project	Ir	0	0	1.0	1.0
Hogback Expansion	Ir	5.7	11.5	11.5	11.5
Navajo Indian Irrigation Project	Ir	145.9	239.0	306.8	306.8
Total		248.1	347.0	428.6	428.6
Arizona					
Base condition		12.1	12.1	12.1	12.1

1/ Lower Colorado River Basin CRSS model does not consider each project separately. TDS pickup is not broken out by project; it is input on a reach-by-reach (cumulative) basis as part of the base salt load pickup.

2/ Ir = Irrigation assumes an annual salt pickup of 2 tons per acre of newly irrigated lands and none for lands receiving supplemental irrigation. Ex = Exports remove salt at a rate approximating their salinity.

PART VII. COLORADO RIVER SALINITY CONTROL PROGRAM

Title I of the Colorado River Basin Salinity Control Act, Public Law 93-320, authorized the Secretary of the Interior to proceed with a program of works of improvement for the enhancement and protection of the quality of water available in the Colorado River for use in the United States and the Republic of Mexico. Title I enables the United States to comply with its obligation under the agreement with Mexico of August 30, 1973 (Minute No. 242 of the International Boundary and Water Commission, United States and Mexico), which was concluded pursuant to the Treaty of February 3, 1944 (TS 994).

Title II of the Colorado River Basin Salinity Control Act, Public Law 93-320, of June 24, 1974, as amended by Public Law 98-569 of October 30, 1984, directs the Secretary of the Interior, commencing on January 1, 1975, and every 2 years thereafter, to submit simultaneously to the President, the Congress, and the Advisory Council, a report on the Colorado River Salinity Control Program covering the progress of investigation, planning, and construction of salinity control units for the 2 previous fiscal years. The report is to include the effectiveness of the units, anticipated work to be accomplished to meet the objectives of Title II with emphasis on the needs during the 5 years immediately following the date of each report, and any special problems that may be impeding progress in attaining an effective salinity control program. Title II also provides that this report may be included in the Quality of Water, Colorado River Basin Biennial Progress Report.

Figure 2 shows the location of the project study areas for both the Department of the Interior and the Department of Agriculture. Table C summarizes the salt load reduction potential for each of the Title II salinity control measures summarized in this chapter. Figures 3 and 4 show a comparison of salt load reductions and cost effectiveness for each of these projects. Part VIII discusses the impact of these control measures on salinity in the Colorado River.

A. Bureau of Reclamation Programs

Most of the planning delays and changes in project concept or scope can be related to the inherent complexities and unknowns encountered in the saline ground water systems found in all source areas. Unlike other conventional water programs, a learning curve must be applied to salinity control in applying corrective actions to offset earlier "trial and error" investigations. Thus, concern has been expressed over program delays, downgrading salinity impacts, and higher costs; however, the net effect of the delays and changes should be to improve the technical confidence in the program.

In order to minimize risk, staging of project features is being encouraged for several units. Staging allows additional time to monitor

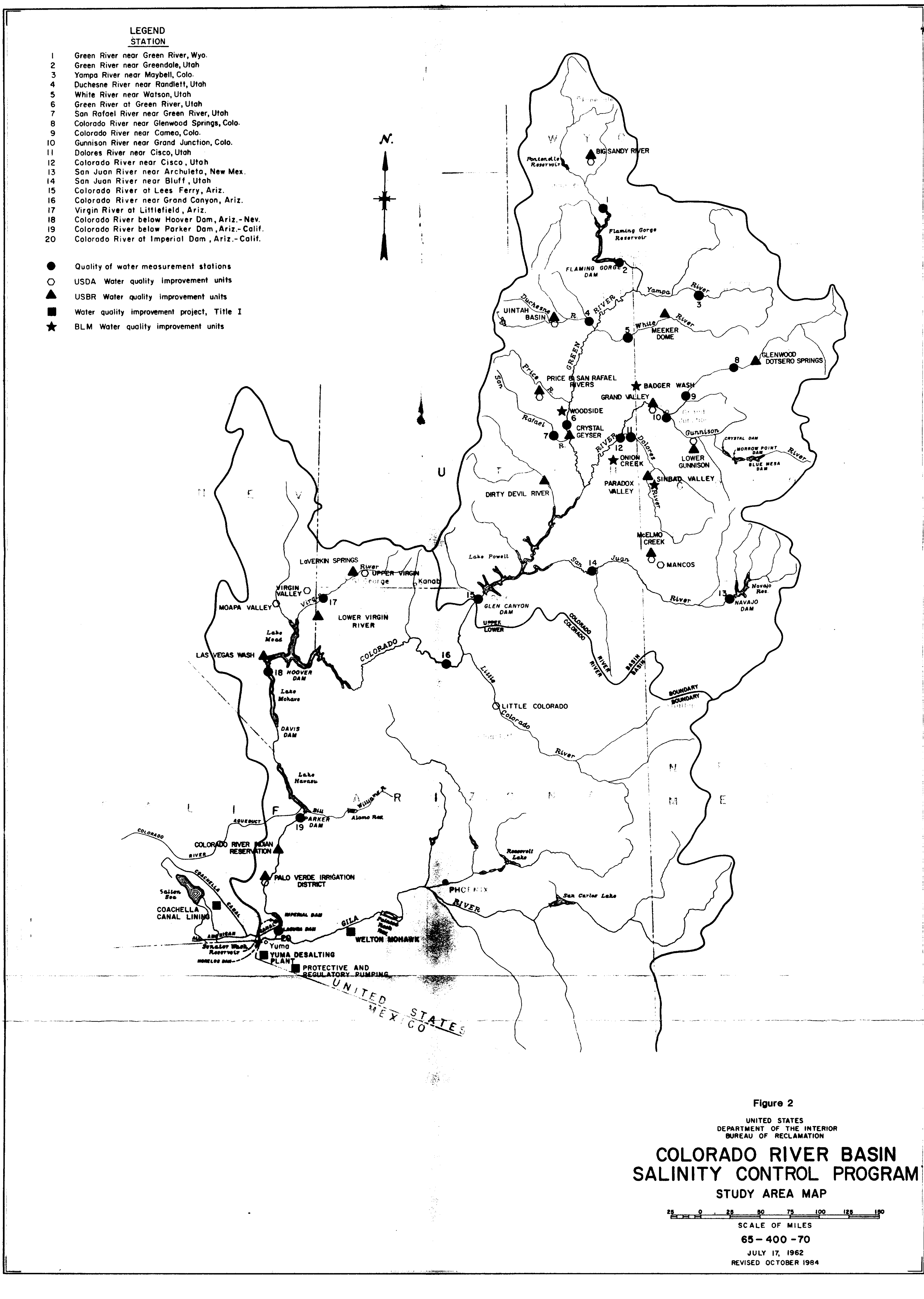

Figure 2

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

COLORADO RIVER BASIN
SALINITY CONTROL PROGRAM
STUDY AREA MAP

65-400-70
JULY 17, 1962
REVISED OCTOBER 1984

Table C
Salinity control program summary

Unit	Potential salt reduction[1/] (1,000 tons/year)	Estimated salt reduction to date (1,000 tons/year)	Annual cost effec-tiveness[2/] (dollars/ton)	Effect at Imperial Dam: TDS reduction (mg/L)	Effect at Imperial Dam: Annual cost effec-tiveness[2/] (dollars/mg/L)
U.S. Department of the Interior (USDI)					
Authorized for construction and/or completed					
Grand Valley, Stage I	28	17.7	72	2.8	719,000
Grand Valley, Stage II	136		77	13.6	766,000
Las Vegas Wash	92		10	9.2	102,000
Lower Gunnison Basin	141		71	14.1	712,000
McElmo Creek	24		50	2.4	500,000
Meeker Dome	57	48	15	4.8	152,000
Paradox Valley	180		25	18	250,000
Authorized for planning					
Big Sandy River	78		69	7.8	691,000
Dirty Devil River	20		74	2	740,000
Glenwood-Dotsero Springs	284		121	28.4	1,210,000
LaVerkin Springs	53		190	5.3	1,900,000
Lower Gunnison Basin, North Fork	3/		3/	3/	3/
Lower Virgin River	3/		3/	3/	3/
Palo Verde Irrigation District	11		28	1.1	280,000
Price-San Rafael Rivers	30		35	3	350,000
Saline Water Use	160		3/	3/	3/
San Juan River	3/		3/	3/	3/
Sinbad Valley (BLM)	7		75	0.7	751,000
Uinta Basin	26		90	2.6	903,000
U.S. Department of Agriculture (USDA)[4/]					
Authorized for construction					
Big Sandy River	35		30	3.5	300,000
Grand Valley[1/]	130	23.3	24	13.0	240,000
Lower Gunnison Basin	335		56	33.5	560,000
Mancos Valley, preliminary	20		89	2.0	890,000
McElmo Creek	38		79	3.3	790,000
Moapa Valley	20		38	2.0	380,000
Price River, preliminary	62		3/	6.2	3/
San Rafael River, preliminary	62		3/	6.2	3/
Uinta Basin	77	12.8	96	7.6	960,000
Virgin Valley	37		9	3.7	90,000

1/ Reflects values presently included in CRSS data base.
2/ The estimates represent, at best, appraisal-level costs in some cases and feasibility-level costs in other cases. Caution must be used in drawing comparative conclusions in attempting to prioritize projects on the basis of these cost-effectiveness values.
3/ Figures not available.
4/ Indexed to 1982 prices.

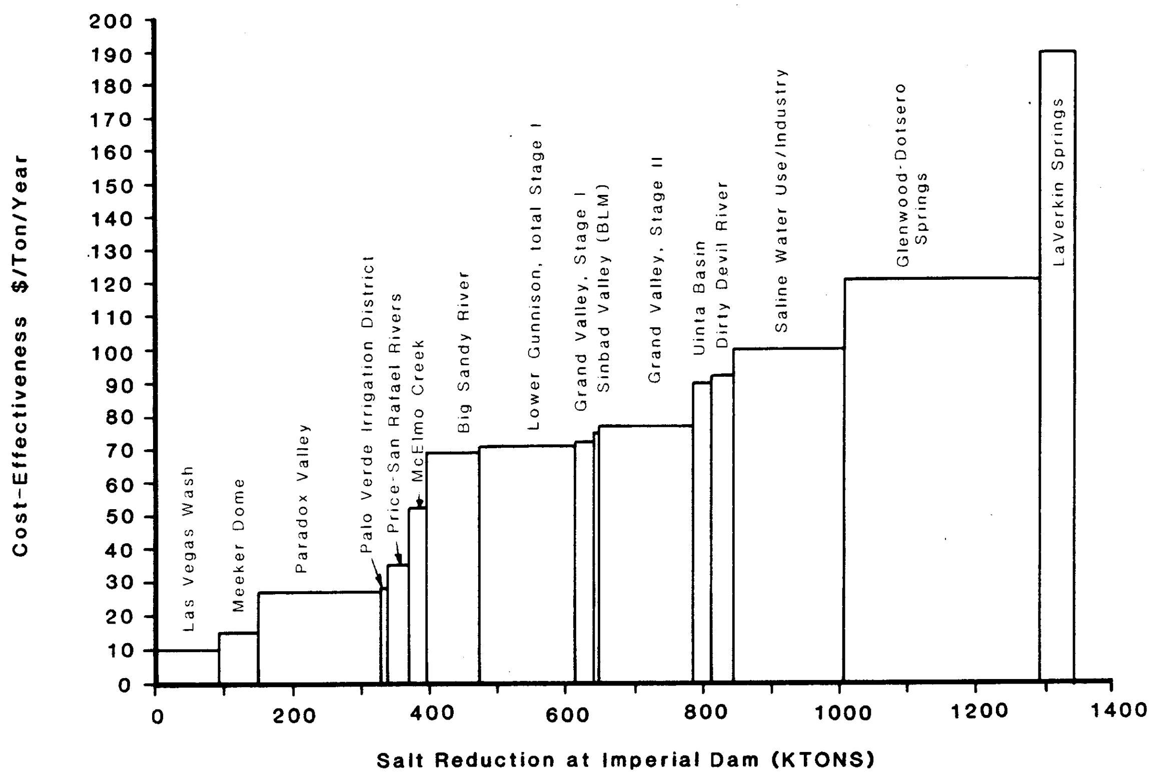

Figure 3 Cost-Effectiveness and Salt Reductions for USDI Projects.

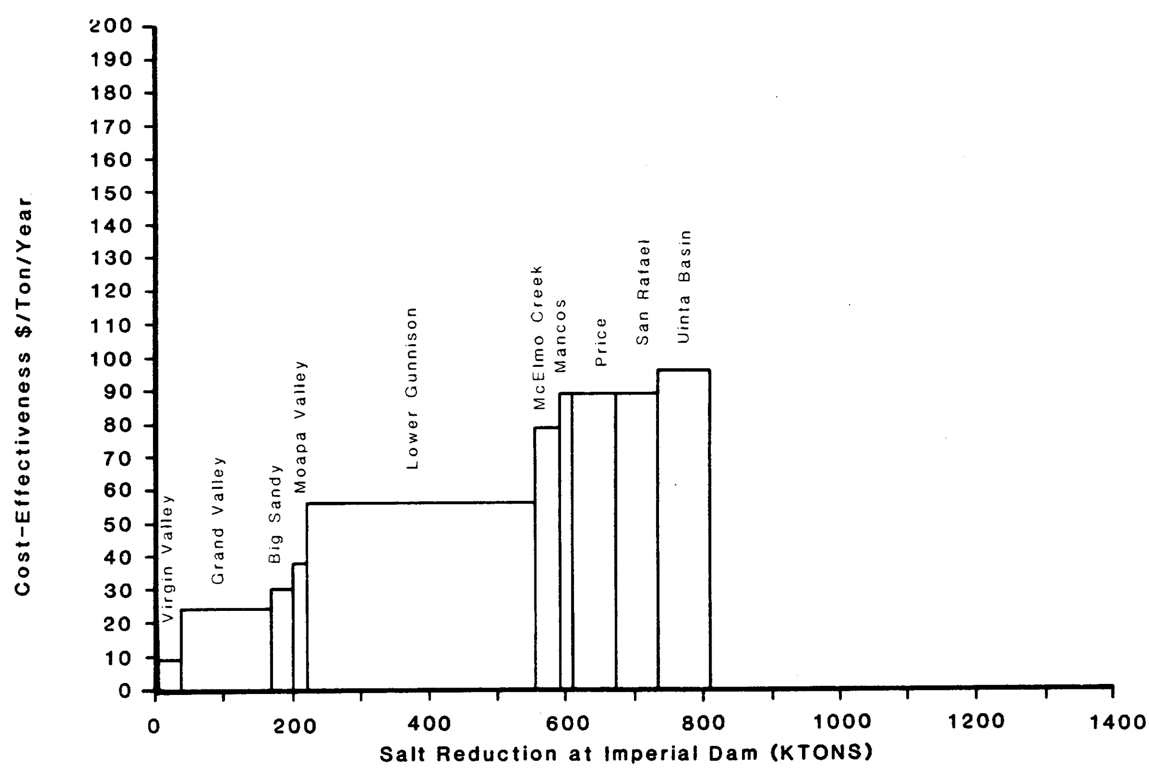

Figure 4 Cost-Effectiveness and Salt Reductions for USDA Projects.

actual results and minimize investment if certain features are not proved effective. By staging portions of projects, however, the trade-offs for minimizing risk may involve higher final costs, delays in project completion, potential project reductions due to funding constraints or changes in plans, and loss of the support of local water users. Recent experience in monitoring the effects of seepage control and collection wells indicates that conclusive evidence is highly subject to masking by normal hydrologic events, and monitoring for several years may be necessary to show definitive results. It is important to note that the intensive onsite monitoring programs, reservoir effects, and ion constituent studies have served to increase the knowledge of the salinity problem and significantly reduce the risk and uncertainty of control efforts.

Some of the Basin States have raised water rights issues over disposal of collected saline water in evaporation ponds. Under Colorado water law, such a control system would not meet the requirements for "beneficial use" in granting a water right. Moreover, the disposal of large quantities of water in ponds requires large land areas and high investment costs in land preparation and liners to prevent leakage. The only strategy that appears to satisfy these concerns is to deliver collected saline water for beneficial use by private industry or for energy development. This strategy, however, increases our dependence on the uncertainties of energy development and the water supply plans of private industry. The Colorado River Salinity Control Forum is addressing this water rights issue on a case-by-case basis by an ad hoc committee.

1. Title I Program

Title I of the Colorado River Basin Control Act of 1974 (Public Law 93-320) provided the means to comply with the United States obligations to Mexico which included as a major feature a desalting plant and brine discharge canal. These facilities will enable the United States to deliver water to Mexico having an average salinity no greater than 115 ppm ± 30 ppm (United States count) over the annual average salinity of the Colorado River water at Imperial Dam.

a. Coachella Canal Lining

To assist in meeting the salinity control objectives of Title I, the Secretary was authorized to construct a concrete-lined canal or to line the unlined initial 49 miles of the Coachella Canal. The act required that a repayment contract be executed with the Coachella Valley County Water District for partial repayment of the cost of the work.

The Coachella Canal originates as a diversion from the All-American Canal at a turnout point near the Mexican border and runs in a generally northwestern direction for a distance of 123 miles. It provides an irrigation water supply for lands now totaling about 67,000 acres in the Coachella Valley. The Coachella Valley County Water

District has 1,500 ft^3/s of capacity in the All-American and Coachella Canals pursuant to its October 15, 1934, contract with the United States.

Shortly after completion of the canal in 1948, seepage losses developed as a result of the first 86 miles of the length of the waterway being unlined. The problem was worst in the initial 49 miles where the unlined canal traversed the coarse, sandy soils of the Imperial East Mesa.

It was estimated that approximately 141,000 acre-feet of Colorado River water were lost each year through seepage from the first 49 miles of the unlined Coachella Canal. The replacement concrete-lined canal was constructed generally adjacent and parallel to the then existing canal along this reach. It is estimated that the lined canal will reduce seepage losses to 9,000 acre-feet per year, resulting in an annual savings of 132,000 acre-feet. The seepage losses saved are to be used for an interim period to substitute for the bypassed Welton-Mohawk drainage waters and for the reject stream from the desalting plant. This water would replace a part of the releases now being made from storage to meet the salinity differential as required by Minute 242 of the International Boundary and Water Commission, United States and Mexico.

The interim period begins on completion of construction and ends the first year that the Secretary of the Interior delivers to California less main stream Colorado River water than requested by California agencies and Federal establishments with water rights in California. Following the interim period, the saved water will be used by entities in California to reduce deficiencies in meeting the California water orders. Because of its priority, the Coachella Valley County Water District will then be the major beneficiary of this saved water.

Approximately 4,200 acres of private lands on the East Mesa in the Imperial Irrigation District were located adjacent to the canal, and the authorizing act provided that these lands be purchased by the United States, thus relieving the necessity to provide this service. It was anticipated that following Federal acquisition, not more than 1,500 acres of developed land would remain in production to be served from the lined canal.

The contract with the Coachella Valley County Water District provides that the total construction costs will be repayable without interest in 40 equal annual payments beginning the year following completion of the construction. The portion of the construction charge allocated to the United States, which will be nonreimbursable, will be that portion determined by the ratio of the number of months in the interim period divided by the number of months in the repayment period. All annual repayment installments of the construction charge obligation after the end of the interim period will be repaid by the Coachella Valley County Water District.

The Coachella Valley County Water District operates and maintains the new lined canal and delivers water to the turnouts installed to serve water users located in the Imperial Irrigation District service area.

b. Protective and Regulatory Pumping

The ground water reservoir underlying United States lands in the Yuma, Ariz., area is the same reservoir underlying contiguous lands in Mexico. Pumping on one side of the boundary affects the ground water reservoir on the other side. The pumping of water from wells located immediately north of the Southerly International Boundary separating Arizona and Sonora, Mexico, will provide accountable water deliveries to Mexico.

In December 1972, Mexico commenced pumping ground water from a well field located immediately south of the International Boundary separating Arizona and Sonora, Mexico. Studies indicate the pumping draws water stored in the ground water reservoir underlying the Yuma area in the United States and in time will seriously affect the surface drain flows historically delivered to Mexico as part of United States' obligation under the 1944 Water Treaty. These flows had been about 125,000 acre-feet of drain flow and 15,000 acre-feet of canal wasteway flow annually. More recent annual flows total only about 105,000 acre-feet at the Southerly International Boundary and will gradually be reduced to about the 15,000 acre-feet of canal wasteway flow.

Public Law 93-320 authorizes the Secretary to construct, operate, and maintain a well field for ground water pumping in a 5-mile zone adjacent to the International Boundary near San Luis, Ariz. The well field, known as the Protective and Regulatory Pumping Unit, would have the capacity to produce approximately 160,000 acre-feet per year. Water produced from the well field would be (1) delivered to Mexico for credit against the Treaty obligation and (2) used in the United States. The law also authorized the Secretary to acquire approximately 23,500 acres of private, State, and State-leased lands within the 5-mile zone near the boundary. The purpose of this land acquisition is to limit agricultural development within the zone, thereby limiting ground water pumping to the 160,000 acre-feet per year as required by Minute No. 242 of the International Boundary and Water Commission, United States and Mexico. About 10,000 acres of Reclamation-withdrawn land are used to assist in this control.

The ground water table within the 5-mile zone is expected to decline during the 50-year life of the Protective and Regulatory Pumping Unit. This decline will occur as a result of project pumping, Mexican well field pumping, and pumping of private wells. Water table drawdown from only project pumping over 50 years is predicted to be about 55 feet in the vicinity of Hillander "C" Irrigation District and between 5 and 20 feet in the southern Yuma Valley. The combined effects of both United States and Mexico pumping will result in a drawdown of approximately 110 feet in the vicinity of the Hillander "C" Irrigation District and from 20 to 60 feet in the southern Yuma Valley.

Ultimate production of the well field will be 160,000 acre-feet per year. Of that, the amount to be delivered to Mexico is expected to be 125,000 acre-feet per year. This quantity, along with 15,000 acre-feet of wasteway flows will furnish the necessary 140,000-acre-foot delivery at the Southerly International Boundary. The balance of the water available from the well field could be sold to other users in the area.

Contracts have been completed for construction of the first 21 wells, a conveyance channel, appurtenances, and an operation and maintenance road. Future construction to complete the 35-well system and maintain the 140,000-acre-foot-per-year delivery at the Southerly International Boundary is scheduled to be completed by 1990.

c. Yuma Desalting Plant

The Yuma Desalting Plant is being built on a 60-acre tract of land 6 miles west of Yuma, Ariz. This site allows easy access to the Main Outlet Drain Extension, which will carry the saline drainage water to the plant, and it is also near the Colorado River, where the desalted water will be delivered.

The purpose of the plant is to upgrade the quality of drainage water from the Welton-Mohawk Irrigation and Drainage District. This plant is a portion of the permanent and definitive solution to the international problem of high salinity in the Colorado River. The Colorado River Salinity Control Act, Public Law 93-320, authorized this work to enable compliance with the provision of Minute 242 of the treaty with Mexico. In part, Minute 242 states that the approximately 1,360,000 acre-feet of water delivered to Mexico upstream of Morelos Dam have an annual average salinity of no more than 115 ppm $\pm$ 30 ppm, U.S. count, over the annual average salinity of Colorado River waters which arrive at Imperial Dam. Imperial Dam is located approximately 20 miles upstream from the delivery point at Morelos Dam.

Presently, the plant is being constructed to produce about 73 million gallons of desalinated or product water per day. This would result in a delivery of about 67,000 acre-feet of product water per year. The product water will be blended with untreated drainage water to make up an estimated return flow of about 73,000 acre-feet each year. The plant is expected to save about 70 percent of the total drainage flow from the Welton-Mohawk Irrigation and Drainage District.

The operational design parameters set up for the plant determined that a membrane desalting process was technically feasible and is economically suitable for the Yuma Desalting Plant operation. The size of the desalting plant was computed using a salt balance formula. The factors included in this formula are the volume of the water delivered to Mexico; the salinity differential required by Minute No. 242

of the International Boundary and Water Commission, United States and Mexico; the salinity of the Colorado River at Imperial Dam; the volume of drainwater treated; the salinity of the drain; a number of other factors related to the diffuse return flows below Imperial Dam; and plant operational factors. The original capacity of the desalting plant was 96 million gallons per day, which could treat 167,000 acre-feet of drain flow. Whenever the salinity of the Colorado River at Imperial Dam is above 949 mg/L, some drainage water would have to be bypassed.

A study done in 1978 by The Advisory Committee on Irrigation Efficiency, Welton-Mohawk Irrigation and Drainage District, recommended expansion of on-farm measures which will result in an irrigation drain flow of 108,000 acre-feet/year. In addition, the Colorado River Salinity Control Forum has established a salinity standard at Imperial Dam of 879 mg/L. Using the salt balance formula and assuming an irrigation drain flow of 108,000 acre-feet and salinity of the Colorado River water at Imperial Dam of 838 mg/L, a plant size of 73 million gallons per day would be required to treat the irrigation return flow portion of the total drainage flow.

2. <u>Title II, Units Completed or Under Construction</u>

Title II of the Colorado River Basin Salinity Control Act authorized the Secretary of the Interior to construct, as part of the Colorado River Salinity Control Program, the Grand Valley Unit, the Las Vegas Wash Unit, the Lower Gunnison Basin Unit, portions of the McElmo Creek Unit, and the Paradox Valley Unit. Another unit, the Meeker Dome Unit, was completed in a verification well plugging program. No additional actions are planned. The Investigation and Construction Schedule, Water Quality Improvement Program, Bureau of Reclamation, is shown in Figure 5.

a. <u>Grand Valley Unit</u>

The Grand Valley Unit is located in Mesa County in west-central Colorado. The unit area includes, for the most part, the entire irrigated portion of the Grand Valley consisting of about 71,000 acres and involving about 200 miles of canals and about 500 miles of laterals.

The Grand Valley is estimated to contribute an average of about 580,000 tons of salt annually to the Colorado River. Most of these salts are leached from the soil and underlying Mancos Formation Shale by ground water that receives its recharge from canal, lateral, and on-farm seepage.

The Mancos Formation is a thick sequence of gray fossil shale varying locally from 4,000 to 5,000 feet thick. Salts present in the shale are mostly calcium sulfate with smaller amounts of sodium chloride, sodium sulfate, and magnesium sulfate. Calcium sulfate (gypsum) is commonly found in crystal form in open joints and fractures of the shale.

Figure 5
Investigation and construction schedule
Water Quality Improvement Program
Bureau of Reclamation

Unit	1981	1982	1983	1984	1985	1986	1987	Beyond 1987
Big Sandy	IIII	IIII	IIII	IIII	IIII	PPPP	PPPP	PPPP
Dirty Devil River	IIII	IIII	IIII	IIII	IIII	IIII	PPPP	PPPP
Glenwood-Dotsero Springs	IIII	IIII	IIII	IIII	IIII	II		
Grand Valley	CCCC	CCCC	CCCC	CCCC	CCCC	CCCC	CCCC	CCCC
Las Vegas Wash 1/	CCCC	CCCC	CCCC	CCCC	CCCC	CCCC	CCCC	CCCC
LaVerkin Springs 2/	IIII	I	IIII	III				
Lower Gunnison Basin	IIII	IIII	IIII	PPPP	PPPP	PPPP	PPPP	CCCC
Lower Gunnison North Fork area	IIII	IIII	IIII	IIII	IIII	IIII	IIII	IIIP
Lower Virgin River 3/	IIII	IIII		IIII	IIII	IIII		
McElmo Creek 4/	IIII	IIII	IIII	IIII	IIII	CCCC	CCCC	CCCC
Meeker Dome	CCCC	CCCC	CCCC	CCCC	CCC			
Palo Verde Irrigation			III	IIII	IIII	IIII	IIII	IIII
Paradox Valley	CCCC	CCCC	CCCC	CCCC	CCCC	CCCC	CCCC	CCCC
Price-San Rafael Rivers	IIII	IIII	IIII	IIII	IIII	IPPP	PPPP	PPPP
Saline Water Use and Disposal Opportunies	IIII	IIII	IIII	IIII	IIII	IIII	IIII	PPPP
San Juan River						IIII	IIII	IIII
Uinta Basin	IIII	IIII	IIII	IIII	IIII	IIII	IIII	IIII

1/ Construction is contingent on local consensus.
2/ Concluding Report prepared December 1981: reinitiated in fiscal year 1984 due to local interest.
3/ Concluding Report prepared March 1982: reinitiated in fiscal year 1984.
4/ Authorized for construction under Dolores Project in October 1984.

Status by quarters
I = Investigation
P = Advanced Planning Investigation
C = Construction

Below the soil, the near-surface weathered zone of Mancos Shale transmits water along joints, fractures, and open bedding planes. Percolating water from irrigation and conveyance system seepage dissolves salts from the weathered shale zone.

Development of the unit was planned in stages. Stage One, encompassing about 10 percent of the unit area, consisted of concrete lining 6.8 miles of canal, consolidating 34 miles of open laterals into 29 miles of pipe laterals, and installing an automated debris collection structure. This work was essentially completed in April 1983.

To test the effects of Stage One improvements on ground water flows and quality, a hydrologically isolated basin, the Reed Wash study area, has been instrumented to monitor surface and ground water inflows and outflows.

Detailed information on surface and ground water inflows and outflows to selected basins within the unit is currently being collected and used to develop water and salt budgets. In addition, an intensive drilling and aquifer testing program is underway in both the areas underlaid by cobble deposits and in the weathered Mancos Shale areas. The purpose of this program is to determine aquifer characteristics such as hydraulic conductivity, as well as to identify quality and direction of ground water flow.

The Stage Two area involves, for the most part, the remainder of the Grand Valley. Stage Two investigations, which began in November 1981, included a reevaluation of various alternatives. Measures studied, in addition to lining with various types of material, included installing barriers, consolidating conveyance systems, and industrial use of saline water.

In May 1983, the preferred plan was selected for Stage Two. The plan provides for pipe laterals in all areas of Stage Two and concrete lining the Government Highline Canal. The west end of the Government Highline Canal and the Stage Two laterals would be constructed first. Improvement of the middle and the east end portions of the Government Highline Canal would be deferred until deemed necessary to meet salinity program goals. Collection of technical and environmental data is continuing.

A separate USDA on-farm salinity control report and implementation program has been initiated in Grand Valley.

b. <u>Las Vegas Wash Unit</u>

Las Vegas Wash (Wash) is a natural drainage channel providing the only surface water outlet for the entire 2,193 square miles of Las Vegas Valley. A drainage area of 1,586 square miles directly contributes to the Wash which conveys storm runoff and wastewater to Las Vegas Bay, an arm of Lake Mead. Located in Clark County in southern Nevada, the Las Vegas Valley contains the largest population center in the State. Three cities (North Las Vegas, Las Vegas, and Henderson) and other communities are drained by tributaries to the Wash. Studies evaluating salinity contributed by the Wash are concerned mainly with the 10-mile reach upstream of Las Vegas Bay. The Wash flood plain and adjacent area support about 1,800 acres of halophyte, hydrophyte, and phreatophyte vegetation.

Before water development in the valley, the Wash was a generally barren and sandy channel which contained discharge only during brief periods of major storm runoff. The growth of the communities in the valley contributed increasing amounts of wastewater discharge to the Wash until the flow became perennial. Return flows to the Wash are from sewage treatment plant effluent, industrial cooling water, urban irrigation, and agricultural drainage. This wastewater carries a solute load of 100,000 tons per year; however, the wastewater leaches an additional 70,000 tons per year of salt as it flows into the Wash. About 63 percent of the salt pickup is calcium sulfate and 26 percent is sodium chloride.

Past investigations associated with plan development have been described in previous progress reports. Construction of an interception facility to collect saline ground water was begun in 1977 but delayed in 1978 to allow time to reevaluate changing ground water conditions.

One alternative salinity control strategy would be to prevent seepage of wastewater and minor storm runoff by placing it in a bypass channel running parallel to the Wash for about 4 miles, circumventing salt deposits in the Wash alluvium. The bypass channel has been viewed by some local entities as being in conflict with nutrient control and wildlife habitat improvement objectives. A consensus of local support for the bypass channel does not appear obtainable while wastewater treatment issues remain unresolved.

The seepage prevention strategy for salinity control is being studied in the Pittman Verification Program. Once-through cooling water is expected to be diverted from unlined ditches into a pipeline. Several new wells in the Pittman area are being used to monitor ground water levels and quality. The curtailment of seepage from the unlined ditches is expected to cause a drop in ground water levels resulting in reduced saline ground water inflow to the Wash. The ground water monitoring is planned to continue through fiscal year 1987. A long-term reduction of 7,000 tons per year is expected to be realized from the diversion to the pipeline. A plan is being developed for a second program to test another alternative strategy for salinity control. Ground water flow reduction may be accomplished by the development of a ground water detention basin system. Each detention basin would be formed by a peripheral slurry trench/wall. One large basin and several small basins would be constructed near the Whitney area (now part of East Las Vegas) to verify the feasibility of this strategy. If a detention basin system appears feasible after 2 years of monitoring, additional large basins may be built. The construction of ground water basins may accomplish the equivalent salinity reduction expected from the bypass channel for the same cost but with less local opposition.

c. Lower Gunnison Basin Unit

The Lower Gunnison Basin Unit is located in the Uncompahgre Valley in west-central Colorado. The study area consists of lands irrigated by the Uncompahgre Project along the lower reaches of the Uncompahgre River in Montrose and Delta Counties. The area which encompasses the communities of Montrose, Delta, and Olathe is principally agricultural, and agribusiness is of primary importance to the local economy.

An estimated 360,000 tons of salt are picked up in the study area annually and conveyed to the Uncompahgre, Gunnison, and Colorado Rivers. The salt pickup is a result of deep percolation and conveyance system seepage as water passes through the weathered and fractured shale of the Mancos Formation on its way to drains and the Uncompahgre River. The primary salt contributed by this formation is gypsum (calcium sulfate).

The recommended plan of development for the Lower Gunnison Basin Unit consists of (1) elimination of winter water flows in the irrigation system, with replacement through the domestic water delivery system, and (2) concrete lining five separate Uncompahgre Project canal systems east of the Uncompahgre River.

The winter water replacement program would eliminate seepage from canals and laterals during the winter months. At the same time, it would allow more efficient livestock watering during winter with no resultant salinity impacts. The program could reduce annual salt loading from the study area by about 80,000 tons. Advance planning on the winter water replacement, including a detailed cost estimate, is expected to be completed by 1986. Because the lining of the canals and laterals is less cost effective than other salinity control measures in other units, advance planning on this portion of the plan will be conducted after more cost-effective measures have been implemented.

Current activities include development of design and cost estimate information for the expansion of the domestic system. Water users who use winter stock water have been identified through a preapplication form sponsored by the Uncompahgre Valley Water Users Association.

d. McElmo Creek Unit

The McElmo Creek Basin is located in southwestern Colorado and covers approximately 720 square miles. About 150 square miles of the basin, mostly in the east, are agricultural land. Early studies in the area show that salt loading results from both irrigation sources and diffuse sources, with irrigation being the main contributor.

The total irrigation diversion into the drainage area averages 105,200 acre-feet annually. The average salt load contributed by the basin is estimated at 119,000 tons annually. The Montezuma Valley Irrigation Company diverts water from the Dolores River that serves the McElmo Creek Basin. The diverted water quality averages 130 mg/L of TDS, while McElmo Creek water contains about 2,600 mg/L of TDS at the Colorado-Utah State line.

Data collected during the study included the following: (1) 15 ponding tests were run on Montezuma Valley Irrigation Company canal sections, and 115 miles of canals within the basin were characterized according to soil structure; (2) ground water research in the basin consisted of 125 wells monitored for water table elevation, salinity, and hydraulic conductivity; (3) computer models were used to determine what proportion irrigation, canal seepage, and precipitation contribute to total salt load (subbasin by subbasin); and, (4) irrigation research was done on 7 test farms in the basin representing various soil types, farm sizes, irrigation methods, and farm management.

Results indicate seepage rates for most of the Montezuma Valley Irrigation Company distribution system are low to moderate except for locations where canal sections have been cut through shale and sandstone and seepage rates are high. Only when results from the four subbasins were combined into a total basin water budget could surface water, ground water, precipitation, and salts associated with water movement be determined, but the use of the basin water budget is limited because of the apparent inaccuracies of data used to calculate the budget.

Through a Multiple Objective Planning Process and Public Involvement Program, several alternatives were proposed to reduce salinity. The Reclamation recommended plan is to line three sections of Montezuma Valley Irrigation Company canals--two on the Lone Pine Lateral and one on the Upper Hermana Lateral--and to install laterals from the proposed Towaoc-Highline Canal (a Dolores Project feature) to serve the Rocky Ford Ditch Service area. The Rocky Ford Ditch would then be abandoned as part of the plan, and its flows would be combined into the proposed Towaoc-Highline Canal. The plan will reduce ground water seepage from canals by 4,060 acre-feet a year and reduce the amount of salt returned to McElmo Creek.

Portions of the McElmo Creek Unit have been authorized for construction as part of the Dolores Project, a participating project of the Colorado River Storage Project. Included are seepage control from the Towaoc-Highline Combined Canal, Rocky Ford laterals, Lone Pine Lateral, and the Upper Hermana Lateral.

The USDA report on McElmo Creek, published January 1983, indicates salt load reductions can be achieved through on-farm salinity control. The on-farm program is compatible with the Reclamation program in this area.

e. <u>Meeker Dome Unit</u>

Meeker Dome, the site of several abandoned oil and gas exploratory wells, is a local anticlinal uplift in northwestern Colorado, 3 miles east of the town of Meeker and on the right bank of the White River.

The Meeker Well, originally drilled for oil exploration purposes and abandoned in the 1920's, was identified as a significant point source of salinity in the Colorado River system. Before the well was plugged to depth below 550 feet in 1968, it was flowing at a rate of about 3 ft^3/s, and its highly saline water (19,200 mg/L) was increasing the salt load of the Colorado River by about 57,000 tons per year.

In February 1969, two abandoned wells 2 miles north of the Meeker Well also were reported to be flowing saline water and were plugged 8 months later. Further seepage appeared in four areas within a 1-mile radius of the plugged Meeker Well in the same year.

Active feasibility investigations were initiated in early 1979 by the organization of a multidisciplinary planning team of interested local, State, and Federal agencies, as well as special interest groups and private citizens. These investigations were designed to gain a better understanding of the quantity, sources, and mechanisms by which saline water enters the White River, and then to identify alternatives that would eliminate or greatly reduce the salt contribution to the river.

Technical investigations conducted through a professional services contract with CH_2M Hill, a water resources consulting firm, indicated that seepage was continuing and that variable loads of salt were being transmitted into the White River and subsequently into the Colorado River. The loading estimate for 1979 approximated 27,000 tons at a flow of about 1.4 ft^3/s and a concentration of 19,000 mg/L.

Problem identification investigations indicated that of the eight oil and gas exploratory wells drilled on the Dome itself, four were adequately plugged. The other four--the Scott, Meeker, James, and Marland Wells--were believed to be unplugged or inadequately plugged and acting as conduits, allowing saline water from deep geological formations to flow through shallower ground water aquifers and pollute surface waters of the White River. To verify this belief, a program was initiated to clean, test, and plug the Scott, James, Meeker, and Marland Wells. A network of observation wells and seep measurement stations were installed to monitor the effects of the verification program.

The bores of the Scott and James Wells were cleaned, tested, and successfully plugged. Major difficulties were encountered with the Marland Well. An adjacent intercept hole was drilled and used to plug it using pressure cementing from the intercept hole. This was apparently successful in stopping the last source of seepage from the dome and eliminating the need for replugging the Meeker Well. The salt load from the dome was estimated at 9,000 tons per year in 1984. Monitoring will continue to assess the effectiveness of the verification program; however, it would appear that no additional seepage control will be necessary at this time.

f. Paradox Valley Unit

Paradox Valley, a collapsed salt anticline, is a northwest-southeast trending valley 3 to 5 miles wide in southwestern Colorado. Geologic investigations in the Colorado Plateau have established the existence of a series of five major northwest-southeast trending salt anticlines (elongated swells), about 100 miles long. Paradox Valley lies along the axis of one of these salt anticlines and was formed from erosion of faulted and uplifted sandstone and shale formations above a residual gypsum cap overlying about 14,000 feet of pure salt and salt-rich shale. The Dolores River remained in its ancient streambed as the uplift and erosion of the valley developed. West Paradox Creek heads in the La Sal Mountains and flows southeast through the northwestern half of the Paradox Valley to the Dolores River. East Paradox Creek, an intermittent stream, drains the southeastern half of Paradox Valley before flowing into the Dolores River.

Ground water comes into contact with the top of the salt formation where it becomes nearly saturated with sodium chloride and surfaces in the Dolores River channel in Paradox Valley. Studies conducted by Reclamation have indicated that the river picks up over 205,000 tons of salt annually as it passes through the valley.

In its Definite Plan Report, Reclamation recommended that a series of wells be drilled on both sides of the river into the brine zone to pump the saline ground water, lowering the interface between the fresh ground water and the underlying brine. The brine would then be stripped of hydrogen sulfide gas and pumped to a terminal evaporation pond in Dry Creek Basin.

Before installing permanent facilities, a verification pumping program was initiated to determine, among other things, what pumping rate is required to reduce the brine inflow. This program has shown that by pumping at a rate of 1.2 ft^3/s, approximately 60 percent of the brine inflow can be controlled. It is projected that by installing more pumping wells in strategic locations and pumping at 2 ft^3/s, 180,000 tons of salt per year can be removed. Initially, a 5-ft^3/s pumping rate was estimated to be necessary to control brine inflow.

The projected lower pumping rate changed the criteria for evaluating disposal methods. A private consulting firm completed a feasibility study of deep well injection and concluded it is technically, economically, and environmentally feasible. After holding public meetings and sending out newsletters requesting comment, Reclamation determined injection to be acceptable to the public. Based on these facts, Reclamation concluded that deep well injection is the preferred disposal method.

The ongoing testing program consists of verification and refinement of controlling brine inflow to the river, design data collection for future facilities, and drilling and testing an actual injection well. Reclamation will use outside consultants for its technical assistance on deep well injection. A test injection well will be constructed to determine characteristics of the disposal formation. Based on these characteristics, the required number and location of disposal wells will be determined, well design will be completed, and required surface facilities will be determined. After analyzing the total required facilities and projected operation, maintenance, and replacement costs, a final decision on whether or not to use deep well brine disposal will be made.

The injection well will be drilled and tested in 1985 and 1986. When positive test results are obtained, the original Definite Plan Report will be amended, and the National Environmental Policy Act (NEPA) requirements will be fulfilled. The constructing of permanent facilities will then follow the approval of the amended plan. Construction should be completed by 1989.

Conditional water rights were obtained from the State of Colorado, and the State has approved pumping and well testing as stipulated in existing well permits. Reclamation will apply for permanent water rights when an actual beneficial use, the improvement of water quality in the Dolores River for downstream water users, is achieved.

3. Title II, Planning Units

Title II authorized and directed the Secretary of the Interior to expedite completion of the planning reports on units described in the Secretary's Report, Colorado River Water Quality Improvement Program, February 1972, Section 203(b)(2) and directs the Secretary to undertake research on additional methods of accomplishing the objective of this title (Title II of Public Law 93-320). The Investigation and Construction Schedule, Water Quality Improvement Program, Bureau of Reclamation, is shown in Figure 5, page 70.

a. Big Sandy River Unit

The Big Sandy River Unit is located in southwestern Wyoming, primarily in Sweetwater County. The Big Sandy River begins in the Wind River Mountains where the water is of good quality. Below Big Sandy Dam, the river is diverted to irrigate the Eden Project. Return flows from the irrigated area and small stream tributaries make up the flows of the lower Big Sandy River.

Major saline seeps and springs begin about 2 miles below the Eden Project area and continue for about 26 miles and contribute about 27 ft^3/s of saline flows at concentrations which vary from 1,000 to 6,000 mg/L. Other tributaries contribute some salinity and a total of approximately 164,000 tons of salt are discharged into the Green River annually.

Drilling investigations have shown that the shallow aquifers near the river are the source of saline seeps. Quality of water in the aquifers varies from about 2,000 to 6,500 mg/L, and an estimated 116,000 tons of salt are contributed annually by the springs and seeps. Pumping of the test wells indicates that the saline water could be intercepted before seeping into the river.

Planning investigations have been ongoing since October 1980. The recommended plan, the Chevron-Texasgulf Alternative, was selected from nine alternatives evaluated by the planning team. This plan involved collecting saline water in the spring and seep area of the Big Sandy River and pumping it by pipelines to a proposed Chevron Chemical Company fertilizer plant near Rock Springs and to the Texasgulf Trona Plant near Green River. Chevron later reported that it planned to construct only one of the three phases of the fertilizer plant originally planned and would not use Big Sandy saline water in phase one. Also, Texasgulf reported that because it did not experience the growth it had anticipated, it would not be expanding the plant and, therefore, would not be using Big Sandy saline water. As a result the selected plan was determined to be nonviable.

Reclamation then began evaluating additional alternatives and narrowed them to two. The first alternative involved piping saline water to Divide Basin for disposal by evaporation and infiltration, and the second involved piping saline water to the Jim Bridger Powerplant for use in powerplant cooling. Both alternatives were presented to the Colorado River Basin Salinity Control Forum which, in accordance with recommendations from the State of Wyoming, rejected the Divide Basin disposal alternative and advocated study of industrial use alternatives.

After a meeting with Wyoming officials, Reclamation agreed to continue the study of the Jim Bridger Powerplant Alternative in combination with the Chevron-Texasgulf Alternative, which will be reevaluated for possible future implementation in whole or in part.

Reclamation has a contract with a consultant to study saline water use in the Jim Bridger Powerplant. The results of this study will be used to finalize costs and opportunities for the Jim Bridger Powerplant Alternative.

Wyoming has been involved in the study from the beginning; has provided information, guidance, and funds throughout the study; and has expressed willingness to provide further funding for the advance planning activities.

The USDA has completed a separate on-farm salinity control report which was published in November 1980. The report identifies various alternatives including an irrigation-land retirement option; however, because of uncertainties about the Bureau of Reclamation off-farm alternatives and expressed concerns by Wyoming, no decisions have been made regarding implementation.

b. Blue Springs Unit

The Blue Springs Unit area is located on the Little Colorado River within the Navajo Indian Reservation in north-central Arizona. The springs contribute an average of 160,000 acre-feet per year which have a collective salinity of 2,500 mg/L and a total salt load of about 550,000 tons per year.

The lower portion of the river flows through a meandering canyon of about 1 mile in width and a half mile in depth. The walls of this rugged gorge are a series of nearly vertical cliffs of massive limestone and sandstone separated by steep slopes or benches of shale, siltstone, or thin-bedded sandstone. The bottom can be reached near Blue Springs only by a rugged foot trail from the rim or by helicopter. The springs originate from ground water which moves into the area from the east and south and emerges as springflow where the canyon has penetrated the Redwall and Mauve limestones below the regional water table. There are many spring openings along two relatively well-defined reaches.

A full-scale feasibility study of the project is not planned due to the high capital cost of building the project and environmental problems resulting from the significant historical and religious value of the area to the Hopi Indians.

c. Colorado River Indian Reservation Unit

The Colorado River Indian Reservation has a total of 268,850 acres located in the lower Colorado River Basin below Parker Dam in northern Yuma County, Ariz., and the eastern part of the San Bernardino and Riverside Counties, Calif.

The United States Supreme Court allocated water to irrigate 107,588 acres, of which 99,374 acres are in Arizona and 8,213 acres are in California. The allocation of the court also provided for a maximum diversion of 717,148 acre-feet. In 1978, 75,405 acres were irrigated with Colorado River water diverted at Headgate Rock Dam. About 200 miles of canals and laterals delivered water to irrigate this acreage. Irrigation return flows are collected in a 100-mile drainage system and are returned to the river.

The purpose of the Colorado River Indian Reservation Unit investigation was to formulate a plan to reduce the salt loading to the Colorado River from irrigation on the reservation. An analysis of the diversions to and drainage from the reservation indicated that the reservation did not make a net salt contribution to the river. Consequently the investigation was terminated, and a Concluding Report was released in October 1979 to present the studies performed.

d. Dirty Devil River Unit

The Dirty Devil River drainage area, containing about 4,300 square miles, originates in the mountains of Wasatch, Fishlake, Awapa, and Aquarius Plateaus and discharges into the Colorado River at the upper end of Lake Powell. About 47 percent of the area is tributary to the Fremont River, about 37 percent to Muddy Creek, and about 16 percent directly to the Dirty Devil River, which is formed by the confluence of the Fremont River and Muddy Creek. Elevations range from about 3,600 feet above sea level at the mouth of the Dirty Devil River to 11,000 feet in the mountain ranges at the west end of the drainage. The drainage basin is principally desert, with annual rainfall averaging 10 inches.

The geologic formations in the drainage basin consist primarily of sedimentary deposits, about 60 percent of which are mudstones, claystones, and shales. The Carmel Formation of Jurassic Age and the Mancos Shale Formations of Cretaceous Age are major contributors of dissolved solids in the basin. Irrigation of alluvial soils derived from shales increases the contribution of dissolved solids to the streams.

e. Glenwood-Dotsero Springs Unit

The Glenwood-Dotsero Springs Unit is located along the Colorado River in Eagle, Garfield, and Mesa Counties in west-central Colorado. Combined discharges annually contribute approximately 25,000 acre-feet of water containing about 440,000 tons of salt, mostly sodium chloride. About half of the salt contribution comes from 20 surface springs. Twelve of these springs are clustered near the town of Glenwood Springs, and eight are grouped about 2.5 miles downstream from Dotsero. The remainder of the salt enters through springs in the stream gravels, diffuse seeps, and to a small extent surface runoff. Several of the springs in Glenwood Springs have been developed for bathing and therapeutic purposes. The major ions in the spring discharge are sodium and chloride.

Planning investigations began in early 1980. Technical work included the measurement and chemical analysis of springs and ground water in the two areas and a detailed technical study of the salt loading mechanism. Plans were then formulated with the aid of public input. More than 33 alternatives were generated. These were then narrowed to two alternatives from which the recommended plan was selected.

The recommended plan consists of collecting both surface and subsurface salt water at Dotsero, transporting it in a gravity flow pressure line to Glenwood Springs where additional surface and subsurface salt water would be collected and added to the Dotsero salt water. The water would then be piped through a gravity pressure line to evaporation ponds at the Colorado-Utah border.

The current plan is not as cost effective as other plans being implemented and, under Colorado water law, evaporation is not considered a beneficial use of water. Another alternative is to utilize saline water as a part of Aquatrain or to find a local industrial use. The study is scheduled to look at several local industrial uses in greater detail.

f. La Verkin Springs Unit

During the past 20 years the La Verkin Springs Project has been studied extensively with several reports being produced. In 1981 a Concluding Report was prepared. The Concluding Report stated the project had no cost-effective alternative.

Simultaneously with the development and submittal of the Concluding Report, the Washington County Water Conservancy District and the State of Utah were being approached with a proposal from a private consultant that indicated total evaporation with clay-lined ponds may make the La Verkin Springs Project cost effective. Based on this information from the private consultant, the project was reinitiated in 1983.

Alternatives developed within the La Verkin Springs Unit 1981 Concluding Report were reanalyzed along with new alternatives developed during this study. The reanalysis was based on geologic data from 1983 field studies and updated and refined hydrologic data and feasibility-grade designs prepared during the previous study.

A Preliminary Findings Report recommending the study be discontinued because of poor cost effectiveness was submitted to the Office of the Commissioner in January 1984. The Salinity Control Forum and the Office of the Commissioner have concurred with the recommendation. The Preliminary Findings Report recommending discontinuance of the study was released in August 1984.

g. Lower Gunnison Basin Unit, North Fork Area

The Lower Gunnison Basin Unit, North Fork area, is located in west-central Colorado on the Gunnison River in Delta County. The Gunnison River is tributary to the Colorado River. The unit area is bounded on the north by Grand Mesa National Forest, on the east by Gunnison National Forest, and on the south and west by the Gunnison River. Major communities in the study area include Cedaredge, Hotchkiss, Paonia, and Crawford. The study area is primarily farm, ranch, and orchard lands which are irrigated. Much of the area is on the slopes of Grand Mesa, and numerous nonsaline seeps and springs occur. Portions of the study area have been investigated by Reclamation for irrigation projects; therefore, some previous drilling information exists.

The major soluble salt in the study area appears to be primarily gypsum from the Mancos Shale Formation and from its derived soils. The distribution of this salt does not appear to be uniform, and one of the objectives to be accomplished early in the study is to identify the highly saline areas. With this information the study area boundary can be refined for more efficient study. The primary causes of the salt loading appear to be related to irrigation delivery system seepage and applied irrigation percolation through the saline soils although some nonirrigation salt sources also exist.

This investigation is in its very early stages, and no salinity quantification has been attempted by Reclamation. The Soil Conservation Service, however, has concluded its on-farm Lower Gunnison Basin salinity study which included the North Fork area and the Uncompahgre Valley. The Soil Conservation Service (SCS) determined that a total of about 840,000 tons of salt is contributed by both areas. Reclamation has completed its study of the Uncompahgre Valley and found that about 360,000 tons of salt are contributed from that area. The North Fork area probably contributes about 480,000 tons of salt per year. Preliminary salinity control concepts to be considered for this unit include lining of canals and laterals, land retirement, and canal and lateral consolidation. Other concepts are expected to be suggested as the investigation proceeds.

A potential exists for cost-sharing participation by local water companies if a delivery system improvement is proposed as a salinity control measure. Cost-sharing possibilities will be explored as the study proceeds. Potential benefits from a lining alternative would be a savings of seepage water; consequently, a smaller diversion might be achieved. If any delivery system problems exist, these could be remedied during system improvement.

Water quality and quantity monitoring in surface streams is underway. An aerial photography contract was to be administered during the summer and fall of 1984 to obtain information relevant to environmental, hydrosalinity, and engineering disciplines. It is hoped that the preliminary data will aid in redefining the study area to consider only highly saline areas.

h. Lower Virgin River Unit

This unit is located along the Lower Virgin River in northeastern Clark County, Nev., and northwestern Mohave County, Ariz. The unit includes natural saline springs averaging 2,900 mg/L near Littlefield, Ariz., and the 3,500 acres of irrigated land along the Virgin River between the springs and Lake Mead.

Investigations under the Colorado River Water Quality Improvement Program began in 1972 as the Littlefield Springs Unit. The initial approach was to study a series of saline springs along the river at Littlefield Springs near the USGS gage "Virgin River at Littlefield, Ariz." The object of that investigation was to determine a best method of collecting and disposing of the water and returning the freshwater to the river or disposing of the saline water from the springs by evaporation. This project was strenuously opposed locally because the springs are the only reliable water supply for irrigation at Mesquite, Bunkerville, and Riverside, Nev., during the summer. The Littlefield Springs study was, therefore, terminated.

In 1977 another study was started to determine the feasibility of extracting the saline subsurface water flowing in the Virgin River downstream of the irrigated area. Information on surface flows indicated that less salt was leaving the area than was entering. It was, therefore, postulated that salt was leaving the reach in underflow. The results of the study found the subsurface water concentration was too low for collection, extraction, and evaporation. A Concluding Report was published in November 1981.

Since November 1981, the State of Nevada and a power company have been interested in developing the saline waters of the Virgin River as a source for powerplant cooling water. In January 1984, the Bureau of Reclamation reinitiated the Virgin River Unit Study to determine if a new water supply and salinity control project could be constructed on the Virgin River. The project needs to locate up to 50,000 acre-feet of saline water that can be used as powerplant cooling water. It could use subsurface Virgin River water which has salinities ranging between 2,000 to 10,000 mg/L.

The SCS has formulated a proposal to reduce salt loading by reducing deep percolation for irrigated agriculture by improving on-farm irrigation efficiency using lined and automatic canals. A planning report on the proposal was released by the SCS in March 1982.

i. Palo Verde Irrigation District

The Palo Verde Irrigation District is a privately developed district located in Riverside and Imperial Counties, Calif. Water for irrigation is diverted from the Colorado River at the Palo Verde Diversion Dam and is conveyed through 295 miles of main canals and laterals to serve approximately 91,400 acres of irrigated land within the district. The irrigation return flows are collected in a 153-mile drainage system and returned to the Colorado River; however, the return flows are located below many of the areas impacted by salinity and would not have the full benefits of an upstream project.

An analysis based on 1974 operational data indicated that the 914,000 acre-feet diverted contained 945,000 tons of salt and that 467,000 acre-feet of return flows to the river contained 1,097,000 tons of salt. The difference of 152,000 tons of salt was the net discharge to the river. For analysis the district was divided into seven subareas, which were found to vary greatly in their salt discharge. Based largely on 1974 data, five subareas were found to discharge various amounts of salt. Two of the subareas were found to retain salt. The variation among them apparently results mainly from differences in the quality of the underlying ground water.

The subarea with the greatest discharge by a substantial margin is the Palo Verde subarea in the southwestern part of the district which discharged 144,000 tons. This subarea was found to be underlain by a sizable body of saline ground water that is gradually being flushed out by percolating irrigation leaching water and canal seepage. The ground water aquifer subject to flushing contains an estimated 6.65 million tons of salt, which is expected to be flushed out gradually by deep percolation of irrigation water.

The rate of salt discharged is theoretically proportional to the amount of subsurface drainage, so an improvement in water use efficiency would result in a reduction in annual salt discharge. The present on-farm irrigation efficiency in the Palo Verde subarea is estimated to be approximately 42 percent. The unlined water distribution system also contributes seepage to the ground water system.

Preliminary studies indicated that increasing the on-farm irrigation efficiency to 60 percent would cause an estimated reduction in salt discharges of 67,400 tons at present, but the reduction would decline gradually in the future. On-farm efficiency would be improved both by on-farm improvements to facilitate more efficient irrigation and better irrigation water management. Salt discharge could be further reduced by lining irrigation canals. More detailed studies are needed to verify these conclusions and to implement a salinity control project. A Status Report was issued in March 1980.

The district has subsequently requested Reclamation to investigate the feasibility of lining the entire distribution system. Costs allocated to salinity control would be nonreimbursable; the district would repay costs not allocated to salinity control. A Special Report was issued in July 1981 which summarized the Status Report and discusses lining the entire system.

The possibility of using the temporarily surplus flows in the Colorado River to speed up the flushing of saline ground water from the southern part of the district was investigated by spreading water on 320 acres of fallow farmland. This cooperative test indicated that ground water flushing was not a viable means of salinity control. A USGS Open File Report, dated April 1984, was prepared on the flushing program.

Current work on a Phase I study will develop a hydrosalinity analysis for the Palo Verde Irrigation District. The study will provide information for Reclamation, the SCS, and the Palo Verde Irrigation District to determine salinity control program components and the need for future studies. If these studies indicate a viable project, implementation will be pursued.

Reclamation and the SCS in California have been working together in the formulation of a joint plan of study to investigate salinity control alternatives.

j. Price-San Rafael Rivers Unit

The Price-San Rafael Rivers Unit is located in east-central Utah, 120 miles southeast of Salt Lake City, encompassing Carbon and Emery Counties. U.S. Highway 50 is a major north-south road in the area passing through Price and Green River, Utah. Both the Price and San Rafael Rivers drain into the Colorado River via the Green River.

Agriculture and energy development (primarily coal mining) make up the principal economic base in the Price and San Rafael River Basins. Most of the agriculture production is used for livestock feed. Only 2 percent of the land is irrigated.

There are no natural springs or seeps in the project area. The salt loading contributed to the Colorado River from the Price and San Rafael River Basins occurs principally as a result of the dissolution of soluble salts in the soil and substrata. Return flows from irrigation and runoff from precipitation transport the predominantly sodium sulfate salts to natural drains and eventually into the streams and rivers. An estimated 430,000 tons of salt annually reach the Colorado River from these two river basins. Of this amount approximately 60 percent is attributed to agriculture.

Alternative plans which have been evaluated for controlling salt loading include irrigation systems improvement; using drainwater for powerplant cooling; collecting saline water and disposing of it through deep well injection, evaporation ponds, or a desalting plant; using saline water for energy development (coal washing, tar sands, or coal slurry pipeline); and the retirement from irrigation of high salt contributing lands. Of these, the Irrigation Systems Improvement Alternative passed the four tests of viability (completeness, effectiveness, efficiency, and acceptability).

The Irrigation Systems Improvement Alternative was selected as the preferred plan and consists of two components--lining canals with the highest amount of leakage and lining stockwatering ponds to improve winter watering practices. The preferred plan would involve lining 11 reaches of canal totaling 7.2 miles in length, improving 215 stockwater ponds, and establishing approximately 24 new ponds.

The SCS continues to maintain liaison with Reclamation as it investigates alternatives for components of an on-farm salinity control program. An SCS review is being conducted and includes lateral improvement components which can be appropriately handled through the USDA program.

k. Saline Water Use and Disposal Opportunities Unit

The following studies and/or activities are currently supported by the Colorado River Water Quality Office in cooperation with Upper and Lower Colorado Regional Offices: (1) a basic agreement contract study for verification of saline water cooling tower equipment in powerplants, (2) recent discussion/meetings with Southern California Edison to consider Etiwanda Powerplant for saline water use--hardware verification, (3) an in-house research study of solution mining potential in the basin, (4) an analysis of Palo Verde drainage water as an alternate cooling water supply for the Danby Dry Lake, Solar Salt Gradient Pond Project, and (5) Environmental Impact Statement reviews of Mobil-Pacific Oil Shale and Utah Combined Hydrocarbon-Sunnyside Tar Sand developments in which saline water supply alternatives need to be examined.

Under the basic agreement contract, a $57,000 verification study evaluated available technology for saline water use at Hunter Powerplant in Utah. In a recent presentation to utilities, preliminary findings established that the Binary Cooling Tower is not cost competitive with other saline water use equipment, and there are other existing processes and off-the-shelf hardware that can be economically used for saline water cooling and disposal applications. Most of the hardware, such as brine concentrators, has already been successfully used by industry for years; however, a complete system of selected equipment has not been evaluated under field conditions for saline water cooling applications.

The contract study examined the incremental costs of using saline water for cooling at the Hunter Powerplant. A final report on the study was completed in August 1984.

An additional study under the same basic agreement is evaluating the incremental costs and economics of saline water use at Jim Bridger Powerplant in Wyoming using Big Sandy River water sources.

In dealing with cooperating utilities to date, there is general interest and support for saline water use, but only for new generation capacity. No new powerplant generation additions are expected until after 1990 in the Colorado River Basin. There is a need to develop credible planning information on the incremental costs, economics, and reliability of saline water use and disposal equipment. It is also apparent that there are opportunities to share in cooperative ventures to verify hardware performance with utilities and manufacturers.

The basic components of the saline water cooling tower and discharge system recommended for Hunter Powerplant included a chemical softener, wet cooling tower (slightly modified), condenser (heat source), surge pond, brine concentrator, and evaporation pond. In a typical system, raw feed water of about 4,000 mg/L of TDS would be softened to reduce scaling constituents in a front-end or side-stream mode. The softened water would then be heated and evaporated or concentrated up to 50,000 mg/L in the cooling tower loop before blowdown to the surge pond. Surge pond wastewater would then be chemically adjusted before introduction into the brine concentrator. The brine blowdown exiting the concentrator may exceed 70,000 to 90,000 mg/L before final disposal in lined evaporation ponds. Thus, in an overall perspective, waste heat from the powerplant provides the energy to drive the system which will concentrate saline water about 20 times into a more manageable volume for final disposal. Existing zero discharge criteria for powerplants assure that salts and other waste materials will be retained onsite.

The Aquatrain Project was proposed by W. R. Grace & Co. and is a cooperative effort between Federal, State, and industrial interests. As originally proposed, Aquatrain conceptualized a saline water pipeline carrying plastic capsules filled with clean, dry coal to the West Coast. In mid-1983, this concept was dropped in favor of two separate pipelines--one carrying a slurry of coal and liquid CO_2 and the other saline water. The change was made because of the rapid advances made by Arthur D. Little, Inc., and W. R. Grace & Co. toward commercialization of their patented liquid CO_2/coal slurry process while technology associated with transporting large capsules filled with coal in a pipeline remained a relative unknown.

On November 2, 1982, Reclamation and W. R. Grace & Co. executed a Cooperative Agreement providing for joint investigation of the project. In November 1983, Reclamation was asked to release W. R. Grace & Co. from the Cooperative Agreement and to approve Western Water Reserves as the new private sector partner. The Cooperative Agreement was modified and on January 30, 1984, Reclamation approved the ownership transfer of Aquatrain, Inc., from W. R. Grace & Co. to Western Water Reserves, Boulder, Colo.

Western Water Reserves has assumed the lead role for development of the project and funding of the non-Federal share. It has also agreed to seek additional industrial participation in the project. The Colorado River Basin Salinity Control Forum endorsed the continued participation by Reclamation in the Aquatrain Project after the transfer due to its potential salinity control measures.

Reclamation, with the assistance of the Bureau of Land Management and the U.S. Forest Service, completed and published a Corridor Study Report in February 1984. This study identified and evaluated at a cursory level corridor opportunities for placing the pipeline between various input and output points (coal mines, CO_2 sources, saline water sources, powerplants, and export sites) within southwest Wyoming, western Colorado, Utah, northern Arizona, central and southern Nevada, and southern and east-central California.

After the shift to two separate pipelines, Reclamation continued to seek industrial users of the saline water on an expanded scale. Reclamation and Western Water Reserves are currently contacting potential users of the Glenwood Springs water to determine their interest in using the water. Similar efforts will be initiated in late 1984 and early 1985 by Reclamation with potential users of Big Sandy River, Price-San Rafael Rivers, and Lower Virgin River return flow and Dirty Devil River flows. Potential users of these waters are powerplants, oil shale development, solution mining, tar sand development, and hydraulic mining.

If all potential saline sources (Big Sandy River, Glenwood-Dotsero Springs, Dirty Devil River, Price-San Rafael Rivers, Lower Virgin River, Las Vegas Wash, and Palo Verde Outfall Drain) are used, a total of 160,000 acre-feet per year of water would be used beneficially which would result in the removal of an estimated 900,000 tons of salt annually.

During the next 2 years, Reclamation will concentrate its efforts on determining the benefits and costs of collecting and transporting saline water to industries that have voiced an interest in its use. Reclamation will also identify incentives that would make the water more attractive to industry. From the benefits and costs both to Reclamation and industry, a cost for the water will be determined.

Reclamation will continue to work with the Basin States to ensure that beneficial uses are being found for the water and to resolve any water rights issues.

1. Uinta Basin Unit

The Uinta Basin Unit is located in northeastern Utah in parts of Duchesne and Uinta Counties and lies between the Uinta Mountains on the north and the Tavaputs Plateau on the south. Principal cities within the unit area include Duchesne, Roosevelt, and Vernal which are located along U.S. Highway 40, a major east-west highway which traverses the area.

Agriculture and energy development make up the principal economic base in the Uinta Basin. Most agriculture is for the production of feed for livestock. The water supply for the irrigated lands comes from local rivers and streams including the Duchesne, Uinta, Lake Fork, and Whiterocks Rivers. Dry farming is not practiced in the Uinta Basin. Nonirrigated land uses include oil and gas production, timber production, and livestock grazing.

The salt load contributed to the Colorado River from the Uinta Basin results from dissolution of soluble salts in the soil and substrata. Return flows from irrigation and runoff transport sodium and sulfate to natural drains and eventually into the streams and rivers. An estimated 450,000 tons of salt annually reach the Colorado River from the Uinta Basin.

Uinta Basin Unit alternatives include lining irrigation canals and laterals to reduce seepage losses and thus reduce the salt load carried to the Colorado River; collecting saline water and disposing of it through deep well injection, evaporation ponds, or a desalting plant; using saline water for energy development, for transportation of coal through coal-slurry pipeline, or for cooling purposes at a local powerplant; and the retirement from irrigation of high salt contributing lands. Of these alternatives, the most viable as determined by Reclamation's four tests of viability (completeness, effectiveness, efficiency, and acceptability) is the canal lining alternative.

Under the canal lining alternative, 55.5 miles of the total approximately 240 miles of canals and laterals in the Uinta Basin would be lined with concrete. Project implementation would reduce the salt load to the Colorado River by approximately 25,500 tons per year, would reduce canal seepage by approximately 16,800 acre-feet per year of which approximately 4,600 acre-feet could be beneficially used to reduce irrigation shortages, and would reduce water user operation and maintenance costs associated with their canal and lateral distribution systems.

The USDA is currently implementing an on-farm salinity control program. The on-farm program and proposed lateral improvements are designed to complement one another.

B. Bureau of Land Management

1. Watershed Improvement Practices

Future efforts of the Bureau of Land Management (BLM) in salinity control will emphasize the identification of significant salinity source areas on public lands. Effective management for salinity reduction including control structures would be recommended and implemented where appropriate. Areas in moderately to highly saline soils which have accelerated erosion are being identified by the BLM. Watershed activity plans will be developed for those areas and implemented as funds permit. The watershed practices that may be effective in salinity control include gully plugs, contour furrowings, pitting, ripping, retention and detention structures, and the implementation of allotment and habitat management plans. The cost of these watershed treatments within Grand Valley, Colo., as estimated by the Soil Conservation Service, is approximately $30 and $40 per acre.

BLM feels that these salinity control projects, with secondary benefits to erosion and flood control, water supply for livestock and wildlife, and/or improved forage production, are consistent with the multiple-use philosophy of BLM. Reports identifying potential salinity control areas have been completed for eastern Utah and the Montrose, Craig, and Grand Junction Districts in Colorado. A Draft Watershed Management Plan, which includes salinity control, has been completed for the Red Creek Drainage in Wyoming.

To date, BLM has not constructed any structural projects with the primary intent of reducing salinity. BLM has constructed check dams, retention dams, and contour furrows for flood and erosion control on saline soils in Colorado, Utah, and Wyoming. Specific areas where activity plans are currently being developed include Sagers Wash in eastern Utah, Elephant Wash in western Colorado, and Red Creek in southwestern Wyoming.

2. Sinbad Valley Unit

The Sinbad Valley Unit is located in western Colorado, south of the town of Gateway. Salt Creek drains Sinbad Valley and has been identified as a point source of saline ground water. Saline ground water discharge from the Paradox member of the Hermosa Formation and overlying alluvium in Sinbad Valley is responsible for high concentrations of dissolved solids, primarily sodium and chloride, in Salt Creek. This ground water is discharged through a series of springs and seeps near the mouth of Sinbad Valley. The Bureau of Land Management initiated a feasibility report for the interception and disposal of these saline waters during the 1982 fiscal year.

Before a preferred alternative can be selected, an assessment of environmental impacts needs to be completed. Sewemup Mesa, located immediately east of Sinbad Valley, is a wilderness study area and is also proposed as an Outstanding Natural Area in the Resource Management Plan. The area has high visual sensitivity, both onsite and along the powerline alinement. Peregrine falcons nest in the area. Water right questions need to be resolved. Compatibility of the project with existing land uses also needs consideration.

The Sinbad Valley feasibility study, initiated by BLM, indicates that additional information is needed before final selection can be made among the various alternatives. First, additional discharge and conductivity measurements are required to define salt loads of high flows. Second, onsite evaporation data are needed to further refine the sizing of evaporation ponds. A pan evaporation station should be established and operated in Sinbad Valley for at least 1 year. Third, the abandoned wildcat well, No. 1, Sinbad Unit, should be evaluated for injection suitability.

Currently, BLM is continuing to maintain a data collection station on Salt Creek. Data being collected consist of streamflow and conductivity measurements. The continuation of this data collection effort is proposed for fiscal year 1985.

C. U.S. Department of Agriculture[14]

1. Title I, Welton-Mohawk Irrigation and Drainage District

The goal of this aspect of Title I was to decrease the drainage return flows from the Welton-Mohawk Irrigation and Drainage District so that the size of the Yuma Desalting Plant could be reduced. The measures identified are acreage reduction, on-farm measures and technical assistance, research and demonstrations, irrigation management services, and extension education and information. Of these measures, the U.S. Department of Agriculture, through the SCS, has initiated the on-farm measures and technical assistance program.

The SCS enters into contracts with eligible landowners and operators (cooperators) to install conservation practices that will directly contribute to the objectives of the program. The SCS contract provides for technical assistance and irrigation water management efficiency checks over a 2-year period after installation of the practices.

A cost-share rate of 75 percent Federal and 25 percent cooperator has been established. Funds to cover the contract cost sharing and the SCS technical services are transferred periodically from Reclamation to the SCS under the Title I Memorandum of Agreement.

Since 1974, there have been 347 individual farm applications for assistance covering over 53,000 acres. Irrigation water management and salinity control plans and contracts executed since the inception of the program total 259 farms on 36,170 acres. The 1982-83 contracts cover 54 farms on 6,815 acres.

Major irrigation water management practices completed in 1982 and 1983 include 43 miles of ditch lining, 8,500 acres of land leveling, 1,570 structures for water control, and 11,555 acres of totally treated irrigated croplands. With the installation of these practices, in combination with on-farm improved irrigation water management, irrigation efficiencies have been improved by 25 to 30 percent on over 27,200 acres. This represents a significant water conservation savings and reduction in deep percolation. These cumulative reductions are having substantial impacts on decreasing the amounts of drainage return flows from the district. Current drainage return goals of 108,000 acre-feet should be achieved by the 1986 completion date.

Generally, the irrigation land retirement program and the present USDA on-farm water management programs are having major impacts on improving irrigation efficiencies, reducing deep percolation, and reducing drainage return flows.

2. <u>Title II, General</u>

Specific language in Title II of the Colorado River Basin Salinity Control Act directed the Secretary of the Interior, the Administrator of EPA, and the Secretary of Agriculture to "cooperate and coordinate their activities effectively to carry out the objectives of this title." This coordination is maintained through the Bureau of Reclamation Federal Interagency Salinity Control Committee and U.S. Department of Agriculture Salinity Control Coordinating Committee. While USDA concentrates on planning and implementing an on-farm salinity control program, the Reclamation agriculturally related salinity control activities focus upon irrigation canal and lateral improvements. In many cases, coordination of the off-farm canal and lateral improvements is necessary for effective on-farm salinity control and water management practices.

a. Irrigation Salt Source Area Studies

This activity is a planning function under the leadership of SCS. The objectives of these studies are (1) to identify salt source areas, (2) to determine salt loading estimates, (3) to evaluate treatment alternatives and salt load reduction impacts, and (4) to develop recommended implementation plans and associated implementation costs. These detailed salinity control studies and investigations are being funded using river basin study authorities of Section 6 of Public Law 83-566. Full coordination is maintained with Reclamation, the EPA, and interested State and local agencies or organizations through various coordinating committees at the local project level.

Table D presents the current status of the 17 identified irrigation salt source area studies. With publication of the Virgin Valley and McElmo Creek reports, USDA has completed seven salinity control studies on over 500,000 acres. If the six units with recommended plans were fully funded and implemented, they would reduce Colorado River salt loading by nearly 735,000 tons per year.

Salinity control planning activities for 1984 were somewhat limited with only modest planning efforts underway in the Price-San Rafael (Utah) and the completion of Mancos Valley (Colorado) in interagency review draft. USDA anticipates adequate funding to resume a more intensive planning effort in the future. Other salt source areas with no anticipated study activities at this time either lack significant salinity control benefits or local support to initiate a planning study.

b. Implementation

Public Law 93-320, as amended by Public Law 98-569, dated October 30, 1984, provides that the Secretary of Agriculture develop and implement a voluntary on-farm program. This will include developing and implementing on-farm and lateral improvement salinity control plans; conducting education, research, and demonstration activities; providing on-farm irrigation management; and conducting monitoring and evaluation activities.

The SCS provides program leadership for technical assistance to individual landowners and operators. Major services that the SCS provides include assisting landowners in developing irrigation water management and salinity control plans, designing and installing irrigation improvement practices, and subsequent water management followup assistance with individual irrigators to improve irrigation application techniques and assure proper maintenance.

There also needs to be significant incentive for individual landowners to invest in sophisticated water management systems which essentially provide for offsite benefits to downstream users. Because of the significant offsite or downstream benefits, up to 70 percent of cost-sharing support is available to encourage local landowners

Table D
Program status
U.S. Department of Agriculture

Area	State	Study status	Starting date	Remarks
Grand Valley	Colorado	Published December 1977	1979	Modified schedule extends implementation to 1993
Uinta Basin	Utah	Published January 1979	1980	Modified schedule extends implementation to 1994
Big Sandy	Wyoming	Published November 1980	Deferred	Reclamation off-farm and USDA on-farm alternatives being reassessed in conjunction with State of Wyoming
Moapa Valley	Nevada	Published February 1981	1985	Pending implementation funding in fiscal year 1985
Lower Gunnison	Colorado	Published September 1981	1986	Proposed to rescope implementation plan with priority areas and implementation phases
Virgin Valley	Nevada, Arizona	Published March 1982	1985	Pending implementation funding in fiscal year 1985
McElmo Creek	Colorado	Published January 1983	1992	Implementation extended to future years
Price-San Rafael	Utah	Underway, scheduled for 1985	1987	Maintain Reclamation liaison in fiscal year 1984; draft report prepared
Upper Virgin	Utah	Temporary suspension	1992	Study activities to resume pending funding in fiscal year 1985
Mancos Valley	Colorado	Underway, scheduled for 1985	1995	Draft report complete; implementation extended to 1995; subject to change
Little Colorado River	Colorado	Published December 1981		No recommended plan or salinity control benefits identified
Colorado River Indian Reservation	Arizona	Underway, scheduled for 1984		General river basin study underway; no major salinity control benefits or implementation anticipated
Palo Verde	California	Pending		Anticipate USDA and Reclamation planning activities for fiscal year 1985
Dirty Devil	Utah	Inactive		
Roaring Fork	Colorado	Inactive		No anticipated activities at this time
Henry's Fork	Wyoming	Inactive		No anticipated activities at this time
Lyman	Wyoming	Inactive		No anticipated activities at this time

to participate. The Agricultural Stabilization and Conservation Service provides cost sharing for the installation of water management practices and related off-farm lateral distribution systems. Cost sharing may be provided through annual practices or through long-term agreements (contracts) based upon complete on-farm water management and salinity control plans.

(1) Grand Valley, Colo.

The Grand Valley Project was initiated in 1979 as the first on-farm salinity control project in the USDA. The implementation program is tailored to the USDA salinity control report, Onfarm Program for Salinity Control, Final Report of the Grand Valley Salinity Study, dated December 1977, and Supplement No. 1 issued in March 1980 which addresses related lateral improvements needed to provide for more effective on-farm salinity control. When fully implemented, the on-farm improvement program and associated lateral work is estimated to reduce Colorado River salt loadings by up to 230,000 tons per year.

Since 1979, the Agricultural Stabilization and Conservation Service has received over 1,600 separate requests for cost-share assistance, with nearly 1,200 participants actually completing an irrigation water management and salinity control practice. While the project relies heavily on annual Agricultural Conservation Program requests and practices, there have been 15 long-term agreements on 2,241 acres developed since 1979. SCS has also assisted in the development of irrigation water management plans for 245 participants on 7,736 acres.

The cumulative effects of these irrigation water management and salinity control practices applied to date have been a 4,655-acre-foot reduction in deep percolation per year with an equivalent salt load reduction of 23,300 tons per year.

(2) Uinta Basin, Utah

The Uinta Basin salinity control project, initiated in 1980, is the second and only other Title II USDA on-farm program underway at this time. The project is being implemented consistent with USDA Salinity Report, Uinta Basin Unit, Utah, published January 1979 and supplemented by an Addendum, November 1980. The implementation plan includes the installation of sprinkler systems on 79,000 acres and improved surface irrigation systems on 43,000 acres. Other associated water management practices are included in the land treatment phases of the project for salinity control. The total estimated salt load reduction estimates for the fully implemented Uinta Basin report is 76,600 tons per year.

The implementation strategy for the Uinta Basin was to target salinity control planning and application to priority areas within the project. The initial USDA salinity control study looked at nine different evaluation units and treated each area as a separate subunit to the entire Uinta Basin. As implementation started in 1980, the Dry Gulch area was identified for priority assistance. Since then implementation focus has been expanded to the Pelican Lake area. This feature has provided for much higher visibility and localized impacts at the project level.

A second feature to the Uinta Basin implementation strategy included the use of complete irrigation water management and salinity control plans as a basis for USDA cost sharing through long-term agreements. The long-term agreement approach provides for a more substantial commitment on behalf of the farmers and USDA, as well as providing assurance that long-term, cost-share provisions will be available for the life of the agreement. This allows for more comprehensive and effective on-farm planning and application. There are also annual cost-share provisions for those landowners who do not wish to participate in the long-term agreement program. Pooling agreements with groups of landowners are also key features to project implementation through the Agricultural Conservation Program.

Under the long-term agreement phase of the program, a total of 433 applications on 61,590 acres has been received since 1980. Plans have been developed and contracts formalized on a total of 294 long-term agreement contracts on 22,279 acres. This represents approximately 50 percent of the total applications received to date.

The cumulative effects of practices applied to date have served to raise irrigation efficiencies on about 7,850 acres from an average of 30 percent "before" to approximately 55 percent "after" where maximum irrigation water management has been achieved. This results in an estimated 7,950-acre-foot-per-year reduction in deep percolation and an annual salt load reduction of 26,400 tons for the project.

c. <u>Extension Education</u>

The Extension Service is using general appropriation funds to conduct demonstration, information, and education programs. Extension specialists conduct water management workshops and other educational programs for farmers, technicians, county agents, and personnel of agricultural service and supply firms. Extension specialists also work with farmers in fine tuning irrigation practices to improve the irrigation efficiency and economy of operations. The Extension Service, through the State Cooperative Extension Service in Utah and Colorado, has continued to provide this extension education support.

In the Grand Valley, the Extension Service worked with Reclamation and the Colorado Cooperative Extension Service to develop a special extension education effort to assist both Reclamation canal and lateral lining activities and the USDA on-farm program. Through Memoranda of Understanding and working cooperative agreements, the Colorado Cooperative Extension Service has provided a full-time extension specialist to assist in the Grand Valley Project area. Major activities include working with landowners and irrigators to more formally organize working groups on the many irrigation distribution laterals.

support this education effort have been provided by Reclamation to the Colorado Cooperative Extension Service through a reimbursable agreement with the Extension Service. Funding will continue through June 1985 for this extension education support at which time USDA and the Colorado Cooperative Extension Service will be expected to fund the position.

3. Progress on Monitoring and Evaluation

Although long delayed by lack of funding, salinity monitoring and evaluation activities by the SCS in the Colorado River Basin have begun to show substantial progress in fiscal year 1984. This progress was preceded by preparation of the comprehensive Monitoring and Evaluation Plan in July 1982 and the acquisition of some staff and approximately $400,000 of monitoring equipment in fiscal year 1983.

There are essentially three focal components to the Monitoring and Evaluation Plan--salt load/irrigation/engineering, wildlife habitat, and on-farm economics. For several reasons, the activities that have commanded the early attention of the monitoring and evaluation effort center around irrigation and engineering--essentially the instrumentation and implementation of the systems that will monitor climate and water use data needed to develop sound water budgets and salt loading estimates.

To this end, measuring devices have been installed on 10 fields from a sample of 30-plus farms ultimately expected to be monitored. Flume measurements of water-on and water-off and soils moisture measurements are underway. No additional fields will be instrumented this fiscal year due to the lack of personnel to observe and record data.

In the Grand Valley, equipment has been purchased for 20 remote monitoring sites. Installation is complete at five of these sites, except for the computer chips needed to read the soil moisture data. Sensors are now being calibrated. The installation and calibration task has been found to be a bigger job than expected and, given the shortage of staff, an attempt is going to be made to have a private contractor undertake installation and calibration of the remaining sites. Current plans call for all 20 sites to be installed and operational by early spring of 1985.

One of the significant difficulties with these sites is the fact that much of the equipment has never been used in these particular ways before and has required modification and/or adaptation before proving to be satisfactory.

For climatic data, three of the nine proposed remote climate stations have been installed in the field in Uinta Basin. Three more of the stations have already been acquired and are onsite and ready to be installed. All of these stations are of the full snow telemetry (SNOTEL) variety rather than the Popcorn (trademark) type, which must transmit data through another SNOTEL site rather than directly.

Two Popcorn stations were completed in the Grand Valley Project early in 1984. They are now operational and transmitting climatic data such as rainfall, temperature, humidity, wind velocity and direction, etc. The computer algorithms that will enable the staff to translate and use the data have been received from the manufacturer.

A wildlife biologist is now on site on the Uinta staff and has been trained in the habitat suitability index and the habitat evaluation procedures (HEP). Sites are now being selected from which to begin collecting point data to establish baseline habitat conditions. The next task will be to select transects to measure changes in vegetation and ground water. It is hoped that LANDSAT imagery can be used in the habitat analysis.

Little progress has been made on the monitoring and evaluation effort in the area of economics except for initiation of a set of forms in Uinta Basin that will be used in the planning effort with each farmer. These forms should facilitate the capture of all baseline economic data and significantly reduce the amount of staff time needed to accurately assess the adverse and beneficial effects of the salinity control effort on individual farmers and the general public.

Shortage of staff for both projects has been the most significant deterrent to more rapid progress in all focal areas of the monitoring and evaluation effort. Each staff is operating at about half the anticipated level. It is expected that people will be added quickly when funding becomes available.

The next major hurdle is expected to be a shortage of computer programming skills. As data begin to be generated in increasing quantities, the ability to efficiently store, process, and interpret that data will become critical. Although the monitoring and evaluation staffs have begun to receive computer training, much training remains to be done. Some of the major data processing programs are expected to be initiated this winter by project staff, assisted by outside resources (e.g., Colorado State University, Agricultural Research Service, etc.).

In summary, the monitoring and evaluation effort is well underway. Equipment is now in place and generating data that can provide significant new levels of reliability regarding our knowledge of salinity control methods. Much remains to be done, but these data allow a start toward achieving higher levels of efficiency and effectiveness in this important social endeavor.

D. State Salinity Discharge Permitting

The States of the Colorado River Basin, the Federal Executive Department, and Congress have adopted the policy that the salinity of the lower main stem of the Colorado River shall be maintained at or below the flow-weighted average values found during 1972 while the Basin States continue to develop their compact-apportioned water. The flow-weighted averages are referred to as numeric criteria at three downstream stations--below Hoover Dam, below Parker Dam, and at Imperial Dam. The numeric criteria for those three stations are 723 mg/L, 747 mg/L, and 879 mg/L, respectively.

Although the numeric criteria have not been exceeded since the Forum adopted its policy, it is anticipated that without salinity control measures, as the States continue to develop their compact-apportioned water supply, the criteria will be exceeded. Therefore, the seven States, working collectively within the auspices of the Colorado River Basin Salinity Control Forum, have from time-to-time adopted additional policies to help facilitate the control of the salinity in the Basin. In 1977, the Forum adopted the "Policy for Implementation of Colorado River Salinity Standards Through the NPDES Permit Program." The policy deals with both industrial and municipal discharges to the river system. With respect to effluent limitations for industrial discharges the stated objective is no-salt return to the river wherever practicable. The policy with respect to municipal discharges is that the incremental increase in salinity shall be 400 mg/L or less than the average salinity of the intake water supply. This policy is being implemented through the NPDES permit program.

In 1980 the Forum adopted a policy encouraging the use of brackish and/or saline waters for industrial purposes. This use of saline waters by industry combined with the "no-salt" discharge policy will reduce the salt load to the river system.

In October 1982, the Forum adopted a policy concerning intercepted ground waters. The 1982 policy more clearly defines those aspects dealing with intercepted ground waters addressed under the 1977 policy. The NPDES permit program is used to facilitate the 1977 and 1982 policies. There is a separate NPDES permit program in each of the States, with authority derived from the Federal Clean Water Act, Public Law 92-500. A brief status report as to the program in each of the States follows.

<u>Arizona</u>.--The authority for issuing NPDES permits has not been delegated to the State and still resides in the Region IX office of EPA. Currently, the State prepares the permits, solicits public comments and involvement, and forwards a final draft of proposed permits to EPA for signature and issuance. For waters tributary to the Colorado River above Imperial Dam, there are three industrial discharge permits now issued by the State of Arizona. There are also 18 municipalities or quasi-public NPDES permittees in the watersheds in Arizona above Imperial Dam.

<u>California</u>.--California has authority to issue NPDES permits. In recent years there have been no applications for industrial discharge permits in the Colorado River drainage in California. Only one municipality in the drainage area has been reissued a municipal discharge permit in recent years. This permit is consistent with Forum policy.

Colorado.--Colorado has the authority to issue NPDES permits. Sixty-four industrial permits have been issued in Colorado in keeping with the discharge policies of the Forum. There are 75 municipal discharge permits in Colorado in the drainage and 65, including all of the larger dischargers, have been required to incorporate salinity monitoring. None of the 75 discharges exceeds the 400-mg/L increase policy of the Forum.

Nevada.--The authority to issue NPDES permits has been delegated to the State of Nevada. The industrial discharges into water tributary to the Colorado River in the State of Nevada are located in the Las Vegas Wash area. Permits have been issued to industrial companies at Henderson and strategies of piping and ponding discharge waters are being implemented. Nevada has also issued permits that prohibit Nevada Power Company from discharging brackish waters from its two generation stations in the drainage. Two of the three major municipalities in the Las Vegas Wash area have been issued discharge permits that are in keeping with the Forum policy. The third major municipality in the area, the city of Las Vegas, has been involved in lengthy discussions, negotiations, and litigation concerning the terms of its discharge permit.

New Mexico.--Authority for issuing permits has not been granted to the State of New Mexico, and the program is being administered by EPA, Region VI. EPA is following the discharge permit policy of the Forum. There are currently 15 industrial discharge permits issued in the State of New Mexico within the drainage. There are eight municipal or domestic discharge permits in the State within the Colorado River drainage and all are in compliance with Forum policy.

Utah.--Major industrial permits are drafted by EPA, and minor industrial permits are drafted by the State of Utah. EPA maintains the authority for the issuance of the permits, but all permits are reviewed by the State for compliance with Forum policy. There are 72 NPDES permits in effect for industrial discharges in the State of Utah in the Colorado River drainage. There are also 31 municipal permits in the State in that drainage. Twenty-one of these municipal facilities provide total containment. Since 1977 and the enactment of the Forum policy, all reissuance of discharge permits has been in compliance with the Forum policy.

Wyoming.--The State of Wyoming has the authority to issue NPDES permits and the State follows the Forum policy in the issuance of these permits. The State is giving particular attention to the discharges from the Pacific Power and Light Company Jim Bridger Powerplant located in Sweetwater County. That plant is currently operating under a conditional discharge permit; it is anticipated that with the installation of air pollution control devices over the period of the next 6 years, water discharge will be eliminated from that plant. Wyoming has issued 13 municipal permits for discharges to tributaries of the Colorado River. These 5-year permits are for relatively small discharges and are reissued in compliance with the policy of the Forum when they reach their expiration dates.

PART VIII. SALINITY PROJECTIONS

A. Methods

An evaluation of the probable effects of developments on the flows and water quality of the Colorado River Basin was made using a computer model. The model, Colorado River Simulation System (CRSS), evaluates the impacts of depletions, salt pickup, and salinity control on future salinity at key stations within the basin.

Table A on pages 57 through 59 summarizes the estimated present and projected future depletion of water used in CRSS through the year 2010 for both the Upper and Lower Basins of the Colorado River. The projections were made after consultation with individual States within the Colorado Basin; however, the projections adopted by Reclamation for planning purposes are not necessarily concurred with by the States.

Table B on page 60 lists the salt pickups used by the CRSS model for the calculation of salinities in the Upper Basin. The Lower Basin salinities are calculated on a reach-by-reach basis using cumulative depletions and pickups, instead of on a project-by-project basis as in the Upper Basin, and are not listed. The salt pickups listed are the actual figures used in the model to calculate the salinity changes projected by CRSS. Irrigation and transbasin diversions show salt gains and losses, respectively; other uses (municipal, industrial, evaporation, mineral, etc.), with the exception of the Las Vegas Wash, show no gains in loading due to salt pickup.

Table C on page 63 summarizes the existing and proposed salinity control measures for the Colorado River Basin. For the purposes of this evaluation, USDA on-farm programs have a 20-year project life after which there is some loss of effectiveness.

The CRSS is a package of computer programs and data bases developed by Reclamation as a tool to be used by water resource managers dealing with water-related issues and problems in the Colorado River Basin. The Colorado River Simulation Model (CRSM), the central feature to the CRSS, is a computer program which simulates the flow of salt and water through the system and the operations of the hydroelectric powerplants. The CRSM is a deterministic model and operates on a monthly time frame. Salts and water are routed through the system by a simple mass balance accounting procedure in which TDS is modeled as a conservative parameter.

Among the assumptions used in CRSS salinity projections is the routing of salts through a given reservoir. The model routes the salts through the main stem reservoirs using a once-a-month mixing algorithm. This assumption limits the ability of the model to predict monthly variations in salinity; however, it does not limit the model in predicting long-term salinity since the monthly differences average out on a yearly basis.

A simulation of historical conditions within the basin was used to test the ability of the CRSS to simulate flows and water quality. The results of the test were then used to calibrate the model. Gains and losses between stations along the Colorado were adjusted to minimize the error between simulated and observed TDS concentrations. The development and use of CRSS is an ongoing (learning) process; however, results from the model have been favorably compared against the 1968-78 historical conditions, and Reclamation believes that in its present form, CRSS is the best long-range predictive tool available.

B. Evaluation of Salinity and Salinity Control

Two different problems were evaluated using CRSS. The first one evaluates the salinity impact of the natural variation in flow in the river. The second evaluates the salinity impact of future salinity control measures beyond those now in place.

1. Natural Variations in Salinity

For these simulations, the virgin flow data base from 1906-83 was used. The mean virgin flow at Lee's Ferry was 15 million acre-feet per year for this period. Fifteen estimates of future salinity conditions were made by using fifteen different virgin flow sequences and the future depletion and salt loads listed in Tables A and B (pages 57 through 60). No additional salinity control measures, other than those which presently exist, were assumed.

Figure 6 displays the variation in salinity due to the natural variation in flow. The plot shows the average salinity of the highest 3 years of flow as the "wet 3," the average of the lowest 3 years of flow as the "dry 3," and the average of all 15 estimates of salinity as the "mean."

2. Effect of Salinity Control

The effect of the salinity control program shown in Figure 7 and Tables E and F was evaluated using CRSS for two conditions. The "base" condition assumes that no more funds will be expended on salinity control. Only the presently completed portions of Grand Valley and Uinta, both Reclamation and USDA, and the Meeker Dome Unit are included in this case. The salt removal assumptions for the "with WQIP" (with Water Quality Improvement Program) condition include all Reclamation and USDA projects which are either completed or authorized for construction, as listed in Table C on page 63. The impacts of units in the planning phases are not included in this evaluation due to the preliminary nature of their salt removal estimates.

According to the CRSS analysis (Figure 7), with the Interior and USDA salinity control units (base case) already in operation or completed as of 1984, the TDS numerical criteria of 879 mg/L at Imperial Dam will be satisfied until 1993.

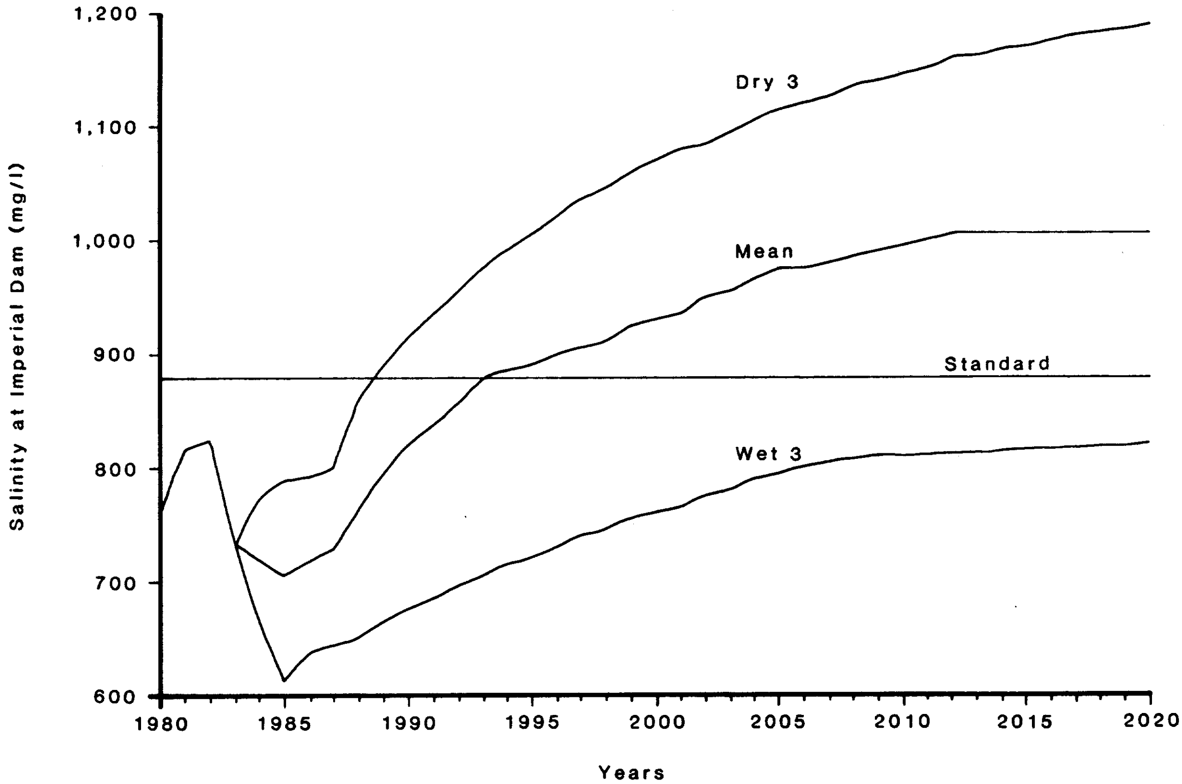

Figure 6 Expected Range of Future Salinities at Imperial Dam.

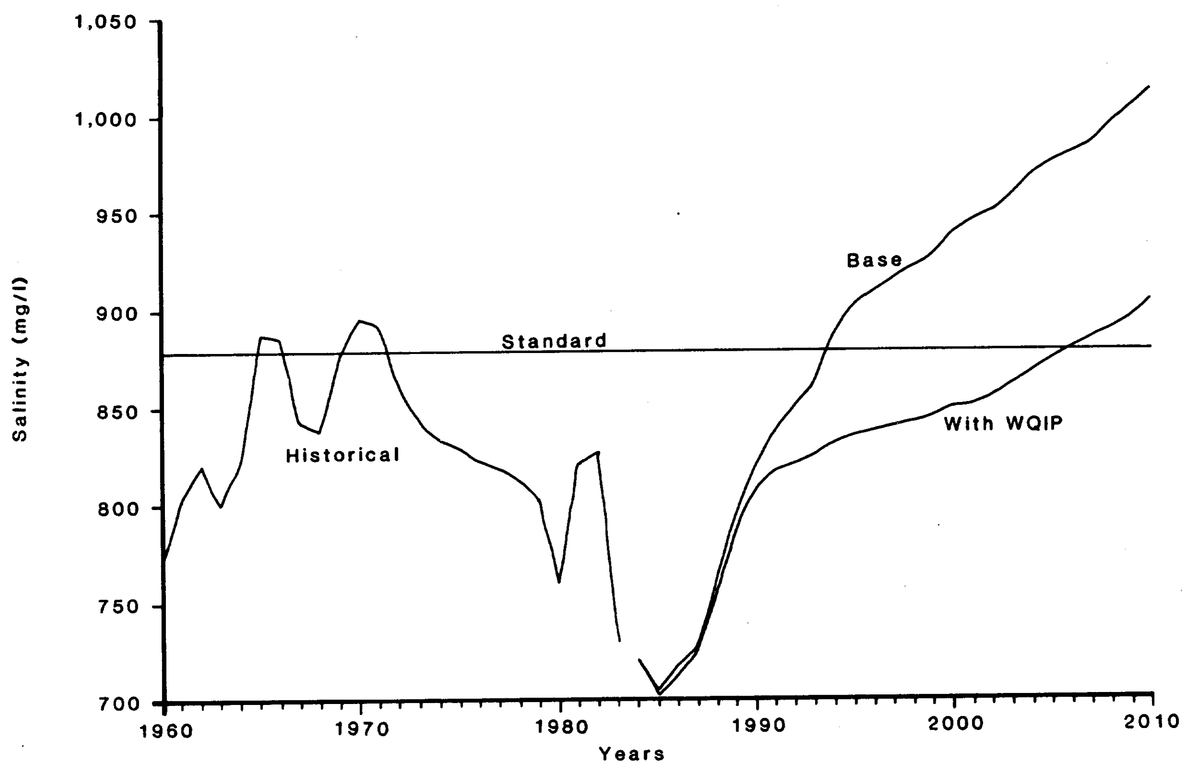

Figure 7 Salinity Projections at Imperial Dam With and Without the Water Quality Improvement Program.

Table E

Summary of mean annual discharge and TDS concentration by depletion level without further water quality improvement projects1/

	Flow by depletion level (1,000 acre-feet/year)					TDS concentration by depletion level (mg/L)					TDS load by depletion level (tons)				
	Virgin	1982	1990	2000	2010	Virgin	1982	1990	2000	2010	Virgin	1982	1990	2000	2010
Green River near Green River, Wyo.	1,358	1,332	1,353	1,307	1,144	99	257	368	405	472	183	466	677	720	735
Green River near Greendale, Utah	1,978	1,616	1,740	1,680	1,483	198	477	445	467	494	532	1,049	1,053	1,067	997
Yampa River near Maybell, Colo.	1,222	1,413	1,245	1,251	1,208	113	157	149	150	153	188	302	252	255	251
Duchesne River near Randlett, Utah	770	634	316	245	218	130	469	1,251	1,561	1,632	136	405	538	520	484
White River near Watson, Utah	563	590	555	552	523	218	330	421	426	437	167	265	318	320	311
Green River at Green River, Utah	5,432	4,890	4,697	4,491	4,056	268	422	484	528	561	1,981	2,808	3,093	3,226	3,096
San Rafael River near Green River, Utah	182	104	131	130	120	311	1,418	1,049	1,060	1,135	77	201	187	187	185
Colorado River at Glenwood Springs, Colo.	2,132	773	1,640	1,624	1,550	178	251	337	344	362	517	264	752	760	763
Colorado River near Cameo, Colo.	3,549	2,743	2,933	2,863	2,723	252	362	465	481	508	1,216	1,351	1,856	1,874	1,882
Gunnison River near Grand Junction, Colo.	2,339	1,918	2,092	2,076	1,992	171	478	608	611	631	545	1,247	1,731	1,726	1,710
Dolores River near Cisco, Utah	832	705	744	716	647	307	553	831	898	928	348	530	841	875	817
Colorado River near Cisco, Utah	6,803	5,309	5,633	5,487	5,155	244	529	677	697	739	2,257	3,821	5,188	5,203	5,183
San Juan River near Archuleta, N. Mex.	1,213	826	853	778	611	91	158	172	181	181	150	178	200	192	150
San Juan River near Bluff, N. Mex.	2,185	1,639	1,616	1,521	1,288	189	405	660	910	1,053	563	903	1,451	1,883	1,845
Colorado River at Lee's Ferry, Ariz.	15,042	9,017	11,634	11,070	9,976	264	544	607	668	720	5,393	6,674	9,608	10,061	9,772
Colorado River near Grand Canyon, Ariz.		9,335	12,052	11,488	10,378		570	641	701	755		7,239	10,511	10,957	10,660
Virgin River at Littlefield, Ariz.		191	149	140	112		1,675	1,351	1,278	1,352		435	274	243	206
Colorado River below Hoover Dam, Ariz.-Nev.		7,454	11,087	10,332	9,696		680	677	764	823		6,896	10,212	10,740	10,857
Colorado River above Parker Dam, Ariz.-Nev.		7,233	10,816	10,030	9,383		717	692	785	846		7,056	10,183	10,712	10,800
Colorado River below Parker Dam, Ariz.-Nev.		6,367	8,026	7,491	7,010		717	703	799	862		6,211	7,677	8,143	8,221
Colorado River at Imperial Dam, Ariz.-Nev.		5,406	7,142	6,622	6,140		824	821	937	1,012		6,061	7,978	8,442	8,454

1/ Includes only existing water quality improvement projects.

Table F

Summary of mean annual discharge and TDS concentration by depletion level with water quality improvement projects1/

	Flow by depletion level (1,000 acre-feet/year)					TDS concentration by depletion level (mg/L)					TDS load by depletion level (tons)				
	Virgin	1982	1990	2000	2010	Virgin	1982	1990	2000	2010	Virgin	1982	1990	2000	2010
Green River near Green River, Wyo.	1,358	1,332	1,352	1,306	1,143	99	257	362	381	447	183	466	666	677	695
Green River near Greendale, Utah	1,978	1,616	1,740	1,679	1,483	198	477	443	450	477	532	1,049	1,049	1,028	962
Yampa River near Maybell, Colo.	1,222	1,413	1,252	1,251	1,208	113	157	149	150	153	188	302	254	255	251
Duchesne River near Randlett, Utah	770	634	316	245	218	130	469	1,146	1,332	1,489	136	405	493	444	442
White River near Watson, Utah	563	590	555	552	523	218	330	421	426	437	167	265	318	320	311
Green River at Green River, Utah	5,432	4,890	4,695	4,490	4,054	268	422	475	501	538	1,981	2,808	3,034	3,061	2,967
San Rafael River near Green River, Utah	182	104	131	130	120	311	1,418	918	717	755	77	201	164	127	123
Colorado River at Glenwood Springs, Colo.	2,132	773	1,640	1,624	1,550	178	251	337	344	362	517	264	752	760	763
Colorado River near Cameo, Colo.	3,549	2,743	2,933	2,863	2,723	252	362	465	481	508	1,216	1,351	1,856	1,874	1,882
Gunnison River near Grand Junction, Colo.	2,339	1,918	2,091	2,075	1,991	171	478	536	422	444	545	1,247	1,525	1,191	1,203
Dolores River near Cisco, Utah	832	705	743	715	646	307	553	557	602	616	348	530	563	586	541
Colorado River near Cisco, Utah	6,803	5,309	5,623	5,486	5,153	244	529	592	550	591	2,257	3,821	4,529	4,105	4,143
San Juan River near Archuleta, N. Mex.	1,213	826	853	778	611	91	158	172	181	181	150	178	200	192	150
San Juan River near Bluff, N. Mex.	2,185	1,639	1,663	1,518	1,285	189	405	652	870	1,000	563	903	1,475	1,797	1,748
Colorado River at Lee's Ferry, Ariz.	15,042	9,017	11,629	11,062	9,969	264	544	586	590	637	5,393	6,674	9,272	8,880	8,640
Colorado River near Grand Canyon,		9,335	12,046	11,480	10,370		570	621	626	675		7,239	10,178	9,778	9,523
Virgin River at Littlefield, Ariz.		191	148	138	111		1,675	1,011	896	1,151		435	204	168	174
Colorado River below Hoover Dam, Ariz.-Nev.		7,454	11,082	10,328	9,693		680	664	687	729		6,896	10,011	9,654	9,614
Colorado River above Parker Dam, Ariz.-Nev.		7,233	10,811	10,026	9,380		717	680	708	750		7,056	10,002	9,658	9,571
Colorado River below Parker Dam, Ariz.-Nev.		6,367	8,022	7,486	7,007		717	692	721	765		6,211	7,553	7,343	7,293
Colorado River at Imperial Dam, Ariz.-Nev.		5,406	7,131	6,618	6,137		824	808	850	904		6,061	7,839	7,653	7,548

1/ Includes only those water quality improvement projects presently authorized for construction.

Using the January 1984 base case conditions for the CRSS analysis, target load reductions have been developed to meet the numeric criteria under future conditions. By the year 2020, about 1.5 million tons will have to be removed from the river system. The target load reductions have been revised downward from earlier estimates which assumed 5.0 million acre-feet of Upper Basin depletions by 2020, requiring up to 2.9 million tons per year.

In meeting the target load reduction requirements, unit and project combinations now under investigation or proposed for implementation appear to be sufficient until the year 2000. The timing for implementation of projects is particularly critical in view of the sharp increase in target load reductions expected to occur around the year 1993.

C. Calculation of Project Impact at Imperial Dam

The CRSS model is the preferred technique for predicting the individual and cumulative salinity impacts of salinity control and water resources development projects. Two project effects are considered in CRSS--change in streamflow and change in salt loading. Simulations are made with and without these project effects to predict TDS concentrations at downstream locations, including standard sites such as Imperial Dam.

For project planners without access to CRSS, simplified equations have been developed from CRSS results to estimate the impact of a project on the salinity at Imperial Dam. Two equations are necessary--one for projects upstream from Parker Dam and the second for projects between Parker and Imperial Dams. Both are based on the 2010 depletion and salt pickup schedules given in Tables A and B (pages 57 through 60). The streamflow and salt load effects for a project above Parker Dam are assumed to pass unchanged to the dam. From these, a constant downstream release is assumed, with all fluctuations accounted for in diversions to the Metropolitan Water District and the Central Arizona Project.

For projects above Parker Dam[1/] the equation is:

$$C = \left(7{,}010\ \frac{(10{,}800 + X)}{(9{,}209.10 + Y)} - 8{,}221\right) \frac{735.29}{6{,}140}$$

where C = Change in TDS (mg/L) at Imperial Dam (2010)
X = Change in salt load (1,000 tons) due to the project
Y = Change in streamflow (1,000 acre-feet) due to the project
for each 735.29 = conversion from tons/acre-foot to mg/L

For projects below Parker Dam, the effects are assumed to pass directly to Imperial Dam. This equation is:

$$C = \left(6{,}140\ \frac{(8{,}454 + X)}{(6{,}140 + Y)} - 8{,}454\right) \frac{735.29}{6{,}140}$$

1/ For each 10,000 tons of salt removed above Parker Dam, salinity at Imperial Dam decreases 0.91 mg/L; and, for each 10,000 acre-feet depleted, salinity at Imperial Dam increases 1.07 mg/L.

In order to avoid misapplication of these equations, the following points should be carefully considered.

1. The equations contain implicitly all the assumptions in CRSS, which include complete mixing, steady state transport of both water and TDS, and no losses of salinity due to chemical precipitation within the river/reservoir system.

2. The equations are based on the level of development anticipated to occur by 2010. At that time, the TDS at Imperial Dam is estimated to be over 1,000 mg/L. The equations should not be used to compute the present contribution from a project area to salinity at Imperial.

3. The equations are updated in each biennial Progress Report to reflect changes to CRSS or the depletion schedule. Estimated project impacts made with different equations are not comparable. Whenever the equations are used, the date and number of the source Progress Report should be specifically referenced.

Questions concerning proper application of the equations should be directed to the Colorado River Water Quality Office, Bureau of Reclamation, Denver, Colo.

PART IX. SPECIAL STUDIES

This section of the report summarizes special studies of general and specific water quality problems in the Colorado River Basin. The bulk of the studies relates to salinity in the Colorado River; but recently eutrophication, the production of algae in reservoirs, has become an increasingly significant problem.

A. Bureau of Reclamation Studies

1. Salinity Trend Study[15]

This study was initiated to identify possible systematic changes in salt loading to the Colorado River and its major tributaries. A systematic change may involve long-term alteration of natural sources of salt or previously unidentified anthropogenic impacts on salt loading or salt transport in the river. Systematic changes have been suggested as a possible explanation for recent decreases in salt concentration measured at Imperial Dam in the Lower Basin. If systematic changes in the salt loading characteristics of the basin have occurred, they must be considered in formulating plans to achieve salinity reduction goals.

A systematic change might manifest itself as a long-term shift in the concentration, load, or mass fraction of one or more of the major solutes in the system. Probable shifts can be identified using trend analysis or by comparison of mean values before and after major alterations within the basin. Both approaches were used in this study. Regression techniques were employed to test for significant trends and "Student's t Test" was used to assess mean value changes. Six major ions were selected for analysis--calcium, magnesium, sodium, chloride, sulfate, and bicarbonate. Together these account for more than 95 percent of the total solute load at the major gage sites in the basin. Fifteen sites, representing major divisions of the basin, were included in the study. Data for these sites were obtained from the USGS computerized water data base, WATSTORE.

One objective of the study was to trace significant trends or mean value changes from downstream to upstream sites in order to identify potential sources. Comparable data sets were, therefore, required for all stations. The first step in the study was to create a data file of representative monthly average streamflow and solute concentration values for the selected gage sites.

The generated data were first used to test various methods relating solute concentration to streamflow. This was necessary so that changes in concentration due to natural flow variation could be accounted for in subsequent regression analyses. A theoretical residence time model was compared to the widely used empirical power model. The two models produced equally good predictions, compared to observed data, for periods of flow regulation.

Trend analyses were completed for 12 of the 15 gage sites with adequate periods of record prior to major flow regulation. Several different regression models were employed, and their results were generally corroborative. Significant negative (decreasing) trends were found for magnesium, sodium, and sulfate at approximately 75 percent of the sites. At the Lees Ferry and Grand Canyon gage sites, concentrations of these three ions have declined in proportion to their electrical charge and relative mass, resulting in a reduction in TDS of approximately 2 mg/L per year for the low flow, December-March, period from 1926-61.

Following construction of the Colorado River Storage Project reservoirs in the early 1960's, variability of solute concentrations and mass fractions was reduced at many downstream gaging stations. The degree of reduction was relatively proportional to the degree of regulation. At some sites, trends toward further reduction in variability developed following initial reservoir filling.

Several other activities of man, including mining, urbanization, and salinity control practices, may have impacted water quality in the basin during this same period. In several cases, impacts could be traced to more than one gaging station downstream; however, the major reservoirs, Lake Powell and Lake Mead, masked all impacts occurring in the Upper Basin. No significant trends in load for any solute were identified for the station below Hoover Dam during the period since 1965; however, concentration of all solutes except chloride were found to be decreasing in at least one season.

Additional research is suggested to determine the possibility and probable magnitude of continuing impacts of major reservoirs on downstream salinity. Also, because of the relative chemical stability at the gage site below Hoover Dam, the observed changes further downstream at Imperial Dam may have resulted from changing conditions in the Lower Basin area. An extension of the present study is, therefore, recommended, with additional Lower Basin gage sites included. Such an extension should also involve updating the monthly data base and data base generation procedures and condensation of statistical analyses to those shown in the present work to be most useful.

2. Reservoir Studies

a. Flaming Gorge Eutrophication Study

The State of Wyoming identified a eutrophication problem in Flaming Gorge in 1976, 1978, and 1979. The problem appeared to be worse after Reclamation installed the selective withdrawal structure at the dam in 1978. USGS and Reclamation have also seen similar problems, plus an anoxic zone below a chemocline near the dam. The water quality problems on Flaming Gorge Reservoir are of concern to numerous Federal, State, and local agencies.

Over the past several years, the State of Wyoming, Reclamation, the Utah Water Research Laboratory, and others have tried to identify an acceptable technical proposal and potential funding for a Flaming Gorge study. The following section summarizes a technical proposal which is the result of this interagency effort.

Each summer the upper, riverine reaches of Flaming Gorge Reservoir experience intense blooms of blue-green algae that seriously degrade the water quality for game fish and recreational boating. There is also evidence that geochemical processes in the reservoir sediments affect both the intensity of the algal blooms and salinity in the overlying water and that the algal blooms in turn affect the geochemical processes. At present, it is not known how effective restoration strategies, including external phosphorus and BOD loading reductions to the reservoir, will be in reducing the intensity of the algal blooms or in increasing the dissolved oxygen concentrations in the water column. It is also not known how changes in the limnology of the riverine reach of the reservoir resulting from mitigative measures will affect fisheries and water quality in the downstream reaches of the reservoir or in the tailwater.

Before a great deal of money and effort are spent in water quality management in the watershed above Flaming Gorge, it is critical to understand the dynamics of phosphorus, nitrogen, BOD, oxygen, and salinity in the reservoir. Because the EPA has determined that federally built and managed reservoirs are not eligible for study or restoration under section 314 of the Clean Water Act, any such investigations must be conducted using funding from organizations that have a vested interest in the management or use of the reservoir. A consortium is being formed among the Bureau of Reclamation; the Utah Water Research Laboratory; a Wyoming group comprised of the Wyoming Department of Environmental Quality, Wyoming Water Research Center, Western Wyoming Community College, the University of Wyoming, and the Wyoming Game and Fish Commission; the Utah Department of Wildlife Resources; and the Environmental Protection Agency. This consortium will contribute funding, expertise, or work items for a 2-year study of the reservoir aimed at providing the needed management information. Each of these institutions is uniquely qualified to engage in some aspect of this study because of unique expertise, extensive experience on the reservoir, and/or favorable geographical proximity to the site. Several of the above institutions already have committed 2 years of funding to various parts of the project. A specific work plan and funding are being developed for a Flaming Gorge water quality study, and field monitoring began in 1984.

Flaming Gorge Reservoir is a unique reservoir laboratory to study a number of problems and issues that are important to regional water quality management. The study is intended to have regional benefits and will provide useful information for other areas such as the municipal and industrial water supply from the Central Utah Project.

b. The Limnology in Reservoirs on the Colorado River[16]

The trophic state of reservoirs on the Colorado River was found to be nutrient poor in 1981 and 1982. Lake Powell and Lake Mead were oligotrophic on the basis of area-weighted, average chlorophyll-a concentrations. Lake Mohave and Lake Havasu were mesotrophic based on that trophic state criterion. The oligotrophic/mesotrophic nature of the reservoirs is due to low phosphorus concentrations that persist in most of the system. Most of the phosphorus inputs are associated with suspended sediments. Sedimentation in the headwaters of Lake Powell effectively retains most of the phosphorus that historically flowed downstream. Suspended sediments and phosphorus inputs from the Grand Canyon rapidly drop out in the upper end of Lake Mead. The Virgin River and Muddy River inflows to Lake Mead are minor sources of phosphorus to the system. Las Vegas Wash is the principal tributary input of phosphorus to the river-reservoir system at and below Lake Mead. Most of this input is in the form of bio-available phosphorus.

The Las Vegas Wash inflow significantly elevates phosphorus concentrations in the inner and middle Las Vegas Bay, and it causes some increase in concentrations in Boulder Basin and the Hoover Dam discharge. Phosphorus loading to Lake Mohave increases as a result of inputs from Las Vegas Wash. Phosphorus retention in Lake Mohave is low due to rapid flushing of the reservoir. Most of the phosphorus discharged from Hoover Dam is thus routed through Lake Mohave into Lake Havasu. Additional phosphorus inputs to Lake Havasu are derived from the Bill Williams River and possibly from pickups in the reach between Davis Dam and upper Lake Havasu.

The Las Vegas Wash inflow seems to be a major reason for the higher trophic state in the downstream reservoirs. The decrease in phosphorus loading that has occurred from Las Vegas and Clark County Sewage Treatment Plants can be expected to decrease productivity in Lake Mohave and possibly Lake Havasu. The slight decrease that occurred in chlorophyll-a concentrations in Lake Mohave during 1982 probably reflects the reduction in phosphorus loading. Productivity in the Boulder Basin area of Lake Mead has undergone a steady decline since the late 1970's when phosphorus loading from Las Vegas Wash began to decrease. This appears to be a major factor responsible for the decline of the fisheries recently experienced in the reservoir. Similar reductions in the productivity of Lake Mohave will probably also result in a decline in fish production. This problem should be carefully evaluated in ongoing reviews of current wastewater treatment practices at the city of Las Vegas and Clark County Sewage Treatment Plants. A relaxation of the phosphorus standards at Las Vegas Wash may be warranted considering the low productivity in the river system.

c. Chemical Precipitation in Lakes Powell and Mead[17]

The Bureau of Reclamation contracted with J. E. Edinger Associates, Inc., to apply a two-dimensional reservoir model to Lakes Powell and Mead. The purpose of the study was to evaluate the impact which these reservoirs may exert on the chemistry of the river system. Due to the large volume of these reservoirs (each capable of storing over 25 million acre-feet), the distance from the nearest gaging stations to the reservoir, and the large volume of evaporation and bank storage, it was not possible to adequately discern these impacts from monitoring. A thermal-hydrodynamics reservoir model, which incorporated chemical equilibria, was applied to each of the two reservoirs.

For purposes of modeling the hydrodynamics, Lake Powell was divided into 32 segments, 6.1 meters (20 feet) thick, and either 10.7 kilometers (km) or 16 km long. An inflow record was developed by taking daily records at the upstream stations, breaking them down into hourly intervals, and routing discharge the remaining distance to the head of the reservoir. Hourly estimates of solar radiation were made from the closest meteorological stations, and surface temperatures and evaporation were computed.

Dissolved solids were routed through the reservoir with the flow, and the equilibrium concentration of calcium carbonate was computed using the computed temperature and pH. Calcium carbonate concentrations in excess of saturation in an individual cell were assumed to precipitate out of solution as calcite.

Simulations were conducted under various conditions to determine the effect of various operating levels and withdrawal elevations on precipitation. The controlling factors on the quantity of potential calcite precipitation, in order of relative importance, were (1) reservoir surface area, (2) surface pH, (3) surface temperature, and (4) inflow concentration.

The estimated total potential calcite precipitation from Lake Powell is estimated to be on the order of 20,000 tons, while it is possible that up to 40,000 tons could precipitate from Lake Mead under present conditions. This represents an upper limit, as it assumes that there is sufficient nuclei for the calcium carbonate crystalization and that reaction rate kinetics do not limit the precipitation. The combined maximum precipitation is less than 1 percent of the annual salt load passing through the reservoirs and is significantly less than previous estimates.

3. Geochemical Investigations

a. Big Sandy River Salinity Control Unit

The feasibility of using water chemistry as an analytical tool in hydrologic testing was examined in the Big Sandy River Unit Hydrosalinity Study. The objective was to determine whether major, trace element, or stable isotope chemistry of waters could be used to distinguish water from different aquifer sources. Such characterization could be used to calculate the amounts of water from different aquifers pumped during a proposed long-term pumping test.

A shallow, relatively saline aquifer in the Laney Shale receives most of its recharge from irrigation return flow. TDS ranges from approximately 2,000 to 6,000 mg/L, and is calcium-sodium-sulfate in character. A deeper artesian aquifer, believed to be recharged in the Wind River Mountain Range, is used as a domestic water supply. TDS is typically less than 1,000 mg/L and chemically is a sodium bicarbonate water. Saline seeps in the study area are chemically similar to the shallow aquifer, and hydrologic testing has indicated that the seeps are the natural discharge of that aquifer.

In order to halt the discharge of the saline seeps into the Big Sandy River, long-term pumping and disposal of the shallow aquifer water has been proposed. There is concern that the pumping will induce upward migration of the higher quality water from the deep aquifer, which will then be pumped out. If waters are properly characterized prior to implementation of the proposal, changes in water chemistry can be used to calculate the relative amount, if any, of the deeper aquifer drawn into the shallow aquifer upon long-term pumping.

Wells that penetrate the two aquifers were pumped or allowed to flow, and samples were collected and submitted for chemical analysis. Seep samples were also collected. In addition to major elements, the trace elements boron, iodide, and bromide were analyzed, as were the stable isotope concentrations of hydrogen and oxygen.

Preliminary sampling shows that analysis of the stable isotopes will be the most useful for mixing ratio calculations. Isotope values for the two source waters were highly distinguishable. The sensitivity of the analysis and the relative constancy of isotope concentrations in different source waters should allow the investigator to attribute shifts in the isotopes to mixing of deep and shallow aquifer waters.

b. Dirty Devil River Salinity Control Unit[18]

Intensive water and sediment samplings were performed in the Dirty Devil River Basin in order to evaluate plans for winter water management in the vicinity of Emery, Utah. The study had two major objectives. The first was to determine, by laboratory synthesis, whether water routed through the agricultural area by pipeline would react differently with downstream channel sediments than did water that had seeped through unlined earthen canals. The second objective was to evaluate water quality changes along Muddy Creek and the Dirty Devil River using geochemistry computer models.

The laboratory study, called a shaker or batch experiment, involved combining fixed proportions of sediment and water in flasks and allowing contact in the flasks to range from 0.5 to 120 hours. Sediment was collected at five sampling sites downstream of Emery. Water was collected from two locations, representing low and high TDS conditions. Results of this study show that little additional salt loading would occur due to dissolution of sediments if water of low TDS were routed through the channel. This conclusion was supported by extensive chemical analysis which showed that most minerals present in the channel sediments were relatively stable with regard to extensive dissolution in this environment. The proposal to reduce salt loading by providing winter water supplies to the Emery agricultural area via pipelines is, therefore, viable.

The computer models used to analyze and evaluate the changes in water quality in the subbasin were developed by the USGS Water Resources Division. An evaluation of chemical equilibrium of the waters with respect to minerals was performed using WATEQF (Plummer et al, 1976). Using information obtained from the WATEQF calculations, reactions were postulated to account for changes in water chemistry along Muddy Creek and the Dirty Devil River. These reactions were quantified using BALANCE (Parkhurst et al, 1982), a computer program that calculates mass transfer of chemical constituents between minerals and water.

Calculations performed by WATEQF indicated that all waters sampled along Muddy Creek and the Dirty Devil River were undersaturated with respect to gypsum (hydrated calcium sulfate). Theoretically, therefore, the streams would be capable of dissolving additional calcium and sulfate minerals. Equilibrium concentrations of calcium, magnesium, and bicarbonate were exceeded with respect to the carbonate minerals calcite and dolomite. This condition, called supersaturation, indicated that some factor is limiting mineral precipitation.

Reactions were postulated to account for increases in various chemical constituents along Muddy Creek. BALANCE calculated the extent to which minerals precipitated or dissolved. Dissolution of minerals, particularly gypsum and halite (sodium chloride), was the primary reaction. Along segments of Muddy Creek and the Dirty Devil River where no seeps or springs were identified, such calculated dissolution indicated that salinity probably entered the stream by diffuse ground water inflow.

c. Nuclear Waste Repository Investigation at Gibson Dome

The Department of Energy is studying nine potential high level, nuclear waste repository sites. Each site is being evaluated according to the terms of the guidelines and requirements specified by the Nuclear Waste Policy Act of 1982, Public Law 97-425. Environmental assessments are scheduled to be completed by January 1, 1985, when three of the nine sites are to be nominated for site characterization. Site characterization will involve the collection of a wide range of detailed information about each of the three sites. This will include the construction of exploratory shafts for tests and studies at the proposed repository depths. After site characterization, one site will be recommended as a repository. The President is to recommend the first repository to Congress by March 31, 1987.

One of the nine potential sites is a salt bed at Gibson Dome. The site is located approximately 12 miles from the Colorado River in southeastern Utah. The site was selected because the presence of salt is an indication that very little reaction is occurring with ground water over long periods of geologic time, and it is one of the best formations to conduct heat away from the waste containers. There are, however, a number of concerns about the Gibson Dome site, particularly its potential water quality impacts to the Colorado River.

Some of these water quality concerns are:

(1) Ground water is known to flow toward the Colorado River both above and below the target repository salt bed.

(2) Canyonlands National Park is located between the proposed Gibson Dome site and the Colorado River. There is only about 1 mile between the proposed site and the national park boundary; thus, monitoring the ground water between the site and river would require major drilling activities inside the park.

(3) The consolidated sandstone and shale geology is fractured, jointed, and faulted, making hydrogeologic modeling and characterization difficult. Potash and uranium mines in the region have experienced gas pockets, resulting in one explosion and flooding. Should any of the containers leak, contamination of the Colorado River may be possible.

(4) Salt can become plastic under sufficient heat and pressure and flows upward in cones of geologic weakness to form salt domes. The Gibson Dome salt bed is buried at depths of 600 to several thousand feet in the vicinity of the site. It is not known how the heat transfer through the salt might affect potential salt plastic movement. Should the Gibson Dome salt bed move, it could surface at the shallowest depth of overburden, which is the Colorado River only 12 miles from the site.

(5) With up to 2 million tons of salt excavated from the site, surface storage and extensive surface facilities would be required to prevent new salt loading into tributaries of the Colorado River.

(6) Accidents during transport of nuclear wastes to the repository could result in contamination of the Colorado River. Should this site be selected, transport routes would be along many of the Colorado River tributaries.

If the Gibson Dome site is selected as one of the three sites for characterization, all of these concerns will need to be addressed.

4. Saline Water Cooling System Verification Program

The program objectives are to (1) assess available technology to show industry that off-the-shelf hardware can be used for saline water cooling, (2) establish the incremental costs of available technology for use of saline water as compared to freshwater, and (3) provide sufficient planning information (engineering and economic) to industry so that saline water sources can be effectively evaluated as an alternative water supply for new plants.

Under a basic agreement contract study, Jack Laughlin, Consulting Engineer, evaluated available saline water use technology for application at Hunter Powerplant. Preliminary findings from the study have established that the binary cooling tower is not cost competitive with other saline water use equipment, and there are other currently used processes and off-the-shelf hardware that are good candidates for saline water cooling and disposal applications. A complete system of select processes will be evaluated using the water composition from a saline water source in the Price River Basin. The study will establish incremental costs of using saline water as compared to using a freshwater supply.

A second study will focus on the economics of selected processes and equipment from the Jim Bridger Powerplant using Big Sandy River water. Preliminary discussions have been held with Electric Power Research Institute and Southern California Edison regarding joint venture opportunities for hardware verification at existing powerplants. Interest and support in saline water use has been expressed by several utilities, equipment manufacturers, EPA, the State of California, and the Mid-Pacific Region (related to the San Luis Drain).

5. Salinity Health Impacts: Conference on Inorganics in Drinking Water and Cardiovascular Disease

A staff member of the Colorado River Water Quality Office attended a recent conference on Inorganics in Drinking Water and Cardiovascular Disease sponsored by the Environmental Protection Agency, Drinking Water Office, Health Impacts Laboratory. The conference was directed by Dr. Edward Calabrese, one of the original United States researchers in the realm of the health impacts of sodium. It was the study by Drs. Calabrese and Tuthill concerning school children in two Massachusetts communities that sparked initiation of many studies around the world.

In the study by Drs. Calabrese and Tuthill, a difference of 2 to 5 millimeters (mm) mercury of blood pressure was found between third graders with a drinking water supply of about 10 mg/L sodium and those drinking water of about 102 mg/L sodium.

Subsequent attempts by Drs. Calabrese and Tuthill to validate these results with other groups or by other methods (bottled water) have proven inconclusive. Studies reported from the Netherlands did support findings of slightly elevated blood pressures among school children consuming high sodium water, but most other studies were either inconclusive or showed that there was no effect.

Two areas of concern mentioned during the discussions were the use of zeolite water softeners on the kitchen cold water faucet and the cooking of vegetables in high sodium waters, as the vegetables could absorb large amounts of sodium during cooking. In most cases, avoidance of these two actions would be more significant than any reduction in raw water concentration.

A significant correlation between higher blood pressure and increased cardiovascular disease mortality was presented at the conference. The link between sodium and high blood pressure was, however, weak.

Other conference discussions on hard vs. soft water primarily concluded that soft water was not harmful but that hard water contained some beneficial property, possibly calcium, which reduced the ability of the body to absorb trace metals, and thus lowered the overall exposure to such elements as cadmium and lead.

Additionally, while water softeners are useful in reducing pipe scaling and soap usage, it was stressed by several speakers that a bypass should be placed on the kitchen cold water tap, the tap most used for drinking and cooking water to maintain a certain level of hardness.

Other papers focused primarily on the health effects of cadmium, barium, and lead in drinking water. Epidemiological studies seem to indicate that barium has no effect on cardiovascular disease below a level of about 10 mg/L, while cadmium and lead do have a definite adverse impact. None of these elements is present in any significant concentrations in the main stem reaches of the Colorado River.

It appears from discussions at the conference that there would not be adverse health impacts related to present sodium or hardness levels in drinking water from the lower Colorado River. Any effect of a reduction in sodium and hardness expected from the Colorado River Salinity Control Program would be negligible.

6. <u>Impact of Depletion Schedules on Salinity Projections</u>

An analysis of the effect of different depletion schedules on CRSS salinity projections was made to determine how sensitive the projections were to the assumptions made for development of the water supply of the basin. The study compared two different depletion schedules, the official Bureau of Reclamation depletion schedule and the low depletion schedule that was developed by the Colorado River Basin Salinity Control Forum.

Figure 8 shows the comparison between the Forum and Reclamation depletion schedules for the Upper Basin. The low rate Forum and the high rate Reclamation schedules bracket the complete range of depletions expected to occur. They diverge a maximum of approximately 430,000 acre-feet per year, or within 10 percent, beyond the turn of the century.

Figure 9 displays the effect of depletions on base case projections of salinity at Imperial Dam using the Forum low and Reclamation depletion schedule. The Reclamation schedule approximates the high depletions schedule of the Forum. Differences in depletion assumptions have only a minor effect on future salinity projections. Although the Reclamation schedule had higher depletions as shown in Figure 8, there was relatively little difference in the salinity at Imperial Dam when compared to the Forum assumptions.

7. Colorado River Enhanced Snowpack Test

The Colorado River Enhanced Snowpack Test (CREST) is an 8-year, $88 million (fiscal year 1983 dollars) program designed to demonstrate and quantify the capability of cloud seeding to augment the flow of the Colorado River.

The enhancement of winter precipitation in the context of a total water management system for the basin offers a unique opportunity to increase the quantity and improve the quality of the water in the river system. It does not preclude continued planning and development of other augmentation alternatives or lessen the commitment of the Department of the Interior to improved water conservation practices.

Cloud seeding has many unique and attractive features. Currently, it appears to be the most cost-effective and promising means for securing additional water in the basin. It does not require major permanent construction or large operation and maintenance costs; moreover, a decision to employ cloud seeding is reversible on a year-to-year or even a storm-to-storm basis should basin hydrology, weather patterns, or public response dictate. Consequently, Reclamation is proposing its CREST Program to help alleviate anticipated water shortages in the basin.

The program benefits from cloud seeding improve when demonstration tests (CREST) are completed in two subbasins and maximum water augmentation is produced in a basinwide operational program. The annual increase in streamflow from the increase in precipitation produced by cloud seeding is estimated to be (1) 410,000 acre-feet of water during the CREST demonstration period of which 340,000 acre-feet would be within the Colorado River Basin drainage and 70,000 within the Rio Grande Basin and (2) 2,263,000 acre-feet of water during a basinwide operational cloud seeding program of which 1,432,000 acre-feet will be in the Colorado Basin above Lee Ferry, 298,000 acre-feet on the Mogollon Rim, and 533,000 acre-feet will be generated in the Rio Grande and Missouri River Basins.

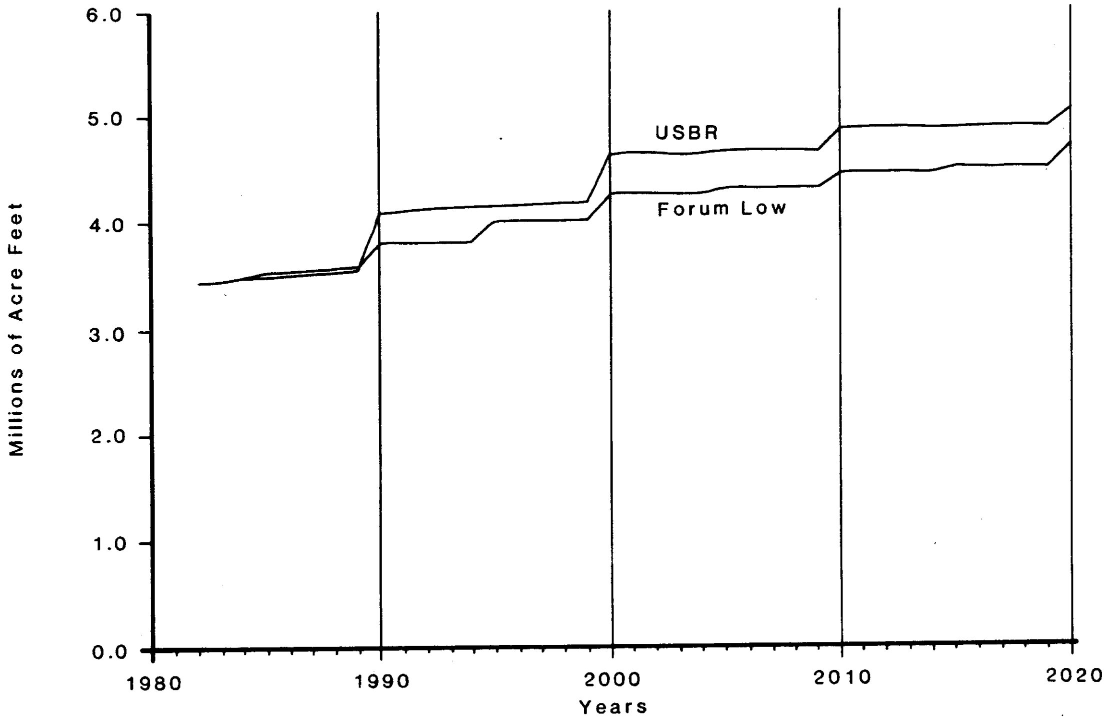

Figure 8 Comparison of Upper Basin Depletion Schedules.

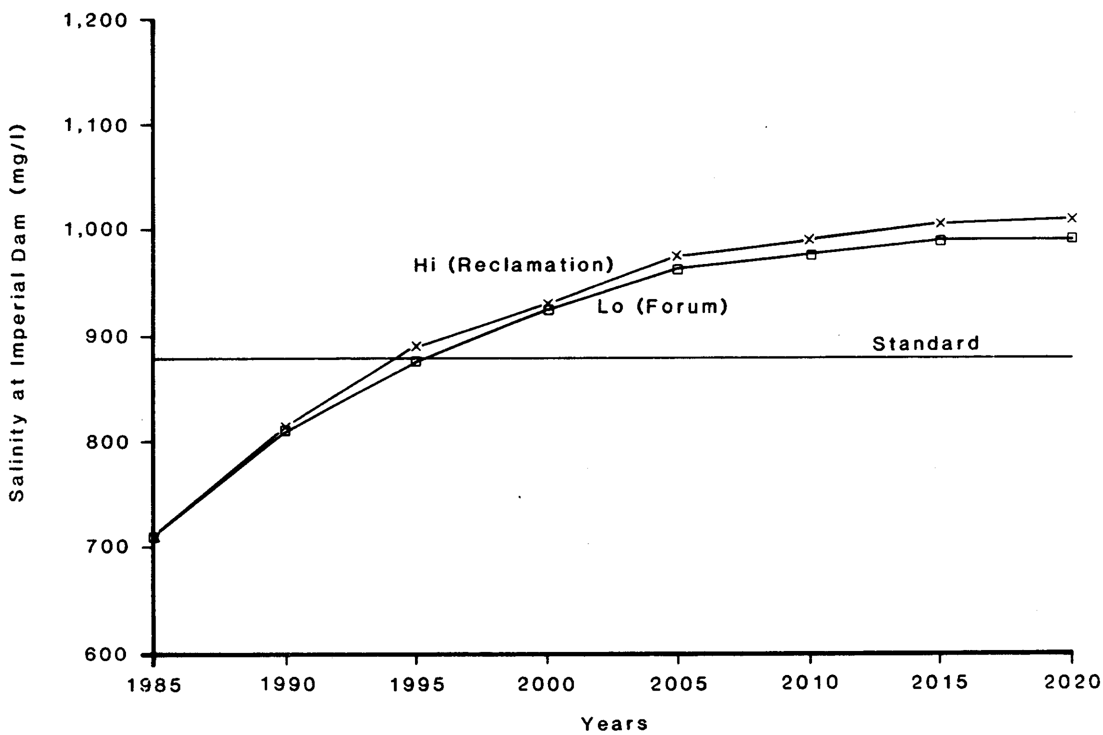

Figure 9 Effect of Depletion Schedules on Base Case Salinity Projections.

The additional streamflow will produce benefits through increased hydroelectric capacity and energy production, salinity reduction, and additional water supplies for industrial, agricultural, and recreational use.

The CREST Program will consist of cloud seeding conducted in two demonstration projects to confirm and demonstrate the technology under meteorological conditions experienced within the basin. In addition, studies will be conducted to facilitate transferring the results obtained during CREST for use in the other water-producing Colorado River subbasins. Other major program activities include a comprehensive physical and statistical evaluation to quantify the increases in precipitation and streamflow, a study of extra-area effects, environmental monitoring activities to investigate possible effects of a long-term cloud seeding program, and a public involvement program.

B. Geological Survey Studies

1. Ground Water Return Flows to the Lower Colorado River

Substantial quantities of water diverted from the lower Colorado River for irrigation along certain reaches are returning directly to the river as subsurface flow. The purpose of this study is to develop methods to make annual estimates of the subsurface return flows in the Yuma, Parker, and Palo Verde-Cibola areas. Return flow estimates have been made for the Yuma area using ground water gradient and river stage data, and a report that documents the method used and the estimates of return flow has been submitted for approval for publication as a water supply paper. A method has been developed for the Parker reach, and sensitivity analyses are being performed. A geohydrologic reconnaissance of the Palo Verde-Cibola reach is currently being carried out. Ground water and river head data are being collected in all the areas.

2. Consumptive Use of Water by Vegetation, Lower Colorado River

Consumptive use of water along the lower Colorado River is defined as diversions minus returns (Arizona vs. California, 387 U.S. 340, 1964). The network of gages required to monitor agricultural water use along the river is costly and time consuming to maintain. LANDSAT imagery, aerial photography (natural color and false color infrared), and field reconnaissance methods are being evaluated for direct measurement of evapotranspiration, thus replacing the least efficient portion of the indirect measurement network.

Crop maps for 1981 and 1982 were prepared for the Colorado River Indian Reservation, which is the test site. From a preliminary multitemporal analysis of LANDSAT imagery, about 95 percent of the cotton fields and about 84 percent of the alfalfa and small grain fields were correctly identified. All crops have been correctly identified on aerial photographs taken during each of the four growing seasons. Calculations of consumptive use, which are based on incremental water use rates developed by the Soil Conservation Service and 5 years of published crop acreages, agree well with diversions-minus-return figures.

3. Sediment Study in Grand Canyon

Reclamation is in the process of uprating all the turbines at Glen Canyon Dam in order to increase the peaking discharge through the turbines. The resultant higher flows through the canyon will increase the possibility of further beach erosion and channel degradation. The purpose of the study is to collect suspended and bedload sediment data, to monitor the effects of the present and future flow regimes at sites through the canyon, and to provide information so that Reclamation can expand and refine its sediment transport model. Personnel will be stationed at Lees Ferry, above the mouth of the Little Colorado River, at Grand Canyon at Phantom Ranch, near National Canyon, and at Diamond (Peach Springs) Creek. Suspended sediment, bedload sediment, and discharge are being collected. Tributary inflow from the Paria River, Little Colorado River, and Kanab Creek is also monitored.

4. Water Resources Monitoring--Gunnison, Montrose, and Delta Counties, Colo.

Coal mining and associated developments of the scale and duration anticipated in major coal producing regions of the west may have adverse effects on the water resources of these regions. Mine dewatering, changes in sand use patterns, disposal of wastes, stream channel realinement, and withdrawals of water for industrial and domestic use may significantly alter existing regional surface and ground water systems, limit available supplies, interfere with traditional water uses, and cause deterioration of the remaining water resources. The objectives of the program are to determine the characteristics of the regional water resources system and to provide an information base for use in detecting and documenting changes in the system or in its components that may be associated with land use changes.

Streamflow was measured and water quality samples were analyzed at 20 more sites on the North Fork Gunnison River and tributaries. Of the more than 140 samples collected, approximately 30 percent were analyzed for metals and the remainder major dissolved chemical constituents. Average pH at the sites ranged from 7.6 to 8.3 (individual values ranged from 7.1 to 8.6), and average specific conductance ranged from 61 to 244 microsiemens per centimeter (uS/cm) at 25° C (individual values ranged from 51 to 462 uS/cm). The water in the basin is predominantly a calcium bicarbonate type. Preliminary data analysis indicates that the sources of water quality constituents in the main stem and solubility controls are associated with the various geologic formations and mining activities adjacent to the North Fork Gunnison River main stem.

5. Stream Water Resource Impacts of Energy Development Within the White River Basin, Colorado and Utah

Various energy developments are now taking place or being planned across the States of Colorado and Utah. Decisions affecting the policy of the energy development need to consider all environmental impact aspects. The White River Basin, located in northwestern Colorado and eastern Utah, has several forms of planned energy development including oil shale, coal, and natural gas. With this large anticipated energy development in the basin and associated population increases, there is a need to study current streamflow quantity and quality conditions and assess probable impacts of future changes. This study is designed primarily to describe hydrology in terms of water resources availability and quality prior to substantial energy development. The study will also help evaluate potential environmental and selected socioeconomic impacts of the energy resource development plans.

6. Modeled Impacts of Surface Coal Mining on Dissolved Solids in the Yampa River Basin, Colo.

The Yampa River Basin is an active mining area. Many new mines are proposed. These proposals must be considered with respect to the cumulative impacts on the water quality downstream. From previous water quality data collection, substantial increases in dissolved solids downstream from existing mining activities are noted.

The objectives of this study are to develop a model for the Yampa River Basin to simulate dissolved solids loads resulting from the existing land use and surface coal mining and to simulate changes in dissolved solids loads that may result from development of proposed coal mines.

A model has been developed (U.S. Geological Survey Water Resources Investigation Report 83-4084) to identify the cumulative effects of mining on dissolved solids downstream for the Trout Creek drainage and a reach of the Yampa River in northwest Colorado. The greatest increase in dissolved solids was noted in Trout Creek; little increase was noted in the Yampa River because of the large dilution effect.

7. Analysis of Trends in Solute Concentration and Load in the Colorado, Gunnison, and Dolores Rivers, Colorado and Utah

There can be a number of reasons for trends in salinity loads at a particular site: (1) natural changes in salinity input above the site, (2) climatic trends affecting streamflow, (3) man-induced changes in salinity input due to changes in agricultural or industrial activities, and (4) changes in streamflow patterns due to increased water use or the construction of reservoirs above the site. Determination of a downward or upward trend in salt load at the monitoring site in terms of standard error of the salinity load as a function of the frequency of data collection is also needed. This would assist managers and planners in determining the data collection frequency and associated costs needed to adequately define the salinity load in the study area.

The objectives of this study are (1) to review the Bureau of Reclamation method of computing monthly load values at four streamflow gaging stations utilizing its data base, (2) to review the Reclamation methods and results for estimating concentration streamflow relationships by comparing the USGS results with those obtained by Reclamation, (3) to analyze the salinity trends by utilizing nonparametric techniques and compare results to the Reclamation regression approach, (4) to evaluate the frequency of data collection by the use of an uncertainty curve, and (5) develop this method of analysis by evaluating one site. A final report, titled, Trend Analysis of Salt Load and Evaluation of the Frequency of Water Quality Measurements for the Gunnison, Colorado, and Dolores Rivers in Colorado and Utah, U.S. Geological Survey WRI Report 84-4048, has been published.

8. Dissolved Solids in the Colorado River Basin

There are indications of a decrease in salt load from some Upper Basin areas, but definitive causes for the decreases are not readily apparent. Hence, there is a need to determine if there are trends in the salinity at the monitoring stations and, if so, the source of the trends.

The study was, therefore, extended to determine for the Upper Colorado River Basin (1) general source areas of dissolved solids and water discharge, (2) the concentration variation at major gaging stations, (3) the time series of annual salt load at each site, (4) long-term trends in salt load at each of the stations, (5) the influence of the activities of man on the salt load, and (6) a method for determining the natural salt load in the Upper Colorado River Basin.

The effort in fiscal year 1984 concentrated on determining the percentage of dissolved solids contributed by each of the major tributaries in the Upper Colorado River Basin and determining the time series of annual dissolved solids load at four or five key stations. Additionally, the data base will be analyzed to determine if any trend exists in the annual time series of dissolved solids load at four or five key stations in the Upper Colorado River Basin.

C. Agricultural Research Service

1. Irrigation with Saline Water

Drain water reuse for irrigation would reduce the amount of brackish water returned to the Colorado River. With proper procedures, such reuse could maintain a suitable agricultural water supply and crop production base. A strategy for this reuse has been developed and is under field and lysimeter test in the Imperial Valley and at Riverside, respectively. In this strategy, saline drain water is substituted for a substantial part of the Colorado River water in the irrigation of certain crops in the crop rotation when they are in suitably tolerant stages; Colorado River water is used at other times in order to keep the salinity low during critical growth stages and to prevent the soil from becoming excessively saline over time. More than 50 percent of the water used for irrigation has been drain water with a TDS concentration of 3,500 mg/L. There has been no yield loss in the 2-year rotation of wheat, sugar beets, and melons. The lysimeter experiment at Riverside is simulating the Imperial Valley field study with measurement of changes in the soil profile chemistry so that a computer model can be tested against the lysimeter data and used to predict reuse potentials of other brackish waters.

A system engineer has begun to investigate the engineering, economic, and overall system requirements for implementing the above-mentioned dual rotation reuse strategy in a way compatible with drainage and irrigation needs and their constraints. A soil scientist is now being sought to carry out additional studies in the Imperial Valley on using brackish waters for irrigation and in reducing tailwater runoff by improving soil infiltration properties.

2. Soil Salinity Monitoring Instrumentation

To sustain a viable irrigated agriculture under saline conditions while reducing leaching, drainage return, and salt loading of the Colorado River and to monitor the changes in soil salinity occurring with modifications of the management of irrigation projects, it is necessary to have practical methods of measuring soil salinity on a large area basis. Toward these objectives work continues on salinity measurement instrumentation. Improved methods of using electromagnetic induction procedures for measuring soil salinity are being developed. Time domain reflectometery techniques have been shown applicable for measuring soil water content (time of transit) and salinity (signal attenuation) simultaneously. The plan to build an electromagnetic probe that fits in a neutron access probe has been delayed as new techniques are sought to overcome a deficiency found in the prototype unit, and a contract has been let to develop a four-electrode system of measuring the soil dielectric constant.

3. Computer Mapping of Irrigated Areas

To facilitate monitoring and inventorying salinity of large areas, like irrigation projects, as well as to develop appropriate salinity management programs for such areas, it would be very helpful to have salinity maps and relations established between salinity and its causative factors, including depth and salinity of ground water, soil type, cropping pattern, and irrigation management. To this end, studies are underway to develop ways of using computer mapping techniques to help predict, locate, and diagnose salinity problems and to aid in predicting incipient salinity problems and consequences of alternative management practices. One test is being conducted near Yuma and another is planned to be undertaken in California in cooperation with the SCS.

4. Isotope Determination of Water Sources

Before appropriate solutions to reduce Colorado River salinization can be selected, the sources of return flow and salt must be established. A study has been developed to test the methodology to determine the relative contributions of on-farm deep percolation, canal and lateral seepage, and natural recharge to water and salt loading in irrigated valleys. The methodology involves use of stable isotopes as well as the chemical compositions of surface, soil, and ground waters. Preliminary information indicates that local rainfall and ground water in the upland areas above the irrigated areas in Grand Valley are isotopically heavier than the Colorado River water used for irrigation. Inputs of local recharge are evident in about one-third of the wells initially sampled. Sufficient data are not yet available to test our ability to separate on-farm deep percolation from distribution canal seepage losses.

Assessment of need for improvements in irrigation efficiency and extent of salt loading from irrigation could be better assessed if the amounts of deep percolation from irrigated fields could be determined. Complete water budget data are rarely available. Estimation of leaching fraction is determined from calculation of the volumes of water infiltrated and removed by evapotranspiration or by measurement of the ratio of the chloride concentration of the irrigation water and soil water at the bottom of the root zone. Irrigation projects often experience high water tables. In this case, the use of single inert tracers, such as chloride, is not suitable to calculate irrigation efficiency because roots extract and concentrate salts from the water table. For such circumstances, however, stable isotopic measurements of the soil water and irrigation water can be used to estimate the percentage of infiltrated water that evaporated. A major limitation is determining quantity of water infiltrated. It is hypothesized that independent estimates of evaporation and evapotranspiration (from dry weight or pan evaporation measurements) can be combined with isotopically determined evaporation percentages to estimate quantity of water infiltrated, thus reconstructing the water budget. Preliminary analyses of rhizosphere data suggest that the proposed method may work where a substantial amount of evaporation occurs. Additional studies are underway to evaluate the potential of this method.

5. Analysis of Water Delivery Systems

Accurate and inexpensive open channel flow monitoring systems are needed for modern irrigation water management programs. Within the past 1 1/2 years, a monitoring and totalizing system for open channel flow measuring devices was developed. The system utilized a pressure transducer and bubbler scheme (double-bubbler) for head detection and was controlled with a handheld calculator. Although extremely accurate (head detection with ±1 mm of actual), the system was still too costly (over $2,000) for broad agricultural use. More recently, a flow monitoring system was developed similar to the first but with dedicated electronic circuitry coupled with a microcomputer (TRS-80) for data manipulation and system control. Total hardware cost for the microcomputer-based system is about one-half ($1,140) the calculator-based system; yet reasonable monitoring accuracy is maintained.

The effective use of water on the farm is affected by the irrigation water delivery system. Irrigation water deliveries were monitored at 20 sites in Parker Valley, Poston, Ariz., for 2 years. The study showed that the variability in the rate of water delivered was affected by the location of the delivery site within the canal system. It is speculated that delivery nonuniformity affects the conveyance efficiency of delivery system laterals.

Emphasis of systems analysis of water delivery and management will be increased at the U.S. Water Conservation Laboratory with the recent addition of a systems engineer to the staff. The main emphasis in this work will be the study of the interface between on-farm water management and water distribution system management.

6. Prediction of Infiltration of Furrow Irrigation

Studies to improve prediction of soil infiltration characteristics for better design and management of furrow irrigation were started in 1983. Results of previous measurements and evaluations were gathered, converted to common format, and evaluated to provide an initial data base. Inflow-outflow and advance time measurements were collected on five additional fields during 1983 to evaluate the modified Kostiakov infiltration equation coefficients and thus add to the data base.

A solution of the kinematic wave equation for furrow irrigation was translated to BASIC and made operational on an in-house Wang computer system. The capacity of the Wang is too limited, however, and irrigation will be simulated on a larger computer, using FORTRAN, in 1984. A recirculating furrow infiltrometer was evaluated. This equipment will be tested in 1984 to evaluate effects of spatial variability, stream size, compaction, water chemistry, etc.

7. High Water Table Irrigation of Crops

Twelve weighing lysimeters were operated for the third year with high water tables of varying salinity. For corn, surface irrigation requirements were about three times as great for a deep water table as for a water table at 60 centimeters (cm). Corn used less saline ground water (6 decisiemens per meter) than better quality ground water supplied from the Colorado River, although water tables were the same. Data for alfalfa followed the same trend as corn. Established alfalfa could meet all its water needs from the 60-cm water table, but some surface irrigations were applied to prevent excessive salt accumulations above the water table.

8. Automatic Valves

A device for automating alfalfa valves was developed that leaves the valves closed if control pressure is lost. Agricultural Research Service personnel at Grand Junction cooperated in evaluating cablegation and other automation devices installed in the Grand Valley by Agricultural Research Service engineers from the Snake River Conservation Research Center.

9. Irrigation System Improvements

Automated surface irrigation systems were installed in the Grand Valley and the Uinta Basin cooperatively with farmers and the SCS to determine their feasibility and benefits and to develop operational and maintenance procedures.

A portion of the area served by a cablegation system in the Uinta Basin was graded and borders were installed. These tests are designed to develop the potential of automated bordered strip irrigation for reducing deep percolation at upper ends of fields with high intake rates.

The area served by one of the new cablegation systems installed in the Grand Valley includes about 20 acres from which soil was removed during leveling so the shale was exposed. This crumbly shale was cultivated to an 8-inch depth but tends to stop deeper penetration of roots. The cooperating farmer installed the automated system so he could irrigate more frequently, without increasing his irrigation costs, and thereby compensate for the limited root zone. This system will be monitored next year to determine uniformity of application and effects on crop yields.

Preliminary tests show that chiseling the furrow, application of small amounts of straw in the furrows, and directing water into furrows with lesser compaction all had potential for increasing infiltration rates by at least 50 percent. It appears that they can be used to increase intake in portions of fields (such as the tail ends) which are often underirrigated. Such procedures should help eliminate the long-time sets and associated deep percolation that are occurring as farmers attempt to adequately water low areas of their fields. Further studies to develop practical means of applying these treatments and monitoring them more closely are planned.

Rate of wetting was found to be a primary factor affecting aggregate stability of soils from the Grand Valley. Slower wetting was also found to increase infiltration rates of soils. This is apparently one of the factors contributing to lowered infiltration rates of portions of a furrow in which water has been applied intermittently (surge irrigation). Evidence from associated surged furrow studies shows potential for surge irrigation to improve top-to-bottom intake uniformity. Surge irrigation can be achieved with the cablegation and other automated irrigation systems.

D. Bureau of Land Management, 1980-82 Salinity Status Report: Result of BLM Studies on Public Lands in the Upper Colorado River Basin[19]

In 1975, the BLM established a team to study salt runoff from public lands in the Colorado River Basin. In 1983 the emphasis of these studies shifted to the identification of opportunities to reduce salinity through watershed treatments and other land management activities.

The BLM has issued several salinity status reports. The 1977 Status Report described the salinity problem and provided a thorough review of salinity literature, including quantitative and qualitative descriptions of salt pickup and transport mechanisms occurring on public lands. The 1978-79 Status Report reviewed alternatives for managing salinity on public lands and proposed three specific point-source salinity control projects.

The purpose of the 1980-82 Salinity Status Report was (1) to summarize the most important results and conclusions from BLM studies completed during the 1980-82 period and (2) to review specific techniques and alternatives for managing salinity from diffuse overland sources.

Studies reviewed were (1) the monitoring study of ephemeral washes in the Price River Basin, Utah, for storm runoff and water quality; (2) the monitoring study of three basins at Badger Wash, Colo., for runoff and water quality; (3) studies of soil geomorphology, soil salinity, and vegetation in the Woodside, Utah, area; (4) a rainfall simulation study of surface runoff and water quality on three soil-landform units on Mancos Shale; (5) a rainfall simulation study of the effects of trampling and vegetative cover on runoff and water quality on Mancos Shale rangelands; (6) a survey study of sediment accumulations in retention basins in Mancos Shale badlands; (7) the monitoring study of summer baseflow salt yields at 18 locations on streams in the Price River Basin, Utah, and (8) the study of salt yields associated with the construction and operation of a wildlife management area at Pariette Draw, Utah.

Management techniques considered as alternatives for controlling salinity from diffuse overland sources were reviewed. They included land treatments, such as contour furrows and trenches, and structural techniques, such as retention basins, gully plugs, and gully headcut controls.

In general, the most saline rangelands were found to have very poor vegetation cover and offer only limited opportunities to manage salinity through grazing or vegetation management. Those opportunities were discussed, and the results of the study are listed below.

1. Annual salt yields were measured at three locations underlain by Mancos Shale. Surface runoff produced an average of 0.03 ton/acre during 1981 summer and fall convectional storms on three small moderately sloped watersheds on Mancos Shale in the Price River Basin. Approximately 0.05 ton/acre/year of salt is estimated to have been discharged from three small, moderately sloped watersheds on Mancos Shale at Badger Wash in western Colorado. Roughly 0.10 ton/acre/year of salt and 3.4 tons/acre/year of sediment accumulated in a series of small catch basins over a 7-year period on steep Mancos Shale badlands near Huntington, Utah.

2. Storm period salt concentrations are closely related to suspended sediment concentrations except at the onset of runoff. Flushing of concentrated in-channel salts is hypothesized to cause a comparatively high ratio of TDS concentration to total solids concentrations at the onset of runoff.

3. Highest salt and sediment concentrations in three small washes in the Price River Basin, Utah, occurred in the first streamflow event following a long period where no discharge occurred, suggesting sediments and salts became available for transport during that period.

4. Three broad geomorphic units and 11 different soil series in 22 mapping units were recognized and described at the Woodside, Utah, salinity study site. Eleven plant communities were recognized and described within the study areas. Soil moisture and soil soluble salts appear to be primary factors affecting vegetation distribution and community differences.

5. Salt and sediment yields from steep Mancos Shale badland formations are much higher on a per unit area basis than from gently sloped Mancos Shale lowlands. Rilling accounts for approximately 80 percent of the erosion on steep Mancos Shale badlands. Interrill erosion accounts for almost all upland erosion on gently sloped Mancos Shale lowlands.

6. Livestock trampling on dry, fine, gray, crusted soils on Mancos Shale lowlands causes surface crusts to be broken and a temporary increase in soil erodibility. These effects are offset by increased depression storage and higher total infiltration. Higher concentrations of salt and sediment occurred from trampled study plots; however, reduced runoff creates the potential for livestock trampling to reduce total sediment and salt yields from this soil-landform type. This conclusion is not expected to apply to compactable soils where trampling, especially under moist soil conditions, may decrease infiltration and increase runoff and surface erosion.

7. Baseflows from ground water sources and irrigation return flows in the Price River Basin, Utah, contribute over three times the annual salt load in the Price River at Woodside, Utah, than surface runoff from short-duration summer convectional storms.

8. Irrigation or inundation of saline streamside soils as part of wildlife management or riparian rehabilitation programs may reduce salinity due to channel erosion but may increase salt leaching from those soils.

9. There is little opportunity to improve salt runoff on highly saline soils on Mancos Shale lowlands through either grazing management or vegetation manipulation. On less saline sites with higher cover potentials, grazing management may result in improved cover and reduced runoff and erosion; however, the lower soil salt content of these sites limits the potential for large reductions in salt yield on a unit-area basis.

10. Watershed treatments and structural controls can result in multiple benefits for salinity control, sediment control, forage production, wildlife, water supply, and downstream flood control. Salinity benefits will generally be greatest using water retention techniques on highly saline soils. Benefits to forage production (range) will generally be greatest using land treatments, e.g., contour furrows on nonsaline to slightly saline soils. Most retention structures have limited lives and require periodic maintenance to maintain their effectiveness. Land treatments are most effective when they result in improvements in vegetation cover which persists after the effective life of the treatment.

11. Because of the close association between erosion and salinity, good management for forage production, range, and watershed condition (including management for soil loss) will generally provide salinity benefits.

DEFINITIONS OF TERMS

Acre-foot is the quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 43,560 cubic feet or about 326,000 gallons or 1,233 cubic meters.

Anoxic refers to the lack of oxygen.

Chemocline is a level in a lake or reservoir where water quality shifts rapidly with elevation from one zone of water quality to another.

Concentration is the flow-weighted average concentration of total dissolved solids (salt) measured in mg/L or tons/acre-foot.

Conductivity. See specific conductance.

Consumptive use is the total amount of water taken up by vegetation for transpiration and evaporation.

Cubic feet per second (ft^3/s) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to approximately 7.48 gallons per second or 448.8 gallons per minute.

Depletion in the context of this report is the total man-caused loss of water from the river system due to consumptive uses, evaporation, evapotranspiration, and transmountain diversion.

Discharge is the volume of water plus suspended sediment that passes a given point within a given period of time.

Dissolution is the process of dissolving.

Diversion is the total amount of water diverted. Diverted water may or may not return to the river.

Eutrophication results from the enrichment of a body of water with nutrients which stimulate the growth of algae. Eutrophic lakes and reservoirs overproduce algae causing loss of dissolved oxygen and taste, odor, and esthetic problems. (See trophic state.)

Gaging station is a particular site on a stream, canal, lake, or reservoir where systematic observations of hydrologic data are obtained.

Historical flow is the flow actually experienced at the gaging station or point of measurement. It is the total runoff of a drainage area above the point of measurement as influenced by nature and the activities of man. It may be recorded or estimated.

Natural flow. See definition of virgin flow.

Oxic refers to the presence of oxygen.

Return flow is the amount of water returned to the river system after being diverted for a use.

Salts are inorganic compounds of metals such as sodium, calcium, magnesium, or potassium and bases such as carbonates, sulfate, or chloride. Soluble salts will dissolve into metallic and basic ions when exposed to water.

Salt pickup is salts added to the system usually by dissolution.

Sediment is a solid material that originates mostly from disintegrated rocks and is transported by, suspended in, or deposited from water; it includes chemical and biochemical precipitates and decomposed organic material, such as humus.

Specific conductance is a measure of the ability of a water to conduct an electrical current. It is expressed in micromhos per centimeter at 25° C. Specific conductance is related to the type and concentration of ions in water and can be used for approximating the dissolved solids content of the water.

Streamflow is the discharge that occurs in a natural channel. Although the term, "discharge," can be applied to the flow of a canal, the word, "streamflow," uniquely describes the discharge in a surface stream. The term, "streamflow," is more general than "runoff" as streamflow may be applied to discharge whether or not it is affected by diversion or regulation.

Suspended sediment is the sediment that at any given time is maintained in suspension by the upward components of turbulent currents or that exists in suspension as a colloid.

Tons per acre-foot indicates the dry mass of total dissolved solids in 1 acre-foot of water. It is computed by multiplying the concentration in milligrams per liter by 0.00136.

Total dissolved solids (TDS) is the total amount of dissolved material, organic and inorganic, contained in water. The actual measure of TDS may be made using numerous methods: evaporation at 105° C, evaporation at 180° C, or sum of ionic constituents (less some portion of the bicarbonate fraction). The method currently used, sum of constituents less approximately half of the bicarbonate fraction, is considered, by the U.S. Geological Survey, to be consistent with measurements made using the 180° C evaporative technique.

Total salt load is the total quantity (mass) of dissolved solids passing a given point during a given time. The load is calculated as a function of concentration and discharge.

Transbasin diversion is the total amount of water diverted out of the Colorado River Basin.

Trophic state is the level of nutrient enrichment and algae production in a lake or reservoir. Oligotrophic, mesotrophic, and eutrophic are used to describe ascending levels of this productivity. (See eutrophication)

Virgin flow is the historical flow at the point of measurement corrected for the effects of manmade developments in the drainage basin above the point of measurement.

Water year is the 12-month period, October 1 through September 30. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months. Thus, the year ending September 30, 1978, is called the "1978 water year."

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NOTES

Tables 1 through 20

The historical flow and quality of water data have been recalculated using the U.S. Geological Survey WATSTORE data base and computer techniques developed jointly by Reclamation and the USGS. The purpose of the new analysis is to develop a consistent, documentable methodology for the calculation of monthly salt loads in the Colorado River Basin and to computerize the preparation of the tables.

The method was originally developed for the trend studies recently conducted by Reclamation and the USGS. Several procedures were evaluated. A 3-year moving regression was determined to be the best overall method in terms of providing the most complete record, preserving short-term fluctuations, and being insensitive to minor errors in the data. Using this method, daily salt load (L) was computed from discharge (Q) and conductivity (S): $L = aQ^bS^c$.

The coefficients a, b, and c for each year of record were estimated by regression analysis using data from a 3-year period. For example, coefficients for 1975 were derived with data from 1974-76.1/ For days without specific conductivity data, an equation for load as a function of discharge alone is also evaluated: $L = a'Q^{b'}$

Daily loads were added to yield the monthly values given in Tables 1 through 20. Monthly values were then added to yield annual values. All values shown in Tables 1 through 20 are rounded but were computed using unrounded values.

For this analysis, salt load data were based on TDS as the sum of constituents, whenever possible. Sum of constituents was defined to include calcium, magnesium, sodium, chloride, sulfate, some measure of carbonate (CO_3^{-2} plus the carbonate equivalent of HCO_3^- or the carbonate equivalent of alkalinity) and, if measured, silica and potassium. If a sum-of-constituents value could not be computed, TDS as residue on evaporation (at 180° C) was substituted.

Extensive error analyses were performed on the WATSTORE data. Suspect values were corrected according to published records or deleted. The resultant data set is considered by Reclamation and the USGS to be the best available for stations in the Colorado River Basin.

Annual values based on the new method were compared to values in previous Quality of Water Progress Reports for selected stations. The observed differences were between ±5 percent, with mean differences approximately zero. Changes in the progress report data base can, therefore, be considered generally insignificant and unbiased.

1/ Since 1984 data were unavailable, the 1983 analysis is preliminary.

NOTES (Continued)

A number of changes have been made in the format of the data tables. The monthly tables report TDS in mg/L instead of tons per acre-foot (the annual summaries still report TDS in both mg/L and tons per acre-foot). The monthly summaries include a column listing "Days w/o EC" which is the number of days without conductivity data in that month. This was included to indicate the quality of the estimated salt load value. When daily conductivity is available, salt load is computed as a function of conductivity and discharge. When conductivity is missing for an unregulated station, salt load is computed as a function of discharge alone. For stations with major discharge regulation, missing daily conductivities were interpolated from existing data.

Several regression statistics are listed in the annual summaries and are defined as follows.

1. The total number of samples in the regression analysis.

2. The percentage of samples with TDS as residue on evaporation rather than sum of constituents.

3. The percentage standard error of daily salt loads estimated as a function of discharge and conductivity.

4. The percentage standard error of daily salt loads estimated as a function of discharge alone.

These statistics provide additional indication as to the quality of annual and monthly salt load values. Those computed by a regression equation which includes a large proportion of evaporation residue TDS values may be biased because residue TDS is normally larger than the sum of constituents. The errors in monthly and annual loads are assumed to be less than the reported daily value standard errors because daily errors may be offset by summation.

For several stations, the data record was not complete and monthly values could not be computed using the new procedure. Standardized methods for synthesizing loads and discharge for periods of missing data are currently being investigated. Gaps in the following tables were filled in with values from the previous progress report. These are identified by an asterisk in the "Days w/o EC" column on the monthly summaries or in the "Regression statistics" column on the annual summaries.

Table 1 – Colorado River Basin – Historical Flow and Quality of Water Data

GREEN RIVER NEAR GREEN RIVER, WYOMING

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC	Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC	Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC	Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	22	16	535	*		Jan	24	19	582	*		Jan	27	21	572	*		Jan	32	22	503	0
	Feb	19	14	542	*		Feb	27	20	545	*		Feb	24	19	582	*		Feb	33	23	513	0
	Mar	45	31	507	*		Mar	41	28	502	*		Mar	45	31	507	*		Mar	44	29	479	0
	Apr	95	51	395	*		Apr	78	45	424	*		Apr	104	54	382	*		Apr	77	43	408	0
	May	174	90	380	*		May	111	58	384	*		May	211	86	300	*		May	74	41	402	0
	Jun	342	116	249	*		Jun	245	93	279	*		Jun	372	119	235	*		Jun	381	101	195	0
1941	Jul	137	51	274	*	1945	Jul	284	80	207	*	1949	Jul	179	64	263	*	1953	Jul	206	59	209	0
	Aug	81	37	336	*		Aug	125	49	288	*		Aug	65	31	351	*		Aug	104	40	279	0
	Sep	48	26	398	*		Sep	76	34	329	*		Sep	38	22	426	*		Sep	39	22	408	0
	Oct	67	40	439	*		Oct	64	40	460	*		Oct	52	34	481	*		Oct	34	24	528	0
	Nov	53	34	472	*		Nov	42	29	508	*		Nov	54	35	477	*		Nov	36	26	531	0
	Dec	26	21	594	*		Dec	33	24	535	*		Dec	34	25	541	*		Dec	24	20	615	0
	TOTAL	1109	527	349	0		TOTAL	1150	519	332	0		TOTAL	1205	541	330	0		TOTAL	1084	448	304	0
	Jan	24	19	582	*		Jan	32	24	552	*		Jan	29	23	583	*		Jan	26	20	575	0
	Feb	23	19	607	*		Feb	26	20	566	*		Feb	33	24	535	*		Feb	27	19	514	0
	Mar	43	30	513	*		Mar	65	40	453	*		Mar	102	54	389	*		Mar	48	31	482	0
	Apr	200	82	302	*		Apr	131	63	354	*		Apr	251	95	278	*		Apr	88	46	388	0
	May	151	75	365	*		May	212	87	302	*		May	270	100	272	*		May	281	73	191	0
	Jun	337	114	249	*		Jun	320	109	251	*		Jun	582	198	250	*		Jun	232	68	216	0
1942	Jul	205	66	237	*	1946	Jul	153	54	260	*	1950	Jul	427	98	169	*	1954	Jul	250	60	177	0
	Aug	58	30	380	*		Aug	74	35	348	*		Aug	140	52	273	*		Aug	86	33	278	0
	Sep	32	20	460	*		Sep	52	27	382	*		Sep	76	34	329	*		Sep	47	24	376	0
	Oct	29	22	558	*		Oct	58	37	469	*		Oct	66	40	446	*		Oct	40	26	474	0
	Nov	26	21	594	*		Nov	51	34	490	*		Nov	71	42	435	*		Nov	39	27	505	0
	Dec	26	20	566	*		Dec	51	34	490	*		Dec	49	32	480	*		Dec	18	15	640	0
	TOTAL	1154	518	330	0		TOTAL	1225	564	339	0		TOTAL	2096	792	278	0		TOTAL	1183	443	276	0
	Jan	28	22	578	*		Jan	26	21	594	*		Jan	34	25	541	*		Jan	20	16	602	0
	Feb	29	22	558	*		Feb	30	22	539	*		Feb	47	31	485	*		Feb	20	15	553	0
	Mar	59	37	461	*		Mar	141	66	344	*		Mar	70	41	431	*		Mar	33	25	549	0
	Apr	200	82	302	*		Apr	75	43	422	*		Apr	154	69	329	*		Apr	74	44	432	0
	May	237	92	285	*		May	368	121	242	*		May	317	111	258	*		May	127	45	261	0
	Jun	476	138	213	*		Jun	501	145	213	*		Jun	528	148	206	*		Jun	244	64	193	0
1943	Jul	359	90	184	*	1947	Jul	327	85	191	*	1951	Jul	349	87	183	*	1955	Jul	116	41	261	0
	Aug	121	47	286	*		Aug	199	64	237	*		Aug	298	58	143	*		Aug	68	28	300	0
	Sep	50	27	397	*		Sep	81	36	327	*		Sep	91	39	315	*		Sep	35	19	412	0
	Oct	48	32	490	*		Oct	75	44	431	*		Oct	81	42	384	0		Oct	33	22	504	0
	Nov	43	29	496	*		Nov	59	37	461	*		Nov	50	32	473	0		Nov	27	20	547	0
	Dec	30	23	564	*		Dec	44	30	501	*		Dec	43	28	482	0		Dec	35	24	507	0
	TOTAL	1680	641	281	0		TOTAL	1926	714	273	0		TOTAL	2062	712	254	0		TOTAL	833	364	321	0
	Jan	25	20	588	*		Jan	38	27	522	*		Jan	41	25	449	0		Jan	37	25	488	0
	Feb	25	20	588	*		Feb	33	24	535	*		Feb	42	25	440	0		Feb	29	19	481	0
	Mar	31	24	569	*		Mar	64	40	460	*		Mar	52	32	451	0		Mar	91	51	413	0
	Apr	267	99	273	*		Apr	95	51	395	*		Apr	190	97	376	0		Apr	158	71	330	0
	May	155	71	337	*		May	187	80	315	*		May	348	110	232	0		May	310	106	253	0
	Jun	351	116	243	*		Jun	396	123	228	*		Jun	399	102	189	0		Jun	555	136	180	0
1944	Jul	230	69	221	*	1948	Jul	121	47	286	*	1952	Jul	171	60	259	0	1956	Jul	197	60	224	0
	Aug	60	30	368	*		Aug	56	29	381	*		Aug	99	38	280	0		Aug	98	37	275	0
	Sep	31	20	474	*		Sep	32	20	460	*		Sep	57	28	369	0		Sep	41	22	389	0
	Oct	38	27	522	*		Oct	36	26	531	*		Oct	42	27	473	0		Oct	35	23	475	1
	Nov	31	23	546	*		Nov	29	22	558	*		Nov	28	23	592	0		Nov	35	24	505	0
	Dec	21	17	595	*		Dec	26	21	594	*		Dec	27	20	553	0		Dec	26	19	545	0
	TOTAL	1265	536	312	0		TOTAL	1113	510	337	0		TOTAL	1496	587	289	0		TOTAL	1611	592	270	1

* See 'Notes' preceding Table 1.

Table 1 - Colorado River Basin - Historical Flow and Quality of Water Data

GREEN RIVER NEAR GREEN RIVER, WYOMING

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	22	16	536	0
	Feb	37	25	493	0
	Mar	57	38	487	0
	Apr	60	35	435	0
	May	176	80	333	0
	Jun	476	120	185	0
1957	Jul	380	92	178	0
	Aug	110	38	252	0
	Sep	68	31	334	0
	Oct	66	35	394	0
	Nov	48	27	413	0
	Dec	41	26	455	0
	TOTAL	1543	562	268	0
	Jan	33	22	486	0
	Feb	47	29	456	0
	Mar	51	33	473	0
	Apr	99	53	390	0
	May	291	82	208	0
	Jun	266	73	201	0
1958	Jul	76	33	316	0
	Aug	51	26	377	0
	Sep	36	23	468	0
	Oct	33	25	546	0
	Nov	32	25	582	0
	Dec	31	23	549	0
	TOTAL	1047	446	314	0
	Jan	24	18	546	0
	Feb	25	17	517	0
	Mar	49	32	479	0
	Apr	73	45	453	0
	May	79	39	368	0
	Jun	322	77	176	0
1959	Jul	140	46	244	0
	Aug	79	29	274	0
	Sep	42	23	412	0
	Oct	51	28	405	0
	Nov	42	23	408	1
	Dec	27	19	523	0
	TOTAL	952	398	308	1
	Jan	27	19	496	0
	Feb	23	17	550	0
	Mar	75	42	419	0
	Apr	84	39	345	0
	May	66	31	340	0
	Jun	173	48	203	0
1960	Jul	68	27	293	0
	Aug	38	16	312	0
	Sep	28	14	387	0
	Oct	42	22	379	31
	Nov	47	23	367	30
	Dec	27	16	421	31
	TOTAL	698	314	331	92

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	20	13	455	31
	Feb	19	12	450	28
	Mar	30	17	412	31
	Apr	50	24	358	30
	May	60	27	331	31
	Jun	162	59	270	30
1961	Jul	47	23	369	31
	Aug	35	19	397	31
	Sep	39	20	384	30
	Oct	41	21	378	6
	Nov	29	17	436	30
	Dec	27	16	450	31
	TOTAL	559	269	354	340
	Jan	32	19	427	31
	Feb	48	24	361	23
	Mar	77	35	333	19
	Apr	203	77	277	17
	May	256	89	257	1
	Jun	355	92	191	0
1962	Jul	250	67	198	1
	Aug	94	34	269	0
	Sep	38	22	423	0
	Oct	38	24	470	1
	Nov	35	22	463	21
	Dec	25	19	539	23
	TOTAL	1453	524	265	137
	Jan	18	14	570	28
	Feb	18	13	548	20
	Mar	42	27	473	0
	Apr	51	31	450	0
	May	101	45	327	0
	Jun	337	87	189	0
1963	Jul	143	44	225	0
	Aug	76	35	341	0
	Sep	77	34	321	1
	Oct	57	28	364	0
	Nov	52	31	441	21
	Dec	30	22	530	31
	TOTAL	1002	410	301	101
	Jan	23	18	577	31
	Feb	22	17	571	29
	Mar	29	18	451	8
	Apr	68	37	395	0
	May	138	51	272	0
	Jun	323	106	240	0
1964	Jul	335	80	176	0
	Aug	87	32	274	0
	Sep	37	22	441	0
	Oct	24	21	641	0
	Nov	25	21	613	3
	Dec	25	20	591	23
	TOTAL	1136	443	287	94

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	28	22	569	18
	Feb	30	22	527	20
	Mar	38	27	517	22
	Apr	44	34	574	1
	May	94	56	440	0
	Jun	429	163	279	0
1965	Jul	466	138	218	0
	Aug	184	68	272	0
	Sep	461	171	272	2
	Oct	85	62	536	0
	Nov	75	48	470	10
	Dec	29	25	626	22
	TOTAL	1963	835	313	95
	Jan	37	29	566	23
	Feb	35	27	556	28
	Mar	88	62	523	13
	Apr	138	69	368	0
	May	160	61	279	0
	Jun	171	53	227	0
1966	Jul	91	40	322	0
	Aug	56	30	387	0
	Sep	45	27	449	0
	Oct	35	26	549	0
	Nov	30	24	591	0
	Dec	25	23	662	0
	TOTAL	911	470	379	64
	Jan	19	18	692	0
	Feb	19	19	736	0
	Mar	33	28	624	0
	Apr	129	67	383	0
	May	138	62	329	0
	Jun	456	120	194	1
1967	Jul	448	107	176	0
	Aug	88	35	293	0
	Sep	65	33	370	0
	Oct	61	34	406	0
	Nov	49	30	452	0
	Dec	17	18	768	0
	TOTAL	1523	572	276	1
	Jan	17	17	741	0
	Feb	16	16	729	0
	Mar	33	28	614	0
	Apr	31	28	678	0
	May	56	37	487	0
	Jun	271	95	257	0
1968	Jul	88	37	308	0
	Aug	135	50	274	0
	Sep	126	47	276	0
	Oct	117	45	284	0
	Nov	54	31	416	0
	Dec	30	26	633	0
	TOTAL	975	457	345	0

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	51	31	448	0
	Feb	89	40	329	0
	Mar	80	44	399	0
	Apr	141	64	332	0
	May	207	74	262	0
	Jun	302	83	202	0
1969	Jul	154	53	251	0
	Aug	96	40	307	0
	Sep	68	34	369	0
	Oct	81	40	364	0
	Nov	50	29	422	0
	Dec	42	29	500	0
	TOTAL	1362	559	302	0
	Jan	38	28	536	0
	Feb	33	24	549	0
	Mar	58	35	445	0
	Apr	75	43	424	0
	May	84	44	389	0
	Jun	204	73	263	0
1970	Jul	127	45	260	0
	Aug	86	36	307	0
	Sep	75	33	329	0
	Oct	62	49	584	0
	Nov	49	24	361	0
	Dec	43	30	510	0
	TOTAL	933	465	367	0
	Jan	43	29	509	0
	Feb	47	28	447	0
	Mar	76	44	430	0
	Apr	107	56	381	0
	May	280	113	298	0
	Jun	480	140	214	0
1971	Jul	291	79	200	0
	Aug	126	46	269	0
	Sep	77	35	331	0
	Oct	72	35	356	0
	Nov	64	34	390	0
	Dec	87	43	366	0
	TOTAL	1748	682	287	0
	Jan	85	45	388	7
	Feb	77	42	405	0
	Mar	106	60	418	0
	Apr	154	72	343	0
	May	294	116	289	0
	Jun	625	165	194	0
1972	Jul	255	76	218	0
	Aug	122	47	282	0
	Sep	75	35	345	0
	Oct	79	41	380	0
	Nov	85	41	360	0
	Dec	51	31	437	6
	TOTAL	2008	771	282	13

Table 1 – Colorado River Basin – Historical Flow and Quality of Water Data

GREEN RIVER NEAR GREEN RIVER, WYOMING

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	73	40	400	9
	Feb	95	44	344	0
	Mar	92	47	377	0
	Apr	110	64	424	0
	May	171	76	325	0
	Jun	162	57	258	0
1973	Jul	127	49	286	0
	Aug	107	46	314	0
	Sep	75	39	381	0
	Oct	67	37	409	0
	Nov	61	37	442	0
	Dec	52	32	455	0
	TOTAL	1193	568	350	9
	Jan	78	42	394	0
	Feb	110	50	335	0
	Mar	114	59	379	0
	Apr	104	55	386	0
	May	207	79	281	0
	Jun	346	96	203	0
1974	Jul	210	64	222	0
	Aug	102	43	310	0
	Sep	53	32	439	0
	Oct	57	34	438	0
	Nov	54	34	459	0
	Dec	59	36	446	0
	TOTAL	1494	622	306	0
	Jan	62	37	438	0
	Feb	57	34	432	0
	Mar	62	39	465	0
	Apr	70	44	468	0
	May	125	62	366	0
	Jun	296	101	251	0
1975	Jul	329	101	226	0
	Aug	132	50	280	0
	Sep	60	33	408	0
	Oct	58	34	436	0
	Nov	60	35	426	0
	Dec	74	41	405	0
	TOTAL	1385	612	325	0
	Jan	71	40	413	0
	Feb	65	36	400	0
	Mar	99	51	377	0
	Apr	106	54	375	0
	May	296	107	266	0
	Jun	292	88	221	0
1976	Jul	177	62	258	0
	Aug	140	55	290	0
	Sep	65	34	381	0
	Oct	58	33	415	0
	Nov	56	31	407	0
	Dec	60	33	402	0
	TOTAL	1487	623	308	0
	Jan	61	34	410	0
	Feb	55	32	423	0
	Mar	42	30	532	0
	Apr	33	26	587	0
	May	30	23	563	0
	Jun	25	20	599	0
1977	Jul	23	19	628	0
	Aug	23	20	646	0
	Sep	33	22	506	0
	Oct	31	23	545	0
	Nov	32	24	540	0
	Dec	43	28	472	0
	TOTAL	431	302	516	0
	Jan	64	33	380	0
	Feb	59	31	381	0
	Mar	79	43	397	0
	Apr	104	49	349	0
	May	167	70	307	0
	Jun	378	109	211	0
1978	Jul	302	75	183	0
	Aug	142	45	234	0
	Sep	82	33	299	0
	Oct	46	27	432	0
	Nov	50	27	394	0
	Dec	59	30	375	0
	TOTAL	1532	572	274	0
	Jan	63	32	372	0
	Feb	61	30	369	0
	Mar	77	40	386	0
	Apr	92	54	435	0
	May	123	54	321	0
	Jun	217	64	215	0
1979	Jul	67	29	318	0
	Aug	63	31	356	0
	Sep	52	27	380	0
	Oct	45	26	420	0
	Nov	47	26	403	0
	Dec	61	31	376	0
	TOTAL	968	443	337	0
	Jan	45	27	443	2
	Feb	39	25	469	0
	Mar	58	35	444	0
	Apr	142	66	343	0
	May	176	76	320	0
	Jun	319	93	214	0
1980	Jul	237	68	211	0
	Aug	100	40	294	0
	Sep	65	32	366	0
	Oct	48	29	444	0
	Nov	56	31	409	0
	Dec	73	37	369	0
	TOTAL	1359	560	303	2
	Jan	63	36	418	0
	Feb	41	27	496	0
	Mar	43	29	504	0
	Apr	69	37	388	0
	May	54	33	449	0
	Jun	84	38	334	0
1981	Jul	98	39	295	0
	Aug	101	39	286	0
	Sep	51	25	366	0
	Oct	40	23	424	0
	Nov	27	18	493	0
	Dec	42	23	408	0
	TOTAL	712	368	380	0
	Jan	45	25	419	0
	Feb	48	26	396	0
	Mar	74	38	376	0
	Apr	82	41	366	0
	May	100	44	324	0
	Jun	345	109	232	0
1982	Jul	494	125	186	0
	Aug	220	65	218	0
	Sep	118	46	287	0
	Oct	191	63	242	0
	Nov	55	28	376	0
	Dec	61	30	370	0
	TOTAL	1832	640	257	0
	Jan	77	37	352	0
	Feb	73	37	375	0
	Mar	106	54	376	0
	Apr	165	72	322	0
	May	179	80	329	0
	Jun	507	151	220	0
1983	Jul	478	124	190	0
	Aug	178	63	258	0
	Sep	108	45	305	0
	Oct	117	52	331	31
	Nov	110	50	334	30
	Dec	54	31	420	31
	TOTAL	2152	797	272	92

Table 1

Colorado River Basin

Historical Flow and Quality of Water Data

GREEN RIVER NEAR GREEN RIVER, WYOMING

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	1109	527	.48	349	*			
1942	1154	518	.45	330	*			
1943	168C	641	.38	281	*			
1944	1265	536	.42	312	*			
1945	1150	519	.45	332	*			
1946	1225	564	.46	339	*			
1947	1926	714	.37	273	*			
1948	1113	510	.46	337	*			
1949	1205	541	.45	330	*			
1950	2096	792	.38	278	*			
1951	2062	712	.35	254	*			
1952	1496	587	.39	289	109	.9	1.5	14.6
1953	1084	448	.41	304	109	.9	1.5	14.6
1954	1183	443	.37	276	110	.9	1.8	13.9
1955	833	364	.44	322	113	1.8	2.0	14.6
1956	1611	592	.37	270	110	1.8	2.1	16.5
1957	1543	562	.36	268	85	2.4	1.7	16.3
1958	1047	446	.43	314	61	1.6	1.6	17.3
1959	952	398	.42	308	42	2.4	1.7	20.6
1960	698	314	.45	331	43	0.0	1.5	23.0
1961	559	269	.48	354	47	29.8	1.8	22.3
1962	1453	524	.36	265	49	59.2	1.7	18.2
1963	1002	410	.41	301	57	78.9	5.6	17.2
1964	1136	443	.39	287	68	79.4	6.2	23.1
1965	1963	835	.43	313	85	45.9	6.6	24.6
1966	911	470	.52	379	91	50.5	5.0	22.2
1967	1523	572	.38	276	72	31.9	4.4	19.0
1968	975	457	.47	345	72	31.9	3.1	15.8
1969	1362	559	.41	302	68	0.0	2.3	14.6
1970	933	465	.50	367	71	0.0	2.7	15.5
1971	1748	682	.39	287	46	0.0	2.5	21.8
1972	2008	771	.38	282	35	0.0	3.3	22.7
1973	1193	568	.48	350	35	0.0	2.9	21.1
1974	1494	622	.42	306	36	0.0	6.0	10.2
1975	1385	612	.44	325	36	0.0	7.5	13.4
1976	1487	623	.42	308	37	0.0	8.2	12.8
1977	431	302	.70	516	37	0.0	8.3	14.9
1978	1532	572	.37	274	37	0.0	7.7	14.2
1979	968	443	.46	337	35	0.0	9.6	15.9
1980	1359	560	.41	303	29	0.0	9.5	14.5
1981	712	368	.52	380	23	0.0	11.0	14.9
1982	1832	640	.35	257	18	0.0	6.4	15.1
1983	2152	797	.37	272	22	0.0	7.3	16.5
Total	56548	23293						
Average	1315	542	.41	303				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 2 - Colorado River Basin - Historical Flow and Quality of Water Data

GREEN RIVER NEAR GREENDALE, UTAH

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	27	25	681	*
	Feb	25	29	853	*
	Mar	72	68	694	*
	Apr	131	74	415	*
	May	276	160	426	*
	Jun	441	175	292	*
1941	Jul	171	94	404	*
	Aug	110	80	535	*
	Sep	67	52	571	*
	Oct	94	91	712	*
	Nov	71	66	684	*
	Dec	36	43	878	*
	TOTAL	1521	957	463	0
	Jan	30	30	735	*
	Feb	31	31	735	*
	Mar	69	74	789	*
	Apr	261	170	479	*
	May	235	180	563	*
	Jun	434	193	327	*
1942	Jul	239	97	298	*
	Aug	73	42	423	*
	Sep	40	29	533	*
	Oct	36	36	735	*
	Nov	35	41	861	*
	Dec	34	36	779	*
	TOTAL	1517	959	465	0
	Jan	33	36	802	*
	Feb	37	36	715	*
	Mar	96	71	544	*
	Apr	262	125	351	*
	May	338	130	283	*
	Jun	552	182	242	*
1943	Jul	393	115	215	*
	Aug	163	76	343	*
	Sep	64	36	414	*
	Oct	60	43	527	*
	Nov	54	45	613	*
	Dec	37	33	656	*
	TOTAL	2089	928	327	0
	Jan	30	28	686	*
	Feb	32	32	735	*
	Mar	48	71	1088	*
	Apr	345	190	405	*
	May	245	142	426	*
	Jun	469	174	273	*
1944	Jul	278	109	288	*
	Aug	76	37	358	*
	Sep	36	22	449	*
	Oct	47	39	610	*
	Nov	39	36	679	*
	Dec	27	23	626	*
	TOTAL	1672	903	397	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	29	28	710	*
	Feb	34	32	692	*
	Mar	65	57	645	*
	Apr	113	79	514	*
	May	176	105	439	*
	Jun	310	144	342	*
1945	Jul	325	120	272	*
	Aug	174	82	347	*
	Sep	103	44	314	*
	Oct	74	55	547	*
	Nov	52	46	650	*
	Dec	42	34	595	*
	TOTAL	1497	826	406	0
	Jan	39	35	660	*
	Feb	33	28	624	*
	Mar	88	59	493	*
	Apr	237	115	357	*
	May	298	130	321	*
	Jun	354	133	276	*
1946	Jul	162	64	291	*
	Aug	81	46	418	*
	Sep	62	37	439	*
	Oct	68	52	562	*
	Nov	63	52	607	*
	Dec	62	48	569	*
	TOTAL	1547	799	380	0
	Jan	32	26	597	*
	Feb	37	33	656	*
	Mar	195	120	453	*
	Apr	136	84	454	*
	May	521	210	296	*
	Jun	628	225	263	*
1947	Jul	372	131	259	*
	Aug	218	99	334	*
	Sep	91	48	388	*
	Oct	90	63	515	*
	Nov	71	55	570	*
	Dec	56	49	643	*
	TOTAL	2447	1143	343	0
	Jan	47	43	673	*
	Feb	40	35	643	*
	Mar	102	81	584	*
	Apr	157	110	515	*
	May	336	126	276	*
	Jun	454	162	262	*
1948	Jul	126	63	368	*
	Aug	59	33	411	*
	Sep	33	25	557	*
	Oct	39	30	566	*
	Nov	34	29	627	*
	Dec	31	31	735	*
	TOTAL	1458	768	387	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	31	28	664	*
	Feb	29	27	685	*
	Mar	73	65	655	*
	Apr	152	105	508	*
	May	310	165	391	*
	Jun	493	230	343	*
1949	Jul	205	106	380	*
	Aug	72	44	449	*
	Sep	42	31	543	*
	Oct	70	65	683	*
	Nov	66	64	713	*
	Dec	40	39	717	*
	TOTAL	1583	969	450	0
	Jan	36	43	878	*
	Feb	45	43	703	*
	Mar	150	92	451	*
	Apr	323	150	342	*
	May	416	190	336	*
	Jun	741	275	273	*
1950	Jul	458	154	247	*
	Aug	153	78	375	*
	Sep	86	53	453	*
	Oct	76	55	532	*
	Nov	80	60	552	*
	Dec	61	51	615	*
	TOTAL	2625	1244	348	0
	Jan	45	36	588	*
	Feb	61	50	603	*
	Mar	93	73	577	*
	Apr	212	100	347	*
	May	395	177	330	*
	Jun	626	225	264	*
1951	Jul	366	132	265	*
	Aug	228	101	326	*
	Sep	98	55	413	*
	Oct	99	70	520	*
	Nov	57	52	671	*
	Dec	54	47	640	*
	TOTAL	2334	1118	352	0
	Jan	49	40	600	*
	Feb	52	42	594	*
	Mar	63	47	549	*
	Apr	318	198	458	*
	May	600	235	288	*
	Jun	554	201	267	*
1952	Jul	205	114	409	*
	Aug	121	72	438	*
	Sep	67	45	494	*
	Oct	49	42	630	*
	Nov	37	41	815	*
	Dec	34	40	865	*
	TOTAL	2149	1117	382	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	48	39	597	*
	Feb	48	41	628	*
	Mar	73	63	635	*
	Apr	96	73	559	*
	May	110	70	468	*
	Jun	452	175	285	*
1953	Jul	198	77	286	*
	Aug	105	57	399	*
	Sep	43	27	462	*
	Oct	35	31	651	*
	Nov	42	41	718	*
	Dec	32	31	712	*
	TOTAL	1282	725	416	0
	Jan	28	31	814	*
	Feb	39	43	811	*
	Mar	62	50	593	*
	Apr	101	66	481	*
	May	302	94	229	*
	Jun	223	81	267	*
1954	Jul	265	73	203	*
	Aug	81	35	318	*
	Sep	45	31	507	*
	Oct	42	40	875	*
	Nov	41	35	628	*
	Dec	20	21	772	*
	TOTAL	1249	600	353	0
	Jan	24	18	552	*
	Feb	24	17	521	*
	Mar	44	49	819	*
	Apr	106	68	472	*
	May	168	88	385	*
	Jun	288	95	243	*
1955	Jul	130	49	277	*
	Aug	80	42	386	*
	Sep	38	22	426	*
	Oct	38	26	503	*
	Nov	36	27	552	*
	Dec	45	37	605	*
	TOTAL	1021	538	387	0
	Jan	50	43	632	*
	Feb	38	29	561	*
	Mar	150	70	343	*
	Apr	203	87	315	*
	May	368	144	288	*
	Jun	615	178	213	*
1956	Jul	207	69	245	*
	Aug	104	44	311	*
	Sep	48	21	322	*
	Oct	46	32	512	24
	Nov	39	28	538	23
	Dec	26	21	598	23
	TOTAL	1893	766	298	70

* See 'Notes' preceding Table 1.

Table 2 - Colorado River Basin - Historical Flow and Quality of Water Data

GREEN RIVER NEAR GREENDALE, UTAH

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	28	22	572	31
	Feb	43	29	498	28
	Mar	66	41	463	31
	Apr	86	51	436	28
	May	272	122	329	26
	Jun	680	236	256	14
1957	Jul	430	153	262	9
	Aug	142	75	390	22
	Sep	82	49	435	25
	Oct	77	48	456	26
	Nov	57	36	467	30
	Dec	46	31	505	31
	TOTAL	2008	893	327	301
	Jan	43	30	512	31
	Feb	55	35	470	28
	Mar	66	43	476	26
	Apr	134	74	403	22
	May	386	147	279	16
	Jun	335	121	265	9
1958	Jul	87	44	377	8
	Aug	57	33	426	11
	Sep	39	28	517	26
	Oct	36	24	488	27
	Nov	34	23	486	27
	Dec	38	25	492	28
	TOTAL	1311	626	351	259
	Jan	29	20	499	31
	Feb	32	21	485	28
	Mar	65	39	436	31
	Apr	98	56	417	27
	May	113	62	401	26
	Jun	366	150	300	22
1959	Jul	176	90	375	26
	Aug	93	51	401	27
	Sep	57	39	495	23
	Oct	68	43	468	27
	Nov	51	34	488	26
	Dec	37	26	518	29
	TOTAL	1187	629	390	323
	Jan	26	19	534	31
	Feb	29	20	521	29
	Mar	149	95	472	25
	Apr	140	76	398	13
	May	127	71	415	9
	Jun	216	94	318	8
1960	Jul	78	41	387	11
	Aug	43	22	382	9
	Sep	35	21	434	10
	Oct	49	32	484	8
	Nov	54	35	482	14
	Dec	27	21	565	30
	TOTAL	972	548	414	197

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	27	20	549	23
	Feb	27	20	548	21
	Mar	64	45	520	20
	Apr	76	50	488	10
	May	79	45	425	8
	Jun	192	71	274	8
1961	Jul	56	29	379	10
	Aug	43	27	462	8
	Sep	55	36	488	9
	Oct	64	44	502	9
	Nov	54	36	496	10
	Dec	44	32	530	11
	TOTAL	780	457	430	147
	Jan	43	28	479	9
	Feb	83	63	555	9
	Mar	150	110	539	9
	Apr	374	199	392	10
	May	395	172	320	8
	Jun	456	193	312	10
1962	Jul	297	125	309	10
	Aug	109	56	377	9
	Sep	44	29	485	12
	Oct	48	38	579	8
	Nov	5	4	588	10
	Dec	17	16	703	12
	TOTAL	2021	1033	376	116
	Jan	23	20	667	9
	Feb	26	24	677	9
	Mar	6	6	668	13
	Apr	8	7	686	9
	May	8	7	684	9
	Jun	7	7	678	11
1963	Jul	6	6	672	10
	Aug	6	6	658	9
	Sep	7	6	643	10
	Oct	8	7	611	9
	Nov	19	11	429	10
	Dec	46	26	411	10
	TOTAL	170	132	572	118
	Jan	58	33	413	9
	Feb	56	31	408	10
	Mar	37	22	444	9
	Apr	35	22	456	8
	May	91	57	465	11
	Jun	86	54	457	3
1964	Jul	150	92	452	2
	Aug	122	75	453	10
	Sep	131	80	452	4
	Oct	159	97	449	10
	Nov	139	80	420	10
	Dec	194	114	431	8
	TOTAL	1258	757	442	94

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	216	128	436	0
	Feb	213	141	485	0
	Mar	233	172	543	2
	Apr	204	157	569	0
	May	66	53	586	2
	Jun	86	70	604	0
1965	Jul	29	24	617	1
	Aug	31	26	615	4
	Sep	44	35	591	0
	Oct	79	61	566	0
	Nov	120	82	499	2
	Dec	116	70	448	0
	TOTAL	1435	1019	522	11
	Jan	72	43	443	0
	Feb	72	44	448	0
	Mar	71	49	506	0
	Apr	130	99	561	0
	May	83	61	542	0
	Jun	95	68	526	0
1966	Jul	104	73	512	3
	Aug	118	82	509	1
	Sep	124	87	514	1
	Oct	124	90	533	0
	Nov	85	64	551	3
	Dec	111	80	529	0
	TOTAL	1188	838	519	8
	Jan	142	101	520	0
	Feb	96	69	528	0
	Mar	66	48	532	1
	Apr	85	64	553	0
	May	122	94	567	0
	Jun	195	152	572	0
1967	Jul	171	135	580	0
	Aug	188	151	590	0
	Sep	180	146	595	2
	Oct	188	155	606	2
	Nov	173	141	599	0
	Dec	197	133	495	0
	TOTAL	1804	1388	566	5
	Jan	187	125	491	1
	Feb	123	83	493	0
	Mar	76	59	570	1
	Apr	96	79	608	1
	May	119	91	561	1
	Jun	97	72	546	0
1968	Jul	198	143	530	5
	Aug	200	145	534	11
	Sep	181	131	532	0
	Oct	140	101	528	0
	Nov	137	90	480	0
	Dec	137	88	469	15
	TOTAL	1691	1204	524	35

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	183	124	499	2
	Feb	220	151	506	0
	Mar	166	116	512	3
	Apr	150	109	532	3
	May	191	140	538	0
	Jun	108	76	517	1
1969	Jul	158	110	513	3
	Aug	194	133	506	3
	Sep	165	111	495	1
	Oct	129	84	477	2
	Nov	129	78	445	0
	Dec	196	117	439	6
	TOTAL	1988	1349	499	24
	Jan	101	61	442	10
	Feb	78	46	441	9
	Mar	81	50	452	9
	Apr	109	68	464	8
	May	64	41	470	11
	Jun	87	55	467	8
1970	Jul	119	74	457	9
	Aug	127	81	471	10
	Sep	117	77	486	9
	Oct	59	39	486	9
	Nov	66	42	470	11
	Dec	80	48	444	8
	TOTAL	1088	684	462	111
	Jan	56	34	445	11
	Feb	43	26	449	9
	Mar	48	30	458	8
	Apr	81	50	456	9
	May	90	57	468	11
	Jun	100	64	470	8
1971	Jul	117	73	459	10
	Aug	151	95	465	9
	Sep	136	87	472	9
	Oct	118	78	486	12
	Nov	171	110	472	9
	Dec	200	122	448	10
	TOTAL	1309	825	464	115
	Jan	170	101	437	10
	Feb	168	103	448	9
	Mar	102	64	459	8
	Apr	140	88	464	11
	May	244	152	459	9
	Jun	190	117	453	8
1972	Jul	181	111	452	6
	Aug	161	101	462	0
	Sep	93	60	474	0
	Oct	195	126	476	0
	Nov	215	139	473	0
	Dec	223	137	453	0
	TOTAL	2083	1300	459	61

Missing EC estimated by interpolation after regulation of flow.

Table 2 - Colorado River Basin - Historical Flow and Quality of Water Data

GREEN RIVER NEAR GREENDALE, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	220	137	458	0
	Feb	203	129	467	0
	Mar	113	76	498	0
	Apr	62	45	532	1
	May	161	111	506	0
	Jun	189	130	509	0
1973	Jul	167	111	491	0
	Aug	211	136	474	0
	Sep	150	98	481	0
	Oct	148	98	490	0
	Nov	154	103	489	0
	Dec	156	98	463	0
	TOTAL	1931	1272	484	1
	Jan	127	81	470	0
	Feb	45	30	498	0
	Mar	51	36	521	0
	Apr	60	43	525	0
	May	182	127	513	0
	Jun	132	89	496	0
1974	Jul	87	59	501	0
	Aug	137	94	506	0
	Sep	141	97	505	0
	Oct	180	126	514	0
	Nov	147	102	510	0
	Dec	148	101	502	0
	TOTAL	1438	986	504	0
	Jan	154	105	502	0
	Feb	163	112	504	0
	Mar	98	67	502	6
	Apr	62	43	503	10
	May	89	62	514	11
	Jun	206	144	515	9
1975	Jul	266	184	510	8
	Aug	198	135	501	10
	Sep	94	64	497	10
	Oct	86	60	508	10
	Nov	126	86	500	13
	Dec	212	142	491	10
	TOTAL	1754	1202	504	97
	Jan	179	118	487	10
	Feb	111	73	486	11
	Mar	108	73	498	8
	Apr	138	99	525	8
	May	259	177	501	11
	Jun	212	144	500	8
1976	Jul	172	116	497	10
	Aug	162	110	500	9
	Sep	160	104	479	9
	Oct	167	111	489	12
	Nov	168	118	519	11
	Dec	191	125	479	11
	TOTAL	2028	1370	497	118
	Jan	178	119	490	10
	Feb	148	91	452	12
	Mar	235	144	450	9
	Apr	173	114	484	10
	May	179	125	516	10
	Jun	145	96	488	8
1977	Jul	140	94	495	12
	Aug	131	91	509	8
	Sep	107	74	508	10
	Oct	71	48	500	12
	Nov	64	44	501	10
	Dec	64	43	494	10
	TOTAL	1633	1081	487	121
	Jan	76	54	526	11
	Feb	70	52	548	9
	Mar	99	73	544	11
	Apr	74	57	569	11
	May	66	52	580	10
	Jun	98	73	546	11
1978	Jul	125	87	512	11
	Aug	105	76	530	9
	Sep	92	66	527	10
	Oct	78	55	515	11
	Nov	97	69	522	10
	Dec	120	85	523	11
	TOTAL	1101	800	534	125
	Jan	138	98	524	8
	Feb	157	111	517	12
	Mar	144	101	513	10
	Apr	124	85	505	9
	May	90	60	487	10
	Jun	87	54	455	13
1979	Jul	124	80	471	12
	Aug	95	63	491	10
	Sep	84	56	495	11
	Oct	91	59	474	9
	Nov	114	73	471	10
	Dec	127	81	471	12
	TOTAL	1377	921	492	126
	Jan	141	92	478	10
	Feb	131	86	479	10
	Mar	104	68	482	10
	Apr	82	55	492	10
	May	64	42	483	13
	Jun	72	46	469	9
1980	Jul	84	51	453	10
	Aug	99	61	451	10
	Sep	99	62	462	9
	Oct	106	67	467	9
	Nov	86	55	470	14
	Dec	70	45	471	11
	TOTAL	1139	730	472	125
	Jan	69	45	482	10
	Feb	83	54	477	9
	Mar	86	56	479	11
	Apr	75	49	480	9
	May	66	43	482	15
	Jun	66	43	477	8
1981	Jul	99	65	479	9
	Aug	99	64	480	11
	Sep	136	88	477	10
	Oct	89	58	481	10
	Nov	75	49	481	11
	Dec	79	52	483	9
	TOTAL	1022	666	479	122
	Jan	83	55	489	11
	Feb	147	98	488	9
	Mar	94	63	495	9
	Apr	139	93	493	8
	May	96	65	500	11
	Jun	85	59	508	8
1982	Jul	87	60	503	10
	Aug	109	74	500	10
	Sep	138	89	473	10
	Oct	240	155	474	11
	Nov	218	135	456	10
	Dec	180	103	419	11
	TOTAL	1616	1048	477	118
	Jan	184	115	460	10
	Feb	132	82	458	9
	Mar	151	94	456	8
	Apr	169	103	446	10
	May	189	107	416	10
	Jun	474	274	425	8
1983	Jul	623	344	406	11
	Aug	311	175	415	8
	Sep	222	124	412	9
	Oct	197	109	406	11
	Nov	189	104	406	30
	Dec	196	111	416	31
	TOTAL	3036	1742	422	155

Missing EC estimated by interpolation after regulation of flow.

Table 2

Colorado River Basin

Historical Flow and Quality of Water Data

GREEN RIVER NEAR GREENDALE, UTAH

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	1521	957	.63	463	*			
1942	1517	959	.63	465	*			
1943	2089	928	.44	327	*			
1944	1672	903	.54	397	*			
1945	1497	826	.55	406	*			
1946	1547	799	.52	380	*			
1947	2447	1143	.47	344	*			
1948	1458	768	.53	387	*			
1949	1583	969	.61	450	*			
1950	2625	1244	.47	349	*			
1951	2334	1118	.48	352	*			
1952	2149	1117	.52	382	*			
1953	1282	725	.57	416	*			
1954	1249	600	.48	353	*			
1955	1021	538	.53	387	*			
1956	1893	766	.40	298	*			
1957	2008	893	.44	327	47	2.1	2.0	30.9
1958	1311	626	.48	351	47	2.1	2.0	30.9
1959	1187	629	.53	390	37	2.7	2.1	36.4
1960	972	548	.56	414	45	2.2	2.0	36.4
1961	780	457	.59	431	59	39.0	1.9	27.3
1962	2021	1033	.51	376	58	55.2	2.1	25.1
1963	170	132	.78	572	51	86.3	2.8	21.0
1964	1258	757	.60	442	37	56.8	6.5	16.0
1965	1435	1019	.71	522	35	34.3	6.6	14.6
1966	1188	838	.71	519	38	0.0	5.6	12.6
1967	1804	1388	.77	566	41	0.0	2.7	7.9
1968	1691	1204	.71	524	46	0.0	3.2	8.0
1969	1988	1349	.68	499	41	0.0	3.3	10.4
1970	1088	684	.63	462	38	0.0	3.4	6.5
1971	1309	825	.63	464	34	0.0	3.5	7.2
1972	2083	1300	.62	459	33	0.0	3.5	7.7
1973	1931	1272	.66	484	33	0.0	2.9	7.3
1974	1438	986	.69	504	33	0.0	2.9	5.2
1975	1754	1202	.69	504	35	0.0	3.4	4.0
1976	2028	1370	.68	497	34	0.0	3.3	3.7
1977	1633	1081	.66	487	30	0.0	4.0	4.9
1978	1101	800	.73	534	30	0.0	4.1	7.2
1979	1377	921	.67	492	31	0.0	5.6	10.6
1980	1139	730	.64	472	35	0.0	5.8	8.2
1981	1022	666	.65	479	34	0.0	4.7	6.6
1982	1616	1048	.65	477	33	0.0	3.0	6.6
1983	3036	1742	.57	422	41	0.0	2.9	6.5
Total	68250	39860						
Average	1587	927	.58	429				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 3 - Colorado River Basin - Historical Flow and Quality of Water Data

YAMPA RIVER NEAR MAYBELL, COLORADO

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	14	6	315	*
	Feb	17	7	303	*
	Mar	39	14	264	*
	Apr	92	21	168	*
	May	451	69	113	*
	Jun	240	43	132	*
1941	Jul	50	14	206	*
	Aug	21	7	245	*
	Sep	11	5	334	*
	Oct	40	14	257	*
	Nov	28	11	289	*
	Dec	24	10	306	*
	TOTAL	1027	221	158	0
	Jan	21	8	280	*
	Feb	19	8	310	*
	Mar	50	17	250	*
	Apr	239	43	132	*
	May	361	59	120	*
	Jun	329	55	123	*
1942	Jul	58	15	190	*
	Aug	14	5	263	*
	Sep	5	3	441	*
	Oct	10	5	368	*
	Nov	15	7	343	*
	Dec	13	6	339	*
	TOTAL	1134	231	150	0
	Jan	12	5	306	*
	Feb	13	6	339	*
	Mar	46	16	256	*
	Apr	190	37	143	*
	May	237	43	133	*
	Jun	270	47	128	*
1943	Jul	70	18	189	*
	Aug	20	7	257	*
	Sep	9	4	327	*
	Oct	10	5	368	*
	Nov	14	6	315	*
	Dec	12	5	306	*
	TOTAL	903	199	162	0
	Jan	10	5	368	*
	Feb	10	5	368	*
	Mar	18	8	327	*
	Apr	44	12	201	*
	May	311	53	125	*
	Jun	347	57	121	*
1944	Jul	64	16	184	*
	Aug	8	4	368	*
	Sep	2	1	368	*
	Oct	9	4	327	*
	Nov	16	7	322	*
	Dec	13	6	339	*
	TOTAL	852	178	154	0
	Jan	12	5	306	*
	Feb	10	5	368	*
	Mar	24	9	276	*
	Apr	89	21	174	*
	May	439	68	114	*
	Jun	393	62	116	*
1945	Jul	163	33	149	*
	Aug	56	15	197	*
	Sep	20	7	257	*
	Oct	17	7	303	*
	Nov	19	8	310	*
	Dec	16	7	322	*
	TOTAL	1258	247	144	0
	Jan	14	6	315	*
	Feb	18	8	327	*
	Mar	40	14	257	*
	Apr	215	40	137	*
	May	220	41	137	*
	Jun	228	42	135	*
1946	Jul	43	12	205	*
	Aug	16	6	276	*
	Sep	9	4	327	*
	Oct	20	8	294	*
	Nov	25	10	294	*
	Dec	20	8	294	*
	TOTAL	868	199	169	0
	Jan	14	6	315	*
	Feb	15	7	343	*
	Mar	76	24	232	*
	Apr	164	33	148	*
	May	492	74	111	*
	Jun	317	53	123	*
1947	Jul	119	26	161	*
	Aug	32	10	230	*
	Sep	17	6	260	*
	Oct	22	9	301	*
	Nov	26	10	283	*
	Dec	38	14	271	*
	TOTAL	1332	272	150	0
	Jan	37	13	258	*
	Feb	37	13	258	*
	Mar	57	19	245	*
	Apr	195	37	140	*
	May	453	69	112	*
	Jun	240	43	132	*
1948	Jul	51	14	202	*
	Aug	20	7	257	*
	Sep	6	3	368	*
	Oct	16	7	322	*
	Nov	17	7	303	*
	Dec	16	7	322	*
	TOTAL	1145	239	153	0
	Jan	15	7	343	*
	Feb	16	7	322	*
	Mar	44	15	251	*
	Apr	192	37	142	*
	May	422	66	115	*
	Jun	433	67	114	*
1949	Jul	120	26	159	*
	Aug	20	7	257	*
	Sep	11	5	334	*
	Oct	24	9	276	*
	Nov	20	8	294	*
	Dec	15	7	343	*
	TOTAL	1332	261	144	0
	Jan	15	7	343	*
	Feb	15	7	343	*
	Mar	28	11	289	*
	Apr	133	28	155	*
	May	271	47	128	*
	Jun	327	55	124	*
1950	Jul	78	19	179	*
	Aug	14	5	263	*
	Sep	11	5	334	*
	Oct	15	6	293	31
	Nov	17	6	278	28
	Dec	16	6	281	0
	TOTAL	941	203	159	59
	Jan	14	6	289	0
	Feb	15	6	298	1
	Mar	33	13	292	0
	Apr	110	32	212	0
	May	329	45	100	2
	Jun	315	30	70	0
1951	Jul	108	14	97	3
	Aug	29	8	190	2
	Sep	13	4	252	2
	Oct	21	6	227	2
	Nov	16	6	264	4
	Dec	12	5	286	5
	TOTAL	1016	174	126	21
	Jan	14	5	275	1
	Feb	14	5	273	0
	Mar	19	7	286	0
	Apr	240	66	202	1
	May	516	81	116	2
	Jun	474	53	83	0
1952	Jul	73	15	150	0
	Aug	33	10	217	2
	Sep	14	5	279	0
	Oct	12	5	342	0
	Nov	12	6	353	3
	Dec	14	6	350	0
	TOTAL	1436	266	136	9
	Jan	15	6	322	0
	Feb	12	5	329	0
	Mar	25	10	310	1
	Apr	72	23	232	0
	May	221	39	129	1
	Jun	364	35	72	0
1953	Jul	52	11	160	1
	Aug	24	8	249	0
	Sep	6	3	390	1
	Oct	9	5	369	1
	Nov	16	6	295	0
	Dec	12	5	343	0
	TOTAL	828	159	141	5
	Jan	15	6	313	0
	Feb	15	7	320	0
	Mar	23	9	285	7
	Apr	103	23	166	0
	May	209	24	85	1
	Jun	85	13	114	0
1954	Jul	17	5	236	2
	Aug	7	4	384	31
	Sep	11	5	323	30
	Oct	23	7	223	0
	Nov	16	6	260	0
	Dec	13	5	320	0
	TOTAL	538	115	157	71
	Jan	12	5	289	0
	Feb	11	4	287	0
	Mar	28	11	301	0
	Apr	120	33	202	1
	May	300	39	96	0
	Jun	200	23	84	1
1955	Jul	31	7	163	0
	Aug	15	5	247	0
	Sep	4	2	403	1
	Oct	8	4	358	3
	Nov	16	6	301	0
	Dec	20	8	286	0
	TOTAL	764	148	142	6
	Jan	17	7	309	0
	Feb	14	6	314	0
	Mar	30	12	287	0
	Apr	214	51	174	0
	May	401	51	94	0
	Jun	259	26	74	0
1956	Jul	33	9	199	5
	Aug	17	6	269	3
	Sep	4	2	421	0
	Oct	8	4	374	0
	Nov	13	6	324	0
	Dec	12	5	334	22
	TOTAL	1022	185	133	30

* See 'Notes' preceding Table 1.

Table 3 – Colorado River Basin – Historical Flow and Quality of Water Data

YAMPA RIVER NEAR MAYBELL, COLORADO

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC	Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC	Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC	Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	13	6	325	22		Jan	12	5	317	22		Jan	17	7	318	18		Jan	17	9	365	0
	Feb	13	6	314	20		Feb	12	5	307	20		Feb	15	7	324	16		Feb	16	8	373	0
	Mar	29	13	321	13		Mar	19	8	307	14		Mar	18	8	321	17		Mar	26	12	344	15
	Apr	125	44	261	1		Apr	56	21	268	1		Apr	156	36	170	3		Apr	248	32	94	0
	May	440	91	152	0		May	233	34	108	0		May	386	51	97	0		May	400	65	119	17
	Jun	680	95	103	0		Jun	195	24	89	3		Jun	455	54	88	1		Jun	222	36	118	0
1957	Jul	358	43	89	1	1961	Jul	22	6	213	2	1965	Jul	150	23	113	0	1969	Jul	75	24	232	0
	Aug	65	16	176	0		Aug	8	4	331	0		Aug	46	13	211	2		Aug	21	8	269	0
	Sep	27	9	240	4		Sep	32	10	226	0		Sep	30	9	213	0		Sep	20	7	250	0
	Oct	29	10	260	0		Oct	62	14	164	0		Oct	37	13	256	0		Oct	28	12	319	0
	Nov	29	11	286	0		Nov	34	10	212	0		Nov	25	11	335	0		Nov	25	11	341	0
	Dec	25	10	298	11		Dec	22	8	269	13		Dec	20	8	301	7		Dec	22	10	332	0
	TOTAL	1832	353	142	72		TOTAL	706	147	154	75		TOTAL	1355	240	130	64		TOTAL	1120	232	152	32
	Jan	20	8	293	17		Jan	20	8	282	17		Jan	21	9	308	18		Jan	22	10	332	0
	Feb	28	11	285	16		Feb	41	16	284	15		Feb	16	7	320	16		Feb	22	13	437	0
	Mar	41	19	334	5		Mar	45	20	325	14		Mar	88	20	167	14		Mar	30	19	455	0
	Apr	162	55	249	3		Apr	387	104	199	1		Apr	122	20	122	0		Apr	82	43	390	0
	May	549	87	117	0		May	439	72	120	5		May	237	80	249	4		May	510	75	108	0
	Jun	330	34	76	0		Jun	305	42	100	12		Jun	110	47	314	0		Jun	443	64	105	0
1958	Jul	35	9	190	0	1962	Jul	113	18	115	2	1966	Jul	18	10	411	0	1970	Jul	122	36	214	0
	Aug	11	5	322	0		Aug	18	6	263	0		Aug	8	4	400	22		Aug	27	10	259	0
	Sep	10	5	345	0		Sep	7	4	444	0		Sep	3	1	365	0		Sep	17	6	275	0
	Oct	13	6	306	1		Oct	18	8	333	1		Oct	16	7	334	0		Oct	29	13	319	0
	Nov	15	6	319	18		Nov	17	8	345	0		Nov	13	6	339	0		Nov	26	12	352	0
	Dec	13	6	333	17		Dec	13	7	376	6		Dec	13	6	343	15		Dec	21	10	363	0
	TOTAL	1227	250	150	77		TOTAL	1423	312	161	73		TOTAL	663	217	241	89		TOTAL	1352	310	169	0
	Jan	14	6	330	18		Jan	13	7	368	18		Jan	12	6	346	11		Jan	23	13	407	0
	Feb	15	6	324	16		Feb	22	9	313	16		Feb	13	6	346	0		Feb	21	10	348	0
	Mar	22	9	316	11		Mar	29	13	336	0		Mar	42	20	347	0		Mar	66	18	194	0
	Apr	89	31	256	0		Apr	79	23	217	0		Apr	88	24	198	0		Apr	277	55	145	0
	May	265	36	99	0		May	251	31	90	1		May	250	39	115	0		May	394	58	109	0
	Jun	287	25	65	0		Jun	147	20	98	1		Jun	316	38	88	0		Jun	462	64	102	1
1959	Jul	48	10	146	0	1963	Jul	17	6	255	0	1967	Jul	109	23	156	0	1971	Jul	117	27	167	3
	Aug	22	7	244	1		Aug	13	6	356	1		Aug	21	8	291	0		Aug	20	9	322	0
	Sep	12	5	306	0		Sep	12	5	324	0		Sep	14	5	287	0		Sep	15	6	314	0
	Oct	41	11	198	0		Oct	7	4	400	0		Oct	17	7	291	0		Oct	19	8	306	0
	Nov	32	9	207	0		Nov	12	6	386	0		Nov	15	7	353	0		Nov	21	13	443	0
	Dec	23	8	266	18		Dec	8	5	416	18		Dec	12	5	325	0		Dec	19	9	344	0
	TOTAL	869	164	139	64		TOTAL	610	135	163	55		TOTAL	908	188	152	11		TOTAL	1453	289	146	4
	Jan	14	6	296	18		Jan	8	4	364	17		Jan	14	6	309	1		Jan	21	10	341	0
	Feb	13	5	295	16		Feb	9	4	354	17		Feb	14	6	316	0		Feb	25	12	361	0
	Mar	41	15	268	13		Mar	14	6	327	18		Mar	28	14	357	0		Mar	72	27	278	0
	Apr	240	51	157	1		Apr	67	25	272	9		Apr	89	27	224	1		Apr	126	28	161	0
	May	287	42	107	0		May	334	58	127	0		May	343	55	118	0		May	261	41	115	0
	Jun	268	29	79	1		Jun	293	33	84	1		Jun	466	116	183	1		Jun	290	33	84	0
1960	Jul	36	8	168	0	1964	Jul	83	18	162	0	1968	Jul	94	37	291	0	1972	Jul	33	9	196	1
	Aug	10	5	352	0		Aug	19	6	242	0		Aug	37	15	291	1		Aug	9	4	320	0
	Sep	6	3	409	18		Sep	11	4	290	0		Sep	15	6	283	0		Sep	12	6	387	0
	Oct	12	5	311	21		Oct	11	5	322	0		Oct	22	10	329	0		Oct	25	8	244	0
	Nov	15	6	302	22		Nov	14	6	335	8		Nov	19	10	374	0		Nov	23	7	216	0
	Dec	13	6	316	22		Dec	17	7	327	18		Dec	17	8	361	0		Dec	22	7	239	0
	TOTAL	955	181	139	132		TOTAL	879	178	149	88		TOTAL	1158	309	196	4		TOTAL	919	192	153	1

Table 3 – Colorado River Basin -- Historical Flow and Quality of Water Data

YAMPA RIVER NEAR MAYBELL, COLORADO

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	19	7	264	0
	Feb	16	6	286	0
	Mar	26	10	287	0
	Apr	97	63	480	11
	May	473	237	369	0
	Jun	358	75	155	0
1973	Jul	131	19	108	0
	Aug	32	12	269	31
	Sep	12	6	367	30
	Oct	15	8	365	31
	Nov	20	9	329	30
	Dec	22	10	325	31
	TOTAL	1221	462	278	164
	Jan	19	9	342	31
	Feb	15	7	356	28
	Mar	35	13	271	31
	Apr	225	42	138	30
	May	596	88	109	31
	Jun	369	63	126	30
1974	Jul	76	22	212	31
	Aug	19	9	331	31
	Sep	5	4	510	30
	Oct	13	7	396	31
	Nov	17	8	359	30
	Dec	8	5	453	31
	TOTAL	1398	278	146	365
	Jan	14	7	388	31
	Feb	17	8	352	28
	Mar	28	12	306	31
	Apr	93	25	194	30
	May	334	61	133	31
	Jun	433	73	124	30
1975	Jul	208	42	150	23
	Aug	31	12	282	23
	Sep	11	5	360	2
	Oct	15	6	313	9
	Nov	18	8	327	8
	Dec	17	7	328	31
	TOTAL	1219	266	161	277
	Jan	15	7	324	11
	Feb	20	10	363	0
	Mar	33	21	472	0
	Apr	87	34	285	7
	May	308	44	105	0
	Jun	221	25	82	0
1976	Jul	61	12	149	2
	Aug	22	8	252	1
	Sep	10	5	356	0
	Oct	13	7	366	0
	Nov	11	5	331	5
	Dec	9	5	426	17
	TOTAL	810	181	165	43
	Jan	8	4	391	31
	Feb	12	6	337	24
	Mar	21	11	394	0
	Apr	52	15	215	18
	May	114	28	180	12
	Jun	90	33	269	0
1977	Jul	5	3	475	20
	Aug	5	3	501	17
	Sep	5	3	420	0
	Oct	11	5	332	31
	Nov	12	5	324	30
	Dec	11	5	339	31
	TOTAL	345	121	259	214
	Jan	14	5	266	3
	Feb	15	6	276	12
	Mar	34	15	319	19
	Apr	198	56	209	5
	May	398	65	120	0
	Jun	531	54	75	0
1978	Jul	184	28	113	18
	Aug	32	8	185	9
	Sep	12	4	276	2
	Oct	12	4	279	0
	Nov	14	6	286	0
	Dec	13	6	318	0
	TOTAL	1456	257	130	68
	Jan	15	6	304	0
	Feb	15	6	323	0
	Mar	31	16	382	0
	Apr	165	60	267	4
	May	479	78	120	1
	Jun	414	47	84	0
1979	Jul	122	24	144	18
	Aug	25	8	226	2
	Sep	7	4	379	24
	Oct	11	5	326	0
	Nov	17	8	341	0
	Dec	13	6	340	17
	TOTAL	1313	268	150	66
	Jan	13	6	361	0
	Feb	25	12	356	0
	Mar	32	19	441	0
	Apr	170	43	187	14
	May	512	77	111	31
	Jun	380	62	120	30
1980	Jul	81	20	182	21
	Aug	16	7	315	17
	Sep	9	4	360	0
	Oct	13	7	375	2
	Nov	13	7	367	0
	Dec	11	6	377	0
	TOTAL	1276	270	156	115
	Jan	10	6	399	0
	Feb	13	7	395	0
	Mar	21	12	428	0
	Apr	62	20	239	9
	May	186	39	152	25
	Jun	181	35	141	29
1981	Jul	32	9	204	0
	Aug	8	3	300	3
	Sep	4	2	398	0
	Oct	19	8	299	0
	Nov	16	6	292	0
	Dec	18	8	338	0
	TOTAL	570	155	200	66
	Jan	18	8	340	0
	Feb	21	12	401	0
	Mar	45	31	509	3
	Apr	148	59	296	6
	May	422	73	126	0
	Jun	430	44	76	0
1982	Jul	178	21	88	4
	Aug	37	10	205	5
	Sep	21	8	261	0
	Oct	41	12	220	0
	Nov	31	14	321	0
	Dec	21	10	343	0
	TOTAL	1413	302	157	18
	Jan	19	9	342	0
	Feb	19	10	377	0
	Mar	55	38	501	0
	Apr	109	57	386	0
	May	373	79	155	20
	Jun	586	77	97	0
1983	Jul	245	36	107	7
	Aug	57	16	207	6
	Sep	18	9	346	30
	Oct	35	14	291	2
	Nov	31	14	337	0
	Dec	27	15	405	2
	TOTAL	1576	373	174	67

Table 3

Colorado River Basin

Historical Flow and Quality of Water Data

YAMPA RIVER NEAR MAYBELL, COLORADO

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	1027	221	.22	158	*			
1942	1134	231	.20	150	*			
1943	903	199	.22	162	*			
1944	852	178	.21	154	*			
1945	1258	247	.20	144	*			
1946	868	199	.23	169	*			
1947	1332	272	.20	150	*			
1948	1145	239	.21	154	*			
1949	1332	261	.20	144	*			
1950	941	203	.22	159	*			
1951	1016	174	.17	126	99	0.0	3.1	23.6
1952	1436	266	.19	136	99	0.0	3.1	23.6
1953	828	159	.19	141	105	0.0	2.0	21.4
1954	538	115	.21	157	106	0.0	2.0	21.3
1955	764	148	.19	142	109	0.0	2.1	21.5
1956	1022	185	.18	133	105	0.0	2.5	23.7
1957	1832	353	.19	142	85	0.0	2.6	24.7
1958	1227	250	.20	150	65	0.0	2.6	27.9
1959	869	164	.19	139	55	0.0	2.5	28.9
1960	955	181	.19	139	62	0.0	2.2	25.4
1961	706	147	.21	154	74	31.1	3.4	35.1
1962	1423	312	.22	162	84	61.9	4.6	35.2
1963	610	135	.22	163	85	90.6	4.9	35.2
1964	879	178	.20	149	85	90.6	5.6	27.7
1965	1355	240	.18	130	93	90.3	6.1	37.7
1966	663	217	.33	241	98	86.7	7.8	35.0
1967	908	188	.21	152	92	67.4	7.2	34.1
1968	1158	309	.27	196	75	36.0	8.0	35.1
1969	1120	232	.21	153	58	1.7	4.0	40.8
1970	1352	310	.23	169	48	2.1	4.2	43.1
1971	1453	289	.20	146	37	0.0	4.1	33.8
1972	919	192	.21	154	35	0.0	4.1	31.1
1973	1221	462	.38	278	33	0.0	4.2	34.4
1974	1398	278	.20	146	28	0.0	5.8	33.8
1975	1219	266	.22	161	29	0.0	7.8	35.8
1976	810	181	.22	165	31	3.2	7.9	30.9
1977	345	121	.35	259	36	2.8	8.0	31.7
1978	1456	257	.18	130	34	2.9	7.7	34.0
1979	1313	268	.20	150	31	0.0	7.6	41.0
1980	1276	270	.21	156	29	0.0	5.3	38.4
1981	570	155	.27	200	25	0.0	4.6	39.8
1982	1413	302	.21	157	20	0.0	5.1	39.5
1983	1576	373	.24	174	23	0.0	4.8	39.9
Total	46419	9928						
Average	1080	231	.21	157				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 4 – Colorado River Basin – Historical Flow and Quality of Water Data

DUCHESNE RIVER NEAR RANDLETT, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	25	28	824	*
	Feb	24	31	950	*
	Mar	21	36	1261	*
	Apr	20	30	1103	*
	May	155	78	370	*
	Jun	232	88	279	*
1941	Jul	35	39	819	*
	Aug	18	27	1103	*
	Sep	15	24	1177	*
	Oct	54	50	681	*
	Nov	51	46	663	*
	Dec	44	46	769	*
	TOTAL	694	523	554	0
	Jan	40	36	662	*
	Feb	39	39	735	*
	Mar	39	48	905	*
	Apr	50	45	662	*
	May	83	60	532	*
	Jun	171	79	340	*
1942	Jul	23	33	1055	*
	Aug	8	17	1563	*
	Sep	5	12	1765	*
	Oct	18	27	1103	*
	Nov	22	31	1036	*
	Dec	28	36	945	*
	TOTAL	526	463	647	0
	Jan	26	29	820	*
	Feb	29	34	862	*
	Mar	29	44	1116	*
	Apr	43	43	735	*
	May	100	64	471	*
	Jun	103	64	457	*
1943	Jul	28	34	893	*
	Aug	23	32	1023	*
	Sep	8	16	1471	*
	Oct	22	31	1036	*
	Nov	24	31	950	*
	Dec	25	32	941	*
	TOTAL	460	454	726	0
	Jan	23	25	799	*
	Feb	26	34	962	*
	Mar	43	52	889	*
	Apr	48	45	689	*
	May	128	73	419	*
	Jun	255	94	271	*
1944	Jul	82	59	529	*
	Aug	8	16	1471	*
	Sep	7	15	1576	*
	Oct	24	33	1011	*
	Nov	26	34	962	*
	Dec	28	37	972	*
	TOTAL	698	517	545	0

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	30	30	735	*
	Feb	27	32	872	*
	Mar	32	45	1034	*
	Apr	24	31	950	*
	May	59	51	636	*
	Jun	91	61	493	*
1945	Jul	30	37	907	*
	Aug	31	37	878	*
	Sep	12	21	1287	*
	Oct	21	29	1015	*
	Nov	26	33	933	*
	Dec	24	33	1011	*
	TOTAL	407	440	795	0
	Jan	23	26	831	*
	Feb	21	29	1015	*
	Mar	29	41	1040	*
	Apr	40	40	735	*
	May	70	55	578	*
	Jun	47	45	704	*
1946	Jul	5	13	1912	*
	Aug	6	14	1716	*
	Sep	4	11	2022	*
	Oct	17	26	1125	*
	Nov	32	39	896	*
	Dec	30	36	882	*
	TOTAL	324	375	851	0
	Jan	26	28	792	*
	Feb	36	39	797	*
	Mar	36	46	940	*
	Apr	23	30	959	*
	May	143	76	391	*
	Jun	158	78	363	*
1947	Jul	33	39	869	*
	Aug	25	32	941	*
	Sep	12	21	1287	*
	Oct	17	28	1211	*
	Nov	29	35	887	*
	Dec	31	37	878	*
	TOTAL	569	489	632	0
	Jan	29	29	735	*
	Feb	26	34	962	*
	Mar	40	48	882	*
	Apr	31	38	901	*
	May	70	55	578	*
	Jun	51	47	678	*
1948	Jul	3	9	2206	*
	Aug	2	7	2574	*
	Sep	1	3	2206	*
	Oct	5	12	1765	*
	Nov	14	24	1261	*
	Dec	26	33	933	*
	TOTAL	298	339	836	0

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	24	26	797	*
	Feb	23	30	959	*
	Mar	44	53	886	*
	Apr	46	45	719	*
	May	127	71	411	*
	Jun	230	90	288	*
1949	Jul	50	47	691	*
	Aug	7	15	1576	*
	Sep	8	17	1563	*
	Oct	25	32	941	*
	Nov	29	35	887	*
	Dec	28	36	945	*
	TOTAL	641	497	570	0
	Jan	31	31	735	*
	Feb	26	32	905	*
	Mar	40	52	956	*
	Apr	44	44	735	*
	May	97	65	493	*
	Jun	193	83	316	*
1950	Jul	45	45	735	*
	Aug	9	18	1471	*
	Sep	13	23	1301	*
	Oct	16	25	1149	*
	Nov	27	34	926	*
	Dec	33	45	1003	*
	TOTAL	574	497	637	0
	Jan	26	26	735	*
	Feb	26	34	962	*
	Mar	23	36	1151	*
	Apr	14	24	1261	*
	May	79	59	549	*
	Jun	124	91	540	*
1951	Jul	31	40	949	*
	Aug	26	38	1075	*
	Sep	10	19	1397	*
	Oct	25	32	941	*
	Nov	32	39	896	*
	Dec	32	39	896	*
	TOTAL	448	477	783	0
	Jan	28	30	788	*
	Feb	26	34	962	*
	Mar	31	44	1044	*
	Apr	111	67	444	*
	May	304	103	249	*
	Jun	302	100	244	*
1952	Jul	70	55	578	*
	Aug	49	46	690	*
	Sep	30	36	882	*
	Oct	21	29	1015	*
	Nov	26	34	962	*
	Dec	37	41	815	*
	TOTAL	1035	619	440	0

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	39	35	660	*
	Feb	33	37	824	*
	Mar	34	48	1038	*
	Apr	13	23	1301	*
	May	15	24	1177	*
	Jun	107	64	440	*
1953	Jul	13	23	1301	*
	Aug	12	21	1287	*
	Sep	5	11	1618	*
	Oct	9	18	1471	*
	Nov	20	28	1029	*
	Dec	26	34	962	*
	TOTAL	326	366	826	0
	Jan	27	30	817	*
	Feb	25	32	941	*
	Mar	20	36	1324	*
	Apr	13	23	1301	*
	May	36	40	817	*
	Jun	5	12	1765	*
1954	Jul	2	6	2206	*
	Aug	1	4	2941	*
	Sep	6	14	1716	*
	Oct	17	27	1168	*
	Nov	18	27	1103	*
	Dec	18	27	1103	*
	TOTAL	188	278	1087	0
	Jan	25	27	794	*
	Feb	21	30	1050	*
	Mar	34	47	1016	*
	Apr	22	31	1036	*
	May	45	45	735	*
	Jun	34	37	800	*
1955	Jul	2	6	2206	*
	Aug	8	17	1563	*
	Sep	4	10	1838	*
	Oct	6	14	1716	*
	Nov	15	24	1177	*
	Dec	29	35	887	*
	TOTAL	245	323	969	0
	Jan	27	27	735	*
	Feb	23	31	991	*
	Mar	25	40	1177	*
	Apr	17	27	1168	*
	May	74	56	556	*
	Jun	90	61	498	*
1956	Jul	4	11	2022	*
	Aug	2	8	2941	*
	Sep	1	5	3677	*
	Oct	4	10	1713	31
	Nov	17	26	1119	6
	Dec	19	22	880	0
	TOTAL	303	325	787	37

* See 'Notes' preceding Table 1.

Table 4 - Colorado River Basin - Historical Flow and Quality of Water Data

DUCHESNE RIVER NEAR RANDLETT, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	21	21	755	0
	Feb	20	22	777	0
	Mar	22	33	1110	0
	Apr	12	22	1403	0
	May	39	48	900	0
	Jun	184	74	295	0
1957	Jul	35	31	654	0
	Aug	18	27	1074	1
	Sep	15	22	1045	0
	Oct	19	31	1198	0
	Nov	41	59	1059	0
	Dec	30	32	791	12
	TOTAL	456	420	679	13
	Jan	29	28	722	17
	Feb	31	32	753	8
	Mar	35	46	970	0
	Apr	29	29	746	0
	May	141	61	318	0
	Jun	103	46	331	1
1958	Jul	4	10	1597	0
	Aug	1	4	2670	0
	Sep	3	7	1852	0
	Oct	5	12	1832	0
	Nov	15	22	1119	0
	Dec	21	25	876	0
	TOTAL	417	323	570	26
	Jan	22	26	858	17
	Feb	24	26	804	14
	Mar	17	20	900	0
	Apr	5	10	1428	0
	May	4	11	1857	0
	Jun	34	28	602	0
1959	Jul	6	12	1403	0
	Aug	4	12	2113	1
	Sep	4	10	1847	0
	Oct	11	17	1155	0
	Nov	13	19	1063	17
	Dec	22	27	923	18
	TOTAL	167	219	965	67
	Jan	23	24	783	18
	Feb	23	23	737	16
	Mar	27	32	855	8
	Apr	8	13	1151	0
	May	18	21	847	0
	Jun	23	20	651	0
1960	Jul	1	4	2488	0
	Aug	0.8	3	2610	0
	Sep	1	4	2556	15
	Oct	5	12	1707	17
	Nov	12	18	1097	22
	Dec	18	23	949	27
	TOTAL	160	197	904	123
	Jan	21	25	893	31
	Feb	19	23	896	28
	Mar	10	15	1100	11
	Apr	2	6	2615	0
	May	3	7	1686	0
	Jun	3	8	2070	0
1961	Jul	0.6	3	2996	0
	Aug	0.6	2	2425	0
	Sep	13	17	903	0
	Oct	19	25	933	0
	Nov	27	26	726	0
	Dec	26	29	798	21
	TOTAL	144	185	941	91
	Jan	21	24	821	22
	Feb	43	38	657	20
	Mar	49	51	772	0
	Apr	70	48	499	0
	May	88	56	464	0
	Jun	146	68	341	0
1962	Jul	27	27	744	0
	Aug	4	10	1874	0
	Sep	4	11	1824	0
	Oct	15	26	1263	0
	Nov	15	23	1147	0
	Dec	23	29	943	0
	TOTAL	505	410	597	42
	Jan	18	22	891	0
	Feb	29	33	850	0
	Mar	10	19	1416	0
	Apr	5	15	2322	0
	May	31	30	719	0
	Jun	50	39	576	0
1963	Jul	3	9	2066	0
	Aug	5	12	1792	0
	Sep	14	24	1221	0
	Oct	7	17	1671	0
	Nov	16	24	1146	0
	Dec	22	25	834	0
	TOTAL	209	268	942	0
	Jan	18	18	722	0
	Feb	18	17	675	0
	Mar	23	24	768	0
	Apr	14	21	1090	0
	May	72	47	487	0
	Jun	122	78	467	0
1964	Jul	29	27	696	0
	Aug	6	12	1546	0
	Sep	4	10	1865	0
	Oct	5	14	2011	1
	Nov	18	27	1121	0
	Dec	27	34	916	0
	TOTAL	356	329	679	1
	Jan	27	26	712	0
	Feb	21	29	991	1
	Mar	26	40	1107	0
	Apr	32	37	857	0
	May	71	79	821	0
	Jun	302	151	366	0
1965	Jul	175	88	372	0
	Aug	57	55	715	0
	Sep	58	63	795	0
	Oct	47	55	850	0
	Nov	47	53	828	0
	Dec	42	47	831	0
	TOTAL	906	723	587	1
	Jan	39	37	684	1
	Feb	38	28	542	0
	Mar	47	48	754	0
	Apr	35	43	897	1
	May	58	62	788	1
	Jun	16	29	1311	1
1966	Jul	3	9	2133	0
	Aug	3	9	2187	1
	Sep	6	15	1777	0
	Oct	11	25	1658	0
	Nov	19	34	1335	0
	Dec	31	41	983	0
	TOTAL	307	380	911	5
	Jan	33	33	730	1
	Feb	30	29	710	0
	Mar	40	55	993	3
	Apr	19	31	1230	0
	May	56	45	588	0
	Jun	253	116	337	0
1967	Jul	76	56	542	0
	Aug	11	20	1351	0
	Sep	10	20	1468	0
	Oct	12	25	1518	1
	Nov	18	31	1261	4
	Dec	32	33	748	1
	TOTAL	591	494	614	10
	Jan	34	31	658	0
	Feb	33	36	798	1
	Mar	40	59	1074	0
	Apr	31	50	1170	0
	May	45	51	832	0
	Jun	250	93	273	0
1968	Jul	24	29	898	0
	Aug	26	36	1029	1
	Sep	13	22	1311	0
	Oct	20	34	1266	0
	Nov	27	39	1053	1
	Dec	38	39	751	0
	TOTAL	582	519	656	3
	Jan	42	38	658	0
	Feb	37	34	681	0
	Mar	52	61	865	0
	Apr	69	63	675	1
	May	183	80	320	0
	Jun	139	105	555	0
1969	Jul	17	27	1151	1
	Aug	9	20	1594	0
	Sep	10	20	1467	3
	Oct	20	30	1136	2
	Nov	22	31	1022	0
	Dec	20	21	781	0
	TOTAL	620	530	628	7
	Jan	14	15	780	1
	Feb	17	19	850	0
	Mar	10	16	1140	1
	Apr	3	8	2110	0
	May	17	21	871	0
	Jun	58	74	939	2
1970	Jul	9	15	1250	1
	Aug	3	7	1803	1
	Sep	5	10	1604	1
	Oct	9	19	1540	0
	Nov	11	19	1308	0
	Dec	7	14	1488	1
	TOTAL	162	237	1073	8
	Jan	23	23	743	0
	Feb	31	32	758	2
	Mar	20	21	747	0
	Apr	12	18	1136	0
	May	28	31	831	2
	Jun	140	66	347	2
1971	Jul	19	24	899	0
	Aug	4	8	1619	0
	Sep	9	16	1351	2
	Oct	20	33	1189	1
	Nov	28	42	1095	6
	Dec	26	31	880	0
	TOTAL	360	345	704	15
	Jan	24	23	700	1
	Feb	35	32	673	3
	Mar	37	40	785	0
	Apr	13	18	1033	1
	May	37	31	623	0
	Jun	116	59	374	0
1972	Jul	6	10	1296	0
	Aug	3	8	1749	0
	Sep	5	11	1766	1
	Oct	23	34	1114	2
	Nov	31	38	894	3
	Dec	37	34	678	6
	TOTAL	366	338	678	17

Table 4 – Colorado River Basin – Historical Flow and Quality of Water Data

DUCHESNE RIVER NEAR RANDLETT, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	32	32	743	3
	Feb	29	30	763	2
	Mar	58	71	903	0
	Apr	49	61	908	2
	May	127	74	429	0
	Jun	138	69	370	0
1973	Jul	31	36	864	13
	Aug	13	21	1171	0
	Sep	17	25	1107	0
	Oct	20	29	1052	2
	Nov	25	33	944	0
	Dec	28	25	676	1
	TOTAL	566	506	657	23
	Jan	28	24	617	1
	Feb	28	21	566	0
	Mar	41	41	747	2
	Apr	19	23	852	0
	May	61	41	501	1
	Jun	55	33	438	2
1974	Jul	13	20	1105	2
	Aug	14	19	1049	1
	Sep	5	10	1625	4
	Oct	6	14	1718	2
	Nov	7	17	1751	4
	Dec	8	10	927	0
	TOTAL	284	274	707	19
	Jan	11	13	874	0
	Feb	10	13	931	0
	Mar	7	13	1342	0
	Apr	4	9	1471	1
	May	17	25	1113	3
	Jun	160	51	235	0
1975	Jul	163	73	329	0
	Aug	15	20	974	1
	Sep	9	17	1333	0
	Oct	11	19	1249	0
	Nov	17	25	1110	0
	Dec	21	21	736	0
	TOTAL	446	299	493	5
	Jan	20	15	553	0
	Feb	27	26	709	0
	Mar	38	41	808	0
	Apr	15	32	1512	0
	May	31	26	618	0
	Jun	29	56	1413	0
1976	Jul	3	7	1628	0
	Aug	4	9	1522	0
	Sep	6	11	1468	1
	Oct	7	13	1358	0
	Nov	7	16	1572	0
	Dec	8	9	822	0
	TOTAL	196	261	980	1
	Jan	9	9	750	1
	Feb	10	12	874	3
	Mar	10	27	1878	1
	Apr	2	6	2066	0
	May	3	7	1801	0
	Jun	4	10	1898	0
1977	Jul	3	7	1819	31
	Aug	2	6	1860	0
	Sep	3	8	1971	0
	Oct	4	9	1711	31
	Nov	5	10	1552	30
	Dec	6	11	1345	0
	TOTAL	62	122	1458	97
	Jan	11	13	885	1
	Feb	14	18	977	28
	Mar	21	27	925	0
	Apr	25	27	787	30
	May	18	22	884	31
	Jun	110	63	421	30
1978	Jul	8	12	1140	31
	Aug	3	8	1863	31
	Sep	4	9	1679	30
	Oct	5	12	1657	30
	Nov	16	24	1092	4
	Dec	16	21	1002	23
	TOTAL	250	255	749	269
	Jan	15	20	966	31
	Feb	17	19	840	10
	Mar	48	59	897	0
	Apr	57	56	723	11
	May	62	38	454	30
	Jun	36	37	771	1
1979	Jul	21	28	947	0
	Aug	32	37	841	1
	Sep	29	33	848	0
	Oct	12	24	1504	0
	Nov	11	17	1197	0
	Dec	9	15	1259	0
	TOTAL	349	384	810	84
	Jan	10	17	1274	0
	Feb	15	21	1018	0
	Mar	14	25	1313	0
	Apr	12	17	1071	0
	May	32	34	768	0
	Jun	165	55	245	0
1980	Jul	23	23	709	0
	Aug	5	9	1340	0
	Sep	15	27	1346	0
	Oct	18	21	832	31
	Nov	22	23	772	30
	Dec	32	29	656	31
	TOTAL	365	301	607	92
	Jan	21	23	800	31
	Feb	15	18	873	28
	Mar	10	16	1092	31
	Apr	6	11	1365	30
	May	13	16	959	31
	Jun	54	31	422	3
1981	Jul	5	10	1503	2
	Aug	4	9	1547	2
	Sep	5	10	1514	3
	Oct	14	26	1388	2
	Nov	10	16	1166	3
	Dec	19	20	756	2
	TOTAL	176	206	857	168
	Jan	27	22	601	3
	Feb	35	28	581	0
	Mar	35	32	668	3
	Apr	33	29	655	3
	May	66	40	444	5
	Jun	147	64	323	4
1982	Jul	47	30	468	3
	Aug	12	16	1001	2
	Sep	32	29	661	2
	Oct	86	42	357	6
	Nov	61	38	462	5
	Dec	61	39	478	6
	TOTAL	641	409	469	42
	Jan	60	39	482	8
	Feb	51	34	496	2
	Mar	74	58	580	1
	Apr	50	36	533	3
	May	86	51	438	5
	Jun	475	137	213	5
1983	Jul	153	64	308	4
	Aug	54	41	557	4
	Sep	47	36	560	4
	Oct	92	53	420	6
	Nov	84	50	435	30
	Dec	81	49	448	31
	TOTAL	1307	649	365	103

Table 4

Colorado River Basin

Historical Flow and Quality of Water Data

DUCHESNE RIVER NEAR RANDLETT, UTAH

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	694	523	.75	554	*			
1942	526	463	.88	647	*			
1943	460	454	.99	726	*			
1944	698	517	.74	545	*			
1945	407	440	1.08	795	*			
1946	324	375	1.16	851	*			
1947	569	489	.86	632	*			
1948	298	339	1.14	837	*			
1949	641	497	.78	570	*			
1950	574	497	.87	637	*			
1951	448	477	1.06	783	*			
1952	1035	619	.60	440	*			
1953	326	366	1.12	826	*			
1954	188	278	1.48	1087	*			
1955	245	323	1.32	969	*			
1956	303	325	1.07	787	*			
1957	456	420	.92	679	88	0.0	1.9	22.9
1958	417	323	.78	570	88	0.0	1.9	22.9
1959	167	219	1.31	965	77	0.0	1.9	21.4
1960	160	197	1.23	904	82	0.0	2.0	21.7
1961	144	185	1.28	941	93	37.6	2.5	22.5
1962	505	410	.81	597	101	69.3	2.6	21.7
1963	209	268	1.28	943	113	92.9	3.1	20.9
1964	356	329	.92	679	128	96.9	3.0	26.8
1965	906	723	.80	587	127	96.9	2.8	27.2
1966	307	380	1.24	911	136	97.1	3.1	25.3
1967	591	494	.84	614	134	91.0	3.9	23.1
1968	582	519	.89	657	148	87.8	4.0	26.2
1969	620	530	.85	628	112	76.8	4.2	28.1
1970	162	237	1.46	1073	72	58.3	4.3	27.0
1971	360	345	.96	705	34	0.0	3.5	21.1
1972	366	338	.92	678	40	0.0	5.5	22.8
1973	566	506	.89	657	39	0.0	6.3	25.3
1974	284	274	.96	707	43	0.0	7.1	25.9
1975	446	299	.67	493	37	0.0	7.4	24.4
1976	196	261	1.33	980	37	0.0	7.1	26.2
1977	62	122	1.98	1458	31	0.0	6.4	25.0
1978	250	255	1.02	749	30	0.0	4.6	26.8
1979	349	384	1.10	810	31	0.0	6.5	23.6
1980	365	301	.83	607	35	0.0	7.9	24.9
1981	176	206	1.17	857	36	0.0	7.1	21.1
1982	641	409	.64	469	34	0.0	7.5	18.4
1983	1307	649	.50	365	31	0.0	3.0	20.1
Total	18687	16564						
Average	435	385	.89	652				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 5 – Colorado River Basin – Historical Flow and Quality of Water Data

WHITE RIVER NEAR WATSON, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	18	16	654	*
	Feb	22	17	568	*
	Mar	31	22	522	*
	Apr	34	23	497	*
	May	156	60	283	*
	Jun	118	50	312	*
1941	Jul	40	26	478	*
	Aug	33	23	513	*
	Sep	29	21	533	*
	Oct	44	27	451	*
	Nov	29	21	533	*
	Dec	24	19	582	*
	TOTAL	578	325	413	0
	Jan	23	18	575	*
	Feb	22	17	568	*
	Mar	43	27	462	*
	Apr	107	47	323	*
	May	158	60	279	*
	Jun	144	57	291	*
1942	Jul	44	27	451	*
	Aug	27	20	545	*
	Sep	23	18	575	*
	Oct	29	21	533	*
	Nov	27	20	545	*
	Dec	23	18	575	*
	TOTAL	670	350	384	0
	Jan	21	17	595	*
	Feb	24	19	582	*
	Mar	33	23	513	*
	Apr	40	26	478	*
	May	56	32	420	*
	Jun	87	42	355	*
1943	Jul	31	22	522	*
	Aug	44	27	451	*
	Sep	20	16	588	*
	Oct	21	17	595	*
	Nov	23	18	575	*
	Dec	22	17	568	*
	TOTAL	422	276	481	0
	Jan	19	16	619	*
	Feb	21	17	595	*
	Mar	32	22	506	*
	Apr	29	21	533	*
	May	94	44	344	*
	Jun	112	49	322	*
1944	Jul	40	26	478	*
	Aug	18	16	654	*
	Sep	15	14	686	*
	Oct	19	16	619	*
	Nov	20	16	588	*
	Dec	20	16	588	*
	TOTAL	439	273	457	0

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	25	19	559	*
	Feb	26	20	566	*
	Mar	28	20	525	*
	Apr	30	21	515	*
	May	108	48	327	*
	Jun	105	47	329	*
1945	Jul	57	32	413	*
	Aug	37	25	497	*
	Sep	23	18	575	*
	Oct	25	19	559	*
	Nov	27	20	545	*
	Dec	21	17	595	*
	TOTAL	512	306	439	0
	Jan	22	17	568	*
	Feb	21	17	595	*
	Mar	30	21	515	*
	Apr	43	27	462	*
	May	68	36	389	*
	Jun	67	35	384	*
1946	Jul	21	17	595	*
	Aug	29	21	533	*
	Sep	21	17	595	*
	Oct	28	20	525	*
	Nov	24	19	582	*
	Dec	23	18	575	*
	TOTAL	397	265	491	0
	Jan	17	15	649	*
	Feb	19	16	619	*
	Mar	43	27	462	*
	Apr	35	24	504	*
	May	140	56	294	*
	Jun	116	50	317	*
1947	Jul	61	34	410	*
	Aug	37	25	497	*
	Sep	26	20	566	*
	Oct	34	23	497	*
	Nov	28	20	525	*
	Dec	27	20	545	*
	TOTAL	583	330	416	0
	Jan	24	19	582	*
	Feb	21	17	595	*
	Mar	38	25	484	*
	Apr	59	33	411	*
	May	128	53	305	*
	Jun	92	43	344	*
1948	Jul	31	22	522	*
	Aug	28	20	525	*
	Sep	19	16	619	*
	Oct	24	19	582	*
	Nov	22	17	568	*
	Dec	19	16	619	*
	TOTAL	505	300	437	0

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	15	14	686	*
	Feb	14	13	683	*
	Mar	39	25	471	*
	Apr	44	27	451	*
	May	106	47	326	*
	Jun	158	60	279	*
1949	Jul	73	38	383	*
	Aug	31	22	522	*
	Sep	28	20	525	*
	Oct	34	23	497	*
	Nov	26	20	566	*
	Dec	21	17	595	*
	TOTAL	589	326	407	0
	Jan	20	16	588	*
	Feb	17	15	649	*
	Mar	30	21	515	*
	Apr	33	23	513	*
	May	63	34	397	*
	Jun	120	51	313	*
1950	Jul	38	25	484	*
	Aug	20	16	588	*
	Sep	24	20	613	*
	Oct	25	19	569	31
	Nov	23	18	572	30
	Dec	23	17	562	4
	TOTAL	436	276	465	65
	Jan	18	15	601	0
	Feb	24	19	578	1
	Mar	27	22	601	0
	Apr	26	19	529	0
	May	79	31	288	1
	Jun	112	37	243	0
1951	Jul	51	26	373	1
	Aug	39	28	532	0
	Sep	21	14	494	1
	Oct	25	17	506	0
	Nov	23	16	508	0
	Dec	21	16	564	0
	TOTAL	466	260	410	4
	Jan	20	16	594	0
	Feb	19	15	554	0
	Mar	21	16	573	1
	Apr	77	69	659	0
	May	149	81	402	0
	Jun	210	83	292	0
1952	Jul	50	30	441	0
	Aug	46	39	629	1
	Sep	33	23	516	0
	Oct	26	19	528	1
	Nov	22	18	600	0
	Dec	26	22	623	0
	TOTAL	699	432	454	3

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	25	19	552	1
	Feb	23	19	591	5
	Mar	35	29	609	0
	Apr	30	24	603	0
	May	70	40	416	1
	Jun	134	54	296	2
1953	Jul	33	25	561	0
	Aug	34	28	594	1
	Sep	17	15	649	2
	Oct	21	17	587	0
	Nov	24	20	604	0
	Dec	21	18	631	0
	TOTAL	469	308	483	12
	Jan	23	18	579	3
	Feb	26	20	581	1
	Mar	24	25	740	0
	Apr	34	26	560	0
	May	69	41	435	0
	Jun	32	25	575	0
1954	Jul	18	21	836	2
	Aug	13	13	718	0
	Sep	35	30	636	1
	Oct	26	21	593	0
	Nov	20	17	615	1
	Dec	18	17	681	0
	TOTAL	338	273	593	8
	Jan	16	14	660	0
	Feb	19	17	650	0
	Mar	47	34	535	0
	Apr	31	25	593	0
	May	87	36	308	0
	Jun	76	30	288	0
1955	Jul	16	13	637	0
	Aug	21	20	712	1
	Sep	12	11	670	0
	Oct	20	16	588	1
	Nov	22	18	616	0
	Dec	21	18	608	0
	TOTAL	387	253	480	2
	Jan	20	17	635	0
	Feb	19	18	671	1
	Mar	44	38	644	0
	Apr	33	22	485	1
	May	99	37	277	0
	Jun	85	29	254	0
1956	Jul	22	17	553	2
	Aug	21	18	631	0
	Sep	13	12	674	0
	Oct	19	16	607	2
	Nov	21	18	636	0
	Dec	18	16	653	0
	TOTAL	414	258	458	6

* See 'Notes' preceding Table 1.

Table 5 – Colorado River Basin – Historical Flow and Quality of Water Data

WHITE RIVER NEAR WATSON, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	21	18	629	0
	Feb	22	18	590	0
	Mar	31	29	707	0
	Apr	29	25	629	1
	May	76	44	429	0
	Jun	218	105	355	1
1957	Jul	169	72	314	0
	Aug	67	49	539	1
	Sep	36	23	455	0
	Oct	33	24	532	0
	Nov	33	26	575	0
	Dec	28	22	564	0
	TOTAL	764	456	438	3
	Jan	24	18	566	0
	Feb	35	27	562	0
	Mar	35	29	608	0
	Apr	45	39	636	0
	May	148	67	332	0
	Jun	131	65	363	0
1958	Jul	34	22	483	0
	Aug	22	17	573	4
	Sep	25	20	575	1
	Oct	27	20	527	6
	Nov	25	18	543	1
	Dec	22	17	570	6
	TOTAL	574	359	460	18
	Jan	23	19	603	4
	Feb	21	16	568	1
	Mar	24	19	604	2
	Apr	30	21	517	1
	May	64	28	317	3
	Jun	96	34	260	0
1959	Jul	30	17	428	1
	Aug	29	22	553	2
	Sep	24	18	563	2
	Oct	28	20	510	4
	Nov	23	17	540	3
	Dec	20	16	596	4
	TOTAL	413	248	442	27
	Jan	17	14	619	4
	Feb	19	16	590	9
	Mar	35	28	586	1
	Apr	40	23	424	0
	May	69	27	290	0
	Jun	95	33	253	2
1960	Jul	21	15	517	5
	Aug	14	12	653	5
	Sep	19	16	626	4
	Oct	21	16	551	2
	Nov	21	16	567	5
	Dec	19	16	616	6
	TOTAL	391	232	437	43
	Jan	19	16	624	7
	Feb	19	15	587	3
	Mar	23	18	595	1
	Apr	22	18	606	0
	May	65	27	310	1
	Jun	65	25	286	7
1961	Jul	16	12	572	7
	Aug	18	16	639	6
	Sep	38	31	593	0
	Oct	38	28	529	2
	Nov	26	19	541	2
	Dec	23	19	610	3
	TOTAL	371	245	485	39
	Jan	21	17	594	7
	Feb	37	28	562	8
	Mar	66	64	706	3
	Apr	85	56	485	4
	May	138	61	325	7
	Jun	128	49	281	4
1962	Jul	59	30	371	5
	Aug	25	19	558	1
	Sep	21	18	637	30
	Oct	28	21	558	5
	Nov	25	20	572	2
	Dec	21	18	623	3
	TOTAL	655	401	450	79
	Jan	20	18	661	2
	Feb	24	19	589	2
	Mar	24	20	612	3
	Apr	29	19	485	2
	May	71	29	298	6
	Jun	31	18	430	2
1963	Jul	12	11	715	1
	Aug	25	23	654	4
	Sep	27	23	645	2
	Oct	15	15	723	31
	Nov	19	17	661	30
	Dec	16	15	713	31
	TOTAL	312	227	536	116
	Jan	17	16	695	31
	Feb	19	17	660	29
	Mar	26	21	603	31
	Apr	30	23	567	30
	May	84	45	396	31
	Jun	99	53	390	30
1964	Jul	30	23	569	31
	Aug	25	21	615	31
	Sep	16	15	703	30
	Oct	20	16	582	11
	Nov	20	16	591	7
	Dec	22	18	629	5
	TOTAL	408	285	514	297
	Jan	23	21	648	4
	Feb	22	19	631	6
	Mar	33	32	713	4
	Apr	35	28	597	19
	May	98	47	350	10
	Jun	158	61	285	5
1965	Jul	69	42	450	3
	Aug	32	24	546	4
	Sep	33	24	534	13
	Oct	34	23	511	8
	Nov	28	21	554	10
	Dec	27	22	610	7
	TOTAL	592	365	453	93
	Jan	24	20	609	10
	Feb	21	17	604	7
	Mar	62	48	566	7
	Apr	32	23	531	16
	May	72	35	363	7
	Jun	26	18	512	15
1966	Jul	10	11	789	2
	Aug	16	16	733	3
	Sep	14	14	730	3
	Oct	23	21	658	2
	Nov	18	15	644	6
	Dec	19	17	680	23
	TOTAL	336	256	559	101
	Jan	18	17	688	31
	Feb	18	16	667	27
	Mar	29	26	669	2
	Apr	24	19	590	1
	May	69	35	368	5
	Jun	102	43	312	7
1967	Jul	31	20	489	2
	Aug	17	14	614	5
	Sep	19	16	604	1
	Oct	22	18	592	2
	Nov	20	17	621	0
	Dec	18	17	695	7
	TOTAL	387	258	491	90
	Jan	18	16	654	31
	Feb	20	17	615	29
	Mar	25	22	653	19
	Apr	29	26	661	3
	May	71	39	399	1
	Jun	149	53	260	1
1968	Jul	37	24	477	3
	Aug	43	39	678	0
	Sep	22	14	473	1
	Oct	26	17	476	2
	Nov	24	16	489	1
	Dec	26	19	543	14
	TOTAL	489	301	452	105
	Jan	23	18	573	31
	Feb	19	15	587	23
	Mar	33	27	604	2
	Apr	52	31	437	1
	May	116	41	259	1
	Jun	75	35	343	0
1969	Jul	33	19	426	1
	Aug	25	18	529	1
	Sep	30	24	591	0
	Oct	33	24	539	0
	Nov	27	18	476	1
	Dec	24	17	511	4
	TOTAL	491	287	430	65
	Jan	26	18	504	5
	Feb	25	17	521	4
	Mar	25	19	554	0
	Apr	27	20	532	0
	May	123	44	262	1
	Jun	141	47	246	1
1970	Jul	52	25	353	0
	Aug	32	20	464	2
	Sep	29	18	449	0
	Oct	33	22	488	0
	Nov	28	16	423	0
	Dec	26	16	454	8
	TOTAL	566	281	365	21
	Jan	26	16	455	5
	Feb	22	14	475	4
	Mar	36	23	478	0
	Apr	43	21	358	0
	May	86	29	246	2
	Jun	135	37	202	0
1971	Jul	47	19	295	0
	Aug	20	12	442	3
	Sep	29	16	412	0
	Oct	28	16	430	2
	Nov	29	18	461	1
	Dec	24	16	494	6
	TOTAL	525	238	334	23
	Jan	24	17	523	6
	Feb	22	15	488	5
	Mar	26	17	475	3
	Apr	30	16	389	2
	May	72	26	268	5
	Jun	108	35	240	4
1972	Jul	22	13	444	6
	Aug	16	12	546	10
	Sep	22	15	503	5
	Oct	30	19	464	4
	Nov	26	17	493	3
	Dec	25	18	529	6
	TOTAL	423	220	383	59

Table 5 - Colorado River Basin - Historical Flow and Quality of Water Data

WHITE RIVER NEAR WATSON, UTAH

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	27	19	516	6
	Feb	21	16	567	5
	Mar	33	24	547	18
	Apr	28	25	654	2
	May	129	52	298	6
	Jun	137	53	283	3
1973	Jul	56	37	484	2
	Aug	28	23	597	2
	Sep	26	20	576	0
	Oct	29	21	522	6
	Nov	27	20	535	4
	Dec	25	19	560	4
	TOTAL	566	329	427	58
	Jan	24	20	600	10
	Feb	19	15	583	11
	Mar	42	33	569	9
	Apr	44	31	515	13
	May	128	47	269	17
	Jun	99	40	294	18
1974	Jul	37	23	460	17
	Aug	23	17	554	17
	Sep	19	15	601	18
	Oct	27	18	492	0
	Nov	25	18	527	0
	Dec	19	15	597	0
	TOTAL	505	291	424	130
	Jan	21	16	564	0
	Feb	21	16	557	0
	Mar	32	24	560	0
	Apr	29	23	572	0
	May	76	30	287	0
	Jun	159	45	206	0
1975	Jul	94	31	245	0
	Aug	31	20	470	0
	Sep	26	18	509	0
	Oct	28	18	473	0
	Nov	25	16	459	0
	Dec	18	10	414	0
	TOTAL	559	265	349	0
	Jan	16	9	423	0
	Feb	26	16	444	0
	Mar	34	24	518	0
	Apr	31	22	534	0
	May	87	32	267	0
	Jun	72	24	251	0
1976	Jul	22	16	519	18
	Aug	21	16	560	18
	Sep	17	13	550	0
	Oct	24	14	444	0
	Nov	20	14	494	8
	Dec	18	13	512	16
	TOTAL	388	212	402	60
	Jan	20	14	504	17
	Feb	19	14	516	15
	Mar	24	16	469	18
	Apr	25	16	470	17
	May	24	15	454	11
	Jun	16	11	518	5
1977	Jul	9	9	734	10
	Aug	13	11	624	11
	Sep	13	11	631	18
	Oct	17	13	582	2
	Nov	18	14	539	6
	Dec	17	12	532	18
	TOTAL	213	153	528	148
	Jan	18	13	524	19
	Feb	17	12	525	17
	Mar	28	20	519	18
	Apr	36	22	441	18
	May	93	39	304	18
	Jun	175	57	238	17
1978	Jul	66	30	335	23
	Aug	23	16	499	0
	Sep	23	18	562	0
	Oct	23	16	515	13
	Nov	23	15	479	16
	Dec	24	16	483	31
	TOTAL	551	273	364	190
	Jan	19	13	493	15
	Feb	16	12	543	28
	Mar	31	18	429	31
	Apr	44	24	406	19
	May	116	40	252	16
	Jun	150	48	235	14
1979	Jul	60	27	327	17
	Aug	29	19	490	0
	Sep	19	13	505	0
	Oct	24	16	487	0
	Nov	25	16	458	0
	Dec	22	14	480	6
	TOTAL	555	260	344	146
	Jan	21	16	569	7
	Feb	35	25	529	0
	Mar	31	24	575	0
	Apr	37	26	520	0
	May	114	50	321	0
	Jun	131	44	248	0
1980	Jul	41	21	379	0
	Aug	22	15	483	0
	Sep	23	14	466	0
	Oct	25	15	451	0
	Nov	24	14	430	0
	Dec	24	13	400	0
	TOTAL	527	278	388	7
	Jan	24	14	427	0
	Feb	21	12	400	0
	Mar	22	14	475	0
	Apr	36	19	391	0
	May	49	19	288	0
	Jun	56	19	250	0
1981	Jul	23	14	433	0
	Aug	15	11	543	0
	Sep	19	12	447	0
	Oct	34	20	431	0
	Nov	24	15	452	0
	Dec	22	12	389	0
	TOTAL	345	180	382	0
	Jan	22	13	446	0
	Feb	32	19	430	23
	Mar	33	21	455	15
	Apr	33	20	448	0
	May	99	34	253	0
	Jun	126	37	216	0
1982	Jul	72	28	286	0
	Aug	38	19	378	0
	Sep	37	20	390	0
	Oct	35	18	382	10
	Nov	32	21	480	30
	Dec	22	16	530	31
	TOTAL	582	266	337	109
	Jan	24	17	522	31
	Feb	25	17	500	28
	Mar	45	27	435	31
	Apr	37	23	459	30
	May	123	75	450	17
	Jun	254	101	291	0
1983	Jul	128	49	282	8
	Aug	56	32	417	7
	Sep	33	23	506	0
	Oct	42	27	470	0
	Nov	37	23	448	0
	Dec	47	28	432	10
	TOTAL	852	440	380	162

Table 5

Colorado River Basin

Historical Flow and Quality of Water Data

WHITE RIVER NEAR WATSON, UTAH

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	578	325	.56	413	*			
1942	670	350	.52	384	*			
1943	422	276	.65	481	*			
1944	439	273	.62	457	*			
1945	512	306	.60	440	*			
1946	397	265	.67	491	*			
1947	583	330	.57	416	*			
1948	505	300	.59	437	*			
1949	589	326	.55	407	*			
1950	436	276	.63	465	*			
1951	466	260	.56	410	70	61.4	6.0	30.6
1952	699	432	.62	454	70	61.4	6.0	30.6
1953	469	308	.66	483	79	45.6	6.6	26.8
1954	338	273	.81	593	117	30.8	5.8	24.7
1955	387	253	.65	480	114	9.6	4.0	18.0
1956	414	258	.62	458	75	0.0	1.9	19.3
1957	764	456	.60	438	37	0.0	2.3	20.5
1958	574	359	.63	460	18	0.0	3.0	42.4
1959	413	248	.60	442	42	0.0	2.5	33.1
1960	391	232	.59	437	67	0.0	2.2	32.0
1961	371	245	.66	485	75	32.0	1.9	30.2
1962	655	401	.61	450	89	69.7	2.4	34.8
1963	312	227	.73	536	91	97.8	2.8	33.1
1964	408	285	.70	514	93	100.0	3.0	33.5
1965	592	365	.62	453	88	100.0	2.8	29.0
1966	336	256	.76	559	105	96.2	2.7	30.1
1967	387	258	.67	491	112	92.0	4.8	26.1
1968	489	301	.62	452	135	87.4	4.9	27.2
1969	491	287	.59	430	104	75.0	5.4	25.0
1970	566	281	.50	365	81	59.3	4.7	27.7
1971	525	238	.45	334	37	0.0	5.3	19.7
1972	423	220	.52	383	36	0.0	4.9	21.6
1973	566	329	.58	427	37	0.0	6.1	23.8
1974	505	291	.58	424	48	0.0	8.4	19.9
1975	559	265	.48	349	55	0.0	8.1	17.5
1976	388	212	.55	402	54	0.0	7.7	17.0
1977	213	153	.72	528	36	0.0	5.2	18.2
1978	551	273	.50	364	26	0.0	7.7	21.7
1979	555	260	.47	344	21	0.0	5.5	15.2
1980	527	278	.53	388	26	0.0	5.5	14.3
1981	345	180	.52	382	30	0.0	6.6	14.0
1982	582	266	.46	337	29	0.0	7.5	19.4
1983	852	440	.52	380	23	0.0	6.5	25.1
Total	21246	12418						
Average	494	289	.58	430				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 6 - Colorado River Basin - Historical Flow and Quality of Water Data

GREEN RIVER AT GREEN RIVER, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	100	110	807	31
	Feb	126	123	718	28
	Mar	216	186	634	31
	Apr	313	241	566	30
	May	1172	606	380	31
	Jun	1146	597	383	30
1941	Jul	358	265	543	31
	Aug	267	217	595	31
	Sep	182	164	665	30
	Oct	318	245	566	31
	Nov	240	200	612	30
	Dec	168	158	689	31
	TOTAL	4608	3112	497	365
	Jan	112	118	771	31
	Feb	123	123	737	28
	Mar	264	213	593	31
	Apr	858	485	416	30
	May	980	535	402	31
	Jun	1271	637	369	30
1942	Jul	415	296	525	31
	Aug	152	146	707	31
	Sep	91	102	824	30
	Oct	118	139	868	0
	Nov	124	137	813	0
	Dec	117	130	818	0
	TOTAL	4622	3060	487	273
	Jan	112	119	782	0
	Feb	130	124	703	0
	Mar	236	193	602	0
	Apr	569	307	397	0
	May	763	306	295	0
	Jun	1074	413	283	0
1943	Jul	612	244	294	0
	Aug	300	233	572	0
	Sep	116	104	657	0
	Oct	124	140	828	0
	Nov	146	151	763	0
	Dec	112	124	815	0
	TOTAL	4294	2459	421	0
	Jan	84	101	883	1
	Feb	111	116	766	0
	Mar	252	268	782	0
	Apr	529	426	593	0
	May	924	460	366	0
	Jun	1391	483	255	0
1944	Jul	591	241	300	0
	Aug	143	104	538	0
	Sep	73	71	720	0
	Oct	115	132	843	0
	Nov	119	134	827	0
	Dec	88	106	884	0
	TOTAL	4421	2643	439	1
	Jan	109	114	773	0
	Feb	128	128	736	0
	Mar	185	186	739	0
	Apr	291	243	613	0
	May	909	383	310	0
	Jun	1016	369	267	0
1945	Jul	701	279	293	0
	Aug	335	241	528	0
	Sep	163	127	573	0
	Oct	161	156	712	0
	Nov	149	144	712	0
	Dec	113	118	771	2
	TOTAL	4260	2488	430	2
	Jan	123	116	692	0
	Feb	117	105	659	0
	Mar	236	209	652	0
	Apr	528	313	436	0
	May	775	313	297	0
	Jun	746	263	260	0
1946	Jul	264	124	345	0
	Aug	152	127	616	0
	Sep	105	97	680	0
	Oct	149	151	745	0
	Nov	170	165	712	0
	Dec	154	145	693	0
	TOTAL	3519	2127	444	0
	Jan	91	100	802	0
	Feb	151	131	637	0
	Mar	411	331	591	0
	Apr	422	250	435	0
	May	1400	504	265	0
	Jun	1348	535	292	0
1947	Jul	656	262	294	0
	Aug	365	261	525	0
	Sep	166	129	573	0
	Oct	181	165	672	0
	Nov	179	161	663	0
	Dec	152	154	743	0
	TOTAL	5522	2983	397	0
	Jan	141	130	678	0
	Feb	137	123	663	0
	Mar	313	258	605	0
	Apr	558	378	499	0
	May	1061	401	278	0
	Jun	952	311	240	0
1948	Jul	268	146	401	0
	Aug	137	111	597	0
	Sep	69	56	597	0
	Oct	92	94	747	0
	Nov	104	107	759	0
	Dec	97	105	795	0
	TOTAL	3928	2219	415	0
	Jan	100	101	741	0
	Feb	110	101	678	0
	Mar	276	257	683	0
	Apr	474	321	499	0
	May	1221	509	306	0
	Jun	1547	627	298	0
1949	Jul	592	332	413	0
	Aug	172	129	552	0
	Sep	111	100	663	0
	Oct	207	200	711	0
	Nov	190	168	648	0
	Dec	128	130	750	0
	TOTAL	5129	2976	427	0
	Jan	141	145	756	0
	Feb	149	149	738	0
	Mar	356	321	661	0
	Apr	620	385	456	0
	May	1026	521	373	0
	Jun	1567	560	263	0
1950	Jul	734	355	356	0
	Aug	246	157	468	0
	Sep	149	133	655	0
	Oct	153	141	676	0
	Nov	166	159	702	0
	Dec	171	158	678	0
	TOTAL	5478	3181	427	0
	Jan	113	123	801	0
	Feb	167	147	647	0
	Mar	205	185	664	0
	Apr	372	258	510	0
	May	882	389	325	0
	Jun	1309	485	272	0
1951	Jul	627	245	288	0
	Aug	379	254	494	0
	Sep	178	134	553	0
	Oct	210	204	713	0
	Nov	164	163	729	0
	Dec	132	140	779	0
	TOTAL	4738	2727	423	0
	Jan	134	130	708	0
	Feb	140	130	682	0
	Mar	160	163	748	0
	Apr	988	841	626	0
	May	2087	970	342	0
	Jun	1809	651	265	0
1952	Jul	514	294	420	0
	Aug	315	277	647	0
	Sep	184	174	695	0
	Oct	129	140	797	0
	Nov	123	147	880	0
	Dec	129	151	861	0
	TOTAL	6712	4067	446	0
	Jan	140	142	749	0
	Feb	141	146	759	0
	Mar	217	215	729	0
	Apr	221	206	686	0
	May	454	239	387	0
	Jun	1167	414	261	0
1953	Jul	376	179	350	0
	Aug	212	174	603	0
	Sep	87	84	703	0
	Oct	86	105	896	0
	Nov	125	143	841	0
	Dec	107	123	846	0
	TOTAL	3333	2170	479	0
	Jan	107	116	798	0
	Feb	138	140	746	0
	Mar	169	171	742	0
	Apr	270	203	552	0
	May	640	242	278	0
	Jun	376	163	318	0
1954	Jul	346	159	338	0
	Aug	120	78	481	0
	Sep	134	138	758	0
	Oct	139	157	834	0
	Nov	120	123	753	0
	Dec	80	97	899	0
	TOTAL	2638	1787	498	0
	Jan	80	85	781	0
	Feb	86	77	659	0
	Mar	237	219	678	0
	Apr	311	244	578	0
	May	678	261	284	0
	Jun	655	235	264	0
1955	Jul	223	99	326	0
	Aug	161	140	642	0
	Sep	71	66	690	0
	Oct	77	82	783	0
	Nov	86	95	806	0
	Dec	127	127	737	0
	TOTAL	2791	1731	456	0
	Jan	155	138	655	0
	Feb	100	103	761	0
	Mar	314	252	590	0
	Apr	460	242	387	0
	May	995	335	247	0
	Jun	1207	379	231	0
1956	Jul	294	135	338	0
	Aug	169	112	486	0
	Sep	72	51	515	0
	Oct	76	72	693	0
	Nov	99	100	739	0
	Dec	79	83	765	0
	TOTAL	4021	2001	366	0

Table 6 – Colorado River Basin – Historical Flow and Quality of Water Data

GREEN RIVER AT GREEN RIVER, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	83	78	691	0
	Feb	100	93	681	0
	Mar	236	210	653	0
	Apr	290	213	539	0
	May	913	417	336	0
	Jun	1871	607	239	0
1957	Jul	1164	381	241	0
	Aug	386	288	548	0
	Sep	202	176	642	0
	Oct	185	177	703	0
	Nov	228	208	670	0
	Dec	149	142	704	0
	TOTAL	5807	2989	378	0
	Jan	128	117	671	0
	Feb	184	156	623	0
	Mar	246	231	689	0
	Apr	432	296	503	0
	May	1311	496	278	0
	Jun	1174	365	229	0
1958	Jul	224	124	407	0
	Aug	110	87	580	0
	Sep	96	99	757	0
	Oct	91	92	744	0
	Nov	102	107	773	0
	Dec	114	121	780	0
	TOTAL	4212	2290	400	0
	Jan	97	105	796	0
	Feb	113	107	694	0
	Mar	146	138	695	0
	Apr	219	162	545	0
	May	480	189	289	0
	Jun	763	244	236	0
1959	Jul	346	174	371	0
	Aug	180	159	652	0
	Sep	104	96	682	0
	Oct	178	157	646	0
	Nov	152	126	611	0
	Dec	106	107	737	0
	TOTAL	2884	1765	450	0
	Jan	95	92	708	0
	Feb	102	94	679	0
	Mar	320	266	611	0
	Apr	534	259	356	0
	May	551	204	272	0
	Jun	683	211	227	0
1960	Jul	170	82	354	0
	Aug	69	52	555	0
	Sep	59	54	675	0
	Oct	96	88	672	31
	Nov	105	93	651	30
	Dec	80	78	715	31
	TOTAL	2864	1572	404	92
	Jan	79	78	720	26
	Feb	94	83	651	18
	Mar	137	114	615	22
	Apr	184	137	545	25
	May	342	161	346	14
	Jun	542	213	290	15
1961	Jul	112	57	373	3
	Aug	79	71	655	1
	Sep	175	147	615	13
	Oct	234	177	557	8
	Nov	161	130	596	10
	Dec	126	116	678	28
	TOTAL	2265	1483	482	183
	Jan	114	109	703	29
	Feb	403	229	417	25
	Mar	401	325	596	22
	Apr	1093	614	413	5
	May	1350	499	272	6
	Jun	1074	405	277	7
1962	Jul	598	248	305	6
	Aug	177	115	477	8
	Sep	98	100	753	14
	Oct	126	140	820	22
	Nov	94	105	821	24
	Dec	72	89	902	29
	TOTAL	5600	2978	391	197
	Jan	71	89	916	31
	Feb	119	117	720	26
	Mar	99	108	799	21
	Apr	154	129	616	19
	May	399	208	383	18
	Jun	310	138	327	5
1963	Jul	51	44	637	7
	Aug	72	113	1151	10
	Sep	95	119	922	12
	Oct	47	64	988	3
	Nov	74	93	926	23
	Dec	84	98	859	25
	TOTAL	1576	1319	615	200
	Jan	109	119	806	31
	Feb	114	115	741	25
	Mar	128	112	643	4
	Apr	190	162	629	2
	May	634	268	311	3
	Jun	725	290	294	7
1964	Jul	344	190	406	10
	Aug	196	179	670	8
	Sep	140	117	618	8
	Oct	196	152	570	9
	Nov	200	164	604	21
	Dec	267	198	545	23
	TOTAL	3242	2066	469	151
	Jan	300	218	534	25
	Feb	303	212	516	23
	Mar	361	256	521	25
	Apr	518	378	537	6
	May	819	382	343	10
	Jun	1207	482	294	18
1965	Jul	546	288	388	4
	Aug	228	199	641	9
	Sep	189	169	657	14
	Oct	253	206	601	24
	Nov	239	197	606	23
	Dec	248	204	605	24
	TOTAL	5211	3191	450	205
	Jan	181	164	666	25
	Feb	166	146	649	21
	Mar	393	288	538	19
	Apr	390	257	485	15
	May	566	312	405	21
	Jun	325	178	403	6
1966	Jul	146	122	612	4
	Aug	146	134	673	1
	Sep	157	152	709	3
	Oct	189	185	718	5
	Nov	159	163	756	0
	Dec	146	156	783	2
	TOTAL	2966	2257	560	122
	Jan	196	168	629	4
	Feb	169	151	656	3
	Mar	256	237	683	3
	Apr	260	191	540	3
	May	504	262	382	2
	Jun	1134	577	374	5
1967	Jul	508	308	446	0
	Aug	247	224	668	13
	Sep	231	231	734	2
	Oct	250	252	742	3
	Nov	243	253	764	0
	Dec	229	275	883	10
	TOTAL	4227	3129	544	48
	Jan	249	219	646	24
	Feb	196	185	695	11
	Mar	241	249	759	0
	Apr	275	248	665	2
	May	709	359	373	5
	Jun	1248	424	250	0
1968	Jul	426	270	466	2
	Aug	345	295	627	14
	Sep	241	214	655	0
	Oct	231	220	702	1
	Nov	221	206	686	0
	Dec	209	180	633	0
	TOTAL	4589	3069	492	59
	Jan	282	227	592	4
	Feb	313	250	589	0
	Mar	354	323	671	0
	Apr	657	439	491	0
	May	1095	474	318	0
	Jun	684	359	386	0
1969	Jul	357	245	503	20
	Aug	270	240	653	17
	Sep	246	227	678	5
	Oct	255	227	654	5
	Nov	236	197	612	0
	Dec	271	211	574	13
	TOTAL	5022	3420	501	64
	Jan	191	159	612	8
	Feb	175	147	616	5
	Mar	194	163	620	4
	Apr	249	202	598	5
	May	867	351	298	7
	Jun	1019	399	288	4
1970	Jul	420	232	407	6
	Aug	212	169	585	10
	Sep	179	163	669	19
	Oct	174	154	649	3
	Nov	159	156	720	2
	Dec	145	130	662	10
	TOTAL	3984	2425	448	83
	Jan	154	130	619	10
	Feb	165	129	575	3
	Mar	202	160	584	4
	Apr	479	274	420	5
	May	714	314	323	7
	Jun	1060	371	258	3
1971	Jul	397	200	371	6
	Aug	197	164	612	9
	Sep	210	185	651	4
	Oct	211	191	665	8
	Nov	263	230	645	0
	Dec	267	206	567	3
	TOTAL	4319	2555	435	62
	Jan	272	209	565	0
	Feb	303	213	516	3
	Mar	323	229	523	12
	Apr	324	201	457	3
	May	635	275	319	4
	Jun	834	298	263	3
1972	Jul	246	154	458	5
	Aug	202	150	548	6
	Sep	124	113	673	5
	Oct	302	252	611	8
	Nov	340	269	580	3
	Dec	277	208	553	5
	TOTAL	4182	2571	452	57

Table 6 – Colorado River Basin – Historical Flow and Quality of Water Data

GREEN RIVER AT GREEN RIVER, UTAH

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	264	196	546	2
	Feb	265	194	537	3
	Mar	342	308	661	4
	Apr	303	266	645	5
	May	1168	480	302	5
	Jun	1069	418	288	4
1973	Jul	521	316	446	5
	Aug	303	230	558	4
	Sep	233	201	637	5
	Oct	231	207	658	8
	Nov	255	214	617	6
	Dec	239	200	615	5
	TOTAL	5193	3229	457	56
	Jan	231	193	614	6
	Feb	150	136	664	5
	Mar	300	241	592	6
	Apr	357	268	552	7
	May	1179	407	254	5
	Jun	892	300	247	5
1974	Jul	269	185	507	11
	Aug	192	163	623	5
	Sep	173	153	651	7
	Oct	229	204	656	7
	Nov	233	212	669	6
	Dec	205	188	675	5
	TOTAL	4410	2650	442	75
	Jan	256	210	602	5
	Feb	258	201	571	7
	Mar	249	215	634	6
	Apr	224	186	611	12
	May	652	297	335	4
	Jun	1253	442	259	6
1975	Jul	899	378	310	7
	Aug	318	234	541	6
	Sep	171	163	699	7
	Oct	160	153	700	10
	Nov	205	180	646	9
	Dec	292	231	581	8
	TOTAL	4937	2888	430	87
	Jan	259	203	578	6
	Feb	249	182	539	7
	Mar	294	242	606	3
	Apr	310	272	647	4
	May	765	369	354	2
	Jun	658	300	336	2
1976	Jul	281	179	467	5
	Aug	206	170	604	5
	Sep	185	149	591	4
	Oct	214	168	577	5
	Nov	219	174	583	1
	Dec	226	171	558	1
	TOTAL	3866	2579	491	45
	Jan	237	178	552	3
	Feb	200	164	603	2
	Mar	287	217	556	4
	Apr	266	187	517	4
	May	347	209	442	4
	Jun	262	150	420	5
1977	Jul	183	158	635	6
	Aug	170	150	649	6
	Sep	140	120	626	5
	Oct	117	106	668	10
	Nov	116	103	653	3
	Dec	118	108	671	5
	TOTAL	2443	1849	556	57
	Jan	126	108	633	5
	Feb	125	107	633	5
	Mar	248	218	647	7
	Apr	374	252	495	4
	May	686	302	324	7
	Jun	1074	350	240	7
1978	Jul	483	211	321	5
	Aug	173	123	522	5
	Sep	139	117	622	6
	Oct	141	123	642	6
	Nov	184	169	675	5
	Dec	177	168	697	2
	TOTAL	3930	2248	421	64
	Jan	183	150	602	0
	Feb	167	132	581	1
	Mar	346	319	679	1
	Apr	518	428	608	3
	May	950	419	324	4
	Jun	942	329	257	4
1979	Jul	403	195	356	3
	Aug	214	170	584	4
	Sep	150	125	615	5
	Oct	151	134	655	5
	Nov	181	155	630	2
	Dec	167	143	629	3
	TOTAL	4369	2699	454	35
	Jan	206	168	600	1
	Feb	305	241	582	0
	Mar	268	244	669	2
	Apr	350	261	548	5
	May	1040	460	325	5
	Jun	1012	366	266	5
1980	Jul	312	181	426	7
	Aug	143	119	614	5
	Sep	183	176	706	5
	Oct	187	173	680	6
	Nov	193	168	637	5
	Dec	174	148	623	4
	TOTAL	4373	2703	455	50
	Jan	137	128	686	3
	Feb	157	134	629	2
	Mar	170	159	688	2
	Apr	214	174	597	7
	May	356	196	406	5
	Jun	458	188	301	4
1981	Jul	159	127	586	8
	Aug	121	107	650	3
	Sep	174	154	651	6
	Oct	228	168	540	30
	Nov	163	130	589	30
	Dec	163	131	592	30
	TOTAL	2500	1796	528	130
	Jan	140	118	616	31
	Feb	214	154	529	27
	Mar	272	213	578	9
	Apr	357	250	515	5
	May	842	353	308	6
	Jun	898	318	261	4
1982	Jul	482	217	331	7
	Aug	230	170	542	7
	Sep	267	210	578	7
	Oct	474	318	493	8
	Nov	380	269	521	4
	Dec	333	219	483	8
	TOTAL	4889	2808	422	123
	Jan	224	161	530	6
	Feb	257	187	534	2
	Mar	442	326	541	6
	Apr	420	303	530	6
	May	961	501	384	6
	Jun	2258	883	288	5
1983	Jul	1360	615	333	7
	Aug	577	372	473	5
	Sep	357	257	528	5
	Oct	448	277	454	31
	Nov	372	239	473	30
	Dec	339	226	490	31
	TOTAL	8015	4345	399	140

Table 6

Colorado River Basin

Historical Flow and Quality of Water Data

GREEN RIVER AT GREEN RIVER, UTAH

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	4608	3112	.68	497	70	100.0	0.0	16.2
1942	4622	3060	.66	487	70	100.0	0.0	16.2
1943	4294	2459	.57	421	48	75.0	2.0	18.0
1944	4421	2643	.60	440	24	0.0	2.3	19.0
1945	4260	2488	.58	430	36	0.0	2.4	19.7
1946	3519	2127	.60	445	36	0.0	1.7	16.9
1947	5522	2983	.54	397	36	0.0	1.8	19.9
1948	3928	2219	.57	415	36	0.0	1.9	19.0
1949	5129	2976	.58	427	41	0.0	2.0	20.2
1950	5478	3181	.58	427	65	6.2	1.8	15.5
1951	4738	2727	.58	423	89	4.5	1.7	18.2
1952	6712	4067	.61	446	99	5.1	1.8	18.9
1953	3333	2170	.65	479	96	31.3	1.9	22.5
1954	2638	1787	.68	498	94	63.8	2.9	20.9
1955	2791	1731	.62	456	104	56.7	2.7	22.0
1956	4021	2001	.50	366	110	27.3	2.7	24.5
1957	5807	2989	.51	379	91	0.0	2.2	24.4
1958	4212	2290	.54	400	72	0.0	2.3	26.1
1959	2884	1765	.61	450	55	0.0	2.9	27.1
1960	2864	1572	.55	404	61	0.0	2.5	33.3
1961	2265	1483	.65	482	71	32.4	2.5	34.7
1962	5600	2978	.53	391	77	62.3	3.4	41.9
1963	1576	1319	.84	615	74	89.2	3.4	37.0
1964	3242	2066	.64	469	74	59.5	4.4	34.4
1965	5211	3191	.61	450	70	27.1	4.1	23.9
1966	2966	2257	.76	560	97	1.0	3.4	23.2
1967	4227	3129	.74	544	112	0.0	3.6	26.8
1968	4589	3069	.67	492	137	0.0	4.0	23.7
1969	5022	3420	.68	501	109	.9	6.5	22.9
1970	3984	2425	.61	448	81	1.2	6.6	19.2
1971	4319	2555	.59	435	44	2.3	7.2	18.7
1972	4182	2571	.61	452	38	0.0	4.3	19.9
1973	5193	3229	.62	457	37	0.0	4.9	16.8
1974	4410	2650	.60	442	38	0.0	7.0	14.2
1975	4937	2888	.59	430	38	0.0	7.0	13.0
1976	3866	2579	.67	491	37	0.0	7.2	16.7
1977	2443	1849	.76	556	35	0.0	6.8	20.6
1978	3930	2248	.57	421	34	0.0	7.3	24.9
1979	4369	2699	.62	454	32	0.0	7.1	25.1
1980	4373	2703	.62	455	33	0.0	6.2	23.4
1981	2500	1796	.72	528	29	0.0	7.6	23.3
1982	4889	2808	.57	422	30	0.0	6.8	20.2
1983	8015	4345	.54	399	37	0.0	7.0	20.2
Total	181893	110608						
Average	4230	2572	.61	447				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 7 – Colorado River Basin – Historical Flow and Quality of Water Data

SAN RAFAEL RIVER NEAR GREEN RIVER, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	2	8	2941	*
	Feb	2	8	2941	*
	Mar	6	21	2574	*
	Apr	1	4	2941	*
	May	50	62	912	*
	Jun	49	59	885	*
1941	Jul	7	20	2101	*
	Aug	6	20	2451	*
	Sep	2	9	3309	*
	Oct	5	20	2941	*
	Nov	5	21	3088	*
	Dec	4	16	2941	*
	TOTAL	139	268	1418	0
	Jan	6	17	2083	*
	Feb	5	18	2647	*
	Mar	6	22	2696	*
	Apr	14	39	2048	*
	May	34	49	1060	*
	Jun	51	61	880	*
1942	Jul	6	18	2206	*
	Aug	6	19	2328	*
	Sep	1	5	3677	*
	Oct	2	10	3677	*
	Nov	3	14	3431	*
	Dec	3	14	3431	*
	TOTAL	137	286	1535	0
	Jan	4	12	2206	*
	Feb	5	17	2500	*
	Mar	6	23	2819	*
	Apr	15	44	2157	*
	May	13	27	1527	*
	Jun	14	28	1471	*
1943	Jul	2	7	2574	*
	Aug	6	19	2328	*
	Sep	1	5	3677	*
	Oct	2	10	3677	*
	Nov	2	10	3677	*
	Dec	3	11	2696	*
	TOTAL	73	213	2145	0
	Jan	2	7	2574	*
	Feb	3	9	2206	*
	Mar	6	21	2574	*
	Apr	1	5	3677	*
	May	40	53	974	*
	Jun	72	78	797	*
1944	Jul	9	26	2124	*
	Aug	7	22	2311	*
	Sep	1	5	3677	*
	Oct	2	10	3677	*
	Nov	3	14	3431	*
	Dec	3	13	3186	*
	TOTAL	149	263	1298	0

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	3	10	2451	*
	Feb	3	12	2941	*
	Mar	6	21	2574	*
	Apr	1	6	4412	*
	May	22	35	1170	*
	Jun	27	41	1117	*
1945	Jul	6	19	2328	*
	Aug	7	24	2521	*
	Sep	2	8	2941	*
	Oct	3	15	3677	*
	Nov	3	14	3431	*
	Dec	2	9	3309	*
	TOTAL	85	214	1851	0
	Jan	2	8	2941	*
	Feb	4	13	2390	*
	Mar	6	22	2696	*
	Apr	11	35	2340	*
	May	20	36	1324	*
	Jun	8	19	1746	*
1946	Jul	1	4	2941	*
	Aug	7	38	3992	*
	Sep	0	0	0	0
	Oct	3	10	2878	31
	Nov	5	15	2401	30
	Dec	4	13	2668	31
	TOTAL	70	213	2246	92
	Jan	2	10	3108	31
	Feb	5	17	2276	28
	Mar	4	14	2576	31
	Apr	3	12	2731	30
	May	33	56	1242	31
	Jun	26	47	1344	30
1947	Jul	5	15	2421	31
	Aug	20	34	1280	31
	Sep	3	11	2791	30
	Oct	2	9	3243	31
	Nov	3	13	2663	30
	Dec	4	14	2536	31
	TOTAL	110	251	1673	365
	Jan	3	12	2805	27
	Feb	6	18	2099	20
	Mar	7	25	2566	4
	Apr	4	14	2705	2
	May	17	25	1092	3
	Jun	13	27	1512	2
1948	Jul	2	8	3183	9
	Aug	5	12	1669	6
	Sep	0	0	0	0
	Oct	0.9	5	3892	25
	Nov	2	8	3481	27
	Dec	2	9	3208	23
	TOTAL	62	163	1927	148

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	2	9	3293	23
	Feb	2	9	2738	14
	Mar	9	28	2302	7
	Apr	10	22	1624	6
	May	30	38	931	6
	Jun	52	62	887	7
1949	Jul	14	34	1860	9
	Aug	5	15	2316	1
	Sep	3	11	3099	6
	Oct	3	12	3124	31
	Nov	3	13	3018	30
	Dec	2	11	3373	31
	TOTAL	135	265	1447	171
	Jan	2	11	3445	31
	Feb	6	18	2123	28
	Mar	5	17	2356	31
	Apr	3	13	2937	30
	May	9	21	1759	31
	Jun	10	24	1671	30
1950	Jul	9	20	1709	31
	Aug	0.6	5	5763	29
	Sep	1	5	3901	22
	Oct	1	7	5009	31
	Nov	2	12	3995	14
	Dec	3	13	3393	9
	TOTAL	53	166	2321	317
	Jan	2	12	3449	9
	Feb	3	11	2868	5
	Mar	2	11	3745	10
	Apr	1	8	4807	0
	May	15	29	1459	0
	Jun	23	37	1164	0
1951	Jul	3	11	3035	2
	Aug	12	26	1612	5
	Sep	1	6	3905	2
	Oct	6	22	2920	1
	Nov	4	17	3390	7
	Dec	3	14	3571	4
	TOTAL	75	205	2021	45
	Jan	3	12	3055	11
	Feb	5	18	2546	9
	Mar	14	40	2139	6
	Apr	24	58	1758	3
	May	93	83	663	8
	Jun	128	116	670	7
1952	Jul	20	36	1372	5
	Aug	12	35	2161	7
	Sep	5	19	2876	3
	Oct	3	17	3566	4
	Nov	4	17	3604	7
	Dec	4	16	2872	7
	TOTAL	314	467	1095	77

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	6	18	2373	13
	Feb	7	22	2400	9
	Mar	6	19	2439	23
	Apr	3	15	3246	6
	May	.2	12	3823	7
	Jun	31	43	1025	4
1953	Jul	5	19	2721	3
	Aug	9	30	2552	5
	Sep	2	7	3540	2
	Oct	4	16	3341	10
	Nov	4	17	3082	7
	Dec	3	13	3128	10
	TOTAL	81	231	2108	99
	Jan	4	12	2460	6
	Feb	5	18	2410	5
	Mar	4	15	3081	11
	Apr	3	12	3074	5
	May	8	20	1932	6
	Jun	1	6	3284	8
1954	Jul	1	6	3574	2
	Aug	0.7	3	3463	4
	Sep	4	14	2678	8
	Oct	2	9	2878	4
	Nov	2	9	3842	1
	Dec	2	11	3356	0
	TOTAL	36	134	2705	60
	Jan	2	8	2682	0
	Feb	2	7	2520	2
	Mar	6	20	2277	10
	Apr	3	11	3150	0
	May	4	11	2207	1
	Jun	6	15	1929	0
1955	Jul	0.3	2	4045	13
	Aug	3	10	2554	11
	Sep	0	0	0	0
	Oct	0.2	1	5211	25
	Nov	1	5	3963	2
	Dec	2	9	3104	4
	TOTAL	29	99	2514	68
	Jan	3	11	2590	1
	Feb	3	10	2495	1
	Mar	3	10	2686	13
	Apr	1	7	3780	9
	May	12	18	1168	3
	Jun	8	15	1364	8
1956	Jul	0.9	4	3343	4
	Aug	0.7	3	2896	18
	Sep	0	0	0	0
	Oct	0.1	0	5425	5
	Nov	0.8	5	4617	3
	Dec	1	5	3860	1
	TOTAL	33	87	1958	66

* See 'Notes' preceding Table 1.

Table 7 – Colorado River Basin – Historical Flow and Quality of Water Data

SAN RAFAEL RIVER NEAR GREEN RIVER, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	2	6	2901	2
	Feb	4	13	2520	9
	Mar	3	12	3540	3
	Apr	1	8	4057	1
	May	9	28	2339	1
	Jun	94	76	588	4
1957	Jul	24	37	1128	3
	Aug	13	35	1987	1
	Sep	4	13	2351	3
	Oct	10	32	2329	0
	Nov	21	51	1777	10
	Dec	5	16	2357	20
	TOTAL	189	325	1263	57
	Jan	4	14	2250	9
	Feb	8	20	1928	18
	Mar	6	20	2474	5
	Apr	13	22	1204	3
	May	66	65	733	12
	Jun	57	54	701	5
1958	Jul	2	8	2678	2
	Aug	4	16	2770	2
	Sep	4	15	2616	1
	Oct	1	7	3883	4
	Nov	2	9	2682	22
	Dec	4	13	2512	9
	TOTAL	172	262	1122	92
	Jan	3	10	2695	1
	Feb	4	12	2259	1
	Mar	3	12	3064	2
	Apr	2	7	3262	1
	May	1	5	3615	8
	Jun	2	7	2507	8
1959	Jul	0.1	1	4456	23
	Aug	0.6	3	2889	20
	Sep	1	4	2349	15
	Oct	0.7	4	3856	16
	Nov	2	7	2982	14
	Dec	1	6	3079	20
	TOTAL	20	77	2825	129
	Jan	1	6	3279	3
	Feb	2	7	2616	3
	Mar	8	22	2149	3
	Apr	3	10	2405	1
	May	8	17	1634	6
	Jun	11	18	1167	2
1960	Jul	0.1	1	3892	16
	Aug	0	0	0	0
	Sep	1	3	1809	9
	Oct	8	19	1834	12
	Nov	2	9	3110	5
	Dec	2	7	2870	16
	TOTAL	46	119	1913	76

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	2	7	2708	3
	Feb	3	8	2361	2
	Mar	2	11	3354	2
	Apr	2	8	3270	2
	May	3	9	2246	0
	Jun	2	6	2135	11
1961	Jul	0	0	0	0
	Aug	7	19	1994	5
	Sep	18	51	2037	2
	Oct	3	11	2670	5
	Nov	4	13	2657	6
	Dec	2	8	2863	5
	TOTAL	48	153	2334	43
	Jan	2	8	2525	3
	Feb	8	19	1807	10
	Mar	6	17	2220	4
	Apr	11	18	1168	10
	May	29	33	853	3
	Jun	37	44	883	10
1962	Jul	7	18	1755	8
	Aug	0.8	4	3519	7
	Sep	3	8	1813	25
	Oct	4	17	2942	6
	Nov	2	11	3525	6
	Dec	2	11	3563	4
	TOTAL	113	208	1354	96
	Jan	2	10	3755	7
	Feb	4	13	2382	5
	Mar	2	11	3757	5
	Apr	0.9	5	4213	11
	May	6	13	1575	14
	Jun	10	22	1604	7
1963	Jul	0.5	2	2853	18
	Aug	9	20	1578	15
	Sep	6	22	2497	11
	Oct	1	6	3545	11
	Nov	2	7	3424	14
	Dec	2	8	3474	10
	TOTAL	46	140	2235	128
	Jan	1	6	3016	7
	Feb	2	8	2525	6
	Mar	3	11	2605	8
	Apr	1	7	3737	6
	May	15	29	1387	10
	Jun	20	34	1264	11
1964	Jul	4	12	2330	8
	Aug	6	19	2241	7
	Sep	1	4	2049	5
	Oct	0.1	1	4913	10
	Nov	1	6	3740	12
	Dec	3	11	2617	7
	TOTAL	59	148	1834	97

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	4	12	2579	4
	Feb	3	10	2431	1
	Mar	3	11	2606	7
	Apr	6	15	2055	4
	May	18	28	1169	8
	Jun	77	80	766	12
1965	Jul	38	55	1064	8
	Aug	16	33	1520	17
	Sep	5	17	2500	14
	Oct	4	16	2856	9
	Nov	5	20	3119	8
	Dec	5	15	2172	7
	TOTAL	183	314	1260	99
	Jan	3	10	2496	10
	Feb	3	10	2158	7
	Mar	8	25	2177	8
	Apr	4	12	1958	7
	May	4	16	2712	11
	Jun	2	7	3079	16
1966	Jul	2	8	3381	10
	Aug	0.6	3	3552	31
	Sep	2	5	2145	28
	Oct	1	7	3391	17
	Nov	1	4	2050	3
	Dec	2	9	2664	3
	TOTAL	34	115	2446	151
	Jan	1	5	3285	2
	Feb	2	7	2651	3
	Mar	2	9	3196	4
	Apr	0.7	4	3890	4
	May	5	14	1888	5
	Jun	22	44	1467	4
1967	Jul	7	19	2088	11
	Aug	3	9	2274	2
	Sep	5	16	2312	5
	Oct	2	9	3160	11
	Nov	2	9	3025	10
	Dec	2	9	3616	2
	TOTAL	54	155	2090	63
	Jan	2	7	3309	3
	Feb	2	9	2839	8
	Mar	3	13	3559	3
	Apr	2	11	3236	5
	May	6	21	2580	4
	Jun	25	33	952	2
1968	Jul	6	20	2398	3
	Aug	11	33	2167	5
	Sep	4	15	2805	2
	Oct	5	22	2962	6
	Nov	3	10	2808	7
	Dec	2	10	3193	5
	TOTAL	72	203	2079	53

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	3	12	2658	3
	Feb	3	10	2514	0
	Mar	9	30	2577	2
	Apr	13	23	1323	5
	May	38	39	756	4
	Jun	32	46	1041	5
1969	Jul	8	20	1909	1
	Aug	9	29	2358	7
	Sep	6	21	2393	7
	Oct	4	14	2435	31
	Nov	4	13	2553	30
	Dec	4	13	2555	31
	TOTAL	132	268	1494	126
	Jan	2	9	3325	31
	Feb	4	12	2404	28
	Mar	2	10	3046	31
	Apr	2	9	3326	30
	May	14	24	1329	31
	Jun	48	57	882	30
1970	Jul	9	21	1783	23
	Aug	4	12	2423	26
	Sep	4	12	2284	30
	Oct	3	12	2564	31
	Nov	3	11	2672	25
	Dec	3	11	2737	27
	TOTAL	97	201	1519	343
	Jan	2	7	3310	27
	Feb	2	8	2949	24
	Mar	3	12	2641	25
	Apr	3	10	2695	22
	May	4	14	2467	23
	Jun	5	13	1819	8
1971	Jul	5	18	2385	6
	Aug	4	13	2302	25
	Sep	2	9	2868	22
	Oct	5	17	2340	27
	Nov	4	14	2521	26
	Dec	2	8	3147	27
	TOTAL	42	143	2486	262
	Jan	2	9	3115	27
	Feb	3	11	2680	25
	Mar	3	12	2700	27
	Apr	2	7	3361	24
	May	2	9	3152	18
	Jun	3	13	3017	7
1972	Jul	1	6	3093	15
	Aug	1	5	3870	23
	Sep	0.8	4	3940	22
	Oct	9	21	1721	26
	Nov	4	13	2670	25
	Dec	2	8	3205	27
	TOTAL	33	118	2660	266

Table 7 - Colorado River Basin - Historical Flow and Quality of Water Data

SAN RAFAEL RIVER NEAR GREEN RIVER, UTAH

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	2	7	3150	6
	Feb	2	8	2259	4
	Mar	18	56	2340	7
	Apr	4	16	2582	7
	May	29	32	817	6
	Jun	51	61	869	7
1973	Jul	10	27	2045	6
	Aug	4	15	2502	8
	Sep	4	14	2545	5
	Oct	5	16	2470	9
	Nov	3	14	3166	7
	Dec	2	11	3347	6
	TOTAL	135	276	1506	78
	Jan	2	9	3271	6
	Feb	2	8	3119	5
	Mar	3	13	3170	10
	Apr	2	9	3223	7
	May	3	13	2793	7
	Jun	4	14	2411	5
1974	Jul	5	19	2835	10
	Aug	3	10	2811	6
	Sep	2	9	2890	7
	Oct	5	18	2926	8
	Nov	4	19	3188	7
	Dec	2	9	3717	6
	TOTAL	37	150	2965	84
	Jan	2	8	3619	6
	Feb	2	9	2952	9
	Mar	3	13	3168	7
	Apr	2	7	3035	15
	May	3	12	2955	7
	Jun	31	45	1050	19
1975	Jul	28	44	1173	15
	Aug	5	15	2190	24
	Sep	5	15	2094	23
	Oct	4	14	2556	25
	Nov	3	12	2785	22
	Dec	2	8	3065	23
	TOTAL	90	202	1648	195
	Jan	1	6	3179	23
	Feb	3	11	2854	21
	Mar	1	6	3168	23
	Apr	0.9	4	3359	29
	May	2	10	3235	12
	Jun	2	9	2888	18
1976	Jul	2	7	2989	20
	Aug	1	6	3163	22
	Sep	2	7	2979	30
	Oct	2	8	3114	24
	Nov	2	7	3190	21
	Dec	1	6	3221	23
	TOTAL	21	87	3083	266
	Jan	1	5	3260	24
	Feb	1	5	3189	21
	Mar	2	6	3169	23
	Apr	0.4	2	3507	23
	May	0.2	1	4064	23
	Jun	0.1	0	4190	23
1977	Jul	3	9	2597	21
	Aug	2	7	2416	22
	Sep	0.9	3	2743	29
	Oct	0.3	1	3233	27
	Nov	0.3	2	3569	25
	Dec	0.7	3	3396	26
	TOTAL	12	46	2942	287
	Jan	0.9	4	3183	28
	Feb	1	5	2792	22
	Mar	5	18	2659	25
	Apr	1	4	3309	24
	May	1	6	3150	25
	Jun	22	53	1781	22
1978	Jul	8	27	2350	26
	Aug	0.9	4	3071	23
	Sep	0.4	2	3316	24
	Oct	5	15	2224	25
	Nov	12	31	1938	25
	Dec	1	6	2850	25
	TOTAL	59	175	2159	294
	Jan	1	5	2875	30
	Feb	2	7	2594	28
	Mar	14	37	1896	25
	Apr	5	17	2361	25
	May	5	14	2013	23
	Jun	24	50	1492	23
1979	Jul	4	12	2237	24
	Aug	3	9	2438	26
	Sep	1	5	2756	22
	Oct	2	9	2758	27
	Nov	2	9	2555	23
	Dec	2	7	3019	27
	TOTAL	67	181	1978	303
	Jan	3	11	2547	30
	Feb	9	23	1993	24
	Mar	6	19	2506	25
	Apr	3	11	2508	24
	May	14	35	1783	24
	Jun	71	102	1061	23
1980	Jul	16	36	1595	25
	Aug	5	15	2303	26
	Sep	12	27	1607	24
	Oct	8	21	1907	25
	Nov	5	15	2306	24
	Dec	3	11	2576	26
	TOTAL	155	327	1545	300
	Jan	3	10	2761	26
	Feb	3	10	2595	27
	Mar	3	12	2625	26
	Apr	2	7	3120	26
	May	1	7	3482	24
	Jun	1	6	3208	22
1981	Jul	2	9	2736	25
	Aug	2	9	2709	26
	Sep	8	20	1827	28
	Oct	6	14	1768	30
	Nov	3	9	2659	29
	Dec	2	8	3133	31
	TOTAL	37	122	2435	320
	Jan	2	8	3020	30
	Feb	4	10	2129	27
	Mar	4	12	2287	23
	Apr	3	10	2380	24
	May	8	16	1570	24
	Jun	32	36	829	23
1982	Jul	17	26	1121	24
	Aug	9	19	1606	25
	Sep	10	19	1451	23
	Oct	7	17	1747	24
	Nov	4	13	2206	23
	Dec	3	12	2481	27
	TOTAL	103	199	1426	297
	Jan	4	11	2303	30
	Feb	9	18	1483	24
	Mar	14	23	1240	28
	Apr	22	27	915	25
	May	27	32	866	25
	Jun	165	83	372	24
1983	Jul	59	45	556	26
	Aug	15	25	1213	25
	Sep	11	22	1445	25
	Oct	12	21	1271	31
	Nov	4	12	2267	30
	Dec	20	26	969	31
	TOTAL	362	346	703	324

Table 7

Colorado River Basin

Historical Flow and Quality of Water Data

SAN RAFAEL RIVER NEAR GREEN RIVER, UTAH

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	139	268	1.93	1418	*			
1942	137	286	2.09	1535	*			
1943	73	213	2.92	2145	*			
1944	149	263	1.77	1298	*			
1945	85	214	2.52	1851	*			
1946	70	213	3.05	2246	*			
1947	110	251	2.28	1673	66	0.0	2.9	29.6
1948	62	163	2.62	1927	66	0.0	2.9	29.6
1949	135	265	1.97	1447	55	0.0	2.7	28.2
1950	53	166	3.16	2321	61	0.0	2.2	18.7
1951	75	205	2.75	2021	75	0.0	2.5	25.1
1952	314	467	1.49	1095	113	0.0	2.7	22.8
1953	81	231	2.87	2108	122	0.0	3.0	29.7
1954	36	134	3.68	2705	119	0.0	2.7	26.5
1955	29	99	3.42	2514	112	0.0	2.6	25.3
1956	33	87	2.66	1959	107	0.0	2.1	24.8
1957	189	325	1.72	1263	94	0.0	2.3	25.3
1958	172	262	1.53	1122	83	0.0	2.9	32.1
1959	20	77	3.84	2825	75	0.0	3.2	33.2
1960	46	119	2.60	1913	83	0.0	3.4	29.8
1961	48	153	3.17	2334	108	38.9	3.5	33.4
1962	113	208	1.84	1354	115	64.3	4.2	36.3
1963	46	140	3.04	2235	115	94.8	4.8	37.7
1964	59	148	2.49	1834	106	63.2	5.9	36.9
1965	183	314	1.71	1260	122	28.7	5.7	31.8
1966	34	115	3.33	2446	154	0.0	4.4	28.7
1967	54	155	2.84	2090	162	0.0	5.6	28.2
1968	72	203	2.83	2079	173	0.0	6.0	31.2
1969	132	268	2.03	1494	116	0.0	6.5	31.8
1970	97	201	2.07	1519	77	0.0	5.7	29.8
1971	42	143	3.38	2486	27	0.0	4.1	25.1
1972	33	118	3.62	2660	32	0.0	4.1	27.2
1973	135	276	2.05	1506	37	0.0	4.5	25.3
1974	37	150	4.03	2965	36	0.0	8.2	26.9
1975	90	202	2.24	1648	33	0.0	8.0	19.5
1976	21	87	4.19	3083	37	0.0	8.9	26.5
1977	12	46	4.00	2942	42	0.0	7.1	23.1
1978	59	175	2.94	2159	40	0.0	7.5	27.1
1979	67	181	2.69	1978	36	0.0	5.5	32.5
1980	155	327	2.10	1545	32	0.0	4.5	27.3
1981	37	122	3.31	2435	33	3.0	4.4	24.7
1982	103	199	1.94	1426	33	3.0	6.0	23.5
1983	362	346	.96	703	29	3.4	5.7	21.1
Total	3998	8583						
Average	93	200	2.15	1579				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 8 – Colorado River Basin – Historical Flow and Quality of Water Data

COLORADO RIVER NEAR GLENWOOD SPRINGS, COLORADO

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	36	27	552	*
	Feb	37	22	437	*
	Mar	51	30	433	*
	Apr	85	40	346	*
	May	535	118	162	*
	Jun	470	90	141	*
1941	Jul	163	60	271	*
	Aug	84	50	438	*
	Sep	67	40	439	*
	Oct	78	44	414	0
	Nov	59	36	451	0
	Dec	48	34	516	22
	TOTAL	1713	591	254	22
	Jan	43	31	541	0
	Feb	41	29	518	0
	Mar	46	31	499	0
	Apr	167	67	294	0
	May	389	90	170	0
	Jun	722	107	109	0
1942	Jul	230	64	204	0
	Aug	78	41	386	0
	Sep	46	34	548	0
	Oct	53	38	535	0
	Nov	49	36	534	0
	Dec	40	33	608	0
	TOTAL	1903	602	232	0
	Jan	37	32	629	0
	Feb	36	29	586	0
	Mar	48	35	532	0
	Apr	162	52	237	0
	May	342	71	153	0
	Jun	582	102	129	0
1943	Jul	253	70	203	0
	Aug	109	49	332	0
	Sep	66	40	450	0
	Oct	60	39	480	0
	Nov	67	34	375	1
	Dec	64	34	393	0
	TOTAL	1827	588	237	1
	Jan	37	29	565	6
	Feb	44	29	479	0
	Mar	50	36	531	0
	Apr	85	42	368	2
	May	302	75	182	0
	Jun	498	81	120	0
1944	Jul	185	54	217	0
	Aug	72	35	361	1
	Sep	45	32	517	0
	Oct	60	38	462	0
	Nov	57	34	445	0
	Dec	59	32	399	2
	TOTAL	1494	518	255	11
	Jan	41	28	502	0
	Feb	37	25	495	0
	Mar	62	31	365	0
	Apr	72	36	372	0
	May	347	75	160	0
	Jun	461	80	128	0
1945	Jul	268	69	190	0
	Aug	180	58	235	0
	Sep	73	38	385	8
	Oct	78	37	346	0
	Nov	73	32	324	0
	Dec	71	31	325	0
	TOTAL	1763	541	226	8
	Jan	67	32	350	0
	Feb	54	29	390	0
	Mar	64	35	399	0
	Apr	198	53	198	0
	May	284	62	161	0
	Jun	362	75	153	0
1946	Jul	164	57	257	2
	Aug	83	42	369	0
	Sep	59	37	455	1
	Oct	70	42	446	0
	Nov	61	34	416	0
	Dec	77	30	282	0
	TOTAL	1542	528	252	3
	Jan	52	31	444	0
	Feb	54	34	460	0
	Mar	68	35	375	1
	Apr	123	45	270	0
	May	486	89	134	0
	Jun	606	106	129	0
1947	Jul	438	90	152	0
	Aug	147	55	277	0
	Sep	79	41	379	0
	Oct	89	41	336	0
	Nov	80	37	340	0
	Dec	75	34	339	0
	TOTAL	2298	639	205	1
	Jan	76	33	313	0
	Feb	72	31	322	0
	Mar	68	32	344	0
	Apr	162	55	251	0
	May	543	100	135	0
	Jun	470	86	134	0
1948	Jul	156	55	259	0
	Aug	90	44	358	0
	Sep	57	36	474	1
	Oct	63	39	459	0
	Nov	66	34	379	0
	Dec	59	35	435	0
	TOTAL	1881	580	227	1
	Jan	67	36	395	0
	Feb	56	31	414	0
	Mar	58	35	440	0
	Apr	132	48	268	0
	May	365	80	161	0
	Jun	654	121	136	0
1949	Jul	356	84	174	0
	Aug	106	47	324	0
	Sep	69	40	426	0
	Oct	61	41	490	0
	Nov	55	37	498	0
	Dec	58	36	451	0
	TOTAL	2036	634	229	0
	Jan	56	35	460	0
	Feb	54	30	406	0
	Mar	80	35	322	0
	Apr	141	48	249	0
	May	259	69	195	1
	Jun	429	86	148	0
1950	Jul	137	57	305	0
	Aug	80	39	362	1
	Sep	66	37	414	0
	Oct	49	36	544	0
	Nov	53	33	462	0
	Dec	56	33	439	0
	TOTAL	1458	538	271	2
	Jan	59	32	397	0
	Feb	58	28	357	0
	Mar	58	31	396	1
	Apr	104	40	281	0
	May	381	80	154	0
	Jun	536	98	134	0
1951	Jul	285	69	179	0
	Aug	132	55	306	1
	Sep	77	43	413	0
	Oct	75	43	420	0
	Nov	63	35	407	0
	Dec	63	32	366	1
	TOTAL	1891	586	228	3
	Jan	53	31	435	0
	Feb	47	28	447	0
	Mar	63	31	366	0
	Apr	194	69	260	0
	May	597	122	150	0
	Jun	785	141	132	0
1952	Jul	245	79	238	2
	Aug	157	74	347	3
	Sep	99	51	378	0
	Oct	77	44	425	0
	Nov	66	40	445	0
	Dec	60	35	425	0
	TOTAL	2443	745	224	5
	Jan	64	36	421	0
	Feb	53	30	409	0
	Mar	68	37	405	0
	Apr	103	48	343	0
	May	229	69	220	0
	Jun	509	98	142	0
1953	Jul	171	68	293	3
	Aug	121	58	355	0
	Sep	69	40	433	0
	Oct	64	40	459	0
	Nov	55	40	535	0
	Dec	58	37	471	0
	TOTAL	1562	601	283	3
	Jan	62	36	429	0
	Feb	48	29	440	0
	Mar	62	36	424	0
	Apr	86	38	323	0
	May	146	48	240	0
	Jun	89	45	372	0
1954	Jul	83	46	405	1
	Aug	74	43	429	0
	Sep	59	36	454	1
	Oct	58	38	479	0
	Nov	49	33	505	0
	Dec	40	35	653	0
	TOTAL	855	463	398	2
	Jan	38	29	569	0
	Feb	34	28	597	0
	Mar	43	33	563	0
	Apr	90	41	334	1
	May	206	56	198	0
	Jun	217	68	231	0
1955	Jul	100	55	404	0
	Aug	86	55	475	1
	Sep	67	39	424	0
	Oct	61	38	458	2
	Nov	55	36	487	0
	Dec	55	32	431	0
	TOTAL	1051	510	357	4
	Jan	52	30	430	0
	Feb	48	26	396	0
	Mar	69	40	432	0
	Apr	120	49	303	0
	May	422	101	175	0
	Jun	330	76	169	0
1956	Jul	104	54	384	1
	Aug	82	49	435	1
	Sep	73	37	378	0
	Oct	66	37	409	0
	Nov	50	36	531	1
	Dec	41	32	578	3
	TOTAL	1455	567	287	6

* See 'Notes' preceding Table 1.

Table 8 – Colorado River Basin – Historical Flow and Quality of Water Data

COLORADO RIVER NEAR GLENWOOD SPRINGS, COLORADO

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	46	32	513	0
	Feb	44	29	479	0
	Mar	51	33	476	0
	Apr	92	46	364	0
	May	350	101	212	2
	Jun	834	156	138	6
1957	Jul	571	120	155	0
	Aug	176	62	259	0
	Sep	88	47	392	0
	Oct	75	45	439	0
	Nov	72	42	426	0
	Dec	63	36	423	0
	TOTAL	2462	748	223	8
	Jan	62	33	397	0
	Feb	58	30	382	0
	Mar	73	38	387	1
	Apr	102	42	305	0
	May	546	106	143	0
	Jun	439	83	139	0
1958	Jul	104	49	348	1
	Aug	67	38	419	1
	Sep	62	35	411	0
	Oct	58	35	445	0
	Nov	54	35	480	0
	Dec	54	34	466	0
	TOTAL	1680	561	245	3
	Jan	63	33	387	0
	Feb	54	28	382	3
	Mar	49	30	445	0
	Apr	81	41	373	0
	May	252	65	190	0
	Jun	342	77	165	0
1959	Jul	126	58	335	0
	Aug	89	51	416	1
	Sep	73	41	413	1
	Oct	84	45	395	0
	Nov	69	38	402	0
	Dec	59	30	377	0
	TOTAL	1341	536	294	5
	Jan	67	32	353	0
	Feb	55	28	370	2
	Mar	93	42	333	0
	Apr	166	52	232	0
	May	288	71	181	0
	Jun	357	82	170	0
1960	Jul	122	56	339	0
	Aug	73	42	426	0
	Sep	67	39	428	1
	Oct	61	37	447	2
	Nov	56	33	442	3
	Dec	61	32	392	3
	TOTAL	1466	548	275	11

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	65	34	387	15
	Feb	56	29	381	0
	Mar	54	31	417	2
	Apr	66	34	375	0
	May	207	56	198	0
	Jun	203	56	204	1
1961	Jul	82	47	419	3
	Aug	80	46	428	0
	Sep	109	53	361	1
	Oct	128	54	310	0
	Nov	81	40	366	1
	Dec	77	40	377	20
	TOTAL	1209	521	317	43
	Jan	80	40	372	23
	Feb	91	42	337	20
	Mar	122	47	286	0
	Apr	347	103	218	0
	May	539	124	168	0
	Jun	455	103	166	0
1962	Jul	288	83	213	1
	Aug	110	53	356	0
	Sep	74	42	419	3
	Oct	127	55	317	0
	Nov	102	49	353	1
	Dec	72	41	420	24
	TOTAL	2407	782	239	72
	Jan	55	36	472	24
	Feb	53	33	460	22
	Mar	62	35	420	0
	Apr	81	38	349	1
	May	175	55	230	1
	Jun	122	55	333	0
1963	Jul	66	44	490	3
	Aug	77	44	423	2
	Sep	76	42	405	3
	Oct	63	39	454	3
	Nov	54	36	483	3
	Dec	38	31	597	24
	TOTAL	922	488	389	86
	Jan	36	30	608	25
	Feb	33	28	611	24
	Mar	39	29	534	6
	Apr	64	38	432	1
	May	210	63	222	3
	Jun	215	65	221	4
1964	Jul	99	59	441	1
	Aug	87	52	437	5
	Sep	72	43	437	4
	Oct	65	40	456	3
	Nov	50	34	508	5
	Dec	51	34	500	23
	TOTAL	1021	514	370	104

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	51	35	494	25
	Feb	44	30	506	22
	Mar	49	34	503	2
	Apr	104	50	355	3
	May	263	76	213	2
	Jun	446	108	177	1
1965	Jul	271	82	221	3
	Aug	172	68	290	3
	Sep	95	49	375	3
	Oct	95	46	351	4
	Nov	85	43	371	4
	Dec	88	42	353	4
	TOTAL	1764	661	275	76
	Jan	78	38	358	2
	Feb	70	33	343	3
	Mar	91	40	326	2
	Apr	84	39	342	2
	May	186	54	214	0
	Jun	109	48	325	3
1966	Jul	89	45	372	3
	Aug	77	35	332	1
	Sep	68	36	383	2
	Oct	72	42	426	6
	Nov	55	35	468	1
	Dec	44	33	545	4
	TOTAL	1022	476	343	29
	Jan	49	32	472	2
	Feb	45	28	456	3
	Mar	67	39	422	1
	Apr	96	42	321	0
	May	185	55	218	0
	Jun	250	69	203	0
1967	Jul	139	62	327	2
	Aug	90	49	401	1
	Sep	83	47	420	1
	Oct	78	46	438	0
	Nov	69	38	403	1
	Dec	59	34	416	0
	TOTAL	1210	540	328	11
	Jan	52	30	425	0
	Feb	53	28	389	1
	Mar	62	33	396	1
	Apr	95	43	328	0
	May	171	53	230	1
	Jun	369	82	163	0
1968	Jul	133	60	333	1
	Aug	125	57	338	0
	Sep	79	41	383	1
	Oct	77	40	379	2
	Nov	67	35	385	2
	Dec	65	36	410	1
	TOTAL	1350	540	294	10

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	66	34	386	2
	Feb	56	30	398	0
	Mar	63	34	397	1
	Apr	131	48	272	1
	May	283	68	177	0
	Jun	260	73	205	1
1969	Jul	174	61	259	2
	Aug	93	45	357	1
	Sep	78	41	380	1
	Oct	94	49	385	1
	Nov	79	39	368	2
	Dec	71	35	367	1
	TOTAL	1448	559	284	13
	Jan	62	32	375	1
	Feb	65	32	362	1
	Mar	72	34	349	1
	Apr	95	39	300	1
	May	488	95	143	0
	Jun	471	95	149	0
1970	Jul	194	65	245	1
	Aug	109	47	319	1
	Sep	101	46	336	0
	Oct	108	48	325	31
	Nov	92	44	346	0
	Dec	69	33	352	2
	TOTAL	1927	610	233	39
	Jan	72	34	347	1
	Feb	72	33	344	0
	Mar	105	46	320	0
	Apr	174	53	223	0
	May	348	75	158	1
	Jun	519	96	136	1
1971	Jul	271	81	219	6
	Aug	121	52	314	0
	Sep	109	51	343	0
	Oct	90	44	355	0
	Nov	86	39	333	1
	Dec	72	38	384	10
	TOTAL	2038	640	231	20
	Jan	67	34	369	1
	Feb	62	29	347	0
	Mar	94	41	316	0
	Apr	116	39	248	0
	May	255	59	169	1
	Jun	355	75	155	0
1972	Jul	128	49	281	1
	Aug	97	41	309	2
	Sep	96	42	322	0
	Oct	92	40	321	0
	Nov	88	36	304	1
	Dec	74	35	353	2
	TOTAL	1524	520	251	8

Table 8 - Colorado River Basin - Historical Flow and Quality of Water Data

COLORADO RIVER NEAR GLENWOOD SPRINGS, COLORADO

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	68	32	344	1
	Feb	60	27	326	0
	Mar	74	32	320	0
	Apr	86	39	331	2
	May	352	73	152	0
	Jun	448	84	138	2
1973	Jul	315	73	171	1
	Aug	138	50	264	0
	Sep	89	38	315	0
	Oct	97	41	308	2
	Nov	90	38	313	0
	Dec	69	36	379	1
	TOTAL	1885	562	219	9
	Jan	68	35	385	0
	Feb	63	33	384	2
	Mar	93	42	330	0
	Apr	123	46	276	0
	May	486	87	132	0
	Jun	427	85	147	0
1974	Jul	199	69	255	1
	Aug	113	50	326	1
	Sep	97	43	329	2
	Oct	91	45	364	0
	Nov	78	41	389	0
	Dec	64	36	418	0
	TOTAL	1901	614	237	6
	Jan	64	35	402	0
	Feb	62	33	397	0
	Mar	74	40	393	0
	Apr	100	44	325	0
	May	213	59	205	0
	Jun	373	82	162	0
1975	Jul	273	74	200	1
	Aug	121	51	310	0
	Sep	84	40	350	0
	Oct	78	39	366	1
	Nov	72	36	361	0
	Dec	63	35	405	2
	TOTAL	1578	568	265	4
	Jan	62	34	400	2
	Feb	65	34	384	10
	Mar	84	39	339	3
	Apr	98	43	323	3
	May	227	58	189	2
	Jun	235	60	188	2
1976	Jul	116	52	330	2
	Aug	92	42	332	3
	Sep	85	38	325	4
	Oct	75	34	338	0
	Nov	61	30	362	0
	Dec	52	28	394	0
	TOTAL	1253	492	289	31
	Jan	51	28	410	0
	Feb	44	26	433	1
	Mar	44	29	480	1
	Apr	73	33	337	1
	May	96	39	297	2
	Jun	98	39	291	1
1977	Jul	82	38	338	0
	Aug	83	37	323	2
	Sep	76	35	335	0
	Oct	62	35	410	0
	Nov	46	30	482	0
	Dec	49	30	454	0
	TOTAL	804	398	364	8
	Jan	51	31	443	0
	Feb	48	28	425	0
	Mar	57	32	417	0
	Apr	102	42	302	0
	May	265	64	177	0
	Jun	470	86	134	0
1978	Jul	212	64	222	0
	Aug	100	45	330	0
	Sep	89	40	330	0
	Oct	86	42	360	0
	Nov	84	40	347	0
	Dec	61	34	411	0
	TOTAL	1625	547	247	0
	Jan	57	32	405	0
	Feb	54	30	401	0
	Mar	66	37	409	0
	Apr	99	45	336	0
	May	319	72	166	0
	Jun	463	88	139	0
1979	Jul	289	74	188	0
	Aug	119	52	323	0
	Sep	90	42	346	0
	Oct	94	45	354	0
	Nov	78	41	388	0
	Dec	71	39	401	0
	TOTAL	1798	596	244	0
	Jan	73	41	409	0
	Feb	67	35	384	0
	Mar	72	38	392	0
	Apr	104	43	303	0
	May	370	82	164	0
	Jun	462	82	130	0
1980	Jul	173	59	251	0
	Aug	103	45	321	0
	Sep	82	40	357	0
	Oct	69	37	392	0
	Nov	66	38	418	0
	Dec	64	36	411	0
	TOTAL	1706	575	248	0
	Jan	48	31	466	0
	Feb	37	25	502	0
	Mar	43	28	481	0
	Apr	68	32	346	0
	May	117	41	258	0
	Jun	163	49	223	0
1981	Jul	91	49	393	0
	Aug	84	36	318	0
	Sep	76	35	336	0
	Oct	63	33	390	0
	Nov	51	29	422	0
	Dec	45	28	453	0
	TOTAL	887	417	346	0
	Jan	49	29	430	0
	Feb	46	27	430	0
	Mar	56	32	418	0
	Apr	78	35	329	0
	May	233	60	188	0
	Jun	380	78	151	0
1982	Jul	223	64	210	0
	Aug	131	49	274	0
	Sep	98	41	307	0
	Oct	100	43	312	10
	Nov	76	34	325	0
	Dec	62	33	387	0
	TOTAL	1533	522	251	10
	Jan	63	31	364	0
	Feb	58	29	369	1
	Mar	67	34	373	9
	Apr	85	38	332	0
	May	283	72	188	0
	Jun	734	122	122	9
1983	Jul	539	101	138	18
	Aug	219	62	210	7
	Sep	112	45	293	5
	Oct	89	40	328	13
	Nov	91	38	310	0
	Dec	87	38	325	0
	TOTAL	2428	652	198	62

Table 8

Colorado River Basin

Historical Flow and Quality of Water Data

COLORADO RIVER NEAR GLENWOOD SPRINGS, COLORADO

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	1713	591	.34	254	*			
1942	1903	602	.32	232	108	0.0	2.3	10.4
1943	1827	588	.32	237	108	0.0	2.3	10.4
1944	1494	518	.35	255	111	0.0	2.3	10.6
1945	1763	541	.31	226	111	0.0	2.2	10.8
1946	1542	528	.34	252	110	0.0	2.1	10.1
1947	2298	639	.28	205	109	0.0	2.8	11.1
1948	1881	580	.31	227	109	0.0	2.9	10.7
1949	2036	634	.31	229	93	0.0	3.3	10.2
1950	1458	538	.37	271	93	0.0	3.3	10.5
1951	1891	586	.31	228	93	0.0	3.4	13.7
1952	2443	745	.31	224	104	0.0	3.6	12.9
1953	1562	601	.38	283	109	34.9	3.1	12.4
1954	855	463	.54	398	106	63.2	3.6	14.3
1955	1051	510	.49	357	114	58.8	2.8	17.6
1956	1455	567	.39	287	112	25.9	2.9	16.5
1957	2462	748	.30	223	96	0.0	2.8	14.7
1958	1680	561	.33	245	76	0.0	2.3	10.1
1959	1341	536	.40	294	56	0.0	1.9	10.5
1960	1466	548	.37	275	56	0.0	1.6	11.2
1961	1209	521	.43	317	58	34.5	2.3	11.9
1962	2407	782	.33	239	64	65.6	2.7	14.8
1963	922	488	.53	389	71	87.3	3.0	14.2
1964	1021	514	.50	370	71	84.5	3.2	12.9
1965	1764	661	.37	275	69	85.5	3.4	11.7
1966	1022	476	.47	343	83	88.0	3.2	10.3
1967	1210	540	.45	328	85	64.7	2.9	9.7
1968	1350	540	.40	294	78	43.6	2.6	10.0
1969	1448	559	.39	284	52	0.0	2.0	8.6
1970	1927	610	.32	233	41	0.0	2.8	9.4
1971	2038	640	.31	231	36	0.0	3.0	8.9
1972	1524	520	.34	251	35	0.0	2.8	8.5
1973	1885	562	.30	219	32	0.0	2.3	11.0
1974	1901	614	.32	237	30	0.0	3.9	11.9
1975	1578	568	.36	265	30	0.0	5.3	11.6
1976	1253	492	.39	289	32	0.0	5.5	10.0
1977	804	398	.49	364	33	0.0	5.5	10.8
1978	1625	547	.34	247	33	0.0	5.6	11.2
1979	1798	596	.33	244	61	0.0	4.5	8.9
1980	1706	575	.34	248	102	0.0	5.4	12.3
1981	887	417	.47	346	137	0.0	6.9	12.4
1982	1533	522	.34	251	149	0.0	7.6	11.5
1983	2428	652	.27	198	185	8.6	7.5	11.6
Total	69363	24416						
Average	1613	568	.35	259				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 9 - Colorado River Basin - Historical Flow and Quality of Water Data

COLORADO RIVER NEAR CAMEO, COLORADO

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	65	83	941	2
	Feb	67	81	897	2
	Mar	82	96	856	2
	Apr	133	110	608	1
	May	948	306	238	1
	Jun	803	223	205	1
1941	Jul	315	156	365	6
	Aug	144	129	662	3
	Sep	122	118	711	2
	Oct	166	143	635	0
	Nov	124	117	693	0
	Dec	104	114	809	3
	TOTAL	3072	1677	401	23
	Jan	90	108	884	7
	Feb	86	103	883	0
	Mar	103	117	833	2
	Apr	334	199	438	1
	May	757	286	278	1
	Jun	1215	289	175	2
1942	Jul	406	192	348	0
	Aug	139	116	618	2
	Sep	86	100	855	2
	Oct	94	111	873	1
	Nov	94	108	847	0
	Dec	84	104	910	0
	TOTAL	3488	1834	387	18
	Jan	77	100	957	0
	Feb	74	91	912	0
	Mar	89	103	850	1
	Apr	237	125	387	4
	May	509	155	223	1
	Jun	931	211	167	1
1943	Jul	387	145	275	0
	Aug	192	137	525	0
	Sep	117	104	652	0
	Oct	111	113	746	1
	Nov	115	104	663	1
	Dec	107	103	712	0
	TOTAL	2946	1490	372	9
	Jan	74	95	941	0
	Feb	76	87	837	0
	Mar	81	95	861	1
	Apr	118	106	664	2
	May	564	202	263	0
	Jun	890	215	177	0
1944	Jul	378	146	285	1
	Aug	123	102	610	1
	Sep	78	89	840	3
	Oct	99	103	764	0
	Nov	100	99	725	3
	Dec	99	97	723	5
	TOTAL	2680	1436	394	16
	Jan	78	88	833	3
	Feb	72	83	856	0
	Mar	95	91	710	0
	Apr	115	101	643	0
	May	601	200	245	0
	Jun	795	192	177	0
1945	Jul	499	165	244	1
	Aug	287	146	375	0
	Sep	118	99	620	1
	Oct	126	105	609	0
	Nov	125	102	599	0
	Dec	117	101	639	0
	TOTAL	3027	1475	358	5
	Jan	109	97	654	4
	Feb	91	85	683	0
	Mar	99	93	687	0
	Apr	284	126	327	0
	May	448	146	239	0
	Jun	690	190	203	2
1946	Jul	267	137	378	3
	Aug	126	106	614	2
	Sep	92	94	745	1
	Oct	122	115	693	2
	Nov	104	96	684	3
	Dec	121	98	595	2
	TOTAL	2554	1382	398	19
	Jan	82	85	757	1
	Feb	82	79	707	0
	Mar	107	102	701	0
	Apr	178	113	469	0
	May	809	221	201	1
	Jun	1027	246	176	2
1947	Jul	733	195	196	2
	Aug	240	137	421	1
	Sep	143	110	569	0
	Oct	153	116	560	0
	Nov	135	104	568	3
	Dec	118	101	632	4
	TOTAL	3806	1610	311	14
	Jan	116	97	614	0
	Feb	111	88	581	0
	Mar	115	102	651	0
	Apr	252	136	395	2
	May	920	264	211	0
	Jun	844	214	186	2
1948	Jul	312	151	357	2
	Aug	161	123	561	0
	Sep	88	92	763	1
	Oct	109	109	741	1
	Nov	107	99	677	1
	Dec	90	91	740	1
	TOTAL	3226	1565	357	10
	Jan	99	92	686	4
	Feb	84	80	701	2
	Mar	98	98	734	1
	Apr	201	127	464	0
	May	573	199	255	0
	Jun	1080	272	186	0
1949	Jul	594	196	243	0
	Aug	184	127	507	1
	Sep	122	112	672	0
	Oct	125	124	728	1
	Nov	108	108	734	4
	Dec	100	105	771	3
	TOTAL	3368	1640	358	16
	Jan	91	95	760	0
	Feb	88	85	712	2
	Mar	118	106	658	0
	Apr	212	122	423	0
	May	418	163	287	2
	Jun	787	218	204	1
1950	Jul	273	149	403	1
	Aug	124	109	645	1
	Sep	111	107	710	0
	Oct	96	108	825	4
	Nov	98	107	804	0
	Dec	98	103	770	1
	TOTAL	2516	1473	431	12
	Jan	96	96	736	1
	Feb	88	84	700	1
	Mar	99	99	736	0
	Apr	151	106	514	0
	May	536	174	239	0
	Jun	857	213	182	1
1951	Jul	471	167	260	2
	Aug	207	136	482	1
	Sep	111	96	638	0
	Oct	120	106	654	0
	Nov	104	97	682	1
	Dec	106	98	681	1
	TOTAL	2948	1473	367	8
	Jan	96	94	718	0
	Feb	84	87	760	3
	Mar	113	108	702	0
	Apr	313	172	403	0
	May	978	340	256	0
	Jun	1320	330	184	1
1952	Jul	449	194	319	0
	Aug	276	175	466	6
	Sep	171	132	567	1
	Oct	123	116	695	1
	Nov	112	111	732	0
	Dec	99	101	752	7
	TOTAL	4134	1960	349	19
	Jan	98	100	745	1
	Feb	80	81	748	1
	Mar	102	95	690	0
	Apr	136	105	568	1
	May	346	142	302	1
	Jun	886	220	183	0
1953	Jul	295	145	361	0
	Aug	194	132	502	0
	Sep	101	96	702	0
	Oct	101	105	760	0
	Nov	99	107	792	1
	Dec	92	104	830	0
	TOTAL	2531	1433	416	5
	Jan	94	92	717	2
	Feb	81	87	791	1
	Mar	94	93	724	1
	Apr	136	101	547	0
	May	296	131	325	1
	Jun	204	117	420	1
1954	Jul	146	116	585	2
	Aug	105	99	689	1
	Sep	103	103	733	2
	Oct	125	112	659	4
	Nov	98	100	746	1
	Dec	82	96	866	1
	TOTAL	1565	1246	585	17
	Jan	74	87	869	2
	Feb	67	82	900	1
	Mar	86	95	811	6
	Apr	142	108	562	5
	May	384	152	292	0
	Jun	448	159	261	0
1955	Jul	214	126	433	4
	Aug	157	130	609	1
	Sep	100	91	668	1
	Oct	91	89	723	0
	Nov	94	97	753	1
	Dec	89	91	750	1
	TOTAL	1946	1307	494	22
	Jan	81	83	753	1
	Feb	75	80	778	0
	Mar	104	97	687	0
	Apr	184	115	459	1
	May	685	225	241	1
	Jun	637	186	215	1
1956	Jul	173	118	501	0
	Aug	115	106	678	0
	Sep	88	76	642	2
	Oct	93	87	687	3
	Nov	83	88	777	5
	Dec	73	85	863	0
	TOTAL	2391	1346	414	14

Table 9 - Colorado River Basin - Historical Flow and Quality of Water Data

COLORADO RIVER NEAR CAMEO, COLORADO

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	80	82	755	0
	Feb	77	80	769	0
	Mar	83	89	790	1
	Apr	151	99	484	1
	May	591	232	289	1
	Jun	1415	370	192	0
1957	Jul	1072	273	187	0
	Aug	339	170	370	1
	Sep	157	117	547	0
	Oct	136	121	659	12
	Nov	123	108	644	0
	Dec	103	96	686	1
	TOTAL	4325	1838	312	17
	Jan	92	82	656	0
	Feb	95	83	645	1
	Mar	123	108	647	0
	Apr	172	118	506	1
	May	847	239	208	1
	Jun	808	205	187	1
1958	Jul	193	123	468	1
	Aug	109	103	694	1
	Sep	103	104	743	2
	Oct	99	106	780	4
	Nov	94	95	748	7
	Dec	86	91	779	5
	TOTAL	2820	1457	380	24
	Jan	94	90	701	21
	Feb	86	85	724	0
	Mar	82	85	758	0
	Apr	118	92	573	0
	May	392	150	281	0
	Jun	684	191	205	0
1959	Jul	215	123	421	0
	Aug	131	109	612	0
	Sep	105	99	695	0
	Oct	138	108	578	1
	Nov	116	99	623	0
	Dec	100	100	741	3
	TOTAL	2262	1331	433	25
	Jan	100	87	638	0
	Feb	92	87	697	0
	Mar	135	100	547	0
	Apr	246	115	343	0
	May	432	150	255	0
	Jun	668	187	206	0
1960	Jul	217	124	421	0
	Aug	117	99	623	0
	Sep	102	93	670	0
	Oct	106	101	700	0
	Nov	99	101	750	0
	Dec	100	97	709	0
	TOTAL	2413	1341	408	0

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	99	92	686	0
	Feb	85	78	674	1
	Mar	86	87	746	0
	Apr	103	89	636	0
	May	355	133	275	0
	Jun	426	136	235	0
1961	Jul	138	105	557	0
	Aug	115	98	623	2
	Sep	175	118	498	0
	Oct	200	114	417	0
	Nov	131	93	525	0
	Dec	121	88	534	0
	TOTAL	2033	1231	445	3
	Jan	115	91	584	0
	Feb	135	95	516	0
	Mar	161	108	495	0
	Apr	513	196	281	0
	May	893	268	221	0
	Jun	882	231	192	2
1962	Jul	545	194	262	0
	Aug	186	124	491	0
	Sep	121	110	670	0
	Oct	173	124	528	0
	Nov	148	111	554	0
	Dec	115	112	711	0
	TOTAL	3985	1763	325	2
	Jan	95	104	803	0
	Feb	87	83	704	0
	Mar	98	98	732	0
	Apr	127	97	560	0
	May	322	124	283	0
	Jun	245	123	369	0
1963	Jul	111	97	644	0
	Aug	115	102	654	0
	Sep	112	94	615	0
	Oct	96	95	727	1
	Nov	90	97	793	0
	Dec	71	91	947	0
	TOTAL	1571	1206	565	1
	Jan	58	76	962	0
	Feb	55	66	888	0
	Mar	67	75	826	0
	Apr	105	93	648	0
	May	403	152	277	0
	Jun	465	149	236	0
1964	Jul	223	129	426	0
	Aug	153	120	578	0
	Sep	116	99	632	6
	Oct	104	99	705	7
	Nov	94	101	790	1
	Dec	91	97	781	0
	TOTAL	1934	1257	478	14

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	92	97	777	0
	Feb	78	82	778	0
	Mar	85	96	833	0
	Apr	161	107	489	0
	May	477	175	269	0
	Jun	920	239	191	0
1965	Jul	605	197	239	0
	Aug	273	139	375	0
	Sep	172	123	527	0
	Oct	167	117	514	1
	Nov	137	109	585	0
	Dec	138	104	554	1
	TOTAL	3305	1586	353	2
	Jan	114	96	617	0
	Feb	99	83	616	1
	Mar	133	103	571	2
	Apr	141	95	494	0
	May	373	147	290	1
	Jun	277	132	350	0
1966	Jul	157	112	525	0
	Aug	119	104	640	0
	Sep	101	96	700	0
	Oct	108	106	716	0
	Nov	93	101	798	0
	Dec	85	103	888	0
	TOTAL	1800	1277	521	4
	Jan	86	93	798	0
	Feb	74	76	758	0
	Mar	106	96	668	0
	Apr	138	94	501	0
	May	328	136	305	0
	Jun	543	178	241	0
1967	Jul	289	142	362	0
	Aug	137	112	602	0
	Sep	125	109	639	0
	Oct	115	103	660	0
	Nov	104	96	683	0
	Dec	100	99	726	0
	TOTAL	2144	1334	458	0
	Jan	89	96	787	0
	Feb	88	85	709	0
	Mar	96	95	731	0
	Apr	133	99	550	0
	May	326	144	324	0
	Jun	757	214	207	0
1968	Jul	257	141	405	0
	Aug	224	143	471	0
	Sep	125	106	625	0
	Oct	128	109	627	0
	Nov	113	99	645	8
	Dec	104	100	705	3
	TOTAL	2439	1430	431	11

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	106	95	659	0
	Feb	86	82	701	0
	Mar	96	88	673	1
	Apr	241	130	396	0
	May	561	182	238	0
	Jun	502	188	276	0
1969	Jul	355	159	329	0
	Aug	152	116	558	0
	Sep	131	110	618	0
	Oct	173	132	564	0
	Nov	131	108	609	1
	Dec	121	122	740	1
	TOTAL	2655	1512	419	3
	Jan	105	97	678	0
	Feb	95	83	645	0
	Mar	116	94	593	0
	Apr	154	96	459	0
	May	836	221	195	0
	Jun	833	220	194	1
1970	Jul	363	161	326	2
	Aug	167	124	543	0
	Sep	182	130	523	0
	Oct	171	128	551	1
	Nov	154	116	557	2
	Dec	140	116	608	0
	TOTAL	3316	1585	352	6
	Jan	138	110	586	0
	Feb	112	91	602	0
	Mar	149	107	528	0
	Apr	293	138	346	0
	May	521	163	230	0
	Jun	885	213	177	0
1971	Jul	451	181	295	0
	Aug	179	125	515	0
	Sep	170	127	546	0
	Oct	150	114	558	0
	Nov	137	104	559	0
	Dec	129	99	564	0
	TOTAL	3314	1573	349	0
	Jan	127	97	564	0
	Feb	119	100	620	0
	Mar	151	118	575	0
	Apr	175	112	473	0
	May	394	153	286	0
	Jun	664	191	212	0
1972	Jul	219	129	433	0
	Aug	142	118	608	0
	Sep	150	117	575	0
	Oct	164	122	546	0
	Nov	152	110	531	2
	Dec	128	99	572	0
	TOTAL	2585	1468	417	2

Table 9 - Colorado River Basin - Historical Flow and Quality of Water Data

COLORADO RIVER NEAR CAMEO, COLORADO

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
1973	Jan	116	96	605	0
	Feb	105	82	577	0
	Mar	125	99	583	0
	Apr	121	95	579	0
	May	592	187	233	0
	Jun	828	221	196	0
	Jul	565	172	224	0
	Aug	207	122	435	0
	Sep	143	112	577	0
	Oct	149	116	572	0
	Nov	141	109	569	4
	Dec	126	106	617	0
	TOTAL	3219	1518	347	4
1974	Jan	122	94	562	0
	Feb	109	88	593	0
	Mar	152	115	558	0
	Apr	185	119	471	0
	May	709	178	185	0
	Jun	658	185	207	0
	Jul	286	147	377	0
	Aug	161	114	521	0
	Sep	128	103	593	0
	Oct	136	111	601	0
	Nov	127	106	619	0
	Dec	115	106	678	0
	TOTAL	2888	1466	373	0
1975	Jan	109	96	647	0
	Feb	98	85	638	0
	Mar	124	110	653	0
	Apr	154	115	548	0
	May	389	165	311	0
	Jun	739	207	205	0
	Jul	561	194	255	0
	Aug	199	124	458	0
	Sep	141	110	575	0
	Oct	140	114	598	0
	Nov	133	105	580	0
	Dec	120	99	609	0
	TOTAL	2908	1524	385	0
1976	Jan	115	94	601	0
	Feb	114	94	605	1
	Mar	139	115	608	0
	Apr	161	112	510	0
	May	401	163	299	0
	Jun	450	155	252	0
	Jul	213	124	427	0
	Aug	149	120	590	0
	Sep	136	109	591	0
	Oct	138	114	607	0
	Nov	116	102	651	0
	Dec	111	114	756	0
	TOTAL	2245	1416	464	1
1977	Jan	105	99	692	0
	Feb	86	84	723	0
	Mar	80	88	806	0
	Apr	110	94	634	0
	May	156	106	499	0
	Jun	176	111	463	0
	Jul	112	90	590	0
	Aug	108	90	614	0
	Sep	103	89	635	0
	Oct	98	93	702	0
	Nov	83	91	805	0
	Dec	86	89	760	0
	TOTAL	1304	1125	635	0
1978	Jan	80	79	729	0
	Feb	74	69	692	0
	Mar	96	88	673	0
	Apr	172	113	481	2
	May	432	181	309	0
	Jun	847	221	192	0
	Jul	360	147	301	0
	Aug	135	100	542	0
	Sep	109	92	621	0
	Oct	108	94	635	0
	Nov	111	95	632	0
	Dec	92	91	726	0
	TOTAL	2614	1370	385	2
1979	Jan	83	82	728	8
	Feb	85	79	685	0
	Mar	113	101	659	0
	Apr	172	112	477	0
	May	607	215	260	0
	Jun	895	233	191	0
	Jul	517	184	262	31
	Aug	178	122	501	31
	Sep	125	103	608	30
	Oct	132	108	603	30
	Nov	127	104	606	29
	Dec	121	104	632	30
	TOTAL	3154	1547	361	189
1980	Jan	111	101	666	30
	Feb	113	97	634	29
	Mar	125	106	624	30
	Apr	189	121	471	30
	May	641	205	236	26
	Jun	885	219	182	0
	Jul	330	145	323	0
	Aug	146	111	556	1
	Sep	122	102	614	1
	Oct	115	102	652	0
	Nov	106	97	673	0
	Dec	101	92	675	0
	TOTAL	2983	1498	369	147
1981	Jan	84	85	746	0
	Feb	66	75	836	0
	Mar	73	88	884	0
	Apr	112	94	616	0
	May	200	107	393	0
	Jun	327	126	284	0
	Jul	148	108	539	2
	Aug	107	91	622	0
	Sep	111	91	602	0
	Oct	116	94	592	0
	Nov	97	83	631	0
	Dec	88	82	685	0
	TOTAL	1529	1124	540	2
1982	Jan	94	83	651	0
	Feb	75	68	660	0
	Mar	97	84	638	0
	Apr	136	88	479	0
	May	422	151	263	0
	Jun	687	180	193	0
	Jul	410	143	256	0
	Aug	209	113	398	0
	Sep	177	110	457	0
	Oct	172	118	502	4
	Nov	147	111	554	0
	Dec	117	101	636	3
	TOTAL	2743	1350	362	7
1983	Jan	104	86	609	21
	Feb	94	81	628	12
	Mar	111	90	600	6
	Apr	132	97	541	0
	May	540	209	285	0
	Jun	1415	336	175	0
	Jul	1001	263	194	6
	Aug	402	179	327	9
	Sep	164	113	505	0
	Oct	148	109	541	8
	Nov	149	108	532	0
	Dec	142	98	507	0
	TOTAL	4402	1769	295	62

Table 9

Colorado River Basin

Historical Flow and Quality of Water Data

COLORADO RIVER NEAR CAMEO, COLORADO

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	3072	1677	.55	401	108	100.0	4.3	12.4
1942	3488	1834	.53	387	108	100.0	4.3	12.4
1943	2946	1490	.51	372	88	81.8	5.0	12.7
1944	2680	1436	.54	394	63	57.1	5.0	9.3
1945	3027	1475	.49	358	39	0.0	2.6	7.2
1946	2554	1382	.54	398	35	0.0	2.4	6.8
1947	3806	1610	.42	311	36	0.0	2.8	8.5
1948	3226	1565	.49	357	36	0.0	2.5	8.3
1949	3368	1640	.49	358	41	0.0	2.4	8.1
1950	2516	1473	.59	431	65	36.9	2.6	8.8
1951	2948	1473	.50	367	65	36.9	3.6	10.4
1952	4134	1960	.47	349	64	39.1	4.0	10.7
1953	2531	1433	.57	416	50	2.0	3.5	9.9
1954	1565	1246	.80	585	51	2.0	2.8	7.5
1955	1946	1307	.67	494	47	0.0	2.4	7.9
1956	2391	1346	.56	414	40	10.0	3.4	12.1
1957	4325	1838	.42	312	42	9.5	3.3	10.9
1958	2820	1457	.52	380	47	10.6	3.2	10.9
1959	2262	1331	.59	433	54	1.9	1.8	14.8
1960	2413	1341	.56	409	58	1.7	1.7	14.1
1961	2033	1231	.61	445	63	9.5	2.1	14.9
1962	3985	1763	.44	325	63	9.5	2.2	10.0
1963	1571	1206	.77	565	63	15.9	2.7	10.4
1964	1934	1257	.65	478	67	32.8	4.0	9.1
1965	3305	1586	.48	353	68	63.2	4.3	9.7
1966	1800	1277	.71	521	86	84.9	3.7	9.1
1967	2144	1334	.62	458	84	67.9	3.7	8.8
1968	2439	1430	.59	431	81	44.4	3.1	7.9
1969	2655	1512	.57	419	54	3.7	2.1	7.2
1970	3316	1585	.48	352	42	0.0	2.6	7.0
1971	3314	1573	.47	349	34	0.0	2.8	9.3
1972	2585	1468	.57	418	35	0.0	2.9	9.1
1973	3219	1518	.47	347	31	0.0	2.2	9.5
1974	2888	1466	.51	373	29	0.0	3.7	8.5
1975	2908	1524	.52	385	27	0.0	5.0	6.8
1976	2245	1416	.63	464	27	0.0	5.5	8.7
1977	1304	1125	.86	635	27	0.0	5.2	7.8
1978	2614	1370	.52	385	27	0.0	5.8	8.8
1979	3154	1547	.49	361	25	0.0	5.6	7.7
1980	2983	1498	.50	369	16	0.0	6.2	8.8
1981	1529	1124	.73	540	10	0.0	3.8	6.7
1982	2743	1350	.49	362	24	0.0	5.6	9.7
1983	4402	1769	.40	295	31	0.0	5.6	9.6
Total	119091	63243						
Average	2770	1471	.53	390				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 10 - Colorado River Basin - Historical Flow and Quality of Water Data

GUNNISON RIVER NEAR GRAND JUNCTION, COLORADO

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	51	100	1445	2
	Feb	51	101	1467	0
	Mar	63	104	1211	3
	Apr	123	119	710	2
	May	871	333	281	3
	Jun	563	269	351	0
1941	Jul	192	178	682	1
	Aug	95	173	1334	0
	Sep	81	180	1630	2
	Oct	198	248	921	4
	Nov	121	162	982	3
	Dec	84	131	1153	0
	TOTAL	2493	2096	618	20
	Jan	71	115	1194	2
	Feb	62	106	1249	4
	Mar	76	127	1235	1
	Apr	546	268	360	0
	May	760	268	259	0
	Jun	688	249	266	2
1942	Jul	167	153	671	0
	Aug	68	131	1428	3
	Sep	56	135	1793	1
	Oct	57	144	1863	1
	Nov	65	125	1411	0
	Dec	58	104	1313	2
	TOTAL	2674	1926	530	16
	Jan	57	103	1334	5
	Feb	48	74	1130	0
	Mar	56	83	1086	0
	Apr	280	113	298	0
	May	389	179	338	0
	Jun	397	183	339	0
1943	Jul	113	119	775	0
	Aug	154	221	1056	0
	Sep	87	133	1125	0
	Oct	69	134	1431	1
	Nov	75	119	1177	0
	Dec	61	103	1236	0
	TOTAL	1785	1564	644	6
	Jan	51	87	1242	1
	Feb	48	74	1134	3
	Mar	53	79	1093	0
	Apr	102	107	769	2
	May	757	239	232	1
	Jun	694	240	255	0
1944	Jul	230	157	501	2
	Aug	51	101	1446	0
	Sep	45	110	1810	3
	Oct	58	134	1688	1
	Nov	71	132	1369	0
	Dec	64	110	1268	0
	TOTAL	2225	1570	519	13
	Jan	55	88	1174	0
	Feb	47	76	1190	1
	Mar	52	74	1046	0
	Apr	91	89	722	0
	May	628	201	236	1
	Jun	407	178	322	1
1945	Jul	164	136	610	0
	Aug	122	146	880	1
	Sep	46	111	1761	1
	Oct	76	149	1432	0
	Nov	73	119	1199	0
	Dec	58	92	1171	2
	TOTAL	1818	1458	590	7
	Jan	58	89	1126	0
	Feb	48	69	1053	0
	Mar	58	74	935	0
	Apr	182	106	428	2
	May	228	140	452	3
	Jun	321	161	370	1
1946	Jul	64	100	1147	2
	Aug	56	120	1565	2
	Sep	54	119	1634	2
	Oct	69	138	1468	1
	Nov	67	111	1223	5
	Dec	56	88	1167	0
	TOTAL	1262	1317	767	18
	Jan	45	75	1218	1
	Feb	47	66	1030	1
	Mar	55	72	955	2
	Apr	96	73	557	0
	May	455	178	287	1
	Jun	502	233	342	2
1947	Jul	242	154	469	0
	Aug	120	179	1096	1
	Sep	95	165	1191	0
	Oct	114	170	1097	2
	Nov	96	127	974	5
	Dec	70	98	1031	3
	TOTAL	1938	1580	600	18
	Jan	58	81	1029	5
	Feb	65	91	1027	1
	Mar	76	102	993	1
	Apr	324	158	358	1
	May	835	240	212	2
	Jun	546	208	280	3
1948	Jul	141	127	665	2
	Aug	71	124	1274	4
	Sep	49	106	1601	1
	Oct	57	125	1618	0
	Nov	70	126	1326	1
	Dec	70	111	1168	1
	TOTAL	2361	1599	498	22
	Jan	51	76	1104	1
	Feb	52	77	1079	2
	Mar	69	97	1039	1
	Apr	235	133	414	1
	May	481	184	281	4
	Jun	651	270	305	2
1949	Jul	265	168	468	2
	Aug	65	113	1278	4
	Sep	53	111	1524	0
	Oct	70	139	1449	2
	Nov	74	114	1135	3
	Dec	54	92	1243	2
	TOTAL	2121	1573	545	24
	Jan	54	85	1153	3
	Feb	56	87	1130	0
	Mar	60	81	987	0
	Apr	219	106	356	1
	May	309	132	315	1
	Jun	319	156	360	5
1950	Jul	88	116	968	4
	Aug	37	78	1553	3
	Sep	46	102	1635	5
	Oct	37	94	1877	4
	Nov	49	100	1498	2
	Dec	60	103	1264	2
	TOTAL	1335	1239	683	30
	Jan	47	76	1188	2
	Feb	46	72	1158	3
	Mar	55	70	938	1
	Apr	62	61	721	2
	May	265	136	379	4
	Jun	323	165	375	1
1951	Jul	93	97	769	2
	Aug	53	87	1217	6
	Sep	37	81	1592	4
	Oct	49	111	1657	4
	Nov	60	109	1343	2
	Dec	46	79	1270	8
	TOTAL	1136	1145	741	39
	Jan	53	81	1132	5
	Feb	48	69	1066	1
	Mar	53	75	1034	2
	Apr	342	156	335	1
	May	818	265	238	2
	Jun	759	251	244	6
1952	Jul	201	153	561	4
	Aug	121	181	1103	2
	Sep	76	137	1316	1
	Oct	67	124	1373	5
	Nov	64	126	1449	4
	Dec	72	122	1250	3
	TOTAL	2672	1740	479	36
	Jan	65	101	1135	1
	Feb	50	76	1112	3
	Mar	61	79	946	1
	Apr	86	87	743	0
	May	230	131	419	1
	Jun	437	187	315	6
1953	Jul	86	96	821	4
	Aug	67	115	1251	0
	Sep	46	104	1656	1
	Oct	58	136	1734	0
	Nov	74	127	1270	2
	Dec	52	92	1314	0
	TOTAL	1312	1331	746	19
	Jan	48	84	1275	0
	Feb	45	71	1160	0
	Mar	45	67	1098	1
	Apr	70	56	595	0
	May	110	91	607	3
	Jun	39	73	1371	4
1954	Jul	40	80	1483	0
	Aug	31	79	1852	2
	Sep	52	117	1675	4
	Oct	64	124	1416	1
	Nov	51	97	1398	2
	Dec	49	92	1368	1
	TOTAL	645	1032	1176	18
	Jan	46	77	1232	4
	Feb	40	67	1222	3
	Mar	59	89	1113	2
	Apr	108	79	536	0
	May	262	128	358	1
	Jun	219	132	444	4
1955	Jul	46	77	1216	5
	Aug	52	97	1363	2
	Sep	35	84	1743	4
	Oct	38	93	1797	1
	Nov	54	109	1489	0
	Dec	57	92	1188	0
	TOTAL	1017	1123	812	26
	Jan	50	81	1192	0
	Feb	44	70	1166	0
	Mar	56	72	934	0
	Apr	142	85	440	0
	May	324	139	316	0
	Jun	262	133	373	1
1956	Jul	37	66	1315	0
	Aug	29	58	1492	0
	Sep	20	59	2152	0
	Oct	35	94	2011	0
	Nov	55	101	1349	0
	Dec	47	84	1297	3
	TOTAL	1101	1042	696	4

Table 10 - Colorado River Basin - Historical Flow and Quality of Water Data

GUNNISON RIVER NEAR GRAND JUNCTION, COLORADO

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	52	86	1220	0
	Feb	55	87	1174	0
	Mar	56	74	968	0
	Apr	136	90	488	0
	May	554	223	296	0
	Jun	1168	347	218	0
1957	Jul	719	264	270	0
	Aug	224	178	584	2
	Sep	108	148	1003	0
	Oct	106	170	1181	2
	Nov	111	138	915	2
	Dec	92	110	878	0
	TOTAL	3381	1915	417	6
	Jan	65	86	963	1
	Feb	70	97	1015	0
	Mar	82	97	866	2
	Apr	254	132	383	0
	May	873	253	213	1
	Jun	570	219	283	1
1958	Jul	65	87	974	1
	Aug	43	71	1217	1
	Sep	51	105	1506	1
	Oct	52	112	1590	0
	Nov	71	120	1236	0
	Dec	65	98	1103	0
	TOTAL	2262	1475	479	8
	Jan	57	85	1094	0
	Feb	50	71	1058	0
	Mar	52	68	957	0
	Apr	55	62	827	0
	May	167	114	499	0
	Jun	256	145	416	4
1959	Jul	34	65	1419	4
	Aug	51	93	1338	0
	Sep	41	90	1603	0
	Oct	96	142	1087	0
	Nov	72	99	1013	0
	Dec	50	78	1138	1
	TOTAL	981	1111	833	9
	Jan	49	78	1169	29
	Feb	41	66	1195	16
	Mar	87	100	843	18
	Apr	270	122	332	4
	May	259	116	330	0
	Jun	336	150	328	0
1960	Jul	58	74	938	0
	Aug	34	68	1489	0
	Sep	38	80	1564	0
	Oct	51	106	1535	0
	Nov	58	87	1092	16
	Dec	51	78	1122	18
	TOTAL	1332	1125	621	101

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	41	70	1245	18
	Feb	39	64	1189	16
	Mar	55	75	1011	17
	Apr	67	67	744	0
	May	266	128	353	0
	Jun	209	124	438	0
1961	Jul	34	69	1485	0
	Aug	44	84	1407	0
	Sep	100	158	1163	0
	Oct	107	124	849	0
	Nov	86	102	872	0
	Dec	57	81	1049	18
	TOTAL	1106	1147	763	69
	Jan	53	76	1068	17
	Feb	58	78	994	16
	Mar	53	75	1028	18
	Apr	395	146	271	0
	May	575	179	229	0
	Jun	477	177	274	0
1962	Jul	219	143	481	0
	Aug	52	86	1230	0
	Sep	63	119	1388	0
	Oct	70	127	1330	0
	Nov	68	107	1163	1
	Dec	54	88	1203	17
	TOTAL	2135	1402	483	69
	Jan	48	82	1247	18
	Feb	70	95	994	16
	Mar	82	89	799	0
	Apr	102	71	507	0
	May	188	100	393	0
	Jun	92	97	769	0
1963	Jul	37	75	1495	2
	Aug	52	100	1425	0
	Sep	51	110	1605	0
	Oct	55	132	1774	0
	Nov	66	112	1254	0
	Dec	49	83	1238	18
	TOTAL	892	1145	945	54
	Jan	43	74	1259	17
	Feb	45	74	1201	17
	Mar	43	74	1273	18
	Apr	78	77	729	0
	May	418	165	290	0
	Jun	316	155	362	0
1964	Jul	83	95	847	0
	Aug	93	148	1164	0
	Sep	59	114	1407	0
	Oct	53	113	1556	0
	Nov	65	115	1309	0
	Dec	59	91	1138	17
	TOTAL	1365	1296	703	69

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	55	87	1163	18
	Feb	45	70	1153	16
	Mar	52	67	945	0
	Apr	228	114	368	0
	May	582	211	266	0
	Jun	681	249	269	0
1965	Jul	472	216	337	0
	Aug	158	152	710	0
	Sep	161	210	959	0
	Oct	116	159	1006	0
	Nov	63	122	1413	0
	Dec	60	97	1175	17
	TOTAL	2673	1753	482	51
	Jan	52	89	1262	18
	Feb	37	72	1441	16
	Mar	68	89	960	0
	Apr	166	108	478	0
	May	211	143	498	0
	Jun	125	125	739	0
1966	Jul	51	87	1257	0
	Aug	38	78	1494	0
	Sep	58	113	1438	0
	Oct	65	129	1458	0
	Nov	45	103	1673	0
	Dec	55	95	1270	0
	TOTAL	971	1231	932	34
	Jan	47	75	1176	0
	Feb	42	66	1162	0
	Mar	62	71	844	0
	Apr	86	62	533	0
	May	143	107	550	0
	Jun	152	149	720	0
1967	Jul	60	103	1274	1
	Aug	59	109	1351	0
	Sep	70	124	1301	0
	Oct	65	116	1300	0
	Nov	106	118	824	0
	Dec	165	114	507	0
	TOTAL	1057	1215	845	1
	Jan	119	107	666	1
	Feb	96	96	734	0
	Mar	65	75	853	0
	Apr	68	66	712	0
	May	268	138	379	0
	Jun	258	145	412	0
1968	Jul	59	97	1195	0
	Aug	107	160	1101	0
	Sep	68	120	1311	0
	Oct	87	140	1185	0
	Nov	133	133	736	0
	Dec	149	108	534	0
	TOTAL	1477	1386	690	1

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	146	109	550	0
	Feb	75	73	716	0
	Mar	145	99	500	0
	Apr	304	117	283	0
	May	332	153	338	0
	Jun	194	187	709	0
1969	Jul	100	127	937	0
	Aug	91	116	933	0
	Sep	119	157	972	0
	Oct	155	185	877	0
	Nov	142	130	674	0
	Dec	128	105	604	0
	TOTAL	1932	1559	593	0
	Jan	129	94	533	0
	Feb	122	81	488	0
	Mar	149	95	469	0
	Apr	137	89	478	0
	May	404	157	285	0
	Jun	415	199	352	0
1970	Jul	174	128	539	0
	Aug	101	118	863	0
	Sep	196	198	743	0
	Oct	188	123	480	31
	Nov	170	126	544	0
	Dec	181	112	454	0
	TOTAL	2368	1519	472	31
	Jan	196	103	385	0
	Feb	201	87	317	0
	Mar	239	103	316	0
	Apr	266	102	282	0
	May	209	133	469	0
	Jun	212	146	508	0
1971	Jul	114	116	747	0
	Aug	114	103	667	0
	Sep	133	137	755	0
	Oct	120	138	848	0
	Nov	132	111	616	0
	Dec	144	104	530	0
	TOTAL	2080	1382	489	0
	Jan	126	75	441	0
	Feb	110	65	433	0
	Mar	109	68	459	0
	Apr	67	55	609	0
	May	115	95	602	0
	Jun	117	102	635	0
1972	Jul	36	63	1292	0
	Aug	38	63	1202	0
	Sep	84	114	989	0
	Oct	104	135	955	0
	Nov	125	106	621	0
	Dec	157	91	429	0
	TOTAL	1190	1031	637	0

Table 10 – Colorado River Basin – Historical Flow and Quality of Water Data

GUNNISON RIVER NEAR GRAND JUNCTION, COLORADO

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	155	77	366	0
	Feb	75	61	595	0
	Mar	83	74	654	0
	Apr	93	69	547	0
	May	456	151	244	0
	Jun	414	184	326	0
1973	Jul	164	128	577	0
	Aug	148	135	674	0
	Sep	110	112	750	0
	Oct	125	116	683	0
	Nov	89	84	691	0
	Dec	170	111	479	0
	TOTAL	2081	1302	460	0
	Jan	216	94	319	0
	Feb	214	106	364	0
	Mar	204	163	590	0
	Apr	141	101	527	0
	May	261	153	431	0
	Jun	121	175	1063	0
1974	Jul	51	135	1930	0
	Aug	42	74	1283	31
	Sep	65	123	1399	17
	Oct	84	95	828	31
	Nov	117	103	651	30
	Dec	111	104	687	31
	TOTAL	1627	1426	645	140
	Jan	114	104	674	31
	Feb	96	93	706	28
	Mar	99	100	738	31
	Apr	158	112	524	30
	May	398	159	294	31
	Jun	336	147	322	30
1975	Jul	165	116	520	31
	Aug	63	86	1001	31
	Sep	76	111	1073	4
	Oct	110	128	861	0
	Nov	141	118	613	0
	Dec	152	118	569	0
	TOTAL	1907	1392	537	247
	Jan	134	94	515	0
	Feb	95	97	748	0
	Mar	87	76	647	0
	Apr	83	67	592	0
	May	207	191	676	10
	Jun	128	114	656	0
1976	Jul	54	88	1205	0
	Aug	50	87	1281	0
	Sep	73	115	1168	0
	Oct	91	119	959	0
	Nov	105	113	792	0
	Dec	120	113	694	0
	TOTAL	1227	1275	764	10
	Jan	116	107	677	0
	Feb	69	71	755	0
	Mar	48	56	865	0
	Apr	35	44	943	0
	May	43	68	1172	0
	Jun	37	65	1312	0
1977	Jul	38	71	1388	0
	Aug	36	62	1255	0
	Sep	36	65	1326	0
	Oct	50	83	1231	0
	Nov	51	82	1190	0
	Dec	43	65	1103	0
	TOTAL	601	840	1028	0
	Jan	49	59	879	0
	Feb	46	50	808	0
	Mar	52	50	712	0
	Apr	133	92	511	0
	May	292	146	368	0
	Jun	314	130	304	0
1978	Jul	143	117	604	0
	Aug	59	59	746	0
	Sep	86	91	786	0
	Oct	68	79	856	0
	Nov	87	102	863	0
	Dec	134	89	492	0
	TOTAL	1461	1066	536	0
	Jan	138	79	420	0
	Feb	155	86	405	0
	Mar	194	119	450	0
	Apr	279	122	322	0
	May	509	271	391	0
	Jun	390	126	237	0
1979	Jul	179	128	525	0
	Aug	100	101	741	0
	Sep	111	146	969	0
	Oct	107	126	868	0
	Nov	94	97	757	0
	Dec	147	86	430	0
	TOTAL	2402	1485	454	0
	Jan	141	100	519	0
	Feb	134	80	440	0
	Mar	149	86	425	0
	Apr	227	99	320	0
	May	560	166	217	0
	Jun	406	133	241	0
1980	Jul	139	98	520	0
	Aug	70	72	755	0
	Sep	76	83	808	0
	Oct	76	75	734	0
	Nov	139	100	525	0
	Dec	143	94	486	0
	TOTAL	2259	1186	386	0
	Jan	129	79	452	0
	Feb	76	50	489	0
	Mar	70	53	549	0
	Apr	70	47	486	0
	May	93	80	635	0
	Jun	79	82	761	0
1981	Jul	58	86	1092	0
	Aug	52	63	894	0
	Sep	76	68	654	0
	Oct	103	134	962	0
	Nov	76	82	792	0
	Dec	72	69	702	30
	TOTAL	954	893	688	30
	Jan	79	71	668	27
	Feb	113	71	461	0
	Mar	139	92	484	0
	Apr	153	80	386	0
	May	314	135	317	0
	Jun	250	143	421	0
1982	Jul	126	102	593	0
	Aug	121	116	704	0
	Sep	159	129	600	9
	Oct	164	104	469	31
	Nov	150	103	502	15
	Dec	151	101	491	0
	TOTAL	1918	1247	478	82
	Jan	140	85	445	0
	Feb	122	69	412	0
	Mar	143	87	446	0
	Apr	149	94	460	0
	May	489	172	259	0
	Jun	808	276	252	0
1983	Jul	493	195	290	0
	Aug	206	140	500	0
	Sep	131	119	666	0
	Oct	146	123	620	3
	Nov	129	101	578	0
	Dec	160	109	499	0
	TOTAL	3118	1569	370	3

Table 10

Colorado River Basin

Historical Flow and Quality of Water Data

GUNNISON RIVER NEAR GRAND JUNCTION, COLORADO

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	2493	2096	.84	618	105	100.0	4.6	22.0
1942	2674	1926	.72	530	105	100.0	4.6	22.0
1943	1785	1564	.88	644	82	85.4	3.7	21.1
1944	2225	1570	.71	519	60	60.0	4.2	19.9
1945	1818	1458	.80	590	36	0.0	2.0	17.8
1946	1262	1317	1.04	767	36	0.0	2.1	21.0
1947	1938	1580	.82	600	36	0.0	3.0	27.5
1948	2361	1599	.68	498	36	0.0	2.9	26.5
1949	2121	1573	.74	545	44	0.0	2.8	26.0
1950	1335	1239	.93	683	68	0.0	1.9	20.7
1951	1136	1145	1.01	741	94	0.0	2.0	25.2
1952	2672	1740	.65	479	111	0.0	1.8	24.5
1953	1312	1331	1.01	746	107	26.2	3.3	26.0
1954	645	1032	1.60	1176	105	57.1	3.8	22.5
1955	1017	1123	1.10	812	103	88.3	3.1	21.8
1956	1101	1042	.95	696	108	58.3	3.8	20.1
1957	3381	1915	.57	417	89	34.8	3.6	20.2
1958	2262	1475	.65	479	69	0.0	1.5	21.0
1959	981	1111	1.13	833	82	0.0	2.2	21.2
1960	1332	1125	.84	621	104	0.0	2.2	19.8
1961	1106	1147	1.04	763	113	18.6	2.1	18.9
1962	2135	1402	.66	483	93	50.5	2.9	20.8
1963	892	1145	1.28	945	89	85.4	3.5	23.1
1964	1355	1296	.96	703	91	85.7	3.4	24.8
1965	2673	1753	.66	482	95	86.3	3.1	21.7
1966	971	1231	1.27	932	104	89.4	3.2	22.8
1967	1057	1215	1.15	845	119	58.8	4.0	24.6
1968	1477	1386	.94	690	115	34.8	4.8	28.8
1969	1932	1559	.81	593	83	0.0	4.1	28.7
1970	2368	1519	.64	472	54	0.0	2.7	29.3
1971	2080	1382	.66	489	36	0.0	2.4	27.5
1972	1190	1031	.87	637	34	0.0	2.2	30.4
1973	2081	1302	.63	460	30	0.0	2.4	30.5
1974	1627	1426	.88	645	27	0.0	3.5	27.2
1975	1907	1392	.73	537	28	0.0	4.7	29.1
1976	1227	1275	1.04	764	31	0.0	5.6	26.5
1977	601	840	1.40	1029	34	0.0	6.5	24.8
1978	1461	1066	.73	536	33	0.0	5.9	19.0
1979	2402	1485	.62	454	32	0.0	6.4	20.4
1980	2259	1186	.52	386	32	0.0	6.9	24.4
1981	954	893	.94	688	28	0.0	7.0	24.6
1982	1918	1247	.65	478	24	0.0	6.8	25.4
1983	3118	1569	.50	370	29	0.0	6.6	24.1
Total	74644	58710						
Average	1736	1365	.79	578				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 11 - Colorado River Basin - Historical Flow and Quality of Water Data

DOLORES RIVER NEAR CISCO, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	14	39	2048	*
	Feb	20	47	1728	*
	Mar	41	58	1040	*
	Apr	175	80	336	*
	May	615	125	149	*
	Jun	248	65	193	*
1941	Jul	98	58	435	*
	Aug	31	44	1044	*
	Sep	32	42	965	*
	Oct	197	102	381	*
	Nov	61	81	976	*
	Dec	34	62	1341	*
	TOTAL	1566	803	377	0
	Jan	26	57	1612	*
	Feb	22	49	1638	*
	Mar	50	63	927	*
	Apr	516	129	184	*
	May	387	98	186	*
	Jun	213	58	200	*
1942	Jul	46	41	655	*
	Aug	17	30	1298	*
	Sep	8	21	1930	*
	Oct	9	27	2206	*
	Nov	10	31	2279	*
	Dec	12	36	2206	*
	TOTAL	1316	640	358	0
	Jan	12	36	2206	*
	Feb	14	39	2048	*
	Mar	20	44	1618	*
	Apr	212	87	302	*
	May	133	56	310	*
	Jun	98	44	330	*
1943	Jul	24	30	919	*
	Aug	34	46	995	*
	Sep	19	32	1238	*
	Oct	11	29	1939	*
	Nov	9	29	2369	*
	Dec	10	32	2353	*
	TOTAL	596	504	622	0
	Jan	9	30	2451	*
	Feb	12	36	2206	*
	Mar	17	42	1817	*
	Apr	97	61	462	*
	May	463	108	172	*
	Jun	267	67	185	*
1944	Jul	73	51	514	*
	Aug	14	27	1418	*
	Sep	5	17	2500	*
	Oct	8	25	2298	*
	Nov	12	34	2083	*
	Dec	11	34	2273	*
	TOTAL	988	532	396	0

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	12	36	2206	*
	Feb	16	42	1930	*
	Mar	14	39	2048	*
	Apr	134	70	384	*
	May	296	85	211	*
	Jun	88	41	343	*
1945	Jul	32	34	781	*
	Aug	29	42	1065	*
	Sep	6	19	2328	*
	Oct	15	33	1618	*
	Nov	10	31	2279	*
	Dec	9	31	2533	*
	TOTAL	661	503	560	0
	Jan	11	34	2273	*
	Feb	10	33	2427	*
	Mar	16	41	1884	*
	Apr	72	53	541	*
	May	53	35	486	*
	Jun	59	35	436	*
1946	Jul	16	24	1103	*
	Aug	18	32	1307	*
	Sep	10	24	1765	*
	Oct	9	27	2206	*
	Nov	11	32	2139	*
	Dec	10	32	2353	*
	TOTAL	295	402	1002	0
	Jan	8	28	2574	*
	Feb	11	35	2340	*
	Mar	15	40	1961	*
	Apr	49	45	675	*
	May	172	65	278	*
	Jun	111	46	305	*
1947	Jul	48	41	628	*
	Aug	37	48	954	*
	Sep	30	40	980	*
	Oct	37	53	1053	*
	Nov	19	30	1161	*
	Dec	16	35	1608	*
	TOTAL	553	506	673	0
	Jan	14	39	2048	*
	Feb	26	55	1555	*
	Mar	26	52	1471	*
	Apr	250	109	321	*
	May	271	84	228	*
	Jun	133	43	238	*
1948	Jul	33	30	668	*
	Aug	18	29	1185	*
	Sep	5	19	2794	*
	Oct	8	29	2665	*
	Nov	8	34	3125	*
	Dec	9	35	2860	*
	TOTAL	801	558	512	0

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	12	38	2328	*
	Feb	17	47	2033	*
	Mar	24	53	1624	*
	Apr	189	112	436	*
	May	233	75	237	*
	Jun	222	73	242	*
1949	Jul	71	53	549	*
	Aug	20	44	1618	*
	Sep	5	27	3971	*
	Oct	9	34	2778	*
	Nov	10	37	2721	*
	Dec	10	38	2794	*
	TOTAL	822	631	564	0
	Jan	12	37	2267	*
	Feb	16	40	1838	*
	Mar	18	44	1797	*
	Apr	128	58	333	*
	May	78	35	330	*
	Jun	67	32	351	*
1950	Jul	22	29	969	*
	Aug	4	14	2574	*
	Sep	5	21	3088	*
	Oct	5	18	2647	*
	Nov	5	22	3235	*
	Dec	8	22	2198	31
	TOTAL	368	372	745	31
	Jan	9	24	1925	31
	Feb	9	22	1817	28
	Mar	8	23	2143	31
	Apr	7	22	2187	30
	May	38	35	671	31
	Jun	48	38	576	30
1951	Jul	12	25	1560	31
	Aug	11	24	1567	31
	Sep	4	18	3378	30
	Oct	4	15	2746	0
	Nov	6	19	2482	0
	Dec	7	25	2714	0
	TOTAL	163	289	1304	273
	Jan	14	32	1657	0
	Feb	9	24	1868	0
	Mar	15	34	1603	0
	Apr	324	117	265	0
	May	365	93	188	0
	Jun	243	58	177	0
1952	Jul	67	40	433	0
	Aug	21	33	1143	0
	Sep	10	31	2149	0
	Oct	8	24	2135	0
	Nov	7	25	2531	0
	Dec	10	31	2321	0
	TOTAL	1095	542	364	0

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	11	32	2071	0
	Feb	9	35	2755	0
	Mar	12	41	2493	0
	Apr	39	35	652	0
	May	64	38	435	0
	Jun	88	33	273	0
1953	Jul	18	26	1048	0
	Aug	19	30	1128	0
	Sep	4	12	2319	0
	Oct	16	35	1597	0
	Nov	11	33	2132	0
	Dec	8	27	2453	0
	TOTAL	301	376	918	0
	Jan	9	32	2665	0
	Feb	9	27	2118	0
	Mar	10	34	2468	1
	Apr	43	35	605	0
	May	53	31	426	0
	Jun	18	21	857	0
1954	Jul	10	17	1298	0
	Aug	7	14	1596	0
	Sep	13	25	1379	0
	Oct	20	28	1040	0
	Nov	9	28	2301	0
	Dec	7	28	3095	1
	TOTAL	209	322	1135	2
	Jan	6	21	2787	0
	Feb	7	21	2191	0
	Mar	32	47	1089	0
	Apr	65	42	475	0
	May	116	46	294	0
	Jun	66	33	369	0
1955	Jul	13	21	1231	0
	Aug	17	31	1330	2
	Sep	3	14	3061	0
	Oct	4	18	3693	0
	Nov	6	28	3423	0
	Dec	9	31	2631	1
	TOTAL	343	354	761	3
	Jan	8	36	3337	0
	Feb	9	31	2601	0
	Mar	16	37	1652	0
	Apr	56	33	426	0
	May	84	41	357	0
	Jun	63	31	359	0
1956	Jul	8	18	1683	0
	Aug	6	17	1999	0
	Sep	0.8	6	5575	0
	Oct	2	15	6185	0
	Nov	6	23	2733	0
	Dec	5	23	3198	0
	TOTAL	265	311	864	0

* See 'Notes' preceding Table 1.

Table 11 – Colorado River Basin – Historical Flow and Quality of Water Data

DOLORES RIVER NEAR CISCO, UTAH

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	6	23	2921	0
	Feb	13	34	1952	0
	Mar	13	34	1980	0
	Apr	114	61	395	0
	May	296	91	226	0
	Jun	352	88	183	0
1957	Jul	158	61	285	0
	Aug	79	57	528	0
	Sep	43	36	623	0
	Oct	31	51	1198	0
	Nov	27	55	1514	0
	Dec	20	48	1778	0
	TOTAL	1150	639	409	0
	Jan	13	41	2362	0
	Feb	32	50	1145	0
	Mar	35	58	1208	0
	Apr	341	128	277	0
	May	368	91	182	0
	Jun	164	66	295	0
1958	Jul	20	35	1299	0
	Aug	8	29	2564	0
	Sep	9	28	2334	0
	Oct	8	29	2728	0
	Nov	9	34	2711	0
	Dec	10	37	2786	0
	TOTAL	1016	626	453	0
	Jan	10	34	2529	0
	Feb	10	30	2279	0
	Mar	11	35	2374	0
	Apr	25	38	1105	0
	May	33	31	686	0
	Jun	32	25	573	0
1959	Jul	7	12	1235	0
	Aug	13	20	1156	0
	Sep	3	10	2323	0
	Oct	11	20	1424	0
	Nov	9	21	1700	0
	Dec	7	22	2461	0
	TOTAL	169	297	1291	0
	Jan	8	22	1872	0
	Feb	9	31	2455	0
	Mar	44	55	917	0
	Apr	157	63	297	0
	May	111	43	283	0
	Jun	104	36	257	0
1960	Jul	20	25	898	0
	Aug	5	13	1938	0
	Sep	4	14	2897	0
	Oct	5	19	2749	31
	Nov	7	21	2187	30
	Dec	7	21	2262	31
	TOTAL	480	361	553	92

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	6	20	2467	31
	Feb	7	20	2081	28
	Mar	12	25	1514	31
	Apr	58	40	517	30
	May	131	58	325	31
	Jun	70	45	470	30
1961	Jul	11	24	1581	31
	Aug	14	26	1426	31
	Sep	18	29	1140	30
	Oct	18	30	1234	31
	Nov	12	26	1613	30
	Dec	9	25	1915	31
	TOTAL	367	368	738	365
	Jan	8	23	2131	31
	Feb	25	31	916	28
	Mar	17	29	1286	31
	Apr	190	65	253	30
	May	134	60	326	31
	Jun	80	50	459	30
1962	Jul	33	37	825	31
	Aug	8	23	2154	31
	Sep	6	20	2271	30
	Oct	12	27	1674	31
	Nov	9	24	2023	30
	Dec	8	24	2141	31
	TOTAL	530	412	572	365
	Jan	6	21	2503	31
	Feb	17	28	1188	28
	Mar	36	34	709	31
	Apr	51	43	618	30
	May	56	46	600	31
	Jun	18	30	1221	30
1963	Jul	8	23	2039	31
	Aug	15	28	1417	31
	Sep	10	24	1811	30
	Oct	5	20	2920	31
	Nov	8	24	2158	30
	Dec	6	21	2728	31
	TOTAL	237	343	1067	365
	Jan	4	19	3170	31
	Feb	6	21	2572	29
	Mar	7	23	2409	31
	Apr	37	39	774	30
	May	117	62	391	31
	Jun	56	48	628	30
1964	Jul	14	29	1537	31
	Aug	28	36	947	31
	Sep	8	23	2080	30
	Oct	7	20	2201	10
	Nov	6	25	2861	4
	Dec	9	26	2020	15
	TOTAL	300	372	910	303

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	11	27	1776	23
	Feb	9	26	2164	19
	Mar	9	30	2441	14
	Apr	174	71	301	4
	May	243	84	254	9
	Jun	165	63	278	9
1965	Jul	96	56	431	9
	Aug	42	44	780	16
	Sep	27	37	1023	13
	Oct	30	44	1059	12
	Nov	21	42	1512	13
	Dec	22	44	1492	13
	TOTAL	849	568	492	154
	Jan	23	44	1449	14
	Feb	14	30	1615	18
	Mar	67	56	613	16
	Apr	130	69	389	17
	May	133	72	400	14
	Jun	44	38	630	5
1966	Jul	14	29	1536	11
	Aug	5	14	2013	22
	Sep	4	13	2209	6
	Oct	6	19	2233	31
	Nov	7	20	2132	30
	Dec	17	30	1321	31
	TOTAL	464	434	688	215
	Jan	8	23	1961	31
	Feb	10	23	1767	28
	Mar	20	35	1323	31
	Apr	19	34	1343	30
	May	58	60	760	31
	Jun	45	54	870	30
1967	Jul	17	32	1401	31
	Aug	23	35	1096	31
	Sep	9	23	1768	30
	Oct	6	22	2573	18
	Nov	6	22	2702	17
	Dec	7	26	2809	25
	TOTAL	228	387	1249	333
	Jan	8	26	2495	27
	Feb	11	35	2342	14
	Mar	10	38	2732	6
	Apr	54	48	655	8
	May	168	70	308	8
	Jun	158	62	289	5
1968	Jul	27	39	1073	8
	Aug	40	44	799	8
	Sep	5	21	3145	5
	Oct	6	30	3572	8
	Nov	8	32	3074	6
	Dec	6	28	3336	9
	TOTAL	501	472	694	112

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	11	34	2213	10
	Feb	11	36	2520	9
	Mar	13	36	2062	11
	Apr	213	79	272	6
	May	168	56	246	5
	Jun	75	43	423	5
1969	Jul	39	40	757	9
	Aug	13	27	1608	10
	Sep	14	29	1482	5
	Oct	15	33	1625	8
	Nov	14	30	1554	6
	Dec	14	33	1700	10
	TOTAL	599	476	583	94
	Jan	13	39	2253	7
	Feb	11	29	1917	7
	Mar	11	37	2352	8
	Apr	51	50	721	6
	May	229	70	226	9
	Jun	89	51	425	4
1970	Jul	29	37	941	11
	Aug	18	31	1268	13
	Sep	64	60	697	9
	Oct	16	33	1468	9
	Nov	15	31	1553	6
	Dec	15	32	1586	13
	TOTAL	560	500	656	102
	Jan	16	35	1593	6
	Feb	15	32	1548	7
	Mar	42	60	1049	5
	Apr	81	40	364	3
	May	109	52	354	6
	Jun	103	46	324	8
1971	Jul	25	29	855	9
	Aug	17	39	1681	6
	Sep	8	20	1757	7
	Oct	16	35	1598	10
	Nov	10	29	2155	8
	Dec	14	31	1698	18
	TOTAL	457	449	722	93
	Jan	13	40	2167	8
	Feb	12	36	2237	6
	Mar	34	41	901	7
	Apr	28	36	963	10
	May	39	35	671	8
	Jun	47	37	573	9
1972	Jul	7	18	1758	9
	Aug	2	11	3850	10
	Sep	6	19	2364	10
	Oct	40	47	878	8
	Nov	23	38	1208	11
	Dec	18	39	1541	9
	TOTAL	269	397	1085	105

Table 11 – Colorado River Basin – Historical Flow and Quality of Water Data

DOLORES RIVER NEAR CISCO, UTAH

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	18	33	1313	31
	Feb	18	30	1277	28
	Mar	33	49	1081	15
	Apr	194	93	353	8
	May	546	161	217	4
	Jun	321	105	242	5
1973	Jul	109	71	482	5
	Aug	13	34	1911	4
	Sep	8	26	2470	7
	Oct	8	33	2900	6
	Nov	8	28	2676	15
	Dec	13	45	2590	9
	TOTAL	1289	709	405	137
	Jan	10	29	2057	24
	Feb	10	27	1969	25
	Mar	24	48	1472	9
	Apr	77	63	602	5
	May	130	52	297	4
	Jun	37	36	724	7
1974	Jul	15	28	1361	6
	Aug	4	13	2285	10
	Sep	2	11	4858	8
	Oct	5	22	3304	6
	Nov	8	27	2402	10
	Dec	7	28	2852	8
	TOTAL	329	384	858	122
	Jan	7	27	2692	14
	Feb	9	29	2334	13
	Mar	14	39	2070	8
	Apr	150	125	612	5
	May	315	86	201	5
	Jun	218	63	213	6
1975	Jul	130	57	325	5
	Aug	16	31	1446	7
	Sep	9	28	2430	6
	Oct	8	33	2957	8
	Nov	8	34	3236	8
	Dec	8	35	3056	8
	TOTAL	891	586	484	93
	Jan	10	37	2753	5
	Feb	13	40	2222	12
	Mar	13	44	2548	5
	Apr	80	46	425	3
	May	132	61	340	13
	Jun	76	44	424	4
1976	Jul	15	31	1527	4
	Aug	8	21	1975	2
	Sep	7	18	1818	1
	Oct	8	26	2259	6
	Nov	6	29	3665	5
	Dec	4	25	4358	6
	TOTAL	373	423	833	66
	Jan	5	35	4891	3
	Feb	8	38	3701	5
	Mar	6	35	4232	1
	Apr	8	24	2160	4
	May	6	26	3376	2
	Jun	10	23	1742	3
1977	Jul	19	41	1566	2
	Aug	15	26	1278	3
	Sep	5	16	2196	7
	Oct	10	25	1759	1
	Nov	6	20	2536	5
	Dec	6	29	3498	5
	TOTAL	104	336	2386	41
	Jan	9	15	1332	8
	Feb	8	23	2127	28
	Mar	16	36	1655	15
	Apr	236	85	264	2
	May	247	73	217	1
	Jun	160	47	217	2
1978	Jul	33	31	694	3
	Aug	5	14	1921	1
	Sep	2	9	4048	3
	Oct	4	19	3647	3
	Nov	10	25	1762	2
	Dec	6	24	2763	16
	TOTAL	735	401	401	84
	Jan	8	13	1273	11
	Feb	12	31	1885	19
	Mar	31	63	1499	10
	Apr	280	109	285	3
	May	389	114	216	1
	Jun	262	82	229	3
1979	Jul	72	59	601	2
	Aug	15	41	2017	3
	Sep	4	20	3883	3
	Oct	5	28	4044	3
	Nov	7	31	3198	5
	Dec	8	36	3328	6
	TOTAL	1092	627	422	69
	Jan	13	36	2067	19
	Feb	16	44	1962	4
	Mar	14	36	1941	23
	Apr	217	94	319	3
	May	407	118	214	4
	Jun	272	76	206	1
1980	Jul	57	46	595	0
	Aug	11	33	2199	6
	Sep	8	27	2632	6
	Oct	8	32	3090	4
	Nov	8	32	2933	9
	Dec	9	36	2973	7
	TOTAL	1039	610	432	86
	Jan	8	32	2808	6
	Feb	7	30	2938	4
	Mar	8	34	3119	8
	Apr	29	44	1107	7
	May	31	39	931	9
	Jun	46	38	618	1
1981	Jul	31	47	1124	1
	Aug	8	25	2245	3
	Sep	13	32	1751	5
	Oct	17	38	1633	31
	Nov	11	35	2228	30
	Dec	10	34	2538	31
	TOTAL	221	429	1429	136
	Jan	8	32	2834	31
	Feb	12	33	2076	28
	Mar	20	41	1533	3
	Apr	131	66	371	2
	May	190	67	260	0
	Jun	141	52	273	0
1982	Jul	54	44	606	2
	Aug	47	48	755	5
	Sep	52	44	629	4
	Oct	29	45	1130	5
	Nov	18	46	1931	7
	Dec	18	38	1563	5
	TOTAL	719	558	571	92
	Jan	16	39	1825	6
	Feb	17	36	1552	7
	Mar	49	53	802	6
	Apr	190	94	364	3
	May	522	150	211	3
	Jun	409	109	196	1
1983	Jul	132	61	340	8
	Aug	58	53	680	2
	Sep	21	50	1772	3
	Oct	20	44	1588	31
	Nov	15	40	1988	30
	Dec	16	41	1938	31
	TOTAL	1463	771	387	131

Table 11

Colorado River Basin

Historical Flow and Quality of Water Data

DOLORES RIVER NEAR CISCO, UTAH

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	1566	803	.51	377	*			
1942	1316	640	.49	358	*			
1943	596	504	.85	622	*			
1944	988	532	.54	396	*			
1945	661	503	.76	560	*			
1946	295	402	1.36	1002	*			
1947	553	506	.92	673	*			
1948	801	558	.70	512	*			
1949	822	631	.77	564	*			
1950	368	372	1.01	745	*			
1951	163	289	1.77	1304	45	0.0	4.1	34.4
1952	1095	542	.50	364	45	0.0	4.1	34.4
1953	301	376	1.25	918	68	0.0	5.1	31.9
1954	209	322	1.54	1135	107	0.0	6.4	33.9
1955	343	354	1.03	761	115	0.0	6.5	36.0
1956	265	311	1.18	864	78	0.0	6.7	38.0
1957	1150	639	.56	409	39	0.0	4.2	39.1
1958	1016	626	.62	453	28	0.0	3.0	42.2
1959	169	297	1.76	1291	56	0.0	3.8	36.3
1960	480	361	.75	553	81	0.0	4.1	37.7
1961	367	368	1.00	738	92	37.0	5.0	32.2
1962	530	412	.78	572	113	72.6	6.4	37.7
1963	237	343	1.45	1067	142	95.8	7.8	41.3
1964	300	372	1.24	910	159	93.7	7.0	41.0
1965	849	568	.67	492	162	92.0	6.3	43.0
1966	464	434	.94	688	161	89.4	5.0	39.8
1967	228	387	1.70	1249	105	92.4	5.5	42.1
1968	501	472	.94	694	103	92.2	6.2	40.8
1969	599	476	.79	584	61	75.4	6.4	40.0
1970	560	500	.89	656	75	61.3	7.3	41.7
1971	457	449	.98	722	44	0.0	6.4	51.0
1972	269	397	1.48	1085	50	0.0	6.2	47.0
1973	1289	709	.55	405	53	5.7	6.1	44.5
1974	329	384	1.17	858	46	6.5	5.1	36.3
1975	891	586	.66	484	41	7.3	5.8	44.6
1976	373	423	1.13	834	36	0.0	12.4	48.8
1977	104	336	3.25	2386	35	0.0	13.0	54.0
1978	735	401	.55	401	39	0.0	11.9	49.9
1979	1092	627	.57	422	40	0.0	5.9	42.0
1980	1039	610	.59	432	35	0.0	4.8	33.4
1981	221	429	1.94	1429	25	0.0	8.0	26.6
1982	719	558	.78	571	24	0.0	7.8	19.8
1983	1463	771	.53	387	27	0.0	8.3	21.7
Total	26772	20582						
Average	623	479	.77	565				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 12 - Colorado River Basin - Historical Flow and Quality of Water Data

COLORADO RIVER NEAR CISCO, UTAH

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	139	300	1583	31
	Feb	153	290	1395	28
	Mar	206	343	1221	31
	Apr	445	438	724	30
	May	2355	825	258	31
	Jun	1582	704	327	30
1941	Jul	579	495	628	31
	Aug	251	365	1071	31
	Sep	237	343	1065	30
	Oct	579	496	630	31
	Nov	311	391	924	30
	Dec	229	359	1150	31
	TOTAL	7068	5348	556	365
	Jan	181	328	1333	31
	Feb	166	299	1327	28
	Mar	229	358	1150	31
	Apr	1344	651	356	30
	May	1809	747	304	31
	Jun	1961	757	284	30
1942	Jul	579	494	628	31
	Aug	185	330	1313	31
	Sep	134	289	1584	30
	Oct	162	367	1670	0
	Nov	186	354	1399	0
	Dec	164	303	1355	0
	TOTAL	7098	5276	547	273
	Jan	153	299	1434	1
	Feb	146	259	1305	0
	Mar	174	291	1227	0
	Apr	709	355	368	0
	May	996	410	303	0
	Jun	1365	528	284	0
1943	Jul	502	368	539	1
	Aug	368	434	867	0
	Sep	212	376	1303	0
	Oct	184	321	1280	0
	Nov	215	313	1069	0
	Dec	189	297	1151	0
	TOTAL	5214	4249	599	2
	Jan	140	247	1298	0
	Feb	152	237	1146	0
	Mar	166	258	1138	0
	Apr	304	334	809	0
	May	1784	709	292	0
	Jun	1843	623	249	0
1944	Jul	677	400	434	0
	Aug	149	256	1267	0
	Sep	99	234	1737	0
	Oct	159	332	1535	0
	Nov	196	343	1288	0
	Dec	171	287	1231	0
	TOTAL	5840	4259	536	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	149	275	1356	0
	Feb	150	272	1331	0
	Mar	178	291	1202	0
	Apr	329	292	654	0
	May	1495	541	266	0
	Jun	1311	482	270	0
1945	Jul	676	400	435	0
	Aug	446	427	703	1
	Sep	146	256	1289	0
	Oct	217	353	1195	0
	Nov	224	304	997	0
	Dec	183	219	883	0
	TOTAL	5505	4112	549	1
	Jan	174	232	979	0
	Feb	155	199	944	0
	Mar	191	241	930	0
	Apr	525	320	449	0
	May	725	342	347	0
	Jun	1026	429	308	0
1946	Jul	310	327	776	0
	Aug	196	357	1342	0
	Sep	135	264	1434	2
	Oct	206	373	1328	0
	Nov	206	325	1160	0
	Dec	208	297	1048	0
	TOTAL	4057	3707	672	2
	Jan	145	238	1204	0
	Feb	150	223	1090	0
	Mar	189	273	1062	0
	Apr	315	271	633	0
	May	1423	555	287	0
	Jun	1594	624	288	0
1947	Jul	985	437	326	0
	Aug	369	439	875	0
	Sep	259	355	1007	0
	Oct	328	470	1052	0
	Nov	277	343	913	0
	Dec	223	311	1025	1
	TOTAL	6258	4539	533	1
	Jan	191	255	982	0
	Feb	210	281	981	0
	Mar	245	331	997	0
	Apr	830	482	427	0
	May	1960	704	264	0
	Jun	1499	595	292	0
1948	Jul	446	365	601	0
	Aug	225	330	1079	0
	Sep	121	255	1542	0
	Oct	175	337	1416	0
	Nov	204	348	1252	0
	Dec	186	308	1220	0
	TOTAL	6291	4588	536	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	188	307	1204	0
	Feb	187	264	1037	1
	Mar	243	349	1058	0
	Apr	615	420	503	0
	May	1289	512	292	0
	Jun	1910	702	270	0
1949	Jul	908	482	391	0
	Aug	224	343	1125	0
	Sep	159	320	1485	0
	Oct	226	413	1347	0
	Nov	210	356	1247	0
	Dec	180	307	1251	0
	TOTAL	6339	4777	554	1
	Jan	199	317	1171	0
	Feb	201	303	1109	0
	Mar	209	282	993	0
	Apr	541	325	442	0
	May	764	364	350	0
	Jun	1113	478	316	0
1950	Jul	347	339	719	0
	Aug	109	204	1372	0
	Sep	138	269	1434	0
	Oct	125	262	1538	0
	Nov	161	293	1333	0
	Dec	167	274	1202	0
	TOTAL	4074	3708	669	0
	Jan	153	248	1195	0
	Feb	151	223	1085	0
	Mar	161	229	1044	0
	Apr	173	203	863	0
	May	758	402	391	0
	Jun	1173	464	291	0
1951	Jul	529	326	453	0
	Aug	238	315	971	0
	Sep	131	235	1323	0
	Oct	169	311	1354	0
	Nov	178	291	1201	0
	Dec	172	258	1103	0
	TOTAL	3987	3507	647	0
	Jan	191	294	1135	0
	Feb	156	259	1223	0
	Mar	194	284	1079	0
	Apr	970	484	367	0
	May	2152	686	235	0
	Jun	2314	685	218	0
1952	Jul	641	459	526	0
	Aug	358	407	836	0
	Sep	213	318	1096	0
	Oct	166	290	1285	0
	Nov	177	314	1305	0
	Dec	188	317	1242	0
	TOTAL	7719	4797	457	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	185	312	1238	0
	Feb	142	237	1224	0
	Mar	187	292	1150	0
	Apr	250	244	718	0
	May	606	356	432	0
	Jun	1399	513	270	0
1953	Jul	353	358	746	0
	Aug	256	350	1006	0
	Sep	128	250	1437	0
	Oct	177	359	1487	0
	Nov	207	360	1282	0
	Dec	171	302	1298	0
	TOTAL	4061	3934	712	0
	Jan	176	330	1374	0
	Feb	143	247	1271	0
	Mar	161	245	1121	0
	Apr	221	225	749	0
	May	436	306	516	0
	Jun	217	246	836	0
1954	Jul	150	239	1174	0
	Aug	98	202	1511	0
	Sep	171	338	1452	0
	Oct	215	328	1119	0
	Nov	164	289	1295	0
	Dec	140	279	1465	0
	TOTAL	2293	3275	1050	0
	Jan	133	266	1463	0
	Feb	121	229	1386	0
	Mar	198	291	1082	0
	Apr	320	263	605	0
	May	752	363	355	0
	Jun	689	365	389	0
1955	Jul	214	251	859	0
	Aug	185	289	1149	0
	Sep	108	221	1509	0
	Oct	119	247	1521	0
	Nov	169	320	1395	0
	Dec	176	305	1275	0
	TOTAL	3185	3409	787	0
	Jan	155	269	1276	0
	Feb	141	252	1309	0
	Mar	187	274	1077	0
	Apr	356	257	532	0
	May	1005	430	315	0
	Jun	924	389	310	0
1956	Jul	172	240	1025	0
	Aug	119	220	1363	0
	Sep	81	179	1613	0
	Oct	121	253	1542	0
	Nov	166	296	1317	1
	Dec	142	273	1415	0
	TOTAL	3569	3333	687	1

Table 12 - Colorado River Basin - Historical Flow and Quality of Water Data

COLORADO RIVER NEAR CISCO, UTAH

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	164	300	1342	0
	Feb	168	258	1134	0
	Mar	168	262	1148	0
	Apr	398	309	571	0
	May	1375	579	310	0
	Jun	2859	817	210	0
1957	Jul	1952	695	262	0
	Aug	661	522	581	0
	Sep	314	367	861	0
	Oct	292	438	1102	0
	Nov	300	429	1053	0
	Dec	239	363	1119	2
	TOTAL	8888	5339	442	2
	Jan	200	318	1168	0
	Feb	225	305	996	0
	Mar	254	337	976	0
	Apr	756	396	385	0
	May	2032	589	213	0
	Jun	1560	532	251	0
1958	Jul	234	275	865	0
	Aug	109	224	1504	0
	Sep	153	302	1449	0
	Oct	155	297	1407	0
	Nov	190	307	1190	0
	Dec	176	293	1226	0
	TOTAL	6045	4174	508	0
	Jan	168	284	1244	0
	Feb	153	240	1155	0
	Mar	150	253	1242	0
	Apr	163	219	988	0
	May	536	348	478	0
	Jun	924	412	328	0
1959	Jul	214	233	800	0
	Aug	160	280	1292	0
	Sep	124	238	1410	0
	Oct	251	352	1032	0
	Nov	210	277	970	0
	Dec	163	256	1154	0
	TOTAL	3214	3391	776	0
	Jan	164	257	1154	0
	Feb	143	226	1159	0
	Mar	273	327	881	0
	Apr	629	316	369	0
	May	758	351	341	0
	Jun	1068	422	290	0
1960	Jul	251	251	738	0
	Aug	106	194	1354	0
	Sep	117	231	1456	0
	Oct	153	246	1182	31
	Nov	177	254	1058	30
	Dec	165	253	1130	31
	TOTAL	4003	3329	612	92
	Jan	157	248	1167	31
	Feb	140	223	1177	28
	Mar	162	251	1140	31
	Apr	206	267	950	30
	May	677	412	448	31
	Jun	664	401	443	30
1961	Jul	130	231	1302	31
	Aug	138	236	1261	31
	Sep	316	310	721	30
	Oct	357	357	736	6
	Nov	252	297	869	22
	Dec	197	276	1029	28
	TOTAL	3395	3509	760	329
	Jan	182	260	1050	23
	Feb	261	303	854	14
	Mar	246	289	865	21
	Apr	1054	455	317	18
	May	1603	580	266	18
	Jun	1400	545	286	16
1962	Jul	765	440	424	15
	Aug	206	276	987	16
	Sep	173	309	1314	14
	Oct	262	326	912	23
	Nov	243	303	919	20
	Dec	180	266	1087	29
	TOTAL	6575	4354	487	227
	Jan	163	260	1168	28
	Feb	193	268	1020	16
	Mar	219	287	963	17
	Apr	245	258	775	18
	May	517	357	508	16
	Jun	332	317	702	18
1963	Jul	115	225	1447	19
	Aug	168	284	1243	13
	Sep	183	293	1180	14
	Oct	134	258	1416	18
	Nov	179	272	1121	20
	Dec	138	250	1330	20
	TOTAL	2585	3329	947	217
	Jan	132	250	1391	23
	Feb	121	226	1375	19
	Mar	128	244	1396	20
	Apr	214	270	926	17
	May	861	415	355	13
	Jun	780	413	390	18
1964	Jul	276	295	787	14
	Aug	241	344	1050	13
	Sep	153	255	1228	17
	Oct	164	279	1253	10
	Nov	182	299	1210	2
	Dec	181	273	1108	14
	TOTAL	3433	3564	763	180
	Jan	162	258	1172	22
	Feb	141	236	1233	19
	Mar	154	252	1203	15
	Apr	562	353	462	4
	May	1272	500	289	10
	Jun	1654	569	253	10
1965	Jul	1117	527	347	8
	Aug	447	371	610	19
	Sep	369	392	780	10
	Oct	360	395	808	11
	Nov	249	337	994	14
	Dec	237	313	974	15
	TOTAL	6723	4503	493	157
	Jan	200	274	1010	13
	Feb	169	242	1052	13
	Mar	278	290	767	12
	Apr	438	280	470	5
	May	697	397	419	11
	Jun	429	342	587	10
1966	Jul	185	263	1043	7
	Aug	120	224	1375	20
	Sep	145	256	1301	8
	Oct	174	294	1239	10
	Nov	153	265	1272	11
	Dec	175	278	1172	13
	TOTAL	3163	3406	792	133
	Jan	146	245	1234	31
	Feb	136	230	1245	11
	Mar	186	255	1013	18
	Apr	198	268	995	30
	May	462	343	546	11
	Jun	714	431	445	2
1967	Jul	327	332	746	3
	Aug	175	271	1141	3
	Sep	178	278	1152	2
	Oct	175	256	1079	31
	Nov	211	274	956	3
	Dec	241	283	863	17
	TOTAL	3146	3467	810	162
	Jan	205	226	808	4
	Feb	193	228	869	4
	Mar	171	237	1018	4
	Apr	230	229	732	4
	May	667	372	410	3
	Jun	1171	478	300	2
1968	Jul	306	317	763	4
	Aug	365	420	847	2
	Sep	159	259	1202	3
	Oct	213	317	1093	5
	Nov	256	314	900	5
	Dec	248	280	828	5
	TOTAL	4185	3677	646	45
	Jan	259	269	764	6
	Feb	189	226	882	7
	Mar	250	247	728	10
	Apr	714	380	391	6
	May	987	441	328	4
	Jun	731	448	451	3
1969	Jul	472	360	561	5
	Aug	199	258	952	4
	Sep	240	315	967	3
	Oct	324	341	773	6
	Nov	289	291	740	5
	Dec	252	266	774	10
	TOTAL	4906	3842	576	69
	Jan	236	249	778	7
	Feb	220	208	695	5
	Mar	277	242	642	6
	Apr	327	266	597	6
	May	1385	503	267	7
	Jun	1340	502	276	6
1970	Jul	538	350	479	5
	Aug	245	279	836	9
	Sep	407	405	733	6
	Oct	360	333	680	7
	Nov	338	287	625	2
	Dec	317	272	632	10
	TOTAL	5988	3897	479	76
	Jan	332	256	567	5
	Feb	321	225	516	6
	Mar	413	264	470	5
	Apr	579	291	369	5
	May	768	392	376	6
	Jun	1141	446	287	5
1971	Jul	535	340	467	6
	Aug	246	271	810	7
	Sep	282	298	776	7
	Oct	280	326	856	9
	Nov	276	287	766	6
	Dec	284	289	749	8
	TOTAL	5458	3685	497	75
	Jan	267	267	734	8
	Feb	227	232	752	7
	Mar	279	257	676	6
	Apr	202	209	761	9
	May	453	310	504	7
	Jun	759	368	356	5
1972	Jul	192	226	867	6
	Aug	119	196	1205	6
	Sep	201	281	1031	8
	Oct	302	365	889	6
	Nov	281	299	782	9
	Dec	267	270	742	9
	TOTAL	3549	3279	679	86

Table 12 – Colorado River Basin – Historical Flow and Quality of Water Data

COLORADO RIVER NEAR CISCO, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	283	288	749	24
	Feb	211	245	855	20
	Mar	240	281	861	0
	Apr	388	353	669	1
	May	1557	619	293	1
	Jun	1557	595	281	0
1973	Jul	799	447	411	1
	Aug	331	326	725	1
	Sep	220	286	953	1
	Oct	251	320	938	1
	Nov	248	292	867	2
	Dec	290	267	677	2
	TOTAL	6374	4318	498	54
	Jan	312	266	627	4
	Feb	294	233	582	1
	Mar	363	295	596	2
	Apr	361	284	577	3
	May	1016	386	279	0
	Jun	747	360	354	2
1974	Jul	313	304	714	1
	Aug	161	233	1064	2
	Sep	158	253	1178	0
	Oct	206	311	1112	1
	Nov	259	314	892	1
	Dec	226	263	857	2
	TOTAL	4416	3501	583	19
	Jan	236	259	807	7
	Feb	207	224	793	5
	Mar	240	259	792	4
	Apr	377	307	598	1
	May	1007	446	326	0
	Jun	1243	489	289	1
1975	Jul	807	403	368	1
	Aug	226	265	861	1
	Sep	185	268	1066	0
	Oct	233	316	998	2
	Nov	279	311	822	1
	Dec	262	276	774	1
	TOTAL	5303	3824	530	24
	Jan	230	243	780	0
	Feb	206	239	852	1
	Mar	220	240	802	0
	Apr	277	306	815	1
	May	639	376	433	2
	Jun	592	358	445	2
1976	Jul	231	269	856	1
	Aug	150	232	1133	0
	Sep	176	249	1039	1
	Oct	219	271	912	2
	Nov	220	259	866	5
	Dec	219	236	792	5
	TOTAL	3379	3279	713	20
	Jan	207	242	863	8
	Feb	146	198	999	4
	Mar	124	189	1127	1
	Apr	97	150	1133	1
	May	143	185	953	0
	Jun	168	207	905	0
1977	Jul	127	224	1300	0
	Aug	109	198	1341	1
	Sep	127	206	1192	0
	Oct	141	216	1122	1
	Nov	142	218	1124	0
	Dec	130	189	1069	0
	TOTAL	1660	2422	1073	16
	Jan	137	187	1005	2
	Feb	138	181	961	3
	Mar	191	230	883	0
	Apr	477	356	549	1
	May	957	502	386	0
	Jun	1343	539	295	0
1978	Jul	535	355	488	0
	Aug	159	214	987	0
	Sep	182	242	980	2
	Oct	200	266	976	0
	Nov	249	283	835	0
	Dec	244	261	786	1
	TOTAL	4813	3615	552	9
	Jan	239	270	832	31
	Feb	251	236	692	11
	Mar	371	335	664	1
	Apr	716	438	450	1
	May	1513	627	305	0
	Jun	1555	604	285	1
1979	Jul	755	417	406	1
	Aug	278	304	805	1
	Sep	218	270	912	0
	Oct	225	281	919	4
	Nov	226	273	888	1
	Dec	258	269	766	2
	TOTAL	6607	4325	481	54
	Jan	262	257	722	2
	Feb	257	247	704	0
	Mar	273	264	711	12
	Apr	566	360	468	2
	May	1655	683	304	0
	Jun	1578	558	260	0
1980	Jul	509	350	506	0
	Aug	203	258	934	2
	Sep	206	262	935	6
	Oct	220	282	941	0
	Nov	264	276	770	0
	Dec	255	264	761	0
	TOTAL	6249	4062	478	24
	Jan	229	241	773	1
	Feb	162	197	891	1
	Mar	155	201	953	1
	Apr	175	203	853	2
	May	296	270	669	3
	Jun	407	277	500	0
1981	Jul	196	256	962	2
	Aug	127	201	1164	1
	Sep	183	248	997	4
	Oct	243	262	796	30
	Nov	200	236	870	30
	Dec	179	231	947	30
	TOTAL	2552	2823	813	105
	Jan	170	225	974	31
	Feb	206	229	819	27
	Mar	263	233	650	0
	Apr	409	293	526	0
	May	893	432	356	0
	Jun	1065	463	319	0
1982	Jul	590	361	451	1
	Aug	353	329	685	2
	Sep	380	359	694	1
	Oct	372	326	644	2
	Nov	321	302	690	1
	Dec	287	266	682	3
	TOTAL	5309	3816	529	68
	Jan	252	239	698	2
	Feb	230	214	683	4
	Mar	299	259	637	1
	Apr	448	321	526	2
	May	1563	679	319	2
	Jun	2740	834	224	1
1983	Jul	1700	613	265	2
	Aug	673	440	481	1
	Sep	308	299	715	2
	Oct	351	307	644	31
	Nov	327	292	657	30
	Dec	345	305	650	31
	TOTAL	9236	4803	382	109

Table 12

Colorado River Basin

Historical Flow and Quality of Water Data

COLORADO RIVER NEAR CISCO, UTAH

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	7068	5348	.76	556	104	100.0	0.0	16.7
1942	7098	5276	.74	547	104	100.0	0.0	16.7
1943	5214	4249	.82	599	82	82.9	3.1	16.6
1944	5840	4259	.73	536	58	55.2	3.7	15.9
1945	5505	4112	.75	549	38	0.0	4.0	14.5
1946	4057	3707	.91	672	36	0.0	3.7	16.5
1947	6258	4539	.73	533	36	0.0	3.4	18.6
1948	6291	4588	.73	536	36	0.0	3.7	16.7
1949	6339	4777	.75	554	41	0.0	4.2	17.3
1950	4074	3708	.91	669	64	4.7	3.9	15.3
1951	3987	3507	.88	647	84	4.8	3.5	13.8
1952	7719	4797	.62	457	92	5.4	3.4	15.1
1953	4061	3934	.97	712	89	2.2	4.0	16.5
1954	2293	3275	1.43	1050	90	1.1	4.8	20.9
1955	3185	3409	1.07	787	95	0.0	4.8	18.8
1956	3569	3333	.93	687	95	0.0	4.2	18.9
1957	8888	5339	.60	442	80	0.0	3.9	17.3
1958	6045	4174	.69	508	65	0.0	3.7	18.3
1959	3214	3391	1.06	776	52	0.0	3.9	20.4
1960	4003	3329	.83	612	54	0.0	3.8	17.6
1961	3395	3509	1.03	760	67	0.0	4.5	18.8
1962	6575	4354	.66	487	71	31.0	5.1	18.9
1963	2585	3329	1.29	947	76	61.8	6.0	19.4
1964	3433	3564	1.04	763	75	62.7	5.9	18.4
1965	6723	4503	.67	493	85	29.4	5.9	21.4
1966	3163	3406	1.08	792	105	0.0	6.0	23.9
1967	3146	3467	1.10	810	117	0.0	5.4	24.5
1968	4185	3677	.88	646	131	0.0	4.6	21.4
1969	4906	3842	.78	576	100	1.0	3.8	17.2
1970	5988	3897	.65	479	73	1.4	6.3	16.3
1971	5458	3685	.68	497	38	2.6	7.9	18.5
1972	3549	3279	.92	679	37	0.0	7.3	18.1
1973	6374	4318	.68	498	37	0.0	4.9	18.3
1974	4416	3501	.79	583	37	0.0	5.3	17.5
1975	5303	3824	.72	530	36	0.0	6.0	16.5
1976	3379	3279	.97	714	36	0.0	5.3	15.2
1977	1660	2422	1.46	1073	35	0.0	7.2	16.1
1978	4813	3615	.75	552	33	0.0	6.5	13.8
1979	6607	4325	.65	481	31	0.0	6.9	16.0
1980	6249	4062	.65	478	32	0.0	5.1	12.6
1981	2552	2823	1.11	814	28	0.0	6.3	13.5
1982	5309	3816	.72	529	30	0.0	6.6	13.3
1983	9236	4803	.52	382	38	0.0	6.0	12.6
Total	213711	168350						
Average	4970	3915	.79	579				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 13 - Colorado River Basin - Historical Flow and Quality of Water Data

SAN JUAN RIVER NEAR ARCHULETA, NEW MEXICO

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	22	9	301	*
	Feb	46	16	256	*
	Mar	98	37	278	*
	Apr	251	53	155	*
	May	709	110	114	*
	Jun	560	68	89	*
1941	Jul	324	46	104	*
	Aug	84	16	140	*
	Sep	68	16	173	*
	Oct	273	33	89	*
	Nov	87	15	127	*
	Dec	52	11	156	*
	TOTAL	2574	430	123	0
	Jan	45	15	245	*
	Feb	48	12	184	*
	Mar	54	23	313	*
	Apr	383	82	157	*
	May	320	48	110	*
	Jun	310	38	90	*
1942	Jul	76	14	135	*
	Aug	41	9	161	*
	Sep	28	7	184	*
	Oct	23	6	192	*
	Nov	22	6	201	*
	Dec	16	6	276	*
	TOTAL	1366	266	143	0
	Jan	16	7	322	*
	Feb	26	9	255	*
	Mar	55	21	281	*
	Apr	198	37	137	*
	May	184	30	120	*
	Jun	134	20	110	*
1943	Jul	51	12	173	*
	Aug	48	10	153	*
	Sep	28	7	184	*
	Oct	35	7	147	*
	Nov	24	7	215	*
	Dec	19	6	232	*
	TOTAL	818	173	156	0
	Jan	16	6	276	*
	Feb	19	6	232	*
	Mar	34	16	346	*
	Apr	131	27	152	*
	May	371	61	121	*
	Jun	382	49	94	*
1944	Jul	134	22	121	*
	Aug	45	9	147	*
	Sep	43	10	171	*
	Oct	41	9	161	*
	Nov	21	6	210	*
	Dec	14	6	315	*
	TOTAL	1251	227	133	0
	Jan	14	6	315	*
	Feb	22	10	334	*
	Mar	35	17	357	*
	Apr	143	28	144	*
	May	278	44	116	*
	Jun	209	28	99	*
1945	Jul	68	14	151	*
	Aug	40	9	165	*
	Sep	21	5	175	*
	Oct	30	11	270	*
	Nov	19	7	271	*
	Dec	12	6	368	*
	TOTAL	891	185	153	0
	Jan	14	6	315	*
	Feb	17	8	346	*
	Mar	22	11	368	*
	Apr	66	15	167	*
	May	73	13	131	*
	Jun	87	16	135	*
1946	Jul	27	9	245	*
	Aug	40	14	257	*
	Sep	29	9	228	*
	Oct	36	11	225	*
	Nov	26	9	255	*
	Dec	19	6	232	*
	TOTAL	456	127	205	0
	Jan	15	6	294	*
	Feb	24	9	276	*
	Mar	32	11	253	*
	Apr	50	12	177	*
	May	186	32	127	*
	Jun	140	18	95	*
1947	Jul	43	12	205	*
	Aug	73	22	222	*
	Sep	56	13	171	*
	Oct	77	16	153	*
	Nov	37	8	159	*
	Dec	27	7	191	*
	TOTAL	760	166	161	0
	Jan	27	7	191	*
	Feb	39	13	245	*
	Mar	43	15	257	*
	Apr	246	49	147	*
	May	306	43	103	*
	Jun	338	40	87	*
1948	Jul	79	13	121	*
	Aug	49	12	180	*
	Sep	22	7	234	*
	Oct	23	8	256	*
	Nov	18	7	286	*
	Dec	13	6	339	*
	TOTAL	1203	220	134	0
	Jan	16	7	322	*
	Feb	25	9	265	*
	Mar	73	27	272	*
	Apr	228	55	177	*
	May	318	48	111	*
	Jun	406	53	96	*
1949	Jul	199	30	111	*
	Aug	57	14	181	*
	Sep	33	9	201	*
	Oct	30	9	221	*
	Nov	21	8	280	*
	Dec	14	7	368	*
	TOTAL	1420	276	143	0
	Jan	16	6	276	*
	Feb	29	12	304	*
	Mar	31	13	308	*
	Apr	116	22	140	*
	May	126	19	111	*
	Jun	112	18	118	*
1950	Jul	44	12	201	*
	Aug	20	7	257	*
	Sep	24	9	276	*
	Oct	20	7	257	*
	Nov	14	7	368	*
	Dec	12	6	368	*
	TOTAL	564	138	180	0
	Jan	10	5	368	*
	Feb	11	5	334	*
	Mar	20	9	331	*
	Apr	35	10	210	*
	May	117	21	132	*
	Jun	94	16	125	*
1951	Jul	21	8	280	*
	Aug	33	12	267	*
	Sep	22	8	267	*
	Oct	17	8	346	*
	Nov	15	7	343	*
	Dec	18	8	327	*
	TOTAL	413	117	208	0
	Jan	19	10	387	*
	Feb	19	10	387	*
	Mar	47	23	360	*
	Apr	326	85	192	*
	May	396	63	117	*
	Jun	454	59	96	*
1952	Jul	136	24	130	*
	Aug	66	17	189	*
	Sep	33	9	201	*
	Oct	22	7	234	*
	Nov	16	7	322	*
	Dec	18	7	286	*
	TOTAL	1552	321	152	0
	Jan	18	7	286	*
	Feb	18	7	286	*
	Mar	37	15	298	*
	Apr	75	18	177	*
	May	117	22	138	*
	Jun	148	22	109	*
1953	Jul	41	13	233	*
	Aug	33	11	245	*
	Sep	16	7	322	*
	Oct	23	10	320	*
	Nov	23	10	320	*
	Dec	14	7	368	*
	TOTAL	563	149	195	0
	Jan	11	5	334	*
	Feb	21	10	350	*
	Mar	28	13	341	*
	Apr	90	19	155	*
	May	143	26	134	*
	Jun	67	13	143	*
1954	Jul	37	15	298	*
	Aug	45	13	212	*
	Sep	30	13	319	*
	Oct	42	10	175	*
	Nov	18	7	286	*
	Dec	13	5	314	10
	TOTAL	545	149	202	10
	Jan	12	5	293	0
	Feb	13	5	279	0
	Mar	27	10	270	0
	Apr	45	11	179	0
	May	132	21	119	0
	Jun	119	17	105	0
1955	Jul	42	13	218	0
	Aug	67	19	207	0
	Sep	28	8	211	0
	Oct	19	6	243	0
	Nov	17	6	280	2
	Dec	15	6	307	3
	TOTAL	537	128	175	5
	Jan	16	6	292	0
	Feb	15	6	314	1
	Mar	48	16	248	0
	Apr	79	16	147	0
	May	174	23	98	0
	Jun	117	16	100	0
1956	Jul	25	7	219	0
	Aug	23	8	249	0
	Sep	11	4	258	2
	Oct	12	5	307	0
	Nov	11	5	324	0
	Dec	9	4	351	0
	TOTAL	539	117	160	3

* See 'Notes' preceding Table 1.

Table 13 – Colorado River Basin – Historical Flow and Quality of Water Data

SAN JUAN RIVER NEAR ARCHULETA, NEW MEXICO

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	13	6	329	0
	Feb	30	14	336	0
	Mar	46	20	315	0
	Apr	120	31	190	0
	May	222	44	147	1
	Jun	480	65	100	1
1957	Jul	327	50	113	0
	Aug	164	35	159	1
	Sep	67	13	145	0
	Oct	67	20	216	0
	Nov	68	18	200	0
	Dec	44	12	208	0
	TOTAL	1647	329	147	3
	Jan	22	8	269	0
	Feb	51	21	300	0
	Mar	77	31	294	0
	Apr	279	83	218	0
	May	460	71	114	0
	Jun	270	34	92	0
1958	Jul	42	11	192	0
	Aug	35	11	231	1
	Sep	40	11	206	0
	Oct	25	9	247	0
	Nov	17	7	287	0
	Dec	14	6	301	0
	TOTAL	1332	301	166	1
	Jan	11	5	330	0
	Feb	15	6	327	0
	Mar	18	8	310	1
	Apr	37	11	217	0
	May	87	16	131	0
	Jun	84	14	122	1
1959	Jul	18	5	231	0
	Aug	34	12	256	0
	Sep	15	5	257	0
	Oct	60	18	228	0
	Nov	39	11	218	0
	Dec	19	7	261	8
	TOTAL	436	119	201	10
	Jan	14	6	314	1
	Feb	16	6	301	0
	Mar	175	59	247	0
	Apr	240	44	135	0
	May	193	31	118	0
	Jun	232	29	92	0
1960	Jul	55	13	171	0
	Aug	25	7	221	0
	Sep	23	7	238	0
	Oct	26	10	276	0
	Nov	16	7	309	0
	Dec	14	6	331	0
	TOTAL	1029	226	162	1

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	12	5	323	0
	Feb	16	7	315	0
	Mar	43	19	315	1
	Apr	113	30	193	0
	May	192	28	107	0
	Jun	122	20	122	6
1961	Jul	38	10	201	2
	Aug	52	15	212	2
	Sep	58	15	188	0
	Oct	52	13	181	1
	Nov	34	10	217	0
	Dec	18	6	234	6
	TOTAL	750	177	174	18
	Jan	15	6	275	0
	Feb	42	16	283	1
	Mar	51	20	281	0
	Apr	242	49	148	0
	May	228	32	104	0
	Jun	165	21	96	0
1962	Jul	39	7	134	0
	Aug	29	8	192	0
	Sep	19	5	197	0
	Oct	18	6	230	0
	Nov	14	5	246	0
	Dec	10	4	268	0
	TOTAL	872	178	150	1
	Jan	7	3	273	0
	Feb	8	3	284	0
	Mar	15	6	285	1
	Apr	31	12	279	8
	May	19	5	180	1
	Jun	19	3	136	3
1963	Jul	20	4	129	0
	Aug	22	4	136	0
	Sep	20	4	149	0
	Oct	24	5	164	0
	Nov	24	6	179	0
	Dec	24	7	203	0
	TOTAL	232	61	192	13
	Jan	17	5	231	1
	Feb	13	4	229	0
	Mar	13	4	240	0
	Apr	15	5	245	0
	May	34	11	232	0
	Jun	82	23	203	0
1964	Jul	108	26	178	1
	Aug	48	11	170	0
	Sep	26	6	163	0
	Oct	28	7	173	0
	Nov	21	6	200	0
	Dec	32	9	215	0
	TOTAL	437	116	196	2

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	90	26	214	12
	Feb	92	27	218	12
	Mar	52	18	249	3
	Apr	85	29	253	2
	May	138	40	212	2
	Jun	215	41	141	3
1965	Jul	102	18	128	0
	Aug	136	24	128	7
	Sep	112	19	123	10
	Oct	131	20	110	31
	Nov	180	31	126	0
	Dec	177	34	142	0
	TOTAL	1511	327	159	82
	Jan	168	36	155	0
	Feb	94	24	186	0
	Mar	114	32	207	0
	Apr	181	49	199	0
	May	129	32	183	0
	Jun	27	6	152	0
1966	Jul	28	4	118	0
	Aug	29	5	137	0
	Sep	27	5	128	0
	Oct	91	16	133	0
	Nov	47	9	143	0
	Dec	25	6	182	0
	TOTAL	961	225	172	0
	Jan	25	6	185	1
	Feb	45	11	189	0
	Mar	70	17	184	0
	Apr	23	6	202	0
	May	17	5	225	0
	Jun	18	6	249	0
1967	Jul	20	7	244	0
	Aug	62	18	209	0
	Sep	59	16	195	0
	Oct	21	5	162	0
	Nov	21	5	187	0
	Dec	21	6	197	1
	TOTAL	402	108	198	2
	Jan	19	5	199	0
	Feb	20	5	190	0
	Mar	18	5	213	0
	Apr	60	16	193	0
	May	49	13	195	0
	Jun	28	7	191	0
1968	Jul	30	8	198	0
	Aug	38	10	194	0
	Sep	47	12	181	0
	Oct	35	9	182	0
	Nov	23	6	181	0
	Dec	24	6	168	0
	TOTAL	392	101	190	0

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	40	9	160	30
	Feb	110	23	153	27
	Mar	94	21	162	30
	Apr	110	26	173	29
	May	117	26	164	30
	Jun	118	26	162	29
1969	Jul	99	22	164	30
	Aug	72	16	164	30
	Sep	76	16	152	29
	Oct	96	19	146	31
	Nov	81	16	148	30
	Dec	90	18	152	31
	TOTAL	1102	238	159	356
	Jan	51	10	150	31
	Feb	110	21	141	28
	Mar	91	18	148	31
	Apr	26	6	157	30
	May	29	6	158	31
	Jun	30	6	159	30
1970	Jul	31	7	156	31
	Aug	39	8	155	31
	Sep	79	16	152	30
	Oct	111	23	151	31
	Nov	103	21	147	30
	Dec	117	23	145	31
	TOTAL	817	165	149	365
	Jan	141	26	135	31
	Feb	120	23	143	28
	Mar	68	14	155	31
	Apr	30	7	166	30
	May	31	7	170	31
	Jun	29	7	168	30
1971	Jul	31	7	165	31
	Aug	31	7	167	31
	Sep	30	7	170	30
	Oct	25	6	177	31
	Nov	18	4	181	30
	Dec	66	15	171	31
	TOTAL	618	130	155	365
	Jan	93	21	170	31
	Feb	84	19	168	29
	Mar	93	22	172	31
	Apr	49	12	182	30
	May	31	8	184	31
	Jun	30	7	181	30
1972	Jul	31	8	181	31
	Aug	39	9	180	31
	Sep	37	9	181	30
	Oct	32	8	183	31
	Nov	30	7	183	30
	Dec	62	15	181	31
	TOTAL	610	146	177	366

Missing EC estimated by interpolation after regulation of flow.

Table 13 – Colorado River Basin – Historical Flow and Quality of Water Data

SAN JUAN RIVER NEAR ARCHULETA, NEW MEXICO

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	71	17	179	31
	Feb	97	24	182	28
	Mar	29	8	202	31
	Apr	30	9	210	30
	May	133	37	201	31
	Jun	182	48	193	30
1973	Jul	266	68	189	31
	Aug	216	51	175	31
	Sep	159	34	159	30
	Oct	120	24	147	31
	Nov	117	23	144	30
	Dec	120	24	146	31
	TOTAL	1540	366	175	365
	Jan	103	21	149	31
	Feb	65	14	156	28
	Mar	63	14	166	31
	Apr	59	14	171	30
	May	57	13	168	31
	Jun	38	9	169	30
1974	Jul	36	8	170	31
	Aug	43	10	168	31
	Sep	42	10	170	30
	Oct	32	7	169	31
	Nov	28	6	169	30
	Dec	30	7	171	31
	TOTAL	596	133	164	365
	Jan	32	8	181	31
	Feb	27	7	182	28
	Mar	31	8	184	31
	Apr	82	20	181	30
	May	148	36	179	31
	Jun	144	37	186	30
1975	Jul	151	38	184	31
	Aug	113	28	181	31
	Sep	92	21	169	30
	Oct	90	20	162	31
	Nov	85	17	149	30
	Dec	96	19	142	31
	TOTAL	1091	257	173	365
	Jan	77	16	155	31
	Feb	54	11	150	29
	Mar	56	11	148	31
	Apr	42	9	161	30
	May	88	20	168	31
	Jun	82	18	165	30
1976	Jul	33	8	179	31
	Aug	37	9	175	31
	Sep	40	9	171	30
	Oct	29	7	169	31
	Nov	27	6	170	30
	Dec	73	15	154	31
	TOTAL	639	141	162	366
	Jan	75	16	154	31
	Feb	37	8	163	28
	Mar	32	7	167	31
	Apr	31	7	169	30
	May	34	8	167	31
	Jun	36	8	168	30
1977	Jul	34	8	169	31
	Aug	35	8	168	31
	Sep	31	7	168	30
	Oct	33	6	146	31
	Nov	30	6	154	30
	Dec	29	7	170	31
	TOTAL	437	97	163	365
	Jan	31	7	172	31
	Feb	29	7	172	28
	Mar	31	7	175	31
	Apr	31	8	178	30
	May	32	8	181	31
	Jun	28	7	184	30
1978	Jul	30	8	185	31
	Aug	34	9	185	31
	Sep	38	9	185	30
	Oct	30	8	203	31
	Nov	30	8	204	30
	Dec	31	9	205	31
	TOTAL	376	95	186	365
	Jan	31	9	206	31
	Feb	32	9	206	28
	Mar	99	26	191	31
	Apr	284	68	177	30
	May	305	71	170	31
	Jun	308	68	162	30
1979	Jul	315	65	152	31
	Aug	114	23	151	31
	Sep	45	9	147	30
	Oct	47	9	136	31
	Nov	33	6	139	30
	Dec	104	19	132	31
	TOTAL	1716	381	163	365
	Jan	101	17	121	31
	Feb	99	16	121	29
	Mar	145	27	136	31
	Apr	91	18	147	30
	May	120	24	148	31
	Jun	71	15	152	30
1980	Jul	61	14	164	31
	Aug	79	21	196	31
	Sep	72	22	229	30
	Oct	72	22	229	31
	Nov	84	23	202	30
	Dec	84	19	170	31
	TOTAL	1080	239	163	366
	Jan	101	21	151	31
	Feb	63	13	152	28
	Mar	40	8	152	31
	Apr	26	5	151	30
	May	31	6	149	31
	Jun	34	7	147	30
1981	Jul	49	10	149	31
	Aug	53	11	152	31
	Sep	53	11	153	30
	Oct	54	11	155	31
	Nov	35	7	154	30
	Dec	37	8	154	31
	TOTAL	576	119	152	365
	Jan	41	9	155	31
	Feb	27	6	155	28
	Mar	45	10	157	31
	Apr	85	18	157	30
	May	116	24	155	31
	Jun	101	22	157	30
1982	Jul	74	16	157	31
	Aug	63	13	156	31
	Sep	66	14	157	30
	Oct	64	14	156	31
	Nov	54	11	155	30
	Dec	91	19	153	31
	TOTAL	826	175	156	365
	Jan	113	23	152	31
	Feb	97	20	152	28
	Mar	127	26	153	31
	Apr	159	33	154	30
	May	106	22	154	31
	Jun	77	16	156	30
1983	Jul	98	21	157	31
	Aug	64	13	151	31
	Sep	66	13	149	30
	Oct	73	16	164	31
	Nov	64	14	160	30
	Dec	73	15	153	31
	TOTAL	1116	234	154	365

Missing EC estimated by interpolation after regulation of flow.

Table 13

Colorado River Basin

Historical Flow and Quality of Water Data

SAN JUAN RIVER NEAR ARCHULETA, NEW MEXICO

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	2574	430	.17	123	*			
1942	1366	266	.19	143	*			
1943	818	173	.21	156	*			
1944	1251	227	.18	133	*			
1945	891	185	.21	153	*			
1946	456	127	.28	205	*			
1947	760	166	.22	161	*			
1948	1203	220	.18	135	*			
1949	1420	276	.19	143	*			
1950	564	138	.24	180	*			
1951	413	117	.28	208	*			
1952	1552	321	.21	152	*			
1953	563	149	.26	195	*			
1954	546	149	.27	202	*			
1955	537	128	.24	175	47	72.3	5.3	26.2
1956	539	117	.22	160	47	72.3	5.3	26.2
1957	1647	329	.20	147	81	84.0	4.8	27.8
1958	1332	301	.23	166	101	87.1	4.5	27.3
1959	436	119	.27	201	94	87.2	3.2	27.4
1960	1029	226	.22	162	96	87.5	3.7	26.4
1961	750	177	.24	174	106	88.7	3.6	29.6
1962	872	178	.20	150	95	87.4	3.9	32.1
1963	232	61	.26	192	72	83.3	3.8	30.0
1964	437	116	.27	196	58	79.3	4.1	26.7
1965	1511	327	.22	159	52	76.9	4.3	26.4
1966	961	225	.23	172	50	76.0	4.0	26.9
1967	402	108	.27	198	44	72.7	2.9	23.3
1968	392	101	.26	190	43	48.8	2.9	15.2
1969	1102	238	.22	159	39	25.6	3.1	11.5
1970	817	165	.20	149	37	0.0	3.3	6.7
1971	618	130	.21	155	35	0.0	3.1	8.3
1972	610	146	.24	177	35	0.0	3.2	9.9
1973	1540	366	.24	175	34	0.0	3.4	8.9
1974	596	133	.22	164	34	0.0	3.9	10.0
1975	1091	257	.24	173	36	0.0	6.4	10.0
1976	639	141	.22	162	38	0.0	6.5	9.7
1977	437	97	.22	163	32	0.0	6.5	6.8
1978	376	95	.25	186	23	0.0	8.5	11.8
1979	1716	381	.22	163	15	0.0	7.5	19.3
1980	1080	239	.22	163	12	0.0	8.2	23.1
1981	576	119	.21	152	12	0.0	6.1	17.6
1982	826	175	.21	156	13	0.0	7.7	7.5
1983	1116	234	.21	154	18	0.0	6.5	6.8
Total	38593	8374						
Average	898	195	.22	160				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 14 - Colorado River Basin - Historical Flow and Quality of Water Data

SAN JUAN RIVER NEAR BLUFF, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	78	77	724	0
	Feb	127	121	702	0
	Mar	211	160	558	0
	Apr	392	255	478	0
	May	1323	705	392	0
	Jun	915	265	213	0
1941	Jul	526	149	209	0
	Aug	174	145	615	0
	Sep	202	194	706	1
	Oct	655	485	545	0
	Nov	191	116	445	0
	Dec	104	83	585	0
	TOTAL	4899	2755	414	1
	Jan	81	72	655	0
	Feb	68	62	678	0
	Mar	126	117	682	0
	Apr	602	303	370	0
	May	479	179	274	0
	Jun	533	137	189	0
1942	Jul	150	73	356	0
	Aug	51	43	622	0
	Sep	38	38	736	0
	Oct	37	45	885	0
	Nov	39	48	901	0
	Dec	43	53	909	0
	TOTAL	2248	1169	383	0
	Jan	43	54	909	0
	Feb	49	58	865	0
	Mar	95	99	764	0
	Apr	293	134	336	0
	May	332	128	284	0
	Jun	254	95	274	0
1943	Jul	106	59	410	0
	Aug	91	92	739	0
	Sep	62	58	683	0
	Oct	58	57	718	0
	Nov	59	57	716	0
	Dec	51	56	810	0
	TOTAL	1494	946	466	0
	Jan	37	42	834	0
	Feb	49	57	853	0
	Mar	76	81	781	0
	Apr	204	124	449	0
	May	640	231	266	0
	Jun	705	168	176	0
1944	Jul	283	98	255	0
	Aug	61	52	629	0
	Sep	66	66	733	0
	Oct	75	68	666	0
	Nov	52	58	824	0
	Dec	43	50	859	0
	TOTAL	2291	1096	352	0
	Jan	41	49	884	0
	Feb	63	70	823	0
	Mar	72	73	749	0
	Apr	196	117	437	0
	May	456	156	251	0
	Jun	377	107	208	0
1945	Jul	128	63	362	0
	Aug	96	113	868	0
	Sep	22	25	839	0
	Oct	62	68	808	0
	Nov	46	48	770	0
	Dec	30	36	871	0
	TOTAL	1588	925	428	0
	Jan	37	42	827	0
	Feb	36	43	884	0
	Mar	47	49	771	0
	Apr	95	62	485	0
	May	125	60	351	0
	Jun	204	81	291	0
1946	Jul	63	56	649	0
	Aug	75	89	873	0
	Sep	44	40	669	0
	Oct	55	52	695	0
	Nov	60	60	733	0
	Dec	46	46	741	0
	TOTAL	887	680	564	0
	Jan	31	35	828	0
	Feb	45	47	766	0
	Mar	51	46	652	0
	Apr	68	42	455	0
	May	329	130	290	0
	Jun	276	80	214	0
1947	Jul	110	45	301	0
	Aug	294	280	702	0
	Sep	124	91	536	0
	Oct	207	184	656	0
	Nov	77	54	510	0
	Dec	65	54	611	0
	TOTAL	1677	1087	477	0
	Jan	52	42	594	0
	Feb	79	66	616	0
	Mar	90	74	609	0
	Apr	358	128	262	0
	May	519	132	187	0
	Jun	603	172	210	0
1948	Jul	147	64	322	0
	Aug	86	70	598	0
	Sep	36	40	825	0
	Oct	75	75	735	0
	Nov	55	59	790	0
	Dec	41	46	817	0
	TOTAL	2140	968	333	0
	Jan	63	68	793	0
	Feb	74	73	724	0
	Mar	152	122	590	0
	Apr	338	150	326	0
	May	503	154	224	0
	Jun	748	229	225	0
1949	Jul	342	118	255	0
	Aug	90	61	497	0
	Sep	41	42	745	0
	Oct	56	56	730	0
	Nov	45	47	782	0
	Dec	35	40	852	0
	TOTAL	2487	1159	343	0
	Jan	41	46	815	0
	Feb	49	53	799	0
	Mar	56	53	687	0
	Apr	136	62	334	0
	May	169	65	284	0
	Jun	191	74	284	0
1950	Jul	68	48	521	0
	Aug	15	16	826	0
	Sep	42	51	900	0
	Oct	30	31	758	0
	Nov	25	34	1017	0
	Dec	32	40	915	0
	TOTAL	854	574	494	0
	Jan	30	37	906	0
	Feb	29	39	982	0
	Mar	34	37	799	0
	Apr	34	29	629	0
	May	141	68	352	0
	Jun	189	64	250	0
1951	Jul	30	24	576	0
	Aug	49	52	774	0
	Sep	45	34	558	0
	Oct	35	36	745	0
	Nov	39	39	730	0
	Dec	36	38	789	0
	TOTAL	691	495	527	0
	Jan	88	98	816	0
	Feb	40	47	853	0
	Mar	87	86	730	0
	Apr	452	180	292	0
	May	618	174	207	0
	Jun	769	181	173	0
1952	Jul	238	100	310	0
	Aug	83	57	501	0
	Sep	56	53	686	0
	Oct	38	38	746	0
	Nov	41	51	919	0
	Dec	43	53	894	0
	TOTAL	2554	1116	321	0
	Jan	42	50	878	0
	Feb	36	40	827	0
	Mar	56	55	723	0
	Apr	107	64	441	0
	May	156	65	304	0
	Jun	267	69	189	0
1953	Jul	77	67	646	0
	Aug	71	80	833	0
	Sep	12	17	1052	0
	Oct	54	66	906	0
	Nov	55	60	806	0
	Dec	34	44	928	0
	TOTAL	967	678	515	0
	Jan	32	41	930	0
	Feb	36	41	848	0
	Mar	48	49	746	0
	Apr	113	56	368	0
	May	218	84	285	0
	Jun	120	56	341	0
1954	Jul	120	120	735	0
	Aug	66	55	618	0
	Sep	89	109	900	0
	Oct	95	68	527	0
	Nov	39	39	722	0
	Dec	35	43	911	0
	TOTAL	1011	761	554	0
	Jan	31	37	892	0
	Feb	34	38	823	0
	Mar	63	63	731	0
	Apr	62	45	530	0
	May	186	70	275	0
	Jun	208	62	220	0
1955	Jul	65	58	661	0
	Aug	142	152	783	0
	Sep	28	22	580	0
	Oct	25	24	729	0
	Nov	31	37	883	0
	Dec	35	45	929	0
	TOTAL	910	653	527	0
	Jan	40	48	867	0
	Feb	34	42	899	0
	Mar	75	59	577	0
	Apr	107	51	348	0
	May	241	79	241	0
	Jun	203	60	219	0
1956	Jul	31	31	723	0
	Aug	36	50	1037	0
	Sep	4	5	1041	0
	Oct	13	19	1088	0
	Nov	29	37	916	0
	Dec	25	33	978	0
	TOTAL	838	513	450	0

Table 14 – Colorado River Basin – Historical Flow and Quality of Water Data

SAN JUAN RIVER NEAR BLUFF, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	38	46	887	0
	Feb	64	64	738	0
	Mar	71	66	688	0
	Apr	177	94	389	0
	May	327	151	339	0
	Jun	787	205	191	0
1957	Jul	566	200	260	0
	Aug	364	234	474	0
	Sep	142	81	420	0
	Oct	150	122	600	0
	Nov	141	99	515	0
	Dec	88	69	575	0
	TOTAL	2915	1431	361	0
	Jan	53	52	721	0
	Feb	119	98	609	0
	Mar	159	124	573	0
	Apr	413	186	331	0
	May	743	177	175	0
	Jun	507	118	171	0
1958	Jul	74	44	439	0
	Aug	42	43	751	0
	Sep	61	55	663	0
	Oct	47	47	735	0
	Nov	43	50	850	0
	Dec	36	43	878	0
	TOTAL	2298	1038	332	0
	Jan	30	39	940	0
	Feb	31	39	931	0
	Mar	32	37	847	0
	Apr	39	34	656	0
	May	111	53	350	0
	Jun	156	59	281	0
1959	Jul	18	13	527	0
	Aug	64	74	848	0
	Sep	11	14	956	0
	Oct	92	79	630	0
	Nov	82	67	597	0
	Dec	46	46	734	0
	TOTAL	712	555	573	0
	Jan	37	43	866	0
	Feb	43	46	773	0
	Mar	260	186	526	0
	Apr	336	101	222	0
	May	285	92	238	0
	Jun	382	98	188	0
1960	Jul	92	45	360	0
	Aug	18	19	766	0
	Sep	17	20	867	0
	Oct	58	46	582	31
	Nov	40	40	737	30
	Dec	40	40	746	31
	TOTAL	1607	776	355	92
	Jan	35	42	902	5
	Feb	41	50	904	2
	Mar	66	65	721	0
	Apr	157	85	399	1
	May	285	89	228	0
	Jun	227	68	220	1
1961	Jul	43	35	592	0
	Aug	87	92	775	1
	Sep	109	94	631	1
	Oct	98	74	553	2
	Nov	72	66	672	0
	Dec	44	47	788	22
	TOTAL	1264	806	469	35
	Jan	36	43	879	9
	Feb	94	89	703	6
	Mar	73	67	675	10
	Apr	315	123	287	14
	May	346	120	254	15
	Jun	297	109	269	15
1962	Jul	87	58	486	13
	Aug	23	30	928	23
	Sep	26	31	853	16
	Oct	104	103	727	20
	Nov	45	52	840	21
	Dec	33	42	929	26
	TOTAL	1480	865	430	188
	Jan	25	34	991	31
	Feb	39	47	880	19
	Mar	40	46	853	22
	Apr	64	55	631	23
	May	95	69	530	23
	Jun	47	45	711	23
1963	Jul	15	23	1168	22
	Aug	48	61	918	20
	Sep	70	69	727	14
	Oct	41	46	825	23
	Nov	47	51	795	23
	Dec	48	51	779	24
	TOTAL	579	596	757	267
	Jan	44	49	824	23
	Feb	30	37	923	17
	Mar	28	38	988	23
	Apr	30	38	948	21
	May	102	65	466	16
	Jun	121	78	473	17
1964	Jul	114	85	550	19
	Aug	132	117	652	16
	Sep	56	60	797	16
	Oct	37	44	885	22
	Nov	42	50	873	21
	Dec	60	63	774	17
	TOTAL	795	726	671	228
	Jan	121	91	552	0
	Feb	120	80	492	0
	Mar	85	75	650	3
	Apr	165	99	440	3
	May	288	128	326	0
	Jun	419	148	259	0
1965	Jul	295	125	311	0
	Aug	218	138	465	0
	Sep	177	95	393	0
	Oct	190	111	427	0
	Nov	232	117	371	0
	Dec	235	125	392	0
	TOTAL	2546	1331	384	6
	Jan	198	100	373	0
	Feb	129	83	470	0
	Mar	199	134	493	0
	Apr	253	114	332	0
	May	267	109	300	0
	Jun	127	69	397	0
1966	Jul	54	53	731	0
	Aug	44	55	922	0
	Sep	43	51	881	0
	Oct	94	78	612	31
	Nov	70	64	669	30
	Dec	72	65	661	31
	TOTAL	1548	973	462	92
	Jan	58	58	729	31
	Feb	64	59	680	28
	Mar	79	71	654	31
	Apr	31	37	880	30
	May	78	65	618	31
	Jun	89	75	620	30
1967	Jul	39	43	809	31
	Aug	151	101	491	31
	Sep	93	75	587	30
	Oct	31	38	911	31
	Nov	38	43	843	30
	Dec	39	45	842	31
	TOTAL	791	710	660	365
	Jan	36	42	870	31
	Feb	54	54	737	29
	Mar	50	52	772	31
	Apr	83	72	633	30
	May	148	105	523	31
	Jun	241	143	437	30
1968	Jul	82	70	632	31
	Aug	176	112	468	31
	Sep	41	46	816	30
	Oct	56	52	676	31
	Nov	49	47	702	30
	Dec	45	44	719	31
	TOTAL	1060	838	582	366
	Jan	83	68	605	31
	Feb	131	95	534	28
	Mar	143	104	533	31
	Apr	216	140	477	30
	May	271	167	453	31
	Jun	238	151	465	30
1969	Jul	202	134	486	31
	Aug	101	80	580	31
	Sep	118	88	553	30
	Oct	208	166	588	0
	Nov	118	72	450	0
	Dec	109	68	456	0
	TOTAL	1938	1333	506	273
	Jan	75	54	533	0
	Feb	130	60	342	0
	Mar	116	62	396	0
	Apr	49	44	662	2
	May	140	77	407	12
	Jun	138	68	360	4
1970	Jul	74	53	525	4
	Aug	66	66	739	5
	Sep	308	211	503	4
	Oct	142	84	435	5
	Nov	137	80	432	4
	Dec	149	80	396	4
	TOTAL	1523	940	454	44
	Jan	164	82	367	5
	Feb	144	71	364	4
	Mar	101	58	422	4
	Apr	69	50	531	5
	May	86	64	547	4
	Jun	123	62	373	4
1971	Jul	66	51	571	4
	Aug	108	128	873	4
	Sep	51	53	753	4
	Oct	100	99	732	5
	Nov	59	61	752	4
	Dec	110	81	540	4
	TOTAL	1182	860	535	51
	Jan	119	72	444	5
	Feb	110	66	444	4
	Mar	119	65	401	4
	Apr	65	44	499	5
	May	81	55	497	4
	Jun	118	71	443	4
1972	Jul	17	18	789	5
	Aug	31	41	984	4
	Sep	56	52	679	5
	Oct	339	298	645	4
	Nov	96	85	651	4
	Dec	100	74	542	6
	TOTAL	1251	941	553	54

Table 14 - Colorado River Basin - Historical Flow and Quality of Water Data

SAN JUAN RIVER NEAR BLUFF, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	109	78	528	4
	Feb	178	125	516	4
	Mar	177	179	740	5
	Apr	261	225	635	4
	May	486	234	354	4
	Jun	464	198	315	6
1973	Jul	398	174	322	10
	Aug	222	111	368	6
	Sep	195	110	415	9
	Oct	133	81	450	13
	Nov	134	80	440	11
	Dec	141	83	434	11
	TOTAL	2897	1679	426	87
	Jan	133	76	420	4
	Feb	92	62	497	4
	Mar	103	91	650	5
	Apr	65	48	537	4
	May	106	58	403	4
	Jun	69	43	461	5
1974	Jul	39	39	734	4
	Aug	25	26	761	5
	Sep	25	25	742	4
	Oct	75	55	536	18
	Nov	70	72	749	5
	Dec	55	53	698	10
	TOTAL	859	648	555	72
	Jan	59	49	617	6
	Feb	50	49	708	7
	Mar	112	114	752	6
	Apr	159	100	462	5
	May	295	117	293	5
	Jun	397	120	223	5
1975	Jul	361	120	244	4
	Aug	147	71	356	5
	Sep	129	72	409	5
	Oct	107	61	422	4
	Nov	102	58	419	5
	Dec	88	51	426	7
	TOTAL	2006	983	360	64
	Jan	97	66	503	5
	Feb	81	60	541	19
	Mar	79	63	585	4
	Apr	53	41	567	5
	May	179	81	333	9
	Jun	180	92	377	11
1976	Jul	52	43	602	23
	Aug	48	38	588	17
	Sep	66	55	615	5
	Oct	51	45	648	9
	Nov	47	47	732	6
	Dec	82	58	516	31
	TOTAL	1014	688	499	144
	Jan	84	58	514	31
	Feb	55	46	611	17
	Mar	42	34	593	8
	Apr	24	23	721	7
	May	21	24	851	31
	Jun	33	30	668	30
1977	Jul	58	38	480	31
	Aug	81	52	470	31
	Sep	33	32	705	30
	Oct	39	38	713	31
	Nov	51	45	652	30
	Dec	49	44	672	31
	TOTAL	569	465	600	308
	Jan	58	50	638	31
	Feb	61	49	598	19
	Mar	101	74	538	31
	Apr	110	79	525	30
	May	155	101	477	31
	Jun	203	122	439	30
1978	Jul	63	52	614	31
	Aug	15	19	927	31
	Sep	30	29	722	30
	Oct	41	39	701	30
	Nov	78	60	566	30
	Dec	76	60	579	30
	TOTAL	991	734	545	354
	Jan	93	71	557	21
	Feb	133	110	611	9
	Mar	226	212	689	0
	Apr	573	335	429	0
	May	635	302	349	0
	Jun	615	226	270	5
1979	Jul	413	151	268	6
	Aug	142	93	481	24
	Sep	39	37	695	15
	Oct	63	51	593	23
	Nov	53	45	626	4
	Dec	126	80	468	21
	TOTAL	3112	1711	404	128
	Jan	149	98	486	22
	Feb	193	170	647	6
	Mar	221	207	687	4
	Apr	285	214	553	4
	May	370	179	356	6
	Jun	378	135	264	0
1980	Jul	123	71	424	15
	Aug	76	56	545	30
	Sep	106	71	493	29
	Oct	84	56	487	27
	Nov	104	63	443	0
	Dec	94	58	453	0
	TOTAL	2183	1378	464	143
	Jan	67	39	430	0
	Feb	61	39	472	0
	Mar	61	46	558	0
	Apr	39	34	648	0
	May	60	49	596	0
	Jun	109	83	562	5
1981	Jul	110	114	760	1
	Aug	53	42	583	0
	Sep	85	50	436	0
	Oct	114	70	450	2
	Nov	64	45	513	30
	Dec	61	43	527	31
	TOTAL	882	654	545	69
	Jan	65	46	516	31
	Feb	64	44	504	28
	Mar	90	58	469	31
	Apr	131	74	417	30
	May	220	109	365	31
	Jun	255	121	348	30
1982	Jul	139	78	413	31
	Aug	199	97	357	31
	Sep	160	85	393	30
	Oct	101	60	438	18
	Nov	93	61	484	0
	Dec	122	71	428	0
	TOTAL	1639	903	405	291
	Jan	144	76	386	6
	Feb	137	74	397	1
	Mar	240	124	380	0
	Apr	297	184	457	0
	May	329	145	323	11
	Jun	355	134	278	30
1983	Jul	262	117	329	4
	Aug	144	91	463	0
	Sep	70	45	469	0
	Oct	116	66	422	31
	Nov	83	53	475	30
	Dec	101	61	447	31
	TOTAL	2276	1170	378	144

Table 14

Colorado River Basin

Historical Flow and Quality of Water Data

SAN JUAN RIVER NEAR BLUFF, UTAH

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	4899	2755	.56	414	109	0.0	2.4	26.8
1942	2248	1169	.52	383	109	0.0	2.4	26.8
1943	1494	946	.63	466	108	0.0	1.5	26.3
1944	2291	1096	.48	352	108	0.0	1.8	24.6
1945	1588	925	.58	428	107	0.0	2.2	25.1
1946	887	680	.77	564	111	0.0	2.4	32.7
1947	1677	1087	.65	477	111	0.0	2.7	33.0
1948	2140	968	.45	333	112	0.0	2.3	34.1
1949	2487	1159	.47	343	110	0.0	2.6	26.7
1950	854	574	.67	494	105	0.0	2.3	25.6
1951	691	495	.72	527	102	0.0	2.4	26.2
1952	2554	1116	.44	321	95	0.0	1.8	28.0
1953	967	678	.70	515	109	2.8	2.1	34.4
1954	1011	761	.75	554	112	2.7	1.9	35.8
1955	910	653	.72	527	121	2.5	1.7	37.3
1956	838	513	.61	450	119	.8	1.7	34.3
1957	2915	1431	.49	361	100	1.0	2.0	33.9
1958	2298	1038	.45	332	80	1.2	2.0	31.2
1959	712	555	.78	573	68	0.0	5.3	35.3
1960	1607	776	.48	355	79	0.0	4.9	35.2
1961	1264	806	.64	469	91	30.8	4.8	34.4
1962	1480	865	.58	430	87	59.8	2.7	30.4
1963	579	596	1.03	757	86	80.2	3.0	30.6
1964	795	726	.91	671	91	45.1	2.8	28.3
1965	2546	1331	.52	385	123	13.8	3.2	25.9
1966	1548	973	.63	462	158	0.0	3.4	29.0
1967	791	710	.90	660	177	0.0	4.0	31.0
1968	1060	838	.79	582	179	0.0	4.0	32.4
1969	1938	1333	.69	506	133	1.5	4.5	35.6
1970	1523	940	.62	454	91	2.2	4.0	34.4
1971	1182	860	.73	535	42	4.8	4.1	32.6
1972	1251	941	.75	553	41	0.0	3.1	34.6
1973	2897	1679	.58	426	39	0.0	3.7	33.8
1974	859	648	.75	555	38	0.0	4.6	38.8
1975	2006	983	.49	360	34	0.0	5.6	22.1
1976	1014	688	.68	499	35	0.0	6.0	21.8
1977	569	465	.82	600	35	0.0	8.5	24.2
1978	991	734	.74	545	33	0.0	9.2	28.4
1979	3112	1711	.55	404	31	0.0	8.9	31.0
1980	2183	1378	.63	464	32	0.0	7.3	28.4
1981	882	654	.74	545	29	0.0	6.8	25.9
1982	1639	903	.55	405	30	0.0	7.5	22.7
1983	2276	1170	.51	378	39	0.0	7.0	23.1
Total	69454	41308						
Average	1615	961	.59	437				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 15 - Colorado River Basin - Historical Flow and Quality of Water Data

COLORADO RIVER AT LEES FERRY, ARIZONA

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	348	474	1002	*
	Feb	423	546	949	*
	Mar	669	749	823	*
	Apr	1091	862	581	*
	May	4974	2239	331	*
	Jun	4004	1522	280	*
1941	Jul	1666	850	375	*
	Aug	798	925	852	*
	Sep	608	821	993	*
	Oct	1797	1959	802	*
	Nov	903	849	691	*
	Dec	576	685	874	*
	TOTAL	17857	12481	514	0
	Jan	407	545	985	*
	Feb	396	507	941	*
	Mar	630	731	853	*
	Apr	2844	1564	404	*
	May	3209	1476	338	*
	Jun	4202	1219	213	*
1942	Jul	1317	751	419	*
	Aug	454	490	794	*
	Sep	275	438	1171	*
	Oct	334	487	1071	31
	Nov	368	561	1119	5
	Dec	357	535	1100	1
	TOTAL	14794	9303	462	37
	Jan	330	481	1074	3
	Feb	332	461	1020	2
	Mar	516	605	862	4
	Apr	1450	883	448	9
	May	2158	923	314	6
	Jun	2729	1079	291	3
1943	Jul	1429	699	360	7
	Aug	793	846	784	5
	Sep	447	484	795	6
	Oct	377	564	1098	8
	Nov	456	584	940	10
	Dec	395	532	991	4
	TOTAL	11413	8140	524	67
	Jan	279	424	1120	6
	Feb	344	464	992	13
	Mar	509	626	904	17
	Apr	1027	857	614	7
	May	3251	1459	330	2
	Jun	4136	1292	230	2
1944	Jul	1782	821	339	5
	Aug	417	447	788	3
	Sep	229	358	1151	9
	Oct	342	516	1110	17
	Nov	383	535	1026	16
	Dec	320	468	1075	14
	TOTAL	13018	8266	467	111
	Jan	325	472	1067	8
	Feb	351	477	998	6
	Mar	437	561	944	7
	Apr	755	735	716	4
	May	2805	1189	312	2
	Jun	2761	1047	279	5
1945	Jul	1668	814	359	4
	Aug	1011	941	684	1
	Sep	370	482	957	9
	Oct	505	746	1086	6
	Nov	443	604	1003	30
	Dec	336	547	1195	31
	TOTAL	11768	8616	538	113
	Jan	366	570	1144	31
	Feb	319	507	1169	28
	Mar	496	645	957	31
	Apr	1013	825	598	30
	May	1732	1066	452	31
	Jun	1993	1099	406	30
1946	Jul	730	750	755	31
	Aug	478	632	972	31
	Sep	310	519	1233	30
	Oct	403	512	936	31
	Nov	467	541	853	30
	Dec	445	537	889	31
	TOTAL	8751	8204	689	365
	Jan	277	427	1132	31
	Feb	357	459	946	28
	Mar	654	629	706	31
	Apr	780	686	647	30
	May	3121	1350	318	31
	Jun	3275	1381	310	30
1947	Jul	1926	1072	409	31
	Aug	1203	853	521	31
	Sep	584	602	758	30
	Oct	818	876	787	0
	Nov	585	621	780	0
	Dec	466	561	887	0
	TOTAL	14048	9516	498	273
	Jan	406	487	882	0
	Feb	458	540	867	0
	Mar	645	734	837	0
	Apr	1703	1099	475	0
	May	3507	1316	276	0
	Jun	3339	1142	252	0
1948	Jul	980	623	468	0
	Aug	531	627	868	0
	Sep	230	345	1103	0
	Oct	331	523	1164	0
	Nov	408	587	1059	0
	Dec	347	499	1059	0
	TOTAL	12884	8523	486	0
	Jan	337	469	1023	0
	Feb	361	449	916	0
	Mar	706	832	866	0
	Apr	1307	983	553	0
	May	3098	1325	315	0
	Jun	4419	1814	302	0
1949	Jul	2137	1096	377	0
	Aug	576	561	716	0
	Sep	313	468	1098	0
	Oct	509	753	1088	0
	Nov	473	619	963	0
	Dec	368	505	1010	0
	TOTAL	14605	9874	497	0
	Jan	350	496	1043	0
	Feb	399	491	905	0
	Mar	650	722	817	0
	Apr	1217	902	545	0
	May	1971	955	357	0
	Jun	2979	1106	273	0
1950	Jul	1377	916	489	0
	Aug	422	419	731	0
	Sep	330	478	1064	0
	Oct	342	483	1039	0
	Nov	350	532	1118	0
	Dec	415	550	974	0
	TOTAL	10800	8051	548	0
	Jan	315	456	1063	0
	Feb	361	457	932	0
	Mar	418	507	893	0
	Apr	531	539	746	0
	May	1645	937	419	0
	Jun	2886	1172	299	0
1951	Jul	1357	647	351	0
	Aug	787	855	799	0
	Sep	411	524	939	0
	Oct	412	595	1061	0
	Nov	445	620	1024	0
	Dec	333	478	1055	0
	TOTAL	9901	7787	578	0
	Jan	476	590	912	0
	Feb	379	484	939	0
	Mar	440	581	972	0
	Apr	2267	1666	541	0
	May	5081	2035	295	0
	Jun	5192	1850	262	0
1952	Jul	1573	876	409	0
	Aug	821	857	767	0
	Sep	542	690	936	0
	Oct	368	522	1041	0
	Nov	386	586	1114	0
	Dec	378	560	1088	0
	TOTAL	17904	11297	464	0
	Jan	394	544	1016	0
	Feb	365	479	964	0
	Mar	458	569	915	0
	Apr	529	577	802	0
	May	1047	728	511	0
	Jun	2992	1119	275	0
1953	Jul	950	606	469	0
	Aug	661	751	835	0
	Sep	258	397	1133	0
	Oct	321	555	1272	0
	Nov	414	617	1096	0
	Dec	341	508	1095	0
	TOTAL	8729	7451	628	0
	Jan	319	478	1104	0
	Feb	342	452	972	0
	Mar	393	495	927	0
	Apr	546	535	720	0
	May	1277	718	414	0
	Jun	792	486	451	0
1954	Jul	647	563	640	0
	Aug	321	373	855	0
	Sep	389	608	1150	0
	Oct	512	700	1005	0
	Nov	349	480	1011	0
	Dec	278	423	1117	0
	TOTAL	6165	6312	753	0
	Jan	244	394	1188	0
	Feb	243	343	1037	0
	Mar	580	744	944	0
	Apr	618	650	774	0
	May	1570	858	402	0
	Jun	1586	761	353	0
1955	Jul	571	386	497	0
	Aug	510	679	979	0
	Sep	230	345	1105	0
	Oct	214	355	1220	0
	Nov	276	448	1196	0
	Dec	326	466	1050	0
	TOTAL	6967	6430	679	0
	Jan	373	483	953	0
	Feb	280	394	1034	0
	Mar	511	589	847	0
	Apr	898	674	552	0
	May	2190	1027	345	0
	Jun	2594	979	278	0
1956	Jul	557	413	545	0
	Aug	356	461	953	0
	Sep	166	242	1070	0
	Oct	187	317	1250	0
	Nov	300	466	1141	0
	Dec	247	382	1137	0
	TOTAL	8658	6427	546	0

* See 'Notes' preceding Table 1.

Table 15 - Colorado River Basin - Historical Flow and Quality of Water Data

COLORADO RIVER AT LEES FERRY, ARIZONA

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	285	417	1078	0
	Feb	323	438	995	0
	Mar	499	613	904	0
	Apr	828	737	655	0
	May	2569	1400	401	0
	Jun	5645	2119	276	0
1957	Jul	4015	1717	315	0
	Aug	1604	1275	584	0
	Sep	822	943	844	0
	Oct	748	1097	1079	0
	Nov	848	1118	970	0
	Dec	517	653	930	0
	TOTAL	18702	12528	493	0
	Jan	397	522	966	0
	Feb	536	642	881	0
	Mar	696	771	815	0
	Apr	1574	1045	488	0
	May	3992	1780	328	0
	Jun	3678	1444	289	0
1958	Jul	628	467	546	0
	Aug	286	412	1058	0
	Sep	319	534	1229	0
	Oct	310	488	1155	0
	Nov	357	574	1182	0
	Dec	366	554	1112	0
	TOTAL	13140	9232	517	0
	Jan	315	474	1109	0
	Feb	315	435	1015	0
	Mar	344	473	1012	0
	Apr	420	483	846	0
	May	1025	704	505	0
	Jun	1836	847	339	0
1959	Jul	782	491	462	0
	Aug	425	588	1017	0
	Sep	246	398	1190	0
	Oct	502	685	1003	0
	Nov	499	597	878	0
	Dec	352	469	980	0
	TOTAL	7060	6644	692	0
	Jan	305	436	1052	0
	Feb	318	429	990	0
	Mar	745	899	887	0
	Apr	1610	997	455	0
	May	1564	781	367	0
	Jun	2239	945	310	0
1960	Jul	647	428	486	0
	Aug	208	276	975	0
	Sep	193	346	1318	0
	Oct	341	561	1210	3
	Nov	345	508	1081	6
	Dec	275	397	1062	12
	TOTAL	8790	7002	586	21
	Jan	266	415	1149	17
	Feb	331	466	1037	10
	Mar	362	500	1016	7
	Apr	567	581	753	2
	May	1153	704	449	3
	Jun	1588	764	354	3
1961	Jul	369	387	772	12
	Aug	337	541	1182	4
	Sep	711	1040	1076	6
	Oct	725	748	758	6
	Nov	527	573	800	12
	Dec	380	473	915	14
	TOTAL	7315	7193	723	96
	Jan	349	442	932	16
	Feb	791	831	773	6
	Mar	598	690	849	6
	Apr	2391	1762	542	7
	May	3633	1787	362	10
	Jun	2876	1584	405	14
1962	Jul	1717	1067	457	10
	Aug	469	459	720	1
	Sep	315	483	1128	1
	Oct	539	779	1063	5
	Nov	428	540	927	7
	Dec	333	449	993	12
	TOTAL	14439	10874	554	95
	Jan	169	259	1129	12
	Feb	369	490	976	4
	Mar	188	254	995	10
	Apr	60	86	1041	11
	May	62	79	940	14
	Jun	140	155	812	12
1963	Jul	90	86	705	13
	Aug	62	58	693	9
	Sep	60	53	648	13
	Oct	61	53	636	15
	Nov	60	55	683	21
	Dec	63	80	935	26
	TOTAL	1384	1708	908	160
	Jan	71	90	934	14
	Feb	231	307	978	11
	Mar	388	488	924	11
	Apr	771	951	907	9
	May	319	389	898	12
	Jun	60	75	920	16
1964	Jul	60	75	918	13
	Aug	174	213	897	5
	Sep	157	101	474	11
	Oct	269	166	456	18
	Nov	348	285	603	17
	Dec	398	385	711	20
	TOTAL	3243	3524	799	157
	Jan	558	531	700	13
	Feb	515	504	721	13
	Mar	556	540	714	10
	Apr	1222	1215	731	11
	May	2284	2125	684	20
	Jun	2323	1938	613	19
1965	Jul	727	336	340	12
	Aug	871	336	284	21
	Sep	750	297	291	28
	Oct	659	278	310	19
	Nov	589	272	339	20
	Dec	531	320	444	22
	TOTAL	11586	8693	552	208
	Jan	451	325	530	27
	Feb	483	361	549	15
	Mar	622	465	550	15
	Apr	825	627	558	2
	May	978	696	523	3
	Jun	754	505	493	3
1966	Jul	658	429	480	4
	Aug	682	432	466	2
	Sep	622	398	470	0
	Oct	552	353	470	5
	Nov	584	381	481	7
	Dec	529	363	505	5
	TOTAL	7739	5334	507	88
	Jan	614	464	556	2
	Feb	534	428	588	0
	Mar	690	605	645	0
	Apr	788	797	744	0
	May	879	806	675	1
	Jun	698	626	659	0
1967	Jul	641	519	596	2
	Aug	692	492	523	2
	Sep	596	433	534	8
	Oct	415	304	538	0
	Nov	460	352	564	8
	Dec	552	452	602	10
	TOTAL	7560	6279	611	33
	Jan	633	597	693	4
	Feb	464	454	720	4
	Mar	858	868	745	5
	Apr	968	1015	771	8
	May	943	963	751	9
	Jun	895	900	740	18
1968	Jul	827	677	602	14
	Aug	685	475	510	21
	Sep	635	445	516	14
	Oct	625	423	498	9
	Nov	634	433	502	16
	Dec	637	488	563	9
	TOTAL	8804	7740	646	131
	Jan	570	512	660	4
	Feb	461	429	684	1
	Mar	708	679	705	2
	Apr	871	853	721	5
	May	763	726	700	9
	Jun	875	785	659	6
1969	Jul	956	797	613	14
	Aug	930	670	530	16
	Sep	794	536	497	14
	Oct	630	455	531	7
	Nov	706	516	537	9
	Dec	815	594	536	14
	TOTAL	9078	7552	612	101
	Jan	706	570	594	5
	Feb	445	380	628	3
	Mar	486	446	675	1
	Apr	942	855	667	3
	May	900	801	655	5
	Jun	800	652	600	4
1970	Jul	769	615	588	3
	Aug	773	600	571	9
	Sep	701	524	549	3
	Oct	498	369	544	1
	Nov	449	346	566	0
	Dec	671	526	577	0
	TOTAL	8139	6683	604	37
	Jan	491	359	537	4
	Feb	416	341	602	5
	Mar	640	555	638	4
	Apr	1011	869	632	4
	May	926	770	612	6
	Jun	894	682	560	0
1971	Jul	943	712	556	2
	Aug	876	638	535	1
	Sep	776	514	487	0
	Oct	584	404	509	1
	Nov	764	527	507	2
	Dec	937	647	508	2
	TOTAL	9259	7019	557	31
	Jan	806	577	527	0
	Feb	444	321	531	0
	Mar	378	306	596	2
	Apr	782	654	615	2
	May	902	712	581	0
	Jun	863	653	557	2
1972	Jul	915	665	534	1
	Aug	1005	733	536	0
	Sep	931	647	511	0
	Oct	631	442	514	3
	Nov	671	480	526	11
	Dec	1017	771	558	3
	TOTAL	9345	6962	548	24

Missing EC estimated by interpolation after regulation of flow.

Table 15 - Colorado River Basin - Historical Flow and Quality of Water Data

COLORADO RIVER AT LEES FERRY, ARIZONA

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	1207	855	521	1
	Feb	764	550	530	3
	Mar	1095	873	586	0
	Apr	1678	1380	605	3
	May	648	532	604	0
	Jun	751	596	584	9
1973	Jul	656	526	590	6
	Aug	567	429	557	16
	Sep	424	322	558	4
	Oct	510	372	537	1
	Nov	412	301	537	7
	Dec	333	223	493	15
	TOTAL	9044	6961	566	65
	Jan	846	568	494	5
	Feb	299	198	487	2
	Mar	388	299	565	4
	Apr	495	397	590	7
	May	803	622	570	5
	Jun	914	673	542	4
1974	Jul	1226	886	531	5
	Aug	1213	865	524	3
	Sep	826	577	513	4
	Oct	602	413	505	6
	Nov	710	482	500	13
	Dec	564	374	488	9
	TOTAL	8888	6356	526	67
	Jan	768	526	504	10
	Feb	556	392	518	14
	Mar	508	382	553	9
	Apr	459	351	562	8
	May	892	694	572	10
	Jun	987	733	546	3
1975	Jul	1221	890	536	1
	Aug	1022	722	520	0
	Sep	966	689	524	2
	Oct	637	442	511	0
	Nov	425	303	524	0
	Dec	520	363	513	0
	TOTAL	8961	6486	532	57
	Jan	692	479	509	0
	Feb	742	556	551	2
	Mar	676	536	583	0
	Apr	660	523	583	0
	May	1046	801	563	0
	Jun	756	562	546	2
1976	Jul	766	555	533	3
	Aug	720	512	522	2
	Sep	842	596	521	1
	Oct	792	550	511	0
	Nov	898	625	512	1
	Dec	810	568	516	0
	TOTAL	9400	6863	537	11
	Jan	994	709	525	0
	Feb	471	358	559	1
	Mar	458	367	589	6
	Apr	164	130	584	0
	May	206	165	591	0
	Jun	466	361	570	0
1977	Jul	847	648	562	0
	Aug	1178	934	583	23
	Sep	977	743	559	6
	Oct	379	284	552	0
	Nov	390	293	552	0
	Dec	823	629	562	0
	TOTAL	7353	5623	562	36
	Jan	948	738	572	0
	Feb	601	466	570	0
	Mar	579	463	587	1
	Apr	492	409	611	4
	May	647	552	627	0
	Jun	758	639	620	25
1978	Jul	702	584	612	6
	Aug	1065	889	614	0
	Sep	969	800	608	17
	Oct	684	553	594	4
	Nov	671	525	576	14
	Dec	889	670	554	0
	TOTAL	9006	7288	595	71
	Jan	1018	742	536	0
	Feb	746	558	550	0
	Mar	204	164	589	0
	Apr	341	300	645	0
	May	517	439	624	0
	Jun	614	501	600	0
1979	Jul	860	687	588	0
	Aug	1064	817	565	0
	Sep	686	536	575	0
	Oct	618	476	567	0
	Nov	802	609	559	0
	Dec	637	457	527	0
	TOTAL	8109	6287	570	0
	Jan	604	436	531	16
	Feb	615	454	543	24
	Mar	606	489	593	0
	Apr	863	696	593	0
	May	845	665	578	0
	Jun	1472	1039	519	0
1980	Jul	1585	1082	502	12
	Aug	1279	870	500	7
	Sep	981	675	506	0
	Oct	777	529	501	0
	Nov	936	622	489	0
	Dec	765	497	478	0
	TOTAL	11329	8056	523	59
	Jan	745	500	493	0
	Feb	640	450	517	16
	Mar	463	347	552	7
	Apr	473	355	553	0
	May	553	420	559	0
	Jun	527	402	561	0
1981	Jul	846	625	543	0
	Aug	903	654	532	0
	Sep	667	465	512	0
	Oct	609	414	500	25
	Nov	585	413	519	30
	Dec	838	603	529	31
	TOTAL	7848	5647	529	109
	Jan	892	659	544	31
	Feb	677	514	559	28
	Mar	509	377	545	22
	Apr	614	485	581	27
	May	616	470	561	3
	Jun	634	498	578	3
1982	Jul	797	603	556	27
	Aug	917	688	552	2
	Sep	617	432	515	0
	Oct	792	575	533	31
	Nov	975	702	529	30
	Dec	976	668	503	31
	TOTAL	9017	6671	544	235
	Jan	914	616	496	31
	Feb	861	610	521	28
	Mar	661	491	547	14
	Apr	951	677	523	26
	May	1259	871	509	3
	Jun	3314	2222	493	22
1983	Jul	3370	2236	488	31
	Aug	1833	1263	507	31
	Sep	1585	1106	513	30
	Oct	1565	1073	504	31
	Nov	1423	981	507	30
	Dec	1473	1016	507	31
	TOTAL	19207	13162	504	308

Missing EC estimated by interpolation after regulation of flow.

Table 15

Colorado River Basin

Historical Flow and Quality of Water Data

COLORADO RIVER AT LEES FERRY, ARIZONA

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	17857	12481	.70	514	*			
1942	14794	9303	.63	462	*			
1943	11413	8140	.71	524	75	0.0	1.6	16.8
1944	13018	8266	.64	467	75	0.0	1.6	16.8
1945	11768	8616	.73	538	43	0.0	1.4	17.1
1946	8751	8204	.94	689	9	0.0	9.3	13.5
1947	14048	9516	.68	498	39	0.0	4.8	17.5
1948	12884	8523	.66	486	74	0.0	3.8	15.3
1949	14605	9874	.68	497	109	0.0	2.0	16.6
1950	10800	8051	.75	548	110	0.0	1.9	17.1
1951	9901	7787	.79	578	110	0.0	1.9	21.4
1952	17904	11297	.63	464	110	0.0	2.0	20.5
1953	8729	7451	.85	628	109	0.0	2.0	21.0
1954	6165	6312	1.02	753	110	.9	2.6	18.7
1955	6967	6430	.92	679	108	.9	2.6	19.3
1956	8658	6427	.74	546	98	1.0	3.4	19.8
1957	18702	12528	.67	493	92	2.2	3.7	28.2
1958	13140	9232	.70	517	81	27.2	4.7	28.9
1959	7060	6644	.94	692	77	51.9	4.0	31.8
1960	8790	7002	.80	586	83	84.3	3.4	30.9
1961	7315	7193	.98	723	93	86.0	3.6	30.6
1962	14439	10874	.75	554	92	85.9	3.7	36.6
1963	1384	1708	1.23	908	69	84.1	3.5	36.5
1964	3243	3524	1.09	799	53	52.8	3.0	40.0
1965	11586	8693	.75	552	44	25.0	3.2	32.1
1966	7739	5334	.69	507	42	0.0	2.6	27.0
1967	7560	6279	.83	611	36	0.C	1.5	20.2
1968	8804	7740	.88	646	40	0.0	1.9	15.1
1969	9078	7552	.83	612	52	0.0	2.0	12.9
1970	8139	6683	.82	604	54	0.0	2.4	11.2
1971	9259	7019	.76	557	50	0.0	2.2	9.0
1972	9345	6962	.75	548	38	0.0	2.4	6.6
1973	9044	6961	.77	566	40	0.0	2.6	7.0
1974	8888	6356	.72	526	39	0.0	3.0	7.2
1975	8961	6486	.72	532	39	0.0	3.4	7.1
1976	9400	6863	.73	537	34	0.0	3.5	7.0
1977	7353	5623	.76	562	34	0.0	3.7	8.2
1978	9006	7288	.81	595	34	0.0	3.3	6.9
1979	8109	6287	.78	570	35	0.0	3.6	6.9
1980	11329	8056	.71	523	35	0.0	3.8	6.6
1981	7848	5647	.72	529	29	0.0	4.4	7.9
1982	9017	6671	.74	544	23	0.0	5.1	8.1
1983	19207	13162	.69	504	28	0.0	5.0	8.3
Total	442007	331045						
Average	10279	7699	.75	551				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 11 - Colorado River Basin - Historical Flow and Quality of Water Data

DOLORES RIVER NEAR CISCO, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	14	39	2048	*
	Feb	20	47	1728	*
	Mar	41	58	1040	*
	Apr	175	80	336	*
	May	615	125	149	*
	Jun	248	65	193	*
1941	Jul	98	58	435	*
	Aug	31	44	1044	*
	Sep	32	42	965	*
	Oct	197	102	381	*
	Nov	61	81	976	*
	Dec	34	62	1341	*
	TOTAL	1566	803	377	0
	Jan	26	57	1612	*
	Feb	22	49	1638	*
	Mar	50	63	927	*
	Apr	516	129	184	*
	May	387	98	186	*
	Jun	213	58	200	*
1942	Jul	46	41	655	*
	Aug	17	30	1298	*
	Sep	8	21	1930	*
	Oct	9	27	2206	*
	Nov	10	31	2279	*
	Dec	12	36	2206	*
	TOTAL	1316	640	358	0
	Jan	12	36	2206	*
	Feb	14	39	2048	*
	Mar	20	44	1618	*
	Apr	212	87	302	*
	May	133	56	310	*
	Jun	98	44	330	*
1943	Jul	24	30	919	*
	Aug	34	46	995	*
	Sep	19	32	1238	*
	Oct	11	29	1939	*
	Nov	9	29	2369	*
	Dec	10	32	2353	*
	TOTAL	596	504	622	0
	Jan	9	30	2451	*
	Feb	12	36	2206	*
	Mar	17	42	1817	*
	Apr	97	61	462	*
	May	463	108	172	*
	Jun	267	67	185	*
1944	Jul	73	51	514	*
	Aug	14	27	1418	*
	Sep	5	17	2500	*
	Oct	8	25	2298	*
	Nov	12	34	2083	*
	Dec	11	34	2273	*
	TOTAL	988	532	396	0
	Jan	12	36	2206	*
	Feb	16	42	1930	*
	Mar	14	39	2048	*
	Apr	134	70	384	*
	May	296	85	211	*
	Jun	88	41	343	*
1945	Jul	32	34	781	*
	Aug	29	42	1065	*
	Sep	6	19	2328	*
	Oct	15	33	1618	*
	Nov	10	31	2279	*
	Dec	9	31	2533	*
	TOTAL	661	503	560	0
	Jan	11	34	2273	*
	Feb	10	33	2427	*
	Mar	16	41	1884	*
	Apr	72	53	541	*
	May	53	35	486	*
	Jun	59	35	436	*
1946	Jul	16	24	1103	*
	Aug	18	32	1307	*
	Sep	10	24	1765	*
	Oct	9	27	2206	*
	Nov	11	32	2139	*
	Dec	10	32	2353	*
	TOTAL	295	402	1002	0
	Jan	8	28	2574	*
	Feb	11	35	2340	*
	Mar	15	40	1961	*
	Apr	49	45	675	*
	May	172	65	278	*
	Jun	111	46	305	*
1947	Jul	48	41	628	*
	Aug	37	48	954	*
	Sep	30	40	980	*
	Oct	37	53	1053	*
	Nov	19	30	1161	*
	Dec	16	35	1608	*
	TOTAL	553	506	673	0
	Jan	14	39	2048	*
	Feb	26	55	1555	*
	Mar	26	52	1471	*
	Apr	250	109	321	*
	May	271	84	228	*
	Jun	133	43	238	*
1948	Jul	33	30	668	*
	Aug	18	29	1185	*
	Sep	5	19	2794	*
	Oct	8	29	2665	*
	Nov	8	34	3125	*
	Dec	9	35	2860	*
	TOTAL	801	558	512	0
	Jan	12	38	2328	*
	Feb	17	47	2033	*
	Mar	24	53	1624	*
	Apr	189	112	436	*
	May	233	75	237	*
	Jun	222	73	242	*
1949	Jul	71	53	549	*
	Aug	20	44	1618	*
	Sep	5	27	3971	*
	Oct	9	34	2778	*
	Nov	10	37	2721	*
	Dec	10	38	2794	*
	TOTAL	822	631	564	0
	Jan	12	37	2267	*
	Feb	16	40	1838	*
	Mar	18	44	1797	*
	Apr	128	58	333	*
	May	78	35	330	*
	Jun	67	32	351	*
1950	Jul	22	29	969	*
	Aug	4	14	2574	*
	Sep	5	21	3088	*
	Oct	5	18	2647	*
	Nov	5	22	3235	*
	Dec	8	22	2198	31
	TOTAL	368	372	745	31
	Jan	9	24	1925	31
	Feb	9	22	1817	28
	Mar	8	23	2143	31
	Apr	7	22	2187	30
	May	38	35	671	31
	Jun	48	38	576	30
1951	Jul	12	25	1560	31
	Aug	11	24	1567	31
	Sep	4	18	3378	30
	Oct	4	15	2746	0
	Nov	6	19	2482	0
	Dec	7	25	2714	0
	TOTAL	163	289	1304	273
	Jan	14	32	1657	0
	Feb	9	24	1868	0
	Mar	15	34	1603	0
	Apr	324	117	265	0
	May	365	93	188	0
	Jun	243	58	177	0
1952	Jul	67	40	433	0
	Aug	21	33	1143	0
	Sep	10	31	2149	0
	Oct	8	24	2135	0
	Nov	7	25	2531	0
	Dec	10	31	2321	0
	TOTAL	1095	542	364	0
	Jan	11	32	2071	0
	Feb	9	35	2755	0
	Mar	12	41	2493	0
	Apr	39	35	652	0
	May	64	38	435	0
	Jun	88	33	273	0
1953	Jul	18	26	1048	0
	Aug	19	30	1128	0
	Sep	4	12	2319	0
	Oct	16	35	1597	0
	Nov	11	33	2132	0
	Dec	8	27	2453	0
	TOTAL	301	376	918	0
	Jan	9	32	2665	0
	Feb	9	27	2118	0
	Mar	10	34	2468	1
	Apr	43	35	605	0
	May	53	31	426	0
	Jun	18	21	857	0
1954	Jul	10	17	1298	0
	Aug	7	14	1596	0
	Sep	13	25	1379	0
	Oct	20	28	1040	0
	Nov	9	28	2301	0
	Dec	7	28	3095	1
	TOTAL	209	322	1135	2
	Jan	6	21	2787	0
	Feb	7	21	2191	0
	Mar	32	47	1089	0
	Apr	65	42	475	0
	May	116	46	294	0
	Jun	66	33	369	0
1955	Jul	13	21	1231	0
	Aug	17	31	1330	2
	Sep	3	14	3061	0
	Oct	4	18	3693	0
	Nov	6	28	3423	0
	Dec	9	31	2631	1
	TOTAL	343	354	761	3
	Jan	8	36	3337	0
	Feb	9	31	2601	0
	Mar	16	37	1652	0
	Apr	56	33	426	0
	May	84	41	357	0
	Jun	63	31	359	0
1956	Jul	8	18	1683	0
	Aug	6	17	1999	0
	Sep	0.8	6	5575	0
	Oct	2	15	6185	0
	Nov	6	23	2733	0
	Dec	5	23	3198	0
	TOTAL	265	311	864	0

* See 'Notes' preceding Table 1.

Table 11 – Colorado River Basin – Historical Flow and Quality of Water Data

DOLORES RIVER NEAR CISCO, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	6	23	2921	0
	Feb	13	34	1952	0
	Mar	13	34	1980	0
	Apr	114	61	395	0
	May	296	91	226	0
	Jun	352	88	183	0
1957	Jul	158	61	285	0
	Aug	79	57	528	0
	Sep	43	36	623	0
	Oct	31	51	1198	0
	Nov	27	55	1514	0
	Dec	20	48	1778	0
	TOTAL	1150	639	409	0
	Jan	13	41	2362	0
	Feb	32	50	1145	0
	Mar	35	58	1208	0
	Apr	341	128	277	0
	May	368	91	182	0
	Jun	164	66	295	0
1958	Jul	20	35	1299	0
	Aug	8	29	2564	0
	Sep	9	28	2334	0
	Oct	8	29	2728	0
	Nov	9	34	2711	0
	Dec	10	37	2786	0
	TOTAL	1016	626	453	0
	Jan	10	34	2529	0
	Feb	10	30	2279	0
	Mar	11	35	2374	0
	Apr	25	38	1105	0
	May	33	31	686	0
	Jun	32	25	573	0
1959	Jul	7	12	1235	0
	Aug	13	20	1156	0
	Sep	3	10	2323	0
	Oct	11	20	1424	0
	Nov	9	21	1700	0
	Dec	7	22	2461	0
	TOTAL	169	297	1291	0
	Jan	8	22	1872	0
	Feb	9	31	2455	0
	Mar	44	55	917	0
	Apr	157	63	297	0
	May	111	43	283	0
	Jun	104	36	257	0
1960	Jul	20	25	898	0
	Aug	5	13	1938	0
	Sep	4	14	2897	0
	Oct	5	19	2749	31
	Nov	7	21	2187	30
	Dec	7	21	2262	31
	TOTAL	480	361	553	92
	Jan	6	20	2467	31
	Feb	7	20	2081	28
	Mar	12	25	1514	31
	Apr	58	40	517	30
	May	131	58	325	31
	Jun	70	45	470	30
1961	Jul	11	24	1581	31
	Aug	14	26	1426	31
	Sep	18	29	1140	30
	Oct	18	30	1234	31
	Nov	12	26	1613	30
	Dec	9	25	1915	31
	TOTAL	367	368	738	365
	Jan	8	23	2131	31
	Feb	25	31	915	28
	Mar	17	29	1286	31
	Apr	190	65	253	30
	May	134	60	326	31
	Jun	80	50	459	30
1962	Jul	33	37	825	31
	Aug	8	23	2154	31
	Sep	6	20	2271	30
	Oct	12	27	1674	31
	Nov	9	24	2023	30
	Dec	8	24	2141	31
	TOTAL	530	412	572	365
	Jan	6	21	2503	31
	Feb	17	28	1188	28
	Mar	36	34	709	31
	Apr	51	43	618	30
	May	56	46	600	31
	Jun	18	30	1221	30
1963	Jul	8	23	2039	31
	Aug	15	28	1417	31
	Sep	10	24	1811	30
	Oct	5	20	2920	31
	Nov	8	24	2158	30
	Dec	6	21	2728	31
	TOTAL	237	343	1067	365
	Jan	4	19	3170	31
	Feb	6	21	2572	29
	Mar	7	23	2409	31
	Apr	37	39	774	30
	May	117	62	391	31
	Jun	56	48	628	30
1964	Jul	14	29	1537	31
	Aug	28	36	947	31
	Sep	8	23	2080	30
	Oct	7	20	2201	10
	Nov	6	25	2861	4
	Dec	9	26	2020	15
	TOTAL	300	372	910	303
	Jan	11	27	1776	23
	Feb	9	26	2164	19
	Mar	9	30	2441	14
	Apr	174	71	301	4
	May	243	84	254	9
	Jun	165	63	278	9
1965	Jul	96	56	431	9
	Aug	42	44	780	16
	Sep	27	37	1023	13
	Oct	30	44	1059	12
	Nov	21	42	1512	13
	Dec	22	44	1492	13
	TOTAL	849	568	492	154
	Jan	23	44	1449	14
	Feb	14	30	1615	18
	Mar	67	56	613	16
	Apr	130	69	389	17
	May	133	72	400	14
	Jun	44	38	630	5
1966	Jul	14	29	1536	11
	Aug	5	14	2013	22
	Sep	4	13	2209	6
	Oct	6	19	2233	31
	Nov	7	20	2132	30
	Dec	17	30	1321	31
	TOTAL	464	434	688	215
	Jan	8	23	1961	31
	Feb	10	23	1767	28
	Mar	20	35	1323	31
	Apr	19	34	1343	30
	May	58	60	760	31
	Jun	45	54	870	30
1967	Jul	17	32	1401	31
	Aug	23	35	1096	31
	Sep	9	23	1768	30
	Oct	6	22	2573	18
	Nov	6	22	2702	17
	Dec	7	26	2809	25
	TOTAL	228	387	1249	333
	Jan	8	26	2495	27
	Feb	11	35	2342	14
	Mar	10	38	2732	6
	Apr	54	48	655	8
	May	168	70	308	8
	Jun	158	62	289	5
1968	Jul	27	39	1073	8
	Aug	40	44	799	8
	Sep	5	21	3145	5
	Oct	6	30	3572	8
	Nov	8	32	3074	6
	Dec	6	28	3336	9
	TOTAL	501	472	694	112
	Jan	11	34	2213	10
	Feb	11	36	2520	9
	Mar	13	36	2062	11
	Apr	213	79	272	6
	May	168	56	246	5
	Jun	75	43	423	5
1969	Jul	39	40	757	9
	Aug	13	27	1608	10
	Sep	14	29	1482	5
	Oct	15	33	1625	8
	Nov	14	30	1554	6
	Dec	14	33	1700	10
	TOTAL	599	476	583	94
	Jan	13	39	2253	7
	Feb	11	29	1917	7
	Mar	11	37	2352	8
	Apr	51	50	721	6
	May	229	70	226	9
	Jun	89	51	425	4
1970	Jul	29	37	941	11
	Aug	18	31	1268	13
	Sep	64	60	697	9
	Oct	16	33	1468	9
	Nov	15	31	1553	6
	Dec	15	32	1586	13
	TOTAL	560	500	656	102
	Jan	16	35	1593	6
	Feb	15	32	1548	7
	Mar	42	60	1049	5
	Apr	81	40	364	3
	May	109	52	354	6
	Jun	103	46	324	8
1971	Jul	25	29	855	9
	Aug	17	39	1681	6
	Sep	8	20	1757	7
	Oct	16	35	1598	10
	Nov	10	29	2155	8
	Dec	14	31	1698	18
	TOTAL	457	449	722	93
	Jan	13	40	2167	8
	Feb	12	36	2237	6
	Mar	34	41	901	7
	Apr	28	36	963	10
	May	39	35	671	8
	Jun	47	37	573	9
1972	Jul	7	18	1758	9
	Aug	2	11	3850	10
	Sep	6	19	2364	10
	Oct	40	47	878	8
	Nov	23	38	1208	11
	Dec	18	39	1541	9
	TOTAL	269	397	1085	105

Table 11 – Colorado River Basin – Historical Flow and Quality of Water Data

DOLORES RIVER NEAR CISCO, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	18	33	1313	31
	Feb	18	30	1277	28
	Mar	33	49	1081	15
	Apr	194	93	353	8
	May	546	161	217	4
	Jun	321	105	242	5
1973	Jul	109	71	482	5
	Aug	13	34	1911	4
	Sep	8	26	2470	7
	Oct	8	33	2900	6
	Nov	8	28	2676	15
	Dec	13	45	2590	9
	TOTAL	1289	709	405	137
	Jan	10	29	2057	24
	Feb	10	27	1969	25
	Mar	24	48	1472	9
	Apr	77	63	602	5
	May	130	52	297	4
	Jun	37	36	724	7
1974	Jul	15	28	1361	6
	Aug	4	13	2285	10
	Sep	2	11	4858	8
	Oct	5	22	3304	6
	Nov	8	27	2402	10
	Dec	7	28	2852	8
	TOTAL	329	384	858	122
	Jan	7	27	2692	14
	Feb	9	29	2334	13
	Mar	14	39	2070	8
	Apr	150	125	612	5
	May	315	86	201	5
	Jun	218	63	213	6
1975	Jul	130	57	325	5
	Aug	16	31	1446	7
	Sep	9	28	2430	6
	Oct	8	33	2957	8
	Nov	8	34	3236	8
	Dec	8	35	3056	8
	TOTAL	891	586	484	93
	Jan	10	37	2753	5
	Feb	13	40	2222	12
	Mar	13	44	2548	5
	Apr	80	46	425	3
	May	132	61	340	13
	Jun	76	44	424	4
1976	Jul	15	31	1527	4
	Aug	8	21	1975	2
	Sep	7	18	1818	1
	Oct	8	26	2259	6
	Nov	6	29	3665	5
	Dec	4	25	4358	6
	TOTAL	373	423	833	66
	Jan	5	35	4891	3
	Feb	8	38	3701	5
	Mar	6	35	4232	1
	Apr	8	24	2160	4
	May	6	26	3376	2
	Jun	10	23	1742	3
1977	Jul	19	41	1566	2
	Aug	15	26	1278	3
	Sep	5	16	2196	7
	Oct	10	25	1759	1
	Nov	6	20	2536	5
	Dec	6	29	3498	5
	TOTAL	104	336	2386	41
	Jan	9	15	1332	8
	Feb	8	23	2127	28
	Mar	16	36	1655	15
	Apr	236	85	264	2
	May	247	73	217	1
	Jun	160	47	217	2
1978	Jul	33	31	694	3
	Aug	5	14	1921	1
	Sep	2	9	4048	3
	Oct	4	19	3647	3
	Nov	10	25	1762	2
	Dec	6	24	2763	16
	TOTAL	735	401	401	84
	Jan	8	13	1273	11
	Feb	12	31	1885	19
	Mar	31	63	1499	10
	Apr	280	109	285	3
	May	389	114	216	1
	Jun	262	82	229	3
1979	Jul	72	59	601	2
	Aug	15	41	2017	3
	Sep	4	20	3883	3
	Oct	5	28	4044	3
	Nov	7	31	3198	5
	Dec	8	36	3328	6
	TOTAL	1092	627	422	69
	Jan	13	36	2067	19
	Feb	16	44	1962	4
	Mar	14	36	1941	23
	Apr	217	94	319	3
	May	407	118	214	4
	Jun	272	76	206	1
1980	Jul	57	46	595	0
	Aug	11	33	2199	6
	Sep	8	27	2632	6
	Oct	8	32	3090	4
	Nov	8	32	2933	9
	Dec	9	36	2973	7
	TOTAL	1039	610	432	86
	Jan	8	32	2808	6
	Feb	7	30	2938	4
	Mar	8	34	3119	8
	Apr	29	44	1107	7
	May	31	39	931	9
	Jun	46	38	618	1
1981	Jul	31	47	1124	1
	Aug	8	25	2245	3
	Sep	13	32	1751	5
	Oct	17	38	1633	31
	Nov	11	35	2228	30
	Dec	10	34	2538	31
	TOTAL	221	429	1429	136
	Jan	8	32	2834	31
	Feb	12	33	2076	28
	Mar	20	41	1533	3
	Apr	131	66	371	2
	May	190	67	260	0
	Jun	141	52	273	0
1982	Jul	54	44	606	2
	Aug	47	48	755	5
	Sep	52	44	629	4
	Oct	29	45	1130	5
	Nov	18	46	1931	7
	Dec	18	38	1563	5
	TOTAL	719	558	571	92
	Jan	16	39	1825	6
	Feb	17	36	1552	7
	Mar	49	53	802	6
	Apr	190	94	364	3
	May	522	150	211	3
	Jun	409	109	196	1
1983	Jul	132	61	340	8
	Aug	58	53	680	2
	Sep	21	50	1772	3
	Oct	20	44	1588	31
	Nov	15	40	1988	30
	Dec	16	41	1938	31
	TOTAL	1463	771	387	131

Table 11

Colorado River Basin

Historical Flow and Quality of Water Data

DOLORES RIVER NEAR CISCO, UTAH

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	1566	803	.51	377	*			
1942	1316	640	.49	358	*			
1943	596	504	.85	622	*			
1944	988	532	.54	396	*			
1945	661	503	.76	560	*			
1946	295	402	1.36	1002	*			
1947	553	506	.92	673	*			
1948	801	558	.70	512	*			
1949	822	631	.77	564	*			
1950	368	372	1.01	745	*			
1951	163	289	1.77	1304	45	0.0	4.1	34.4
1952	1095	542	.50	364	45	0.0	4.1	34.4
1953	301	376	1.25	918	68	0.0	5.1	31.9
1954	209	322	1.54	1135	107	0.0	6.4	33.9
1955	343	354	1.03	761	115	0.0	6.5	36.0
1956	265	311	1.18	864	78	0.0	6.7	38.0
1957	1150	639	.56	409	39	0.0	4.2	39.1
1958	1016	626	.62	453	28	0.0	3.0	42.2
1959	169	297	1.76	1291	56	0.0	3.8	36.3
1960	480	361	.75	553	81	0.0	4.1	37.7
1961	367	368	1.00	738	92	37.0	5.0	32.2
1962	530	412	.78	572	113	72.6	6.4	37.7
1963	237	343	1.45	1067	142	95.8	7.8	41.3
1964	300	372	1.24	910	159	93.7	7.0	41.0
1965	849	568	.67	492	162	92.0	6.3	43.0
1966	464	434	.94	688	161	89.4	5.0	39.8
1967	228	387	1.70	1249	105	92.4	5.5	42.1
1968	501	472	.94	694	103	92.2	6.2	40.8
1969	599	476	.79	584	61	75.4	6.4	40.0
1970	560	500	.89	656	75	61.3	7.3	41.7
1971	457	449	.98	722	44	0.0	6.4	51.0
1972	269	397	1.48	1085	50	0.0	6.2	47.0
1973	1289	709	.55	405	53	5.7	6.1	44.5
1974	329	384	1.17	858	46	6.5	5.1	36.3
1975	891	586	.66	484	41	7.3	5.8	44.6
1976	373	423	1.13	834	36	0.0	12.4	48.8
1977	104	336	3.25	2386	35	0.0	13.0	54.0
1978	735	401	.55	401	39	0.0	11.9	49.9
1979	1092	627	.57	422	40	0.0	5.9	42.0
1980	1039	610	.59	432	35	0.0	4.8	33.4
1981	221	429	1.94	1429	25	0.0	8.0	26.6
1982	719	558	.78	571	24	0.0	7.8	19.8
1983	1463	771	.53	387	27	0.0	8.3	21.7
Total	26772	20582						
Average	623	479	.77	565				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 12 - Colorado River Basin - Historical Flow and Quality of Water Data

COLORADO RIVER NEAR CISCO, UTAH

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	139	300	1583	31
	Feb	153	290	1395	28
	Mar	206	343	1221	31
	Apr	445	438	724	30
	May	2355	825	258	31
	Jun	1582	704	327	30
1941	Jul	579	495	628	31
	Aug	251	365	1071	31
	Sep	237	343	1065	30
	Oct	579	496	630	31
	Nov	311	391	924	30
	Dec	229	359	1150	31
	TOTAL	7068	5348	556	365
	Jan	181	328	1333	31
	Feb	166	299	1327	28
	Mar	229	358	1150	31
	Apr	1344	651	356	30
	May	1809	747	304	31
	Jun	1961	757	284	30
1942	Jul	579	494	628	31
	Aug	185	330	1313	31
	Sep	134	289	1584	30
	Oct	162	367	1670	0
	Nov	186	354	1399	0
	Dec	164	303	1355	0
	TOTAL	7098	5276	547	273
	Jan	153	299	1434	1
	Feb	146	259	1305	0
	Mar	174	291	1227	0
	Apr	709	355	368	0
	May	996	410	303	0
	Jun	1365	528	284	0
1943	Jul	502	368	539	1
	Aug	368	434	867	0
	Sep	212	376	1303	0
	Oct	184	321	1280	0
	Nov	215	313	1069	0
	Dec	189	297	1151	0
	TOTAL	5214	4249	599	2
	Jan	140	247	1298	0
	Feb	152	237	1146	0
	Mar	166	258	1138	0
	Apr	304	334	809	0
	May	1784	709	292	0
	Jun	1843	623	249	0
1944	Jul	677	400	434	0
	Aug	149	256	1267	0
	Sep	99	234	1737	0
	Oct	159	332	1535	0
	Nov	196	343	1288	0
	Dec	171	287	1231	0
	TOTAL	5840	4259	536	0
	Jan	149	275	1356	0
	Feb	150	272	1331	0
	Mar	178	291	1202	0
	Apr	329	292	654	0
	May	1495	541	266	0
	Jun	1311	482	270	0
1945	Jul	676	400	435	0
	Aug	446	427	703	1
	Sep	146	256	1289	0
	Oct	217	353	1195	0
	Nov	224	304	997	0
	Dec	183	219	883	0
	TOTAL	5505	4112	549	1
	Jan	174	232	979	0
	Feb	155	199	944	0
	Mar	191	241	930	0
	Apr	525	320	449	0
	May	725	342	347	0
	Jun	1026	429	308	0
1946	Jul	310	327	776	0
	Aug	196	357	1342	0
	Sep	135	264	1434	2
	Oct	206	373	1328	0
	Nov	206	325	1160	0
	Dec	208	297	1048	0
	TOTAL	4057	3707	672	2
	Jan	145	238	1204	0
	Feb	150	223	1090	0
	Mar	189	273	1062	0
	Apr	315	271	633	0
	May	1423	555	287	0
	Jun	1594	624	288	0
1947	Jul	985	437	326	0
	Aug	369	439	875	0
	Sep	259	355	1007	0
	Oct	328	470	1052	0
	Nov	277	343	913	0
	Dec	223	311	1025	1
	TOTAL	6258	4539	533	1
	Jan	191	255	982	0
	Feb	210	281	981	0
	Mar	245	331	997	0
	Apr	830	482	427	0
	May	1960	704	264	0
	Jun	1499	595	292	0
1948	Jul	446	365	601	0
	Aug	225	330	1079	0
	Sep	121	255	1542	0
	Oct	175	337	1416	0
	Nov	204	348	1252	0
	Dec	186	308	1220	0
	TOTAL	6291	4588	536	0
	Jan	188	307	1204	0
	Feb	187	264	1037	1
	Mar	243	349	1058	0
	Apr	615	420	503	0
	May	1289	512	292	0
	Jun	1910	702	270	0
1949	Jul	908	482	391	0
	Aug	224	343	1125	0
	Sep	159	320	1485	0
	Oct	226	413	1347	0
	Nov	210	356	1247	0
	Dec	180	307	1251	0
	TOTAL	6339	4777	554	1
	Jan	199	317	1171	0
	Feb	201	303	1109	0
	Mar	209	282	993	0
	Apr	541	325	442	0
	May	764	364	350	0
	Jun	1113	478	316	0
1950	Jul	347	339	719	0
	Aug	109	204	1372	0
	Sep	138	269	1434	0
	Oct	125	262	1538	0
	Nov	161	293	1333	0
	Dec	167	274	1202	0
	TOTAL	4074	3708	669	0
	Jan	153	248	1195	0
	Feb	151	223	1085	0
	Mar	161	229	1044	0
	Apr	173	203	863	0
	May	758	402	391	0
	Jun	1173	464	291	0
1951	Jul	529	326	453	0
	Aug	238	315	971	0
	Sep	131	235	1323	0
	Oct	169	311	1354	0
	Nov	178	291	1201	0
	Dec	172	258	1103	0
	TOTAL	3987	3507	647	0
	Jan	191	294	1135	0
	Feb	156	259	1223	0
	Mar	194	284	1079	0
	Apr	970	484	367	0
	May	2152	686	235	0
	Jun	2314	685	218	0
1952	Jul	641	459	526	0
	Aug	358	407	836	0
	Sep	213	318	1096	0
	Oct	166	290	1285	0
	Nov	177	314	1305	0
	Dec	188	317	1242	0
	TOTAL	7719	4797	457	0
	Jan	185	312	1238	0
	Feb	142	237	1224	0
	Mar	187	292	1150	0
	Apr	250	244	718	0
	May	606	356	432	0
	Jun	1399	513	270	0
1953	Jul	353	358	746	0
	Aug	256	350	1006	0
	Sep	128	250	1437	0
	Oct	177	359	1487	0
	Nov	207	360	1282	0
	Dec	171	302	1298	0
	TOTAL	4061	3934	712	0
	Jan	176	330	1374	0
	Feb	143	247	1271	0
	Mar	161	245	1121	0
	Apr	221	225	749	0
	May	436	306	516	0
	Jun	217	246	836	0
1954	Jul	150	239	1174	0
	Aug	98	202	1511	0
	Sep	171	338	1452	0
	Oct	215	328	1119	0
	Nov	164	289	1295	0
	Dec	140	279	1465	0
	TOTAL	2293	3275	1050	0
	Jan	133	266	1463	0
	Feb	121	229	1386	0
	Mar	198	291	1082	0
	Apr	320	263	605	0
	May	752	363	355	0
	Jun	689	365	389	0
1955	Jul	214	251	859	0
	Aug	185	289	1149	0
	Sep	108	221	1509	0
	Oct	119	247	1521	0
	Nov	169	320	1395	0
	Dec	176	305	1275	0
	TOTAL	3185	3409	787	0
	Jan	155	269	1276	0
	Feb	141	252	1309	0
	Mar	187	274	1077	0
	Apr	356	257	532	0
	May	1005	430	315	0
	Jun	924	389	310	0
1956	Jul	172	240	1025	0
	Aug	119	220	1363	0
	Sep	81	179	1613	0
	Oct	121	253	1542	0
	Nov	166	296	1317	1
	Dec	142	273	1415	0
	TOTAL	3569	3333	687	1

Table 12 - Colorado River Basin - Historical Flow and Quality of Water Data

COLORADO RIVER NEAR CISCO, UTAH

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	164	300	1342	0
	Feb	168	258	1134	0
	Mar	168	262	1148	0
	Apr	398	309	571	0
	May	1375	579	310	0
	Jun	2859	817	210	0
1957	Jul	1952	695	262	0
	Aug	661	522	581	0
	Sep	314	367	861	0
	Oct	292	438	1102	0
	Nov	300	429	1053	0
	Dec	239	363	1119	2
	TOTAL	8888	5339	442	2
	Jan	200	318	1168	0
	Feb	225	305	996	0
	Mar	254	337	976	0
	Apr	756	396	385	0
	May	2032	589	213	0
	Jun	1560	532	251	0
1958	Jul	234	275	865	0
	Aug	109	224	1504	0
	Sep	153	302	1449	0
	Oct	155	297	1407	0
	Nov	190	307	1190	0
	Dec	176	293	1226	0
	TOTAL	6045	4174	508	0
	Jan	168	284	1244	0
	Feb	153	240	1155	0
	Mar	150	253	1242	0
	Apr	163	219	988	0
	May	536	348	478	0
	Jun	924	412	328	0
1959	Jul	214	233	800	0
	Aug	160	280	1292	0
	Sep	124	238	1410	0
	Oct	251	352	1032	0
	Nov	210	277	970	0
	Dec	163	256	1154	0
	TOTAL	3214	3391	776	0
	Jan	164	257	1154	0
	Feb	143	226	1159	0
	Mar	273	327	881	0
	Apr	629	316	369	0
	May	758	351	341	0
	Jun	1068	422	290	0
1960	Jul	251	251	738	0
	Aug	106	194	1354	0
	Sep	117	231	1456	0
	Oct	153	246	1182	31
	Nov	177	254	1058	30
	Dec	165	253	1130	31
	TOTAL	4003	3329	612	92
	Jan	157	248	1167	31
	Feb	140	223	1177	28
	Mar	162	251	1140	31
	Apr	206	267	950	30
	May	677	412	448	31
	Jun	664	401	443	30
1961	Jul	130	231	1302	31
	Aug	138	236	1261	31
	Sep	316	310	721	30
	Oct	357	357	736	6
	Nov	252	297	869	22
	Dec	197	276	1029	28
	TOTAL	3395	3509	760	329
	Jan	182	260	1050	23
	Feb	261	303	854	14
	Mar	246	289	865	21
	Apr	1054	455	317	18
	May	1603	580	266	18
	Jun	1400	545	286	16
1962	Jul	765	440	424	15
	Aug	206	276	987	16
	Sep	173	309	1314	14
	Oct	262	326	912	23
	Nov	243	303	919	20
	Dec	180	266	1087	29
	TOTAL	6575	4354	487	227
	Jan	163	260	1168	28
	Feb	193	268	1020	16
	Mar	219	287	963	17
	Apr	245	258	775	18
	May	517	357	508	16
	Jun	332	317	702	18
1963	Jul	115	225	1447	19
	Aug	168	284	1243	13
	Sep	183	293	1180	14
	Oct	134	258	1416	18
	Nov	179	272	1121	20
	Dec	138	250	1330	20
	TOTAL	2585	3329	947	217
	Jan	132	250	1391	23
	Feb	121	226	1375	19
	Mar	128	244	1396	20
	Apr	214	270	926	17
	May	861	415	355	13
	Jun	780	413	390	18
1964	Jul	276	295	787	14
	Aug	241	344	1050	13
	Sep	153	255	1228	17
	Oct	164	279	1253	10
	Nov	182	299	1210	2
	Dec	181	273	1108	14
	TOTAL	3433	3564	763	180
	Jan	162	258	1172	22
	Feb	141	236	1233	19
	Mar	154	252	1203	15
	Apr	562	353	462	4
	May	1272	500	289	10
	Jun	1654	569	253	10
1965	Jul	1117	527	347	8
	Aug	447	371	610	19
	Sep	369	392	780	10
	Oct	360	395	808	11
	Nov	249	337	994	14
	Dec	237	313	974	15
	TOTAL	6723	4503	493	157
	Jan	200	274	1010	13
	Feb	169	242	1052	13
	Mar	278	290	767	12
	Apr	438	280	470	5
	May	697	397	419	11
	Jun	429	342	587	10
1966	Jul	185	263	1043	7
	Aug	120	224	1375	20
	Sep	145	256	1301	8
	Oct	174	294	1239	10
	Nov	153	265	1272	11
	Dec	175	278	1172	13
	TOTAL	3163	3406	792	133
	Jan	146	245	1234	31
	Feb	136	230	1245	11
	Mar	186	255	1013	18
	Apr	198	268	995	30
	May	462	343	546	11
	Jun	714	431	445	2
1967	Jul	327	332	746	3
	Aug	175	271	1141	3
	Sep	178	278	1152	2
	Oct	175	256	1079	31
	Nov	211	274	956	3
	Dec	241	283	863	17
	TOTAL	3146	3467	810	162
	Jan	205	226	808	4
	Feb	193	228	869	4
	Mar	171	237	1018	4
	Apr	230	229	732	4
	May	667	372	410	3
	Jun	1171	478	300	2
1968	Jul	306	317	763	4
	Aug	365	420	847	2
	Sep	159	259	1202	3
	Oct	213	317	1093	5
	Nov	256	314	900	5
	Dec	248	280	828	5
	TOTAL	4185	3677	646	45
	Jan	259	269	764	6
	Feb	189	226	882	7
	Mar	250	247	728	10
	Apr	714	380	391	6
	May	987	441	328	4
	Jun	731	448	451	3
1969	Jul	472	360	561	5
	Aug	199	258	952	4
	Sep	240	315	967	3
	Oct	324	341	773	6
	Nov	289	291	740	5
	Dec	252	266	774	10
	TOTAL	4906	3842	576	69
	Jan	236	249	778	7
	Feb	220	208	695	5
	Mar	277	242	642	6
	Apr	327	266	597	6
	May	1385	503	267	7
	Jun	1340	502	276	6
1970	Jul	538	350	479	5
	Aug	245	279	836	9
	Sep	407	405	733	6
	Oct	360	333	680	7
	Nov	338	287	625	2
	Dec	317	272	632	10
	TOTAL	5988	3897	479	76
	Jan	332	256	567	5
	Feb	321	225	516	6
	Mar	413	264	470	5
	Apr	579	291	369	5
	May	768	392	376	6
	Jun	1141	446	287	5
1971	Jul	535	340	467	6
	Aug	246	271	810	7
	Sep	282	298	776	7
	Oct	280	326	856	9
	Nov	276	287	766	6
	Dec	284	289	749	8
	TOTAL	5458	3685	497	75
	Jan	267	267	734	8
	Feb	227	232	752	7
	Mar	279	257	676	6
	Apr	202	209	761	9
	May	453	310	504	7
	Jun	759	368	356	5
1972	Jul	192	226	867	6
	Aug	119	196	1205	6
	Sep	201	281	1031	8
	Oct	302	365	889	6
	Nov	281	299	782	9
	Dec	267	270	742	9
	TOTAL	3549	3279	679	86

Table 12 – Colorado River Basin – Historical Flow and Quality of Water Data

COLORADO RIVER NEAR CISCO, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	283	288	749	24
	Feb	211	245	855	20
	Mar	240	281	861	0
	Apr	388	353	669	1
	May	1557	619	293	1
	Jun	1557	595	281	0
1973	Jul	799	447	411	1
	Aug	331	326	725	1
	Sep	220	286	953	1
	Oct	251	320	938	1
	Nov	248	292	867	2
	Dec	290	267	677	2
	TOTAL	6374	4318	498	54
	Jan	312	266	627	4
	Feb	294	233	582	1
	Mar	363	295	596	2
	Apr	361	284	577	3
	May	1016	386	279	0
	Jun	747	360	354	2
1974	Jul	313	304	714	1
	Aug	161	233	1064	2
	Sep	158	253	1178	0
	Oct	206	311	1112	1
	Nov	259	314	892	1
	Dec	226	263	857	2
	TOTAL	4416	3501	583	19
	Jan	236	259	807	7
	Feb	207	224	793	5
	Mar	240	259	792	4
	Apr	377	307	598	1
	May	1007	446	326	0
	Jun	1243	489	289	1
1975	Jul	807	403	368	1
	Aug	226	265	861	1
	Sep	185	268	1066	0
	Oct	233	316	998	2
	Nov	279	311	822	1
	Dec	262	276	774	1
	TOTAL	5303	3824	530	24
	Jan	230	243	780	0
	Feb	206	239	852	1
	Mar	220	240	802	0
	Apr	277	306	815	1
	May	639	376	433	2
	Jun	592	358	445	2
1976	Jul	231	269	856	1
	Aug	150	232	1133	0
	Sep	176	249	1039	1
	Oct	219	271	912	2
	Nov	220	259	866	5
	Dec	219	236	792	5
	TOTAL	3379	3279	713	20
	Jan	207	242	863	8
	Feb	146	198	999	4
	Mar	124	189	1127	1
	Apr	97	150	1133	1
	May	143	185	953	0
	Jun	168	207	905	0
1977	Jul	127	224	1300	0
	Aug	109	198	1341	1
	Sep	127	206	1192	0
	Oct	141	216	1122	1
	Nov	142	218	1124	0
	Dec	130	189	1069	0
	TOTAL	1660	2422	1073	16
	Jan	137	187	1005	2
	Feb	138	181	961	3
	Mar	191	230	883	0
	Apr	477	356	549	1
	May	957	502	386	0
	Jun	1343	539	295	0
1978	Jul	535	355	488	0
	Aug	159	214	987	0
	Sep	182	242	980	2
	Oct	200	266	976	0
	Nov	249	283	835	0
	Dec	244	261	786	1
	TOTAL	4813	3615	552	9
	Jan	239	270	832	31
	Feb	251	236	692	11
	Mar	371	335	664	1
	Apr	716	438	450	1
	May	1513	627	305	0
	Jun	1555	604	285	1
1979	Jul	755	417	406	1
	Aug	278	304	805	1
	Sep	218	270	912	0
	Oct	225	281	919	4
	Nov	226	273	888	1
	Dec	258	269	766	2
	TOTAL	6607	4325	481	54
	Jan	262	257	722	2
	Feb	257	247	704	0
	Mar	273	264	711	12
	Apr	566	360	468	2
	May	1655	683	304	0
	Jun	1578	558	260	0
1980	Jul	509	350	506	0
	Aug	203	258	934	2
	Sep	206	262	935	6
	Oct	220	282	941	0
	Nov	264	276	770	0
	Dec	255	264	761	0
	TOTAL	6249	4062	478	24
	Jan	229	241	773	1
	Feb	162	197	891	1
	Mar	155	201	953	1
	Apr	175	203	853	2
	May	296	270	669	3
	Jun	407	277	500	0
1981	Jul	196	256	962	2
	Aug	127	201	1164	1
	Sep	183	248	997	4
	Oct	243	262	796	30
	Nov	200	236	870	30
	Dec	179	231	947	30
	TOTAL	2552	2823	813	105
	Jan	170	225	974	31
	Feb	206	229	819	27
	Mar	263	233	650	0
	Apr	409	293	526	0
	May	893	432	356	0
	Jun	1065	463	319	0
1982	Jul	590	361	451	1
	Aug	353	329	685	2
	Sep	380	359	694	1
	Oct	372	326	644	2
	Nov	321	302	690	1
	Dec	287	266	682	3
	TOTAL	5309	3816	529	68
	Jan	252	239	698	2
	Feb	230	214	683	4
	Mar	299	259	637	1
	Apr	448	321	526	2
	May	1563	679	319	2
	Jun	2740	834	224	1
1983	Jul	1700	613	265	2
	Aug	673	440	481	1
	Sep	308	299	715	2
	Oct	351	307	644	31
	Nov	327	292	657	30
	Dec	345	305	650	31
	TOTAL	9236	4803	382	109

Table 12

Colorado River Basin

Historical Flow and Quality of Water Data

COLORADO RIVER NEAR CISCO, UTAH

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	7068	5348	.76	556	104	100.0	0.0	16.7
1942	7098	5276	.74	547	104	100.0	0.0	16.7
1943	5214	4249	.82	599	82	82.9	3.1	16.6
1944	5840	4259	.73	536	58	55.2	3.7	15.9
1945	5505	4112	.75	549	38	0.0	4.0	14.5
1946	4057	3707	.91	672	36	0.0	3.7	16.5
1947	6258	4539	.73	533	36	0.0	3.4	18.6
1948	6291	4588	.73	536	36	0.0	3.7	16.7
1949	6339	4777	.75	554	41	0.0	4.2	17.3
1950	4074	3708	.91	669	64	4.7	3.9	15.3
1951	3987	3507	.88	647	84	4.8	3.5	13.8
1952	7719	4797	.62	457	92	5.4	3.4	15.1
1953	4061	3934	.97	712	89	2.2	4.0	16.5
1954	2293	3275	1.43	1050	90	1.1	4.8	20.9
1955	3185	3409	1.07	787	95	0.0	4.8	18.8
1956	3569	3333	.93	687	95	0.0	4.2	18.9
1957	8888	5339	.60	442	80	0.0	3.9	17.3
1958	6045	4174	.69	508	65	0.0	3.7	18.3
1959	3214	3391	1.06	776	52	0.0	3.9	20.4
1960	4003	3329	.83	612	54	0.0	3.8	17.6
1961	3395	3509	1.03	760	67	0.0	4.5	18.8
1962	6575	4354	.66	487	71	31.0	5.1	18.9
1963	2585	3329	1.29	947	76	61.8	6.0	19.4
1964	3433	3564	1.04	763	75	62.7	5.9	18.4
1965	6723	4503	.67	493	85	29.4	5.9	21.4
1966	3163	3406	1.08	792	105	0.0	6.0	23.9
1967	3146	3467	1.10	810	117	0.0	5.4	24.5
1968	4185	3677	.88	646	131	0.0	4.6	21.4
1969	4906	3842	.78	576	100	1.0	3.8	17.2
1970	5988	3897	.65	479	73	1.4	6.3	16.3
1971	5458	3685	.68	497	38	2.6	7.9	18.5
1972	3549	3279	.92	679	37	0.0	7.3	18.1
1973	6374	4318	.68	498	37	0.0	4.9	18.3
1974	4416	3501	.79	583	37	0.0	5.3	17.5
1975	5303	3824	.72	530	36	0.0	6.0	16.5
1976	3379	3279	.97	714	36	0.0	5.3	15.2
1977	1660	2422	1.46	1073	35	0.0	7.2	16.1
1978	4813	3615	.75	552	33	0.0	6.5	13.8
1979	6607	4325	.65	481	31	0.0	6.9	16.0
1980	6249	4062	.65	478	32	0.0	5.1	12.6
1981	2552	2823	1.11	814	28	0.0	6.3	13.5
1982	5309	3816	.72	529	30	0.0	6.6	13.3
1983	9236	4803	.52	382	38	0.0	6.0	12.6
Total	213711	168350						
Average	4970	3915	.79	579				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 13 – Colorado River Basin – Historical Flow and Quality of Water Data

SAN JUAN RIVER NEAR ARCHULETA, NEW MEXICO

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC	Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC	Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC	Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	22	9	301	*		Jan	14	6	315	*		Jan	16	7	322	*		Jan	18	7	286	*
	Feb	46	16	256	*		Feb	22	10	334	*		Feb	25	9	265	*		Feb	18	7	286	*
	Mar	98	37	278	*		Mar	35	17	357	*		Mar	73	27	272	*		Mar	37	15	298	*
	Apr	251	53	155	*		Apr	143	28	144	*		Apr	228	55	177	*		Apr	75	18	177	*
	May	709	110	114	*		May	278	44	116	*		May	318	48	111	*		May	117	22	138	*
	Jun	560	68	89	*		Jun	209	28	99	*		Jun	406	53	96	*		Jun	148	22	109	*
1941	Jul	324	46	104	*	1945	Jul	68	14	151	*	1949	Jul	199	30	111	*	1953	Jul	41	13	233	*
	Aug	84	16	140	*		Aug	40	9	165	*		Aug	57	14	181	*		Aug	33	11	245	*
	Sep	68	16	173	*		Sep	21	5	175	*		Sep	33	9	201	*		Sep	16	7	322	*
	Oct	273	33	89	*		Oct	30	11	270	*		Oct	30	9	221	*		Oct	23	10	320	*
	Nov	87	15	127	*		Nov	19	7	271	*		Nov	21	8	280	*		Nov	23	10	320	*
	Dec	52	11	156	*		Dec	12	6	368	*		Dec	14	7	368	*		Dec	14	7	368	*
	TOTAL	2574	430	123	0		TOTAL	891	185	153	0		TOTAL	1420	276	143	0		TOTAL	563	149	195	0
	Jan	45	15	245	*		Jan	14	6	315	*		Jan	16	6	276	*		Jan	11	5	334	*
	Feb	48	12	184	*		Feb	17	8	346	*		Feb	29	12	304	*		Feb	21	10	350	*
	Mar	54	23	313	*		Mar	22	11	368	*		Mar	31	13	308	*		Mar	28	13	341	*
	Apr	383	82	157	*		Apr	66	15	167	*		Apr	116	22	140	*		Apr	90	19	155	*
	May	320	48	110	*		May	73	13	131	*		May	126	19	111	*		May	143	26	134	*
	Jun	310	38	90	*		Jun	87	16	135	*		Jun	112	18	118	*		Jun	67	13	143	*
1942	Jul	76	14	135	*	1946	Jul	27	9	245	*	1950	Jul	44	12	201	*	1954	Jul	37	15	298	*
	Aug	41	9	161	*		Aug	40	14	257	*		Aug	20	7	257	*		Aug	45	13	212	*
	Sep	28	7	184	*		Sep	29	9	228	*		Sep	24	9	276	*		Sep	30	13	319	*
	Oct	23	6	192	*		Oct	36	11	225	*		Oct	20	7	257	*		Oct	42	10	175	*
	Nov	22	6	201	*		Nov	26	9	255	*		Nov	14	7	368	*		Nov	18	7	286	*
	Dec	16	6	276	*		Dec	19	6	232	*		Dec	12	6	368	*		Dec	13	5	314	10
	TOTAL	1366	266	143	0		TOTAL	456	127	205	0		TOTAL	564	138	180	0		TOTAL	545	149	202	10
	Jan	16	7	322	*		Jan	15	6	294	*		Jan	10	5	368	*		Jan	12	5	293	0
	Feb	26	9	255	*		Feb	24	9	276	*		Feb	11	5	334	*		Feb	13	5	279	0
	Mar	55	21	281	*		Mar	32	11	253	*		Mar	20	9	331	*		Mar	27	10	270	0
	Apr	198	37	137	*		Apr	50	12	177	*		Apr	35	10	210	*		Apr	45	11	179	0
	May	184	30	120	*		May	186	32	127	*		May	117	21	132	*		May	132	21	119	0
	Jun	134	20	110	*		Jun	140	18	95	*		Jun	94	16	125	*		Jun	119	17	105	0
1943	Jul	51	12	173	*	1947	Jul	43	12	205	*	1951	Jul	21	8	280	*	1955	Jul	42	13	218	0
	Aug	48	10	153	*		Aug	73	22	222	*		Aug	33	12	267	*		Aug	67	19	207	0
	Sep	28	7	184	*		Sep	56	13	171	*		Sep	22	8	267	*		Sep	28	8	211	0
	Oct	35	7	147	*		Oct	77	16	153	*		Oct	17	8	346	*		Oct	19	6	243	0
	Nov	24	7	215	*		Nov	37	8	159	*		Nov	15	7	343	*		Nov	17	6	280	2
	Dec	19	6	232	*		Dec	27	7	191	*		Dec	18	8	327	*		Dec	15	6	307	3
	TOTAL	818	173	156	0		TOTAL	760	166	161	0		TOTAL	413	117	208	0		TOTAL	537	128	175	5
	Jan	16	6	276	*		Jan	27	7	191	*		Jan	19	10	387	*		Jan	16	6	292	0
	Feb	19	6	232	*		Feb	39	13	245	*		Feb	19	10	387	*		Feb	15	6	314	1
	Mar	34	16	346	*		Mar	43	15	257	*		Mar	47	23	360	*		Mar	48	16	248	0
	Apr	131	27	152	*		Apr	246	49	147	*		Apr	326	85	192	*		Apr	79	16	147	0
	May	371	61	121	*		May	306	43	103	*		May	396	63	117	*		May	174	23	98	0
	Jun	382	49	94	*		Jun	338	40	87	*		Jun	454	59	96	*		Jun	117	16	100	0
1944	Jul	134	22	121	*	1948	Jul	79	13	121	*	1952	Jul	136	24	130	*	1956	Jul	25	7	219	0
	Aug	45	9	147	*		Aug	49	12	180	*		Aug	66	17	189	*		Aug	23	8	249	0
	Sep	43	10	171	*		Sep	22	7	234	*		Sep	33	9	201	*		Sep	11	4	258	2
	Oct	41	9	161	*		Oct	23	8	256	*		Oct	22	7	234	*		Oct	12	5	307	0
	Nov	21	6	210	*		Nov	18	7	286	*		Nov	16	7	322	*		Nov	11	5	324	0
	Dec	14	6	315	*		Dec	13	6	339	*		Dec	18	7	286	*		Dec	9	4	351	0
	TOTAL	1251	227	133	0		TOTAL	1203	220	134	0		TOTAL	1552	321	152	0		TOTAL	539	117	160	3

* See 'Notes' preceding Table 1.

Table 13 – Colorado River Basin – Historical Flow and Quality of Water Data

SAN JUAN RIVER NEAR ARCHULETA, NEW MEXICO

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	13	6	329	0
	Feb	30	14	336	0
	Mar	46	20	315	0
	Apr	120	31	190	0
	May	222	44	147	1
	Jun	480	65	100	1
1957	Jul	327	50	113	0
	Aug	164	35	159	1
	Sep	67	13	145	0
	Oct	67	20	216	0
	Nov	68	18	200	0
	Dec	44	12	208	0
	TOTAL	1647	329	147	3
	Jan	22	8	269	0
	Feb	51	21	300	0
	Mar	77	31	294	0
	Apr	279	83	218	0
	May	460	71	114	0
	Jun	270	34	92	0
1958	Jul	42	11	192	0
	Aug	35	11	231	1
	Sep	40	11	206	0
	Oct	25	9	247	0
	Nov	17	7	287	0
	Dec	14	6	301	0
	TOTAL	1332	301	166	1
	Jan	11	5	330	0
	Feb	15	6	327	0
	Mar	18	8	310	1
	Apr	37	11	217	0
	May	87	16	131	0
	Jun	84	14	122	1
1959	Jul	18	5	231	0
	Aug	34	12	255	0
	Sep	15	5	257	0
	Oct	60	18	228	0
	Nov	39	11	218	0
	Dec	19	7	261	8
	TOTAL	436	119	201	10
	Jan	14	6	314	1
	Feb	16	6	301	0
	Mar	175	59	247	0
	Apr	240	44	135	0
	May	193	31	118	0
	Jun	232	29	92	0
1960	Jul	55	13	171	0
	Aug	25	7	221	0
	Sep	23	7	238	0
	Oct	26	10	276	0
	Nov	16	7	309	0
	Dec	14	6	331	0
	TOTAL	1029	226	162	1
	Jan	12	5	323	0
	Feb	16	7	315	0
	Mar	43	19	315	1
	Apr	113	30	193	0
	May	192	28	107	0
	Jun	122	20	122	6
1961	Jul	38	10	201	2
	Aug	52	15	212	2
	Sep	58	15	188	0
	Oct	52	13	181	1
	Nov	34	10	217	0
	Dec	18	6	234	6
	TOTAL	750	177	174	18
	Jan	15	6	275	0
	Feb	42	16	283	1
	Mar	51	20	281	0
	Apr	242	49	148	0
	May	228	32	104	0
	Jun	165	21	96	0
1962	Jul	39	7	134	0
	Aug	29	8	192	0
	Sep	19	5	197	0
	Oct	18	6	230	0
	Nov	14	5	246	0
	Dec	10	4	268	0
	TOTAL	872	178	150	1
	Jan	7	3	273	0
	Feb	8	3	284	0
	Mar	15	6	285	1
	Apr	31	12	279	8
	May	19	5	180	1
	Jun	19	3	136	3
1963	Jul	20	4	129	0
	Aug	22	4	136	0
	Sep	20	4	149	0
	Oct	24	5	164	0
	Nov	24	6	179	0
	Dec	24	7	203	0
	TOTAL	232	61	192	13
	Jan	17	5	231	1
	Feb	13	4	229	0
	Mar	13	4	240	0
	Apr	15	5	245	0
	May	34	11	232	0
	Jun	82	23	203	0
1964	Jul	108	26	178	1
	Aug	48	11	170	0
	Sep	26	6	163	0
	Oct	28	7	173	0
	Nov	21	6	200	0
	Dec	32	9	215	0
	TOTAL	437	116	196	2
	Jan	90	26	214	12
	Feb	92	27	218	12
	Mar	52	18	249	3
	Apr	85	29	253	2
	May	138	40	212	2
	Jun	215	41	141	3
1965	Jul	102	18	128	0
	Aug	136	24	128	7
	Sep	112	19	123	10
	Oct	131	20	110	31
	Nov	180	31	126	0
	Dec	177	34	142	0
	TOTAL	1511	327	159	82
	Jan	168	36	155	0
	Feb	94	24	186	0
	Mar	114	32	207	0
	Apr	181	49	199	0
	May	129	32	183	0
	Jun	27	6	152	0
1966	Jul	28	4	118	0
	Aug	29	5	137	0
	Sep	27	5	128	0
	Oct	91	16	133	0
	Nov	47	9	143	0
	Dec	25	6	182	0
	TOTAL	961	225	172	0
	Jan	25	6	185	1
	Feb	45	11	189	0
	Mar	70	17	184	0
	Apr	23	6	202	0
	May	17	5	225	0
	Jun	18	6	249	0
1967	Jul	20	7	244	0
	Aug	62	18	209	0
	Sep	59	16	195	0
	Oct	21	5	162	0
	Nov	21	5	187	0
	Dec	21	6	197	1
	TOTAL	402	108	198	2
	Jan	19	5	199	0
	Feb	20	5	190	0
	Mar	18	5	213	0
	Apr	60	16	193	0
	May	49	13	195	0
	Jun	28	7	191	0
1968	Jul	30	8	198	0
	Aug	38	10	194	0
	Sep	47	12	181	0
	Oct	35	9	182	0
	Nov	23	6	181	0
	Dec	24	6	168	0
	TOTAL	392	101	190	0
	Jan	40	9	160	30
	Feb	110	23	153	27
	Mar	94	21	162	30
	Apr	110	26	173	29
	May	117	26	164	30
	Jun	118	26	162	29
1969	Jul	99	22	164	30
	Aug	72	16	164	30
	Sep	76	16	152	29
	Oct	96	19	146	31
	Nov	81	16	148	30
	Dec	90	18	152	31
	TOTAL	1102	238	159	356
	Jan	51	10	150	31
	Feb	110	21	141	28
	Mar	91	18	148	31
	Apr	26	6	157	30
	May	29	6	158	31
	Jun	30	6	159	30
1970	Jul	31	7	156	31
	Aug	39	8	155	31
	Sep	79	16	152	30
	Oct	111	23	151	31
	Nov	103	21	147	30
	Dec	117	23	145	31
	TOTAL	817	165	149	365
	Jan	141	26	135	31
	Feb	120	23	143	28
	Mar	68	14	155	31
	Apr	30	7	166	30
	May	31	7	170	31
	Jun	29	7	168	30
1971	Jul	31	7	165	31
	Aug	31	7	167	31
	Sep	30	7	170	30
	Oct	25	6	177	31
	Nov	18	4	181	30
	Dec	66	15	171	31
	TOTAL	618	130	155	365
	Jan	93	21	170	31
	Feb	84	19	168	29
	Mar	93	22	172	31
	Apr	49	12	182	30
	May	31	8	184	31
	Jun	30	7	181	30
1972	Jul	31	8	181	31
	Aug	39	9	180	31
	Sep	37	9	181	30
	Oct	32	8	183	31
	Nov	30	7	183	30
	Dec	62	15	181	31
	TOTAL	610	146	177	366

Missing EC estimated by interpolation after regulation of flow.

Table 13 - Colorado River Basin - Historical Flow and Quality of Water Data

SAN JUAN RIVER NEAR ARCHULETA, NEW MEXICO

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	71	17	179	31
	Feb	97	24	182	28
	Mar	29	8	202	31
	Apr	30	9	210	30
	May	133	37	201	31
	Jun	182	48	193	30
1973	Jul	266	68	189	31
	Aug	216	51	175	31
	Sep	159	34	159	30
	Oct	120	24	147	31
	Nov	117	23	144	30
	Dec	120	24	146	31
	TOTAL	1540	366	175	365
	Jan	103	21	149	31
	Feb	65	14	156	28
	Mar	63	14	166	31
	Apr	59	14	171	30
	May	57	13	168	31
	Jun	38	9	169	30
1974	Jul	36	8	170	31
	Aug	43	10	168	31
	Sep	42	10	170	30
	Oct	32	7	169	31
	Nov	28	6	169	30
	Dec	30	7	171	31
	TOTAL	596	133	164	365
	Jan	32	8	181	31
	Feb	27	7	182	28
	Mar	31	8	184	31
	Apr	82	20	181	30
	May	148	36	179	31
	Jun	144	37	186	30
1975	Jul	151	38	184	31
	Aug	113	28	181	31
	Sep	92	21	169	30
	Oct	90	20	162	31
	Nov	85	17	149	30
	Dec	96	19	142	31
	TOTAL	1091	257	173	365
	Jan	77	16	155	31
	Feb	54	11	150	29
	Mar	56	11	148	31
	Apr	42	9	161	30
	May	88	20	168	31
	Jun	82	18	165	30
1976	Jul	33	8	179	31
	Aug	37	9	175	31
	Sep	40	9	171	30
	Oct	29	7	169	31
	Nov	27	6	170	30
	Dec	73	15	154	31
	TOTAL	639	141	162	366
	Jan	75	16	154	31
	Feb	37	8	163	28
	Mar	32	7	167	31
	Apr	31	7	169	30
	May	34	8	167	31
	Jun	36	8	168	30
1977	Jul	34	8	169	31
	Aug	35	8	168	31
	Sep	31	7	168	30
	Oct	33	6	146	31
	Nov	30	6	154	30
	Dec	29	7	170	31
	TOTAL	437	97	163	365
	Jan	31	7	172	31
	Feb	29	7	172	28
	Mar	31	7	175	31
	Apr	31	8	178	30
	May	32	8	181	31
	Jun	28	7	184	30
1978	Jul	30	8	185	31
	Aug	34	9	185	31
	Sep	38	9	185	30
	Oct	30	8	203	31
	Nov	30	8	204	30
	Dec	31	9	205	31
	TOTAL	376	95	186	365
	Jan	31	9	206	31
	Feb	32	9	206	28
	Mar	99	26	191	31
	Apr	284	68	177	30
	May	305	71	170	31
	Jun	308	68	162	30
1979	Jul	315	65	152	31
	Aug	114	23	151	31
	Sep	45	9	147	30
	Oct	47	9	136	31
	Nov	33	6	139	30
	Dec	104	19	132	31
	TOTAL	1716	381	163	365
	Jan	101	17	121	31
	Feb	99	16	121	29
	Mar	145	27	136	31
	Apr	91	18	147	30
	May	120	24	148	31
	Jun	71	15	152	30
1980	Jul	61	14	164	31
	Aug	79	21	196	31
	Sep	72	22	229	30
	Oct	72	22	229	31
	Nov	84	23	202	30
	Dec	84	19	170	31
	TOTAL	1080	239	163	366
	Jan	101	21	151	31
	Feb	63	13	152	28
	Mar	40	8	152	31
	Apr	26	5	151	30
	May	31	6	149	31
	Jun	34	7	147	30
1981	Jul	49	10	149	31
	Aug	53	11	152	31
	Sep	53	11	153	30
	Oct	54	11	155	31
	Nov	35	7	154	30
	Dec	37	8	154	31
	TOTAL	576	119	152	365
	Jan	41	9	155	31
	Feb	27	6	155	28
	Mar	45	10	157	31
	Apr	85	18	157	30
	May	116	24	155	31
	Jun	101	22	157	30
1982	Jul	74	16	157	31
	Aug	63	13	156	31
	Sep	66	14	157	30
	Oct	64	14	156	31
	Nov	54	11	155	30
	Dec	91	19	153	31
	TOTAL	826	175	156	365
	Jan	113	23	152	31
	Feb	97	20	152	28
	Mar	127	26	153	31
	Apr	159	33	154	30
	May	106	22	154	31
	Jun	77	16	156	30
1983	Jul	98	21	157	31
	Aug	64	13	151	31
	Sep	66	13	149	30
	Oct	73	16	164	31
	Nov	64	14	160	30
	Dec	73	15	153	31
	TOTAL	1116	234	154	365

Missing EC estimated by interpolation after regulation of flow.

Table 13

Colorado River Basin

Historical Flow and Quality of Water Data

SAN JUAN RIVER NEAR ARCHULETA, NEW MEXICO

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	2574	430	.17	123	*			
1942	1366	266	.19	143	*			
1943	818	173	.21	156	*			
1944	1251	227	.18	133	*			
1945	891	185	.21	153	*			
1946	456	127	.28	205	*			
1947	760	166	.22	161	*			
1948	1203	220	.18	135	*			
1949	1420	276	.19	143	*			
1950	564	138	.24	180	*			
1951	413	117	.28	208	*			
1952	1552	321	.21	152	*			
1953	563	149	.26	195	*			
1954	546	149	.27	202	*			
1955	537	128	.24	175	47	72.3	5.3	26.2
1956	539	117	.22	160	47	72.3	5.3	26.2
1957	1647	329	.20	147	81	84.0	4.8	27.8
1958	1332	301	.23	166	101	87.1	4.5	27.3
1959	436	119	.27	201	94	87.2	3.2	27.4
1960	1029	226	.22	162	96	87.5	3.7	26.4
1961	750	177	.24	174	106	88.7	3.6	29.6
1962	872	178	.20	150	95	87.4	3.9	32.1
1963	232	61	.26	192	72	83.3	3.8	30.0
1964	437	116	.27	196	58	79.3	4.1	26.7
1965	1511	327	.22	159	52	76.9	4.3	26.4
1966	961	225	.23	172	50	76.0	4.0	26.9
1967	402	108	.27	198	44	72.7	2.9	23.3
1968	392	101	.26	190	43	48.8	2.9	15.2
1969	1102	238	.22	159	39	25.6	3.1	11.5
1970	817	165	.20	149	37	0.0	3.3	6.7
1971	618	130	.21	155	35	0.0	3.1	8.3
1972	610	146	.24	177	35	0.0	3.2	9.9
1973	1540	366	.24	175	34	0.0	3.4	8.9
1974	596	133	.22	164	34	0.0	3.9	10.0
1975	1091	257	.24	173	36	0.0	6.4	10.0
1976	639	141	.22	162	38	0.0	6.5	9.7
1977	437	97	.22	163	32	0.0	6.5	6.8
1978	376	95	.25	186	23	0.0	8.5	11.8
1979	1716	381	.22	163	15	0.0	7.5	19.3
1980	1080	239	.22	163	12	0.0	8.2	23.1
1981	576	119	.21	152	12	0.0	6.1	17.6
1982	826	175	.21	156	13	0.0	7.7	7.5
1983	1116	234	.21	154	18	0.0	6.5	6.8
Total	38593	8374						
Average	898	195	.22	160				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 14 - Colorado River Basin - Historical Flow and Quality of Water Data

SAN JUAN RIVER NEAR BLUFF, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	78	77	724	0
	Feb	127	121	702	0
	Mar	211	160	558	0
	Apr	392	255	478	0
	May	1323	705	392	0
	Jun	915	265	213	0
1941	Jul	526	149	209	0
	Aug	174	145	615	0
	Sep	202	194	706	1
	Oct	655	485	545	0
	Nov	191	116	445	0
	Dec	104	83	585	0
	TOTAL	4899	2755	414	1
	Jan	81	72	655	0
	Feb	68	62	678	0
	Mar	126	117	682	0
	Apr	602	303	370	0
	May	479	179	274	0
	Jun	533	137	189	0
1942	Jul	150	73	356	0
	Aug	51	43	622	0
	Sep	38	38	736	0
	Oct	37	45	885	0
	Nov	39	48	901	0
	Dec	43	53	909	0
	TOTAL	2248	1169	383	0
	Jan	43	54	909	0
	Feb	49	58	865	0
	Mar	95	99	764	0
	Apr	293	134	336	0
	May	332	128	284	0
	Jun	254	95	274	0
1943	Jul	106	59	410	0
	Aug	91	92	739	0
	Sep	62	58	683	0
	Oct	58	57	718	0
	Nov	59	57	716	0
	Dec	51	56	810	0
	TOTAL	1494	946	466	0
	Jan	37	42	834	0
	Feb	49	57	853	0
	Mar	76	81	781	0
	Apr	204	124	449	0
	May	640	231	266	0
	Jun	705	168	176	0
1944	Jul	283	98	255	0
	Aug	61	52	629	0
	Sep	66	66	733	0
	Oct	75	68	666	0
	Nov	52	58	824	0
	Dec	43	50	859	0
	TOTAL	2291	1096	352	0
	Jan	41	49	884	0
	Feb	63	70	823	0
	Mar	72	73	749	0
	Apr	196	117	437	0
	May	456	156	251	0
	Jun	377	107	208	0
1945	Jul	128	63	362	0
	Aug	96	113	868	0
	Sep	22	25	839	0
	Oct	62	68	808	0
	Nov	46	48	770	0
	Dec	30	36	871	0
	TOTAL	1588	925	428	0
	Jan	37	42	827	0
	Feb	36	43	884	0
	Mar	47	49	771	0
	Apr	95	62	485	0
	May	125	60	351	0
	Jun	204	81	291	0
1946	Jul	63	56	649	0
	Aug	75	89	873	0
	Sep	44	40	669	0
	Oct	55	52	695	0
	Nov	60	60	733	0
	Dec	46	46	741	0
	TOTAL	887	680	564	0
	Jan	31	35	828	0
	Feb	45	47	766	0
	Mar	51	46	652	0
	Apr	68	42	455	0
	May	329	130	290	0
	Jun	276	80	214	0
1947	Jul	110	45	301	0
	Aug	294	280	702	0
	Sep	124	91	536	0
	Oct	207	184	656	0
	Nov	77	54	510	0
	Dec	65	54	611	0
	TOTAL	1677	1087	477	0
	Jan	52	42	594	0
	Feb	79	66	616	0
	Mar	90	74	609	0
	Apr	358	128	262	0
	May	519	132	187	0
	Jun	603	172	210	0
1948	Jul	147	64	322	0
	Aug	86	70	598	0
	Sep	36	40	825	0
	Oct	75	75	735	0
	Nov	55	59	790	0
	Dec	41	46	817	0
	TOTAL	2140	968	333	0
	Jan	63	68	793	0
	Feb	74	73	724	0
	Mar	152	122	590	0
	Apr	338	150	326	0
	May	503	154	224	0
	Jun	748	229	225	0
1949	Jul	342	118	255	0
	Aug	90	61	497	0
	Sep	41	42	745	0
	Oct	56	56	730	0
	Nov	45	47	782	0
	Dec	35	40	852	0
	TOTAL	2487	1159	343	0
	Jan	41	46	815	0
	Feb	49	53	799	0
	Mar	56	53	687	0
	Apr	136	62	334	0
	May	169	65	284	0
	Jun	191	74	284	0
1950	Jul	68	48	521	0
	Aug	15	16	826	0
	Sep	42	51	900	0
	Oct	30	31	758	0
	Nov	25	34	1017	0
	Dec	32	40	915	0
	TOTAL	854	574	494	0
	Jan	30	37	906	0
	Feb	29	39	982	0
	Mar	34	37	799	0
	Apr	34	29	629	0
	May	141	68	352	0
	Jun	189	64	250	0
1951	Jul	30	24	576	0
	Aug	49	52	774	0
	Sep	45	34	558	0
	Oct	35	36	745	0
	Nov	39	39	730	0
	Dec	36	38	789	0
	TOTAL	691	495	527	0
	Jan	88	98	816	0
	Feb	40	47	853	0
	Mar	87	86	730	0
	Apr	452	180	292	0
	May	618	174	207	0
	Jun	769	181	173	0
1952	Jul	238	100	310	0
	Aug	83	57	501	0
	Sep	56	53	686	0
	Oct	38	38	746	0
	Nov	41	51	919	0
	Dec	43	53	894	0
	TOTAL	2554	1116	321	0
	Jan	42	50	878	0
	Feb	36	40	827	0
	Mar	56	55	723	0
	Apr	107	64	441	0
	May	156	65	304	0
	Jun	267	69	189	0
1953	Jul	77	67	646	0
	Aug	71	80	833	0
	Sep	12	17	1052	0
	Oct	54	66	906	0
	Nov	55	60	806	0
	Dec	34	44	928	0
	TOTAL	967	678	515	0
	Jan	32	41	930	0
	Feb	36	41	848	0
	Mar	48	49	746	0
	Apr	113	56	368	0
	May	218	84	285	0
	Jun	120	56	341	0
1954	Jul	120	120	735	0
	Aug	66	55	618	0
	Sep	89	109	900	0
	Oct	95	68	527	0
	Nov	39	39	722	0
	Dec	35	43	911	0
	TOTAL	1011	761	554	0
	Jan	31	37	892	0
	Feb	34	38	823	0
	Mar	63	63	731	0
	Apr	62	45	530	0
	May	186	70	275	0
	Jun	208	62	220	0
1955	Jul	65	58	661	0
	Aug	142	152	783	0
	Sep	28	22	580	0
	Oct	25	24	729	0
	Nov	31	37	883	0
	Dec	35	45	929	0
	TOTAL	910	653	527	0
	Jan	40	48	867	0
	Feb	34	42	899	0
	Mar	75	59	577	0
	Apr	107	51	348	0
	May	241	79	241	0
	Jun	203	60	219	0
1956	Jul	31	31	723	0
	Aug	36	50	1037	0
	Sep	4	5	1041	0
	Oct	13	19	1088	0
	Nov	29	37	916	0
	Dec	25	33	978	0
	TOTAL	838	513	450	0

Table 14 – Colorado River Basin – Historical Flow and Quality of Water Data

SAN JUAN RIVER NEAR BLUFF, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	38	46	887	0
	Feb	64	64	738	0
	Mar	71	66	688	0
	Apr	177	94	389	0
	May	327	151	339	0
	Jun	787	205	191	0
1957	Jul	566	200	260	0
	Aug	364	234	474	0
	Sep	142	81	420	0
	Oct	150	122	600	0
	Nov	141	99	515	0
	Dec	88	69	575	0
	TOTAL	2915	1431	361	0
	Jan	53	52	721	0
	Feb	119	98	609	0
	Mar	159	124	573	0
	Apr	413	186	331	0
	May	743	177	175	0
	Jun	507	118	171	0
1958	Jul	74	44	439	0
	Aug	42	43	751	0
	Sep	61	55	663	0
	Oct	47	47	735	0
	Nov	43	50	850	0
	Dec	36	43	878	0
	TOTAL	2298	1038	332	0
	Jan	30	39	940	0
	Feb	31	39	931	0
	Mar	32	37	847	0
	Apr	39	34	656	0
	May	111	53	350	0
	Jun	156	59	281	0
1959	Jul	18	13	527	0
	Aug	64	74	848	0
	Sep	11	14	956	0
	Oct	92	79	630	0
	Nov	82	67	597	0
	Dec	46	46	734	0
	TOTAL	712	555	573	0
	Jan	37	43	866	0
	Feb	43	46	773	0
	Mar	260	186	526	0
	Apr	336	101	222	0
	May	285	92	238	0
	Jun	382	98	188	0
1960	Jul	92	45	360	0
	Aug	18	19	766	0
	Sep	17	20	867	0
	Oct	58	46	582	31
	Nov	40	40	737	30
	Dec	40	40	746	31
	TOTAL	1607	776	355	92

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	35	42	902	5
	Feb	41	50	904	2
	Mar	66	65	721	0
	Apr	157	85	399	1
	May	285	89	228	0
	Jun	227	68	220	1
1961	Jul	43	35	592	0
	Aug	87	92	775	1
	Sep	109	94	631	1
	Oct	98	74	553	2
	Nov	72	66	672	0
	Dec	44	47	788	22
	TOTAL	1264	806	469	35
	Jan	36	43	879	9
	Feb	94	89	703	6
	Mar	73	67	675	10
	Apr	315	123	287	14
	May	346	120	254	15
	Jun	297	109	269	15
1962	Jul	87	58	486	13
	Aug	23	30	928	23
	Sep	26	31	853	16
	Oct	104	103	727	20
	Nov	45	52	840	21
	Dec	33	42	929	26
	TOTAL	1480	865	430	188
	Jan	25	34	991	31
	Feb	39	47	880	19
	Mar	40	46	853	22
	Apr	64	55	631	23
	May	95	69	530	23
	Jun	47	45	711	23
1963	Jul	15	23	1168	22
	Aug	48	61	918	20
	Sep	70	69	727	14
	Oct	41	46	825	23
	Nov	47	51	795	23
	Dec	48	51	779	24
	TOTAL	579	596	757	267
	Jan	44	49	824	23
	Feb	30	37	923	17
	Mar	28	38	988	23
	Apr	30	38	948	21
	May	102	65	466	16
	Jun	121	78	473	17
1964	Jul	114	85	550	19
	Aug	132	117	652	16
	Sep	56	60	797	16
	Oct	37	44	885	22
	Nov	42	50	873	21
	Dec	60	63	774	17
	TOTAL	795	726	671	228

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	121	91	552	0
	Feb	120	80	492	0
	Mar	85	75	650	3
	Apr	165	99	440	3
	May	288	128	326	0
	Jun	419	148	259	0
1965	Jul	295	125	311	0
	Aug	218	138	465	0
	Sep	177	95	393	0
	Oct	190	111	427	0
	Nov	232	117	371	0
	Dec	235	125	392	0
	TOTAL	2546	1331	384	6
	Jan	198	100	373	0
	Feb	129	83	470	0
	Mar	199	134	493	0
	Apr	253	114	332	0
	May	267	109	300	0
	Jun	127	69	397	0
1966	Jul	54	53	731	0
	Aug	44	55	922	0
	Sep	43	51	881	0
	Oct	94	78	612	31
	Nov	70	64	669	30
	Dec	72	65	661	31
	TOTAL	1548	973	462	92
	Jan	58	58	729	31
	Feb	64	59	680	28
	Mar	79	71	654	31
	Apr	31	37	880	30
	May	78	65	618	31
	Jun	89	75	620	30
1967	Jul	39	43	809	31
	Aug	151	101	491	31
	Sep	93	75	587	30
	Oct	31	38	911	31
	Nov	38	43	843	30
	Dec	39	45	842	31
	TOTAL	791	710	660	365
	Jan	36	42	870	31
	Feb	54	54	737	29
	Mar	50	52	772	31
	Apr	83	72	633	30
	May	148	105	523	31
	Jun	241	143	437	30
1968	Jul	82	70	632	31
	Aug	176	112	468	31
	Sep	41	46	816	30
	Oct	56	52	676	31
	Nov	49	47	702	30
	Dec	45	44	719	31
	TOTAL	1060	838	582	366

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	83	68	605	31
	Feb	131	95	534	28
	Mar	143	104	533	31
	Apr	216	140	477	30
	May	271	167	453	31
	Jun	238	151	465	30
1969	Jul	202	134	486	31
	Aug	101	80	580	31
	Sep	118	88	553	30
	Oct	208	166	588	0
	Nov	118	72	450	0
	Dec	109	68	456	0
	TOTAL	1938	1333	506	273
	Jan	75	54	533	0
	Feb	130	60	342	0
	Mar	116	62	396	0
	Apr	49	44	662	2
	May	140	77	407	12
	Jun	138	68	360	4
1970	Jul	74	53	525	4
	Aug	66	66	739	5
	Sep	308	211	503	4
	Oct	142	84	435	5
	Nov	137	80	432	4
	Dec	149	80	396	4
	TOTAL	1523	940	454	44
	Jan	164	82	367	5
	Feb	144	71	364	4
	Mar	101	58	422	4
	Apr	69	50	531	5
	May	86	64	547	4
	Jun	123	62	373	4
1971	Jul	66	51	571	4
	Aug	108	128	873	4
	Sep	51	53	753	4
	Oct	100	99	732	5
	Nov	59	61	752	4
	Dec	110	81	540	4
	TOTAL	1182	860	535	51
	Jan	119	72	444	5
	Feb	110	66	444	4
	Mar	119	65	401	4
	Apr	65	44	499	5
	May	81	55	497	4
	Jun	118	71	443	4
1972	Jul	17	18	789	5
	Aug	31	41	984	4
	Sep	56	52	679	5
	Oct	339	298	645	4
	Nov	96	85	651	4
	Dec	100	74	542	6
	TOTAL	1251	941	553	54

Table 14 - Colorado River Basin - Historical Flow and Quality of Water Data

SAN JUAN RIVER NEAR BLUFF, UTAH

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	109	78	528	4
	Feb	178	125	516	4
	Mar	177	179	740	5
	Apr	261	225	635	4
	May	486	234	354	4
	Jun	464	198	315	6
1973	Jul	398	174	322	10
	Aug	222	111	368	6
	Sep	195	110	415	9
	Oct	133	81	450	13
	Nov	134	80	440	11
	Dec	141	83	434	11
	TOTAL	2897	1679	426	87
	Jan	133	76	420	4
	Feb	92	62	497	4
	Mar	103	91	650	5
	Apr	65	48	537	4
	May	106	58	403	4
	Jun	69	43	461	5
1974	Jul	39	39	734	4
	Aug	25	26	761	5
	Sep	25	25	742	4
	Oct	75	55	536	18
	Nov	70	72	749	5
	Dec	55	53	698	10
	TOTAL	859	648	555	72
	Jan	59	49	617	6
	Feb	50	49	708	7
	Mar	112	114	752	6
	Apr	159	100	462	5
	May	295	117	293	5
	Jun	397	120	223	5
1975	Jul	361	120	244	4
	Aug	147	71	356	5
	Sep	129	72	409	5
	Oct	107	61	422	4
	Nov	102	58	419	5
	Dec	88	51	426	7
	TOTAL	2006	983	360	64
	Jan	97	66	503	5
	Feb	81	60	541	19
	Mar	79	63	585	4
	Apr	53	41	567	5
	May	179	81	333	9
	Jun	180	92	377	11
1976	Jul	52	43	602	23
	Aug	48	38	588	17
	Sep	66	55	615	5
	Oct	51	45	648	9
	Nov	47	47	732	6
	Dec	82	58	516	31
	TOTAL	1014	688	499	144
	Jan	84	58	514	31
	Feb	55	46	611	17
	Mar	42	34	593	8
	Apr	24	23	721	7
	May	21	24	851	31
	Jun	33	30	668	30
1977	Jul	58	38	480	31
	Aug	81	52	470	31
	Sep	33	32	705	30
	Oct	39	38	713	31
	Nov	51	45	652	30
	Dec	49	44	672	31
	TOTAL	569	465	600	308
	Jan	58	50	638	31
	Feb	61	49	598	19
	Mar	101	74	538	31
	Apr	110	79	525	30
	May	155	101	477	31
	Jun	203	122	439	30
1978	Jul	63	52	614	31
	Aug	15	19	927	31
	Sep	30	29	722	30
	Oct	41	39	701	30
	Nov	78	60	566	30
	Dec	76	60	579	30
	TOTAL	991	734	545	354
	Jan	93	71	557	21
	Feb	133	110	611	9
	Mar	226	212	689	0
	Apr	573	335	429	0
	May	635	302	349	0
	Jun	615	226	270	5
1979	Jul	413	151	268	6
	Aug	142	93	481	24
	Sep	39	37	695	15
	Oct	63	51	593	23
	Nov	53	45	626	4
	Dec	126	80	468	21
	TOTAL	3112	1711	404	128
	Jan	149	98	486	22
	Feb	193	170	647	6
	Mar	221	207	687	4
	Apr	285	214	553	4
	May	370	179	356	6
	Jun	378	135	264	0
1980	Jul	123	71	424	15
	Aug	76	56	545	30
	Sep	106	71	493	29
	Oct	84	56	487	27
	Nov	104	63	443	0
	Dec	94	58	453	0
	TOTAL	2183	1378	464	143
	Jan	67	39	430	0
	Feb	61	39	472	0
	Mar	61	46	558	0
	Apr	39	34	648	0
	May	60	49	596	0
	Jun	109	83	562	5
1981	Jul	110	114	760	1
	Aug	53	42	583	0
	Sep	85	50	436	0
	Oct	114	70	450	2
	Nov	64	45	513	30
	Dec	61	43	527	31
	TOTAL	882	654	545	69
	Jan	65	46	516	31
	Feb	64	44	504	28
	Mar	90	58	469	31
	Apr	131	74	417	30
	May	220	109	365	31
	Jun	255	121	348	30
1982	Jul	139	78	413	31
	Aug	199	97	357	31
	Sep	160	85	393	30
	Oct	101	60	438	18
	Nov	93	61	484	0
	Dec	122	71	428	0
	TOTAL	1639	903	405	291
	Jan	144	76	386	6
	Feb	137	74	397	1
	Mar	240	124	380	0
	Apr	297	184	457	0
	May	329	145	323	11
	Jun	355	134	278	30
1983	Jul	262	117	329	4
	Aug	144	91	463	0
	Sep	70	45	469	0
	Oct	116	66	422	31
	Nov	83	53	475	30
	Dec	101	61	447	31
	TOTAL	2276	1170	378	144

Table 14

Colorado River Basin

Historical Flow and Quality of Water Data

SAN JUAN RIVER NEAR BLUFF, UTAH

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	4899	2755	.56	414	109	0.0	2.4	26.8
1942	2248	1169	.52	383	109	0.0	2.4	26.8
1943	1494	946	.63	466	108	0.0	1.5	26.3
1944	2291	1096	.48	352	108	0.0	1.8	24.6
1945	1588	925	.58	428	107	0.0	2.2	25.1
1946	887	680	.77	564	111	0.0	2.4	32.7
1947	1677	1087	.65	477	111	0.0	2.7	33.0
1948	2140	968	.45	333	112	0.0	2.3	34.1
1949	2487	1159	.47	343	110	0.0	2.6	26.7
1950	854	574	.67	494	105	0.0	2.3	25.6
1951	691	495	.72	527	102	0.0	2.4	26.2
1952	2554	1116	.44	321	95	0.0	1.8	28.0
1953	967	678	.70	515	109	2.8	2.1	34.4
1954	1011	761	.75	554	112	2.7	1.9	35.8
1955	910	653	.72	527	121	2.5	1.7	37.3
1956	838	513	.61	450	119	.8	1.7	34.3
1957	2915	1431	.49	361	100	1.0	2.0	33.9
1958	2298	1038	.45	332	80	1.2	2.0	31.2
1959	712	555	.78	573	68	0.0	5.3	35.3
1960	1607	776	.48	355	79	0.0	4.9	35.2
1961	1264	806	.64	469	91	30.8	4.8	34.4
1962	1480	865	.58	430	87	59.8	2.7	30.4
1963	579	596	1.03	757	86	80.2	3.0	30.6
1964	795	726	.91	671	91	45.1	2.8	28.3
1965	2546	1331	.52	385	123	13.8	3.2	25.9
1966	1548	973	.63	462	158	0.0	3.4	29.0
1967	791	710	.90	660	177	0.0	4.0	31.0
1968	1060	838	.79	582	179	0.0	4.0	32.4
1969	1938	1333	.69	506	133	1.5	4.5	35.6
1970	1523	940	.62	454	91	2.2	4.0	34.4
1971	1182	860	.73	535	42	4.8	4.1	32.6
1972	1251	941	.75	553	41	0.0	3.1	34.6
1973	2897	1679	.58	426	39	0.0	3.7	33.8
1974	859	648	.75	555	38	0.0	4.6	38.8
1975	2006	983	.49	360	34	0.0	5.6	22.1
1976	1014	688	.68	499	35	0.0	6.0	21.8
1977	569	465	.82	600	35	0.0	8.5	24.2
1978	991	734	.74	545	33	0.0	9.2	28.4
1979	3112	1711	.55	404	31	0.0	8.9	31.0
1980	2183	1378	.63	464	32	0.0	7.3	28.4
1981	882	654	.74	545	29	0.0	6.8	25.9
1982	1639	903	.55	405	30	0.0	7.5	22.7
1983	2276	1170	.51	378	39	0.0	7.0	23.1
Total	69454	41308						
Average	1615	961	.59	437				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 15 - Colorado River Basin - Historical Flow and Quality of Water Data

COLORADO RIVER AT LEES FERRY, ARIZONA

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	348	474	1002	*
	Feb	423	546	949	*
	Mar	669	749	823	*
	Apr	1091	862	581	*
	May	4974	2239	331	*
	Jun	4004	1522	280	*
1941	Jul	1666	850	375	*
	Aug	798	925	852	*
	Sep	608	821	993	*
	Oct	1797	1959	802	*
	Nov	903	849	691	*
	Dec	576	685	874	*
	TOTAL	17857	12481	514	0
	Jan	407	545	985	*
	Feb	396	507	941	*
	Mar	630	731	853	*
	Apr	2844	1564	404	*
	May	3209	1476	338	*
	Jun	4202	1219	213	*
1942	Jul	1317	751	419	*
	Aug	454	490	794	*
	Sep	275	438	1171	*
	Oct	334	487	1071	31
	Nov	368	561	1119	5
	Dec	357	535	1100	1
	TOTAL	14794	9303	462	37
	Jan	330	481	1074	3
	Feb	332	461	1020	2
	Mar	516	605	862	4
	Apr	1450	883	448	9
	May	2158	923	314	6
	Jun	2729	1079	291	3
1943	Jul	1429	699	360	7
	Aug	793	846	784	5
	Sep	447	484	795	6
	Oct	377	564	1098	8
	Nov	456	584	940	10
	Dec	395	532	991	4
	TOTAL	11413	8140	524	67
	Jan	279	424	1120	6
	Feb	344	464	992	13
	Mar	509	626	904	17
	Apr	1027	857	614	7
	May	3251	1459	330	2
	Jun	4136	1292	230	2
1944	Jul	1782	821	339	5
	Aug	417	447	788	3
	Sep	229	358	1151	9
	Oct	342	516	1110	17
	Nov	383	535	1026	16
	Dec	320	468	1075	14
	TOTAL	13018	8266	467	111
	Jan	325	472	1067	8
	Feb	351	477	998	6
	Mar	437	561	944	7
	Apr	755	735	716	4
	May	2805	1189	312	2
	Jun	2761	1047	279	5
1945	Jul	1668	814	359	4
	Aug	1011	941	684	1
	Sep	370	482	957	9
	Oct	505	746	1086	6
	Nov	443	604	1003	30
	Dec	336	547	1195	31
	TOTAL	11768	8616	538	113
	Jan	366	570	1144	31
	Feb	319	507	1169	28
	Mar	496	645	957	31
	Apr	1013	825	598	30
	May	1732	1066	452	31
	Jun	1993	1099	406	30
1946	Jul	730	750	755	31
	Aug	478	632	972	31
	Sep	310	519	1233	30
	Oct	403	512	936	31
	Nov	467	541	853	30
	Dec	445	537	889	31
	TOTAL	8751	8204	689	365
	Jan	277	427	1132	31
	Feb	357	459	946	28
	Mar	654	629	706	31
	Apr	780	686	647	30
	May	3121	1350	318	31
	Jun	3275	1381	310	30
1947	Jul	1926	1072	409	31
	Aug	1203	853	521	31
	Sep	584	602	758	30
	Oct	818	876	787	0
	Nov	585	621	780	0
	Dec	466	561	887	0
	TOTAL	14048	9516	498	273
	Jan	406	487	882	0
	Feb	458	540	867	0
	Mar	645	734	837	0
	Apr	1703	1099	475	0
	May	3507	1316	276	0
	Jun	3339	1142	252	0
1948	Jul	980	623	468	0
	Aug	531	627	868	0
	Sep	230	345	1103	0
	Oct	331	523	1164	0
	Nov	408	587	1059	0
	Dec	347	499	1059	0
	TOTAL	12884	8523	486	0
	Jan	337	469	1023	0
	Feb	361	449	916	0
	Mar	706	832	866	0
	Apr	1307	983	553	0
	May	3098	1325	315	0
	Jun	4419	1814	302	0
1949	Jul	2137	1096	377	0
	Aug	576	561	716	0
	Sep	313	468	1098	0
	Oct	509	753	1088	0
	Nov	473	619	963	0
	Dec	368	505	1010	0
	TOTAL	14605	9874	497	0
	Jan	350	496	1043	0
	Feb	399	491	905	0
	Mar	650	722	817	0
	Apr	1217	902	545	0
	May	1971	955	357	0
	Jun	2979	1106	273	0
1950	Jul	1377	916	489	0
	Aug	422	419	731	0
	Sep	330	478	1064	0
	Oct	342	483	1039	0
	Nov	350	532	1118	0
	Dec	415	550	974	0
	TOTAL	10800	8051	548	0
	Jan	315	456	1063	0
	Feb	361	457	932	0
	Mar	418	507	893	0
	Apr	531	539	746	0
	May	1645	937	419	0
	Jun	2886	1172	299	0
1951	Jul	1357	647	351	0
	Aug	787	855	799	0
	Sep	411	524	939	0
	Oct	412	595	1061	0
	Nov	445	620	1024	0
	Dec	333	478	1055	0
	TOTAL	9901	7787	578	0
	Jan	476	590	912	0
	Feb	379	484	939	0
	Mar	440	581	972	0
	Apr	2267	1666	541	0
	May	5081	2035	295	0
	Jun	5192	1850	262	0
1952	Jul	1573	876	409	0
	Aug	821	857	767	0
	Sep	542	690	936	0
	Oct	368	522	1041	0
	Nov	386	586	1114	0
	Dec	378	560	1088	0
	TOTAL	17904	11297	464	0
	Jan	394	544	1016	0
	Feb	365	479	964	0
	Mar	458	569	915	0
	Apr	529	577	802	0
	May	1047	728	511	0
	Jun	2992	1119	275	0
1953	Jul	950	606	469	0
	Aug	661	751	835	0
	Sep	258	397	1133	0
	Oct	321	555	1272	0
	Nov	414	617	1096	0
	Dec	341	508	1095	0
	TOTAL	8729	7451	628	0
	Jan	319	478	1104	0
	Feb	342	452	972	0
	Mar	393	495	927	0
	Apr	546	535	720	0
	May	1277	718	414	0
	Jun	792	486	451	0
1954	Jul	647	563	640	0
	Aug	321	373	855	0
	Sep	389	608	1150	0
	Oct	512	700	1005	0
	Nov	349	480	1011	0
	Dec	278	423	1117	0
	TOTAL	6165	6312	753	0
	Jan	244	394	1188	0
	Feb	243	343	1037	0
	Mar	580	744	944	0
	Apr	618	650	774	0
	May	1570	858	402	0
	Jun	1586	761	353	0
1955	Jul	571	386	497	0
	Aug	510	679	979	0
	Sep	230	345	1105	0
	Oct	214	355	1220	0
	Nov	276	448	1196	0
	Dec	326	466	1050	0
	TOTAL	6967	6430	679	0
	Jan	373	483	953	0
	Feb	280	394	1034	0
	Mar	511	589	847	0
	Apr	898	674	552	0
	May	2190	1027	345	0
	Jun	2594	979	278	0
1956	Jul	557	413	545	0
	Aug	356	461	953	0
	Sep	166	242	1070	0
	Oct	187	317	1250	0
	Nov	300	466	1141	0
	Dec	247	382	1137	0
	TOTAL	8658	6427	546	0

* See 'Notes' preceding Table 1.

Table 15 – Colorado River Basin – Historical Flow and Quality of Water Data

COLORADO RIVER AT LEES FERRY, ARIZONA

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	285	417	1078	0
	Feb	323	438	995	0
	Mar	499	613	904	0
	Apr	828	737	655	0
	May	2569	1400	401	0
	Jun	5645	2119	276	0
1957	Jul	4015	1717	315	0
	Aug	1604	1275	584	0
	Sep	822	943	844	0
	Oct	748	1097	1079	0
	Nov	848	1118	970	0
	Dec	517	653	930	0
	TOTAL	18702	12528	493	0
	Jan	397	522	966	0
	Feb	536	642	881	0
	Mar	696	771	815	0
	Apr	1574	1045	488	0
	May	3992	1780	328	0
	Jun	3678	1444	289	0
1958	Jul	628	467	546	0
	Aug	286	412	1058	0
	Sep	319	534	1229	0
	Oct	310	488	1156	0
	Nov	357	574	1182	0
	Dec	366	554	1112	0
	TOTAL	13140	9232	517	0
	Jan	315	474	1109	0
	Feb	315	435	1015	0
	Mar	344	473	1012	0
	Apr	420	483	846	0
	May	1025	704	505	0
	Jun	1836	847	339	0
1959	Jul	782	491	462	0
	Aug	425	588	1017	0
	Sep	246	398	1190	0
	Oct	502	685	1003	0
	Nov	499	597	878	0
	Dec	352	469	980	0
	TOTAL	7060	6644	692	0
	Jan	305	436	1052	0
	Feb	318	429	990	0
	Mar	745	899	887	0
	Apr	1610	997	455	0
	May	1564	781	367	0
	Jun	2239	945	310	0
1960	Jul	647	428	486	0
	Aug	208	276	975	0
	Sep	193	346	1318	0
	Oct	341	561	1210	3
	Nov	345	508	1081	6
	Dec	275	397	1062	12
	TOTAL	8790	7002	586	21
	Jan	266	415	1149	17
	Feb	331	466	1037	10
	Mar	362	500	1016	7
	Apr	567	581	753	2
	May	1153	704	449	3
	Jun	1588	764	354	3
1961	Jul	369	387	772	12
	Aug	337	541	1182	4
	Sep	711	1040	1076	6
	Oct	725	748	758	6
	Nov	527	573	800	12
	Dec	380	473	915	14
	TOTAL	7315	7193	723	96
	Jan	349	442	932	16
	Feb	791	831	773	6
	Mar	598	690	849	6
	Apr	2391	1762	542	7
	May	3633	1787	362	10
	Jun	2876	1584	405	14
1962	Jul	1717	1067	457	10
	Aug	469	459	720	1
	Sep	315	483	1128	1
	Oct	539	779	1063	5
	Nov	428	540	927	7
	Dec	333	449	993	12
	TOTAL	14439	10874	554	95
	Jan	169	259	1129	12
	Feb	369	490	976	4
	Mar	188	254	995	10
	Apr	60	86	1041	11
	May	62	79	940	14
	Jun	140	155	812	12
1963	Jul	90	86	705	13
	Aug	62	58	693	9
	Sep	60	53	648	13
	Oct	61	53	636	15
	Nov	60	55	683	21
	Dec	63	80	935	26
	TOTAL	1384	1708	908	160
	Jan	71	90	934	14
	Feb	231	307	978	11
	Mar	388	488	924	11
	Apr	771	951	907	9
	May	319	389	898	12
	Jun	60	75	920	16
1964	Jul	60	75	918	13
	Aug	174	213	897	5
	Sep	157	101	474	11
	Oct	269	166	456	18
	Nov	348	285	603	17
	Dec	398	385	711	20
	TOTAL	3243	3524	799	157
	Jan	558	531	700	13
	Feb	515	504	721	13
	Mar	556	540	714	10
	Apr	1222	1215	731	11
	May	2284	2125	684	20
	Jun	2323	1938	613	19
1965	Jul	727	336	340	12
	Aug	871	336	284	21
	Sep	750	297	291	28
	Oct	659	278	310	19
	Nov	589	272	339	20
	Dec	531	320	444	22
	TOTAL	11586	8693	552	208
	Jan	451	325	530	27
	Feb	483	361	549	15
	Mar	622	465	550	15
	Apr	825	627	558	2
	May	978	696	523	3
	Jun	754	505	493	3
1966	Jul	658	429	480	4
	Aug	682	432	466	2
	Sep	622	398	470	0
	Oct	552	353	470	5
	Nov	584	381	481	7
	Dec	529	363	505	5
	TOTAL	7739	5334	507	88
	Jan	614	464	556	2
	Feb	534	428	588	0
	Mar	690	605	645	0
	Apr	788	797	744	0
	May	879	806	675	1
	Jun	698	626	659	0
1967	Jul	641	519	596	2
	Aug	692	492	523	2
	Sep	596	433	534	8
	Oct	415	304	538	0
	Nov	460	352	564	8
	Dec	552	452	602	10
	TOTAL	7560	6279	611	33
	Jan	633	597	693	4
	Feb	464	454	720	4
	Mar	858	868	745	5
	Apr	968	1015	771	8
	May	943	963	751	9
	Jun	895	900	740	18
1968	Jul	827	677	602	14
	Aug	685	475	510	21
	Sep	635	445	516	14
	Oct	625	423	498	9
	Nov	634	433	502	16
	Dec	637	488	563	9
	TOTAL	8804	7740	646	131
	Jan	570	512	660	4
	Feb	461	429	684	1
	Mar	708	679	705	2
	Apr	871	853	721	5
	May	763	726	700	9
	Jun	875	785	659	6
1969	Jul	956	797	613	14
	Aug	930	670	530	16
	Sep	794	536	497	14
	Oct	630	455	531	7
	Nov	706	516	537	9
	Dec	815	594	536	14
	TOTAL	9078	7552	612	101
	Jan	706	570	594	5
	Feb	445	380	628	3
	Mar	486	446	675	1
	Apr	942	855	667	3
	May	900	801	655	5
	Jun	800	652	600	4
1970	Jul	769	615	588	3
	Aug	773	600	571	9
	Sep	701	524	549	3
	Oct	498	369	544	1
	Nov	449	346	566	0
	Dec	671	526	577	0
	TOTAL	8139	6683	604	37
	Jan	491	359	537	4
	Feb	416	341	602	5
	Mar	640	555	638	4
	Apr	1011	869	632	4
	May	926	770	612	6
	Jun	894	682	560	0
1971	Jul	943	712	556	2
	Aug	876	638	535	1
	Sep	776	514	487	0
	Oct	584	404	509	1
	Nov	764	527	507	2
	Dec	937	647	508	2
	TOTAL	9259	7019	557	31
	Jan	806	577	527	0
	Feb	444	321	531	0
	Mar	378	306	596	2
	Apr	782	654	615	2
	May	902	712	581	0
	Jun	863	653	557	2
1972	Jul	915	665	534	1
	Aug	1005	733	536	0
	Sep	931	647	511	0
	Oct	631	442	514	3
	Nov	671	480	526	11
	Dec	1017	771	558	3
	TOTAL	9345	6962	548	24

Missing EC estimated by interpolation after regulation of flow.

Table 15 – Colorado River Basin – Historical Flow and Quality of Water Data

COLORADO RIVER AT LEES FERRY, ARIZONA

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	1207	855	521	1
	Feb	764	550	530	3
	Mar	1095	873	586	0
	Apr	1678	1380	605	3
	May	648	532	604	0
	Jun	751	596	584	9
1973	Jul	656	526	590	6
	Aug	567	429	557	16
	Sep	424	322	558	4
	Oct	510	372	537	1
	Nov	412	301	537	7
	Dec	333	223	493	15
	TOTAL	9044	6961	566	65
	Jan	846	568	494	5
	Feb	299	198	487	2
	Mar	388	299	565	4
	Apr	495	397	590	7
	May	803	622	570	5
	Jun	914	673	542	4
1974	Jul	1226	886	531	5
	Aug	1213	865	524	3
	Sep	826	577	513	4
	Oct	602	413	505	6
	Nov	710	482	500	13
	Dec	564	374	488	9
	TOTAL	8888	6356	526	67
	Jan	768	526	504	10
	Feb	556	392	518	14
	Mar	508	382	553	9
	Apr	459	351	562	8
	May	892	694	572	10
	Jun	987	733	546	3
1975	Jul	1221	890	536	1
	Aug	1022	722	520	0
	Sep	966	689	524	2
	Oct	637	442	511	0
	Nov	425	303	524	0
	Dec	520	363	513	0
	TOTAL	8961	6486	532	57
	Jan	692	479	509	0
	Feb	742	556	551	2
	Mar	676	536	583	0
	Apr	660	523	583	0
	May	1046	801	563	0
	Jun	756	562	546	2
1976	Jul	766	555	533	3
	Aug	720	512	522	2
	Sep	842	596	521	1
	Oct	792	550	511	0
	Nov	898	625	512	1
	Dec	810	568	516	0
	TOTAL	9400	6863	537	11
	Jan	994	709	525	0
	Feb	471	358	559	1
	Mar	458	367	589	6
	Apr	164	130	584	0
	May	206	165	591	0
	Jun	466	361	570	0
1977	Jul	847	648	562	0
	Aug	1178	934	583	23
	Sep	977	743	559	6
	Oct	379	284	552	0
	Nov	390	293	552	0
	Dec	823	629	562	0
	TOTAL	7353	5623	562	36
	Jan	948	738	572	0
	Feb	601	466	570	0
	Mar	579	463	587	1
	Apr	492	409	611	4
	May	647	552	627	0
	Jun	758	639	620	25
1978	Jul	702	584	612	6
	Aug	1065	889	614	0
	Sep	969	800	608	17
	Oct	684	553	594	4
	Nov	671	525	576	14
	Dec	889	670	554	0
	TOTAL	9006	7288	595	71
	Jan	1018	742	536	0
	Feb	746	558	550	0
	Mar	204	164	589	0
	Apr	341	300	645	0
	May	517	439	624	0
	Jun	614	501	600	0
1979	Jul	860	687	588	0
	Aug	1064	817	565	0
	Sep	686	536	575	0
	Oct	618	476	567	0
	Nov	802	609	559	0
	Dec	637	457	527	0
	TOTAL	8109	6287	570	0
	Jan	604	436	531	16
	Feb	615	454	543	24
	Mar	606	489	593	0
	Apr	863	696	593	0
	May	845	665	578	0
	Jun	1472	1039	519	0
1980	Jul	1585	1082	502	12
	Aug	1279	870	500	7
	Sep	981	675	506	0
	Oct	777	529	501	0
	Nov	936	622	489	0
	Dec	765	497	478	0
	TOTAL	11329	8056	523	59
	Jan	745	500	493	0
	Feb	640	450	517	16
	Mar	463	347	552	7
	Apr	473	355	553	0
	May	553	420	559	0
	Jun	527	402	561	0
1981	Jul	846	625	543	0
	Aug	903	654	532	0
	Sep	667	465	512	0
	Oct	609	414	500	25
	Nov	585	413	519	30
	Dec	838	603	529	31
	TOTAL	7848	5647	529	109
	Jan	892	659	544	31
	Feb	677	514	559	28
	Mar	509	377	545	22
	Apr	614	485	581	27
	May	616	470	561	3
	Jun	634	498	578	3
1982	Jul	797	603	556	27
	Aug	917	688	552	2
	Sep	617	432	515	0
	Oct	792	575	533	31
	Nov	975	702	529	30
	Dec	976	668	503	31
	TOTAL	9017	6671	544	235
	Jan	914	616	496	31
	Feb	861	610	521	28
	Mar	661	491	547	14
	Apr	951	677	523	26
	May	1259	871	509	3
	Jun	3314	2222	493	22
1983	Jul	3370	2236	488	31
	Aug	1833	1263	507	31
	Sep	1585	1106	513	30
	Oct	1565	1073	504	31
	Nov	1423	981	507	30
	Dec	1473	1016	507	31
	TOTAL	19207	13162	504	308

Missing EC estimated by interpolation after regulation of flow.

Table 15

Colorado River Basin

Historical Flow and Quality of Water Data

COLORADO RIVER AT LEES FERRY, ARIZONA

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	17857	12481	.70	514	*			
1942	14794	9303	.63	462	*			
1943	11413	8140	.71	524	75	0.0	1.6	16.8
1944	13018	8266	.64	467	75	0.0	1.6	16.8
1945	11768	8616	.73	538	43	0.0	1.4	17.1
1946	8751	8204	.94	689	9	0.0	9.3	13.5
1947	14048	9516	.68	498	39	0.0	4.8	17.5
1948	12884	8523	.66	486	74	0.0	3.8	15.3
1949	14605	9874	.68	497	109	0.0	2.0	16.6
1950	10800	8051	.75	548	110	0.0	1.9	17.1
1951	9901	7787	.79	578	110	0.0	1.9	21.4
1952	17904	11297	.63	464	110	0.0	2.0	20.5
1953	8729	7451	.85	628	109	0.0	2.0	21.0
1954	6165	6312	1.02	753	110	.9	2.6	18.7
1955	6967	6430	.92	679	108	.9	2.6	19.3
1956	8658	6427	.74	546	98	1.0	3.4	19.8
1957	18702	12528	.67	493	92	2.2	3.7	28.2
1958	13140	9232	.70	517	81	27.2	4.7	28.9
1959	7060	6644	.94	692	77	51.9	4.0	31.8
1960	8790	7002	.80	586	83	84.3	3.4	30.9
1961	7315	7193	.98	723	93	86.0	3.6	30.6
1962	14439	10874	.75	554	92	85.9	3.7	36.6
1963	1384	1708	1.23	908	69	84.1	3.5	36.5
1964	3243	3524	1.09	799	53	52.8	3.0	40.0
1965	11586	8693	.75	552	44	25.0	3.2	32.1
1966	7739	5334	.69	507	42	0.0	2.6	27.0
1967	7560	6279	.83	611	36	0.C	1.5	20.2
1968	8804	7740	.88	646	40	0.0	1.9	15.1
1969	9078	7552	.83	612	52	0.0	2.0	12.9
1970	8139	6683	.82	604	54	0.0	2.4	11.2
1971	9259	7019	.76	557	50	0.0	2.2	9.0
1972	9345	6962	.75	548	38	0.0	2.4	6.6
1973	9044	6961	.77	566	40	0.0	2.6	7.0
1974	8888	6356	.72	526	39	0.0	3.0	7.2
1975	8961	6486	.72	532	39	0.0	3.4	7.1
1976	9400	6863	.73	537	34	0.0	3.5	7.0
1977	7353	5623	.76	562	34	0.0	3.7	8.2
1978	9006	7288	.81	595	34	0.0	3.3	6.9
1979	8109	6287	.78	570	35	0.0	3.6	6.9
1980	11329	8056	.71	523	35	0.0	3.8	6.6
1981	7848	5647	.72	529	29	0.0	4.4	7.9
1982	9017	6671	.74	544	23	0.0	5.1	8.1
1983	19207	13162	.69	504	28	0.0	5.0	8.3
Total	442007	331045						
Average	10279	7699	.75	551				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 16 – Colorado River Basin – Historical Flow and Quality of Water Data

COLORADO RIVER NEAR GRAND CANYON, ARIZONA

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	434	623	1057	1
	Feb	515	684	977	2
	Mar	838	965	847	4
	Apr	1209	1015	617	4
	May	4976	2446	362	2
	Jun	4100	1868	335	1
1941	Jul	1753	1073	450	12
	Aug	861	985	841	8
	Sep	659	878	980	5
	Oct	1904	2033	785	6
	Nov	953	950	733	19
	Dec	595	733	906	6
	TOTAL	18795	14252	558	70
	Jan	429	600	1028	7
	Feb	435	581	982	4
	Mar	653	809	911	6
	Apr	2763	1592	424	2
	May	3163	1505	350	2
	Jun	4241	1364	237	1
1942	Jul	1345	789	431	0
	Aug	486	536	811	0
	Sep	294	467	1169	1
	Oct	356	561	1159	0
	Nov	386	603	1148	14
	Dec	373	559	1103	31
	TOTAL	14925	9967	491	68
	Jan	347	539	1140	31
	Feb	351	515	1079	28
	Mar	579	696	883	31
	Apr	1417	1050	545	30
	May	2161	1319	449	31
	Jun	2676	1458	401	30
1943	Jul	1459	1072	540	31
	Aug	833	831	734	31
	Sep	494	592	881	17
	Oct	408	667	1200	0
	Nov	477	683	1053	0
	Dec	420	606	1061	0
	TOTAL	11623	10027	634	260
	Jan	298	469	1159	0
	Feb	363	524	1062	0
	Mar	551	789	1053	0
	Apr	1099	1052	704	0
	May	3206	1740	399	0
	Jun	4144	1684	299	0
1944	Jul	1854	968	384	0
	Aug	456	501	808	0
	Sep	251	405	1186	0
	Oct	361	631	1284	0
	Nov	401	653	1198	0
	Dec	345	540	1151	0
	TOTAL	13328	9954	549	0

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	356	557	1150	0
	Feb	381	558	1079	0
	Mar	472	664	1035	0
	Apr	804	774	708	0
	May	2803	1500	394	0
	Jun	2754	1338	357	0
1945	Jul	1732	956	406	0
	Aug	1071	1137	781	0
	Sep	393	531	992	0
	Oct	525	853	1195	0
	Nov	465	679	1073	0
	Dec	359	525	1076	0
	TOTAL	12114	10072	611	0
	Jan	384	548	1050	0
	Feb	333	470	1039	0
	Mar	514	667	954	0
	Apr	1016	958	693	0
	May	1775	968	401	0
	Jun	1995	1091	402	0
1946	Jul	784	623	584	0
	Aug	567	803	1041	0
	Sep	372	631	1247	0
	Oct	419	654	1148	0
	Nov	492	676	1010	0
	Dec	468	602	946	0
	TOTAL	9120	8692	701	0
	Jan	303	455	1105	0
	Feb	371	519	1029	0
	Mar	653	784	882	0
	Apr	785	710	665	0
	May	3088	1436	342	0
	Jun	3234	1551	353	0
1947	Jul	1953	953	359	0
	Aug	1329	1526	844	0
	Sep	640	790	907	0
	Oct	894	1065	876	0
	Nov	608	686	829	0
	Dec	490	633	950	0
	TOTAL	14349	11107	569	0
	Jan	427	557	958	0
	Feb	458	599	960	0
	Mar	669	820	901	0
	Apr	1732	1315	558	0
	May	3392	1504	326	0
	Jun	3358	1308	287	0
1948	Jul	1009	708	516	0
	Aug	587	761	953	0
	Sep	242	394	1196	0
	Oct	336	592	1294	0
	Nov	434	675	1143	0
	Dec	365	476	959	0
	TOTAL	13011	9707	549	0

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	363	543	1099	0
	Feb	374	513	1008	0
	Mar	796	944	872	0
	Apr	1337	1195	657	0
	May	2959	1432	356	0
	Jun	4303	2084	356	0
1949	Jul	2128	1212	419	0
	Aug	632	695	808	0
	Sep	340	557	1204	0
	Oct	521	796	1124	0
	Nov	488	660	995	0
	Dec	381	552	1066	0
	TOTAL	14621	11181	562	0
	Jan	358	562	1153	0
	Feb	414	567	1007	0
	Mar	670	821	901	0
	Apr	1192	997	615	0
	May	1941	1167	442	0
	Jun	2925	1395	351	0
1950	Jul	1401	1049	550	0
	Aug	444	500	829	0
	Sep	343	531	1139	0
	Oct	359	553	1133	0
	Nov	355	572	1185	0
	Dec	434	618	1047	0
	TOTAL	10836	9332	633	0
	Jan	326	506	1140	0
	Feb	366	511	1026	0
	Mar	429	566	970	0
	Apr	535	623	855	0
	May	1552	1027	487	0
	Jun	2800	1295	340	0
1951	Jul	1397	737	388	0
	Aug	833	915	808	0
	Sep	452	612	996	0
	Oct	425	653	1130	0
	Nov	466	698	1102	0
	Dec	353	535	1114	0
	TOTAL	9934	8678	642	0
	Jan	593	717	889	0
	Feb	396	531	986	0
	Mar	435	599	1013	0
	Apr	2209	1832	610	0
	May	5062	2570	373	0
	Jun	5203	2327	329	0
1952	Jul	1590	996	461	0
	Aug	833	949	838	0
	Sep	596	814	1005	0
	Oct	393	590	1105	0
	Nov	396	642	1190	0
	Dec	400	638	1173	0
	TOTAL	18107	13205	536	0

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	407	609	1098	0
	Feb	377	539	1051	0
	Mar	478	656	1010	0
	Apr	533	653	900	0
	May	989	857	638	0
	Jun	2932	1374	345	0
1953	Jul	980	746	560	0
	Aug	703	899	940	0
	Sep	290	494	1251	0
	Oct	325	601	1360	0
	Nov	428	689	1183	0
	Dec	359	565	1155	0
	TOTAL	8803	8683	725	0
	Jan	333	534	1179	0
	Feb	353	505	1053	0
	Mar	423	575	999	0
	Apr	566	635	825	0
	May	1211	826	501	0
	Jun	797	533	491	0
1954	Jul	668	622	685	0
	Aug	349	453	954	0
	Sep	415	669	1184	0
	Oct	526	764	1067	0
	Nov	360	520	1064	0
	Dec	296	469	1165	0
	TOTAL	6297	7104	829	0
	Jan	261	452	1273	0
	Feb	269	417	1140	0
	Mar	586	785	986	0
	Apr	621	719	851	0
	May	1515	909	441	0
	Jun	1596	855	394	0
1955	Jul	618	471	560	0
	Aug	668	898	988	0
	Sep	265	418	1162	0
	Oct	236	429	1335	0
	Nov	298	468	1156	0
	Dec	353	511	1062	0
	TOTAL	7286	7332	740	0
	Jan	398	546	1007	0
	Feb	310	407	965	0
	Mar	511	633	910	0
	Apr	878	715	599	0
	May	2126	1026	355	0
	Jun	2584	1121	319	0
1956	Jul	598	470	578	0
	Aug	383	487	935	0
	Sep	185	283	1124	0
	Oct	202	372	1353	0
	Nov	325	538	1216	0
	Dec	274	450	1207	0
	TOTAL	8774	7048	591	0

Table 16 – Colorado River Basin – Historical Flow and Quality of Water Data

COLORADO RIVER NEAR GRAND CANYON, ARIZONA

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	343	502	1078	0
	Feb	370	509	1010	0
	Mar	541	682	927	0
	Apr	812	774	701	0
	May	2501	1408	414	0
	Jun	5541	2255	299	0
1957	Jul	4033	1627	297	0
	Aug	1672	1550	682	0
	Sep	884	1014	843	0
	Oct	784	1150	1079	0
	Nov	892	1282	1057	0
	Dec	537	710	973	0
	TOTAL	18910	13463	523	0
	Jan	415	569	1008	0
	Feb	536	684	939	0
	Mar	749	859	844	0
	Apr	1580	1251	582	0
	May	3900	1759	332	0
	Jun	3763	1471	287	0
1958	Jul	683	604	649	3
	Aug	337	467	1019	31
	Sep	379	499	968	30
	Oct	346	482	1024	31
	Nov	385	510	974	30
	Dec	388	518	983	31
	TOTAL	13461	9672	528	156
	Jan	334	515	1133	7
	Feb	326	447	1010	28
	Mar	365	503	1014	27
	Apr	423	527	917	1
	May	1011	793	577	1
	Jun	1804	967	394	0
1959	Jul	795	543	502	0
	Aug	488	688	1038	4
	Sep	271	444	1205	7
	Oct	528	772	1074	0
	Nov	569	709	916	0
	Dec	394	540	1007	11
	TOTAL	7308	7448	749	86
	Jan	348	511	1080	9
	Feb	353	496	1032	11
	Mar	820	934	838	9
	Apr	1650	1052	469	14
	May	1580	960	447	15
	Jun	2212	1093	363	12
1960	Jul	678	582	631	13
	Aug	233	350	1107	7
	Sep	219	420	1413	3
	Oct	382	620	1194	10
	Nov	380	594	1150	1
	Dec	300	443	1085	12
	TOTAL	9155	8056	647	116
	Jan	291	472	1192	6
	Feb	353	508	1058	1
	Mar	379	561	1090	3
	Apr	587	642	804	3
	May	1147	789	505	3
	Jun	1692	828	360	3
1961	Jul	417	414	730	5
	Aug	374	624	1225	2
	Sep	748	1004	987	14
	Oct	772	770	734	31
	Nov	570	621	801	27
	Dec	409	519	933	8
	TOTAL	7740	7752	736	106
	Jan	369	501	999	4
	Feb	832	880	777	3
	Mar	610	735	885	4
	Apr	2467	1796	535	8
	May	3716	1902	376	12
	Jun	2850	1489	384	9
1962	Jul	1821	1112	449	8
	Aug	512	529	761	2
	Sep	318	487	1125	5
	Oct	557	838	1106	2
	Nov	443	570	946	4
	Dec	344	505	1080	3
	TOTAL	14840	11345	562	64
	Jan	182	325	1315	2
	Feb	374	494	972	2
	Mar	203	279	1009	4
	Apr	72	116	1193	4
	May	79	133	1243	24
	Jun	148	176	876	7
1963	Jul	108	135	922	8
	Aug	112	149	981	8
	Sep	122	171	1033	4
	Oct	77	111	1060	3
	Nov	76	110	1068	4
	Dec	77	131	1245	6
	TOTAL	1629	2331	1052	76
	Jan	79	134	1256	9
	Feb	245	353	1060	3
	Mar	382	535	1029	0
	Apr	796	999	923	4
	May	356	452	933	5
	Jun	77	132	1263	3
1964	Jul	84	147	1289	6
	Aug	287	380	976	2
	Sep	191	203	784	0
	Oct	299	238	585	4
	Nov	371	324	644	3
	Dec	413	389	693	17
	TOTAL	3578	4287	881	56
	Jan	608	583	705	8
	Feb	539	543	740	2
	Mar	568	596	771	3
	Apr	1251	1238	728	3
	May	2282	2145	691	3
	Jun	2282	1916	617	3
1965	Jul	724	433	439	3
	Aug	879	445	372	2
	Sep	767	387	371	2
	Oct	675	362	395	4
	Nov	612	381	457	9
	Dec	588	406	508	3
	TOTAL	11776	9435	589	45
	Jan	529	414	575	7
	Feb	524	427	600	11
	Mar	718	580	594	1
	Apr	865	693	589	6
	May	1011	781	568	5
	Jun	792	592	550	5
1966	Jul	698	525	553	9
	Aug	694	518	549	6
	Sep	623	466	550	7
	Oct	567	434	563	6
	Nov	589	450	562	9
	Dec	620	499	592	13
	TOTAL	8229	6379	570	85
	Jan	649	546	619	6
	Feb	564	490	639	8
	Mar	704	650	679	6
	Apr	801	805	739	9
	May	861	814	695	8
	Jun	711	661	683	9
1967	Jul	693	632	670	7
	Aug	786	653	611	9
	Sep	713	613	632	8
	Oct	459	405	648	10
	Nov	495	446	663	21
	Dec	597	545	671	11
	TOTAL	8032	7258	664	112
	Jan	658	659	736	7
	Feb	533	557	768	4
	Mar	900	915	748	7
	Apr	1078	1096	747	7
	May	976	1005	757	5
	Jun	925	930	739	12
1968	Jul	865	782	665	5
	Aug	775	648	614	4
	Sep	675	541	589	2
	Oct	647	506	575	2
	Nov	675	561	611	11
	Dec	665	615	681	28
	TOTAL	9372	8814	691	94
	Jan	628	614	719	9
	Feb	509	520	752	5
	Mar	727	731	740	10
	Apr	927	943	748	0
	May	798	795	732	6
	Jun	870	826	698	7
1969	Jul	994	900	666	13
	Aug	1002	868	637	13
	Sep	842	680	593	6
	Oct	662	548	609	5
	Nov	751	615	602	7
	Dec	832	676	598	4
	TOTAL	9542	8716	672	85
	Jan	768	691	662	3
	Feb	494	485	722	1
	Mar	510	515	743	4
	Apr	969	931	707	7
	May	946	902	701	2
	Jun	821	732	656	4
1970	Jul	814	710	641	2
	Aug	798	710	654	10
	Sep	756	644	627	0
	Oct	542	465	632	4
	Nov	483	399	607	0
	Dec	700	559	587	0
	TOTAL	8599	7744	662	37
	Jan	544	441	596	0
	Feb	430	384	657	0
	Mar	645	585	667	3
	Apr	1000	864	635	0
	May	933	780	615	0
	Jun	896	696	571	1
1971	Jul	933	710	560	2
	Aug	932	749	591	2
	Sep	821	623	558	1
	Oct	675	541	589	0
	Nov	786	603	564	1
	Dec	994	745	551	1
	TOTAL	9589	7720	592	11
	Jan	840	658	576	4
	Feb	471	392	612	10
	Mar	364	335	676	0
	Apr	793	684	633	5
	May	912	755	609	9
	Jun	890	719	594	1
1972	Jul	871	692	584	3
	Aug	996	781	576	1
	Sep	945	721	561	1
	Oct	917	743	596	0
	Nov	730	611	616	30
	Dec	1070	823	566	4
	TOTAL	9800	7913	594	68

Table 16 – Colorado River Basin – Historical Flow and Quality of Water Data

COLORADO RIVER NEAR GRAND CANYON, ARIZONA

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	1231	948	566	5
	Feb	839	681	597	11
	Mar	1205	998	609	0
	Apr	1916	1496	574	1
	May	846	660	574	2
	Jun	771	620	592	1
1973	Jul	671	541	594	1
	Aug	586	485	609	2
	Sep	449	379	620	1
	Oct	516	429	612	4
	Nov	445	373	617	0
	Dec	354	296	615	3
	TOTAL	9829	7907	592	31
	Jan	877	657	551	2
	Feb	326	277	625	17
	Mar	434	373	632	4
	Apr	507	428	621	30
	May	816	672	606	31
	Jun	932	762	601	30
1974	Jul	1235	996	593	31
	Aug	1229	991	593	31
	Sep	829	681	605	30
	Oct	609	495	598	31
	Nov	740	598	594	30
	Dec	582	474	599	31
	TOTAL	9115	7404	597	298
	Jan	803	648	593	31
	Feb	565	459	597	28
	Mar	548	446	599	31
	Apr	504	412	601	30
	May	914	736	592	31
	Jun	995	799	590	30
1975	Jul	1246	995	587	31
	Aug	1029	826	590	31
	Sep	992	796	590	30
	Oct	649	535	607	31
	Nov	441	371	619	30
	Dec	524	437	614	31
	TOTAL	9211	7460	596	365
	Jan	718	589	603	31
	Feb	767	623	597	29
	Mar	712	585	604	31
	Apr	694	569	603	30
	May	1079	860	586	31
	Jun	760	619	599	30
1976	Jul	807	657	599	31
	Aug	722	593	603	31
	Sep	862	697	594	30
	Oct	819	681	612	31
	Nov	903	745	607	30
	Dec	829	688	610	31
	TOTAL	9672	7905	601	366
	Jan	1018	835	603	31
	Feb	487	415	626	28
	Mar	492	418	625	31
	Apr	189	171	666	30
	May	220	197	659	31
	Jun	472	402	627	30
1977	Jul	888	735	608	31
	Aug	1245	1009	596	31
	Sep	976	801	604	30
	Oct	419	376	660	31
	Nov	387	349	663	30
	Dec	804	684	625	31
	TOTAL	7597	6393	619	365
	Jan	930	782	618	31
	Feb	592	513	637	28
	Mar	694	597	632	31
	Apr	481	428	654	30
	May	581	508	644	31
	Jun	766	653	627	30
1978	Jul	697	601	634	31
	Aug	1092	905	610	31
	Sep	1015	844	611	30
	Oct	707	601	625	31
	Nov	722	612	624	30
	Dec	1054	888	619	31
	TOTAL	9330	7932	625	365
	Jan	1057	891	620	31
	Feb	831	702	621	28
	Mar	318	275	635	31
	Apr	500	428	629	30
	May	602	514	627	31
	Jun	632	538	626	30
1979	Jul	858	726	623	31
	Aug	1079	909	620	31
	Sep	709	603	625	30
	Oct	619	513	610	31
	Nov	813	653	591	30
	Dec	679	557	603	31
	TOTAL	8696	7308	618	365
	Jan	600	497	609	31
	Feb	836	665	585	29
	Mar	671	553	606	31
	Apr	965	760	579	30
	May	888	708	587	31
	Jun	1463	1094	550	30
1980	Jul	1562	1168	550	31
	Aug	1324	1009	561	31
	Sep	1020	799	576	30
	Oct	765	600	577	31
	Nov	925	715	568	30
	Dec	748	587	577	31
	TOTAL	11766	9155	572	366
	Jan	717	565	580	31
	Feb	616	486	581	28
	Mar	477	387	596	31
	Apr	482	390	595	30
	May	543	437	591	31
	Jun	520	419	592	30
1981	Jul	843	657	573	31
	Aug	906	704	571	31
	Sep	682	538	580	30
	Oct	662	521	579	31
	Nov	596	471	582	30
	Dec	877	679	569	31
	TOTAL	7921	6254	581	365
	Jan	920	710	567	31
	Feb	736	570	570	28
	Mar	587	466	583	31
	Apr	659	518	579	30
	May	643	507	580	31
	Jun	647	510	579	30
1982	Jul	826	642	572	31
	Aug	965	743	566	31
	Sep	671	527	578	30
	Oct	752	583	570	31
	Nov	942	716	559	30
	Dec	988	750	558	31
	TOTAL	9335	7242	570	365
	Jan	907	692	561	31
	Feb	890	674	557	28
	Mar	758	587	570	31
	Apr	984	743	555	27
	May	1312	972	545	27
	Jun	3327	2272	502	30
1983	Jul	3413	2331	502	27
	Aug	1806	1251	510	1
	Sep	1563	1116	525	0
	Oct	1618	1108	503	0
	Nov	1445	1058	538	29
	Dec	1488	1093	540	31
	TOTAL	19509	13898	524	262

Table 16

Colorado River Basin

Historical Flow and Quality of Water Data

COLORADO RIVER NEAR GRAND CANYON, ARIZONA

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	18795	14252	.76	558	75	0.0	1.8	20.8
1942	14925	9967	.67	491	75	0.0	1.8	20.8
1943	11623	10027	.86	634	74	0.0	3.9	19.0
1944	13328	9954	.75	549	72	0.0	3.9	14.1
1945	12114	10072	.83	611	99	0.0	3.9	15.7
1946	9120	8692	.95	701	100	0.0	2.6	16.8
1947	14349	11107	.77	569	104	0.0	2.8	17.9
1948	13011	9707	.75	549	106	0.0	2.6	16.6
1949	14621	11181	.76	562	106	0.0	2.6	15.4
1950	10836	9332	.86	633	106	.9	3.0	15.0
1951	9934	8678	.87	642	107	.9	3.0	15.7
1952	18107	13205	.73	536	107	.9	2.6	15.3
1953	8803	8683	.99	725	107	0.0	2.4	16.7
1954	6297	7104	1.13	829	109	0.0	2.3	19.3
1955	7286	7332	1.01	740	99	0.0	2.3	20.1
1956	8774	7048	.80	591	82	0.0	3.0	25.5
1957	18910	13463	.71	524	70	0.0	3.3	32.2
1958	13461	9672	.72	528	61	24.6	4.3	33.1
1959	7308	7448	1.02	749	67	53.7	4.1	35.0
1960	9155	8055	.88	647	74	86.5	4.3	33.3
1961	7740	7752	1.00	737	85	85.9	4.2	31.3
1962	14840	11345	.76	562	101	88.1	3.6	32.0
1963	1629	2331	1.43	1052	93	87.1	3.5	26.6
1964	3578	4287	1.20	881	84	67.9	3.9	28.2
1965	11776	9435	.80	589	56	35.7	2.9	27.5
1966	8229	6379	.78	570	48	0.0	2.0	22.7
1967	8033	7258	.90	664	45	0.0	2.9	19.1
1968	9372	8814	.94	692	44	0.0	3.4	13.9
1969	9542	8716	.91	672	47	0.0	3.6	14.1
1970	8599	7744	.90	662	41	0.0	2.8	13.3
1971	9589	7720	.81	592	40	0.0	2.6	12.2
1972	9800	7913	.81	594	32	0.0	3.1	8.1
1973	9829	7907	.80	592	33	0.0	2.4	7.8
1974	9115	7404	.81	597	34	0.0	3.3	7.9
1975	9211	7460	.81	596	35	0.0	4.4	6.9
1976	9672	7905	.82	601	35	0.0	5.3	9.6
1977	7597	6393	.84	619	32	3.1	5.3	10.2
1978	9330	7932	.85	625	26	3.8	5.4	9.1
1979	8696	7308	.84	618	22	4.5	6.0	7.5
1980	11766	9155	.78	572	17	0.0	5.2	8.0
1981	7921	6254	.79	581	12	0.0	4.0	7.5
1982	9335	7242	.78	570	10	0.0	4.3	5.5
1983	19509	13898	.71	524	13	0.0	4.1	6.5
Total	455463	373532						
Average	10592	8687	.82	603				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 17 – Colorado River Basin – Historical Flow and Quality of Water Data

VIRGIN RIVER AT LITTLEFIELD, ARIZONA

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	15	35	1716	*
	Feb	31	61	1447	*
	Mar	62	51	605	*
	Apr	62	52	617	*
	May	131	60	337	*
	Jun	19	34	1316	*
1941	Jul	22	54	1805	*
	Aug	20	62	2279	*
	Sep	6	18	2206	*
	Oct	23	74	2366	*
	Nov	19	43	1664	*
	Dec	17	39	1687	*
	TOTAL	427	583	1004	0
	Jan	20	44	1618	*
	Feb	16	35	1608	*
	Mar	20	38	1397	*
	Apr	50	51	750	*
	May	28	44	1156	*
	Jun	5	16	2353	*
1942	Jul	4	14	2574	*
	Aug	9	29	2369	*
	Sep	4	13	2390	*
	Oct	9	31	2533	*
	Nov	10	29	2132	*
	Dec	11	31	2072	*
	TOTAL	186	375	1482	0
	Jan	18	42	1716	*
	Feb	21	45	1576	*
	Mar	36	47	960	*
	Apr	34	46	995	*
	May	11	26	1738	*
	Jun	4	13	2390	*
1943	Jul	4	14	2574	*
	Aug	13	42	2376	*
	Sep	6	20	2451	*
	Oct	9	30	2451	*
	Nov	10	28	2059	*
	Dec	13	32	1810	*
	TOTAL	179	385	1581	0
	Jan	13	33	1867	*
	Feb	15	35	1716	*
	Mar	26	42	1188	*
	Apr	25	42	1235	*
	May	49	51	765	*
	Jun	11	25	1671	*
1944	Jul	4	13	2390	*
	Aug	4	13	2390	*
	Sep	4	14	2574	*
	Oct	5	16	2353	*
	Nov	13	32	1810	*
	Dec	12	31	1900	*
	TOTAL	181	347	1410	0
	Jan	11	30	2005	*
	Feb	17	38	1644	*
	Mar	20	38	1397	*
	Apr	20	36	1324	*
	May	25	39	1147	*
	Jun	5	15	2206	*
1945	Jul	5	15	2206	*
	Aug	26	79	2234	*
	Sep	8	25	2298	*
	Oct	20	62	2279	*
	Nov	10	29	2132	*
	Dec	14	35	1838	*
	TOTAL	181	441	1792	0
	Jan	13	32	1810	*
	Feb	10	27	1985	*
	Mar	10	28	2059	*
	Apr	12	29	1777	*
	May	5	15	2206	*
	Jun	4	13	2390	*
1946	Jul	6	21	2574	*
	Aug	13	42	2376	*
	Sep	4	13	2390	*
	Oct	37	81	1610	*
	Nov	33	61	1359	*
	Dec	22	47	1571	*
	TOTAL	169	409	1779	0
	Jan	15	35	1716	*
	Feb	12	30	1838	*
	Mar	13	31	1753	*
	Apr	16	34	1563	*
	May	17	33	1427	*
	Jun	4	14	2574	*
1947	Jul	5	16	2353	*
	Aug	14	41	2153	*
	Sep	4	14	2574	*
	Oct	8	22	2002	31
	Nov	9	25	1963	30
	Dec	14	33	1745	31
	TOTAL	131	327	1836	92
	Jan	11	27	1906	31
	Feb	12	30	1787	29
	Mar	13	31	1793	31
	Apr	20	41	1521	30
	May	10	26	1863	31
	Jun	4	14	2533	30
1948	Jul	4	15	2529	31
	Aug	5	17	2329	31
	Sep	6	17	2162	30
	Oct	6	18	2251	31
	Nov	9	25	1951	30
	Dec	10	26	1936	31
	TOTAL	111	288	1913	366
	Jan	13	31	1802	31
	Feb	14	32	1657	28
	Mar	18	39	1622	31
	Apr	30	56	1339	30
	May	28	53	1380	31
	Jun	12	27	1698	30
1949	Jul	5	15	2461	31
	Aug	4	14	2587	31
	Sep	7	19	2026	30
	Oct	9	24	2033	31
	Nov	11	28	1880	30
	Dec	13	33	1793	31
	TOTAL	163	370	1667	365
	Jan	15	35	1747	31
	Feb	16	36	1652	28
	Mar	14	33	1766	31
	Apr	15	36	1710	30
	May	7	19	2182	31
	Jun	4	14	2538	30
1950	Jul	12	27	1670	31
	Aug	6	17	2214	31
	Sep	6	17	2136	30
	Oct	5	16	2443	31
	Nov	9	24	2009	30
	Dec	10	27	1952	31
	TOTAL	118	302	1883	365
	Jan	11	29	1909	31
	Feb	8	22	2057	28
	Mar	8	23	2075	31
	Apr	7	20	2070	30
	May	10	26	1923	31
	Jun	4	13	2626	30
1951	Jul	6	17	2165	31
	Aug	17	30	1313	31
	Sep	6	18	2146	30
	Oct	7	21	2214	31
	Nov	9	25	2077	30
	Dec	20	43	1544	31
	TOTAL	112	285	1869	365
	Jan	21	48	1682	31
	Feb	11	29	1956	29
	Mar	27	59	1572	31
	Apr	80	131	1213	30
	May	71	120	1239	31
	Jun	12	29	1789	30
1952	Jul	4	14	2481	31
	Aug	5	17	2354	31
	Sep	6	17	2231	30
	Oct	6	18	2332	31
	Nov	10	27	1957	30
	Dec	14	34	1818	31
	TOTAL	267	544	1498	366
	Jan	13	33	1824	31
	Feb	9	24	1991	28
	Mar	7	21	2164	31
	Apr	6	19	2277	30
	May	5	16	2479	31
	Jun	4	14	2577	30
1953	Jul	8	22	1979	31
	Aug	13	28	1578	31
	Sep	4	14	2591	30
	Oct	7	21	2169	31
	Nov	9	27	2093	30
	Dec	11	31	2043	31
	TOTAL	98	271	2044	365
	Jan	15	38	1874	31
	Feb	12	33	1944	28
	Mar	17	41	1797	31
	Apr	23	55	1734	30
	May	10	27	2036	31
	Jun	5	17	2241	30
1954	Jul	8	21	2094	31
	Aug	10	25	1879	31
	Sep	9	23	1884	30
	Oct	9	24	2076	31
	Nov	9	27	2114	30
	Dec	13	35	1977	31
	TOTAL	140	366	1924	365
	Jan	12	33	2035	31
	Feb	12	32	1961	28
	Mar	11	30	2073	31
	Apr	6	19	2294	30
	May	5	17	2369	31
	Jun	4	13	2486	30
1955	Jul	10	26	1873	31
	Aug	40	76	1394	31
	Sep	4	15	2427	30
	Oct	5	17	2329	31
	Nov	10	30	2157	30
	Dec	13	38	2119	31
	TOTAL	133	346	1906	365
	Jan	15	42	2046	31
	Feb	11	33	2139	29
	Mar	8	24	2241	31
	Apr	6	18	2307	30
	May	5	15	2378	31
	Jun	4	14	2338	30
1956	Jul	8	22	2168	31
	Aug	4	13	2402	31
	Sep	4	12	2433	30
	Oct	4	14	2473	31
	Nov	6	19	2294	30
	Dec	8	23	2223	31
	TOTAL	82	248	2232	366

* See 'Notes' preceding Table 1.

Table 17 – Colorado River Basin – Historical Flow and Quality of Water Data

VIRGIN RIVER AT LITTLEFIELD, ARIZONA

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	12	33	2027	31
	Feb	14	36	1934	28
	Mar	10	28	2094	31
	Apr	6	19	2270	30
	May	15	40	1939	31
	Jun	9	24	2032	30
1957	Jul	4	14	2483	31
	Aug	9	24	1951	31
	Sep	4	13	2512	30
	Oct	15	35	1771	31
	Nov	21	47	1670	30
	Dec	15	38	1822	31
	TOTAL	133	351	1939	365
	Jan	10	27	2025	31
	Feb	19	44	1723	28
	Mar	41	83	1484	31
	Apr	64	123	1421	30
	May	70	133	1402	31
	Jun	7	20	2064	30
1958	Jul	6	17	2092	31
	Aug	5	16	2227	31
	Sep	22	48	1586	30
	Oct	8	21	2088	31
	Nov	11	30	2036	30
	Dec	10	27	2066	31
	TOTAL	272	590	1596	365
	Jan	10	29	2052	31
	Feb	13	36	1980	28
	Mar	9	26	2069	31
	Apr	4	13	2217	30
	May	4	12	2245	31
	Jun	4	11	2264	30
1959	Jul	4	12	2255	31
	Aug	12	31	1928	31
	Sep	4	12	2235	30
	Oct	5	14	2214	31
	Nov	12	35	2045	30
	Dec	9	25	2129	31
	TOTAL	91	257	2084	365
	Jan	11	32	2098	31
	Feb	10	29	2104	29
	Mar	10	28	2116	31
	Apr	6	17	2170	30
	May	5	14	2208	31
	Jun	3	10	2259	30
1960	Jul	4	11	2251	31
	Aug	4	11	2254	31
	Sep	6	16	2147	30
	Oct	6	18	2133	31
	Nov	13	28	1646	30
	Dec	8	22	2026	31
	TOTAL	84	237	2063	366
	Jan	8	21	2048	31
	Feb	7	20	2024	28
	Mar	8	22	2020	31
	Apr	4	14	2379	30
	May	4	13	2525	31
	Jun	4	13	2496	30
1961	Jul	8	21	1854	31
	Aug	17	33	1457	31
	Sep	22	35	1171	30
	Oct	6	17	2206	31
	Nov	8	20	1974	30
	Dec	13	30	1708	31
	TOTAL	108	259	1769	365
	Jan	10	26	1835	31
	Feb	30	49	1180	28
	Mar	17	36	1580	31
	Apr	33	57	1274	30
	May	9	22	1856	31
	Jun	3	12	2502	30
1962	Jul	4	13	2452	31
	Aug	3	12	2563	31
	Sep	7	17	1705	30
	Oct	6	19	2112	31
	Nov	6	18	2142	30
	Dec	7	21	2043	31
	TOTAL	137	299	1608	365
	Jan	9	23	1919	31
	Feb	9	22	1848	28
	Mar	6	18	2165	31
	Apr	4	14	2412	30
	May	4	13	2500	31
	Jun	3	11	2678	30
1963	Jul	3	12	2640	31
	Aug	11	24	1621	31
	Sep	14	26	1420	30
	Oct	5	16	2186	31
	Nov	9	23	1775	30
	Dec	7	19	2098	31
	TOTAL	85	223	1934	365
	Jan	7	19	2108	31
	Feb	8	20	1987	29
	Mar	7	19	2108	31
	Apr	13	28	1654	30
	May	11	26	1736	31
	Jun	3	10	2764	30
1964	Jul	4	13	2459	31
	Aug	14	26	1383	31
	Sep	3	11	2652	30
	Oct	3	11	2469	0
	Nov	7	21	2327	0
	Dec	9	25	2141	0
	TOTAL	86	230	1958	274
	Jan	9	25	2087	0
	Feb	8	22	2082	1
	Mar	8	21	1980	4
	Apr	30	45	1078	3
	May	24	35	1062	1
	Jun	9	19	1535	1
1965	Jul	3	11	2560	2
	Aug	5	17	2602	1
	Sep	6	18	2056	0
	Oct	6	20	2506	0
	Nov	21	40	1425	1
	Dec	26	45	1275	1
	TOTAL	154	316	1506	15
	Jan	13	31	1754	0
	Feb	11	28	1844	1
	Mar	15	29	1459	0
	Apr	17	28	1244	0
	May	6	17	1979	0
	Jun	3	11	2471	0
1966	Jul	4	12	2380	1
	Aug	3	11	2596	1
	Sep	4	14	2573	0
	Oct	6	20	2334	0
	Nov	9	25	2082	1
	Dec	77	144	1378	0
	TOTAL	168	371	1623	4
	Jan	13	34	1973	1
	Feb	9	25	1976	1
	Mar	10	30	2094	1
	Apr	11	29	1889	1
	May	20	36	1341	2
	Jun	7	18	1952	0
1967	Jul	4	14	2467	1
	Aug	8	23	2266	2
	Sep	14	38	2032	2
	Oct	7	22	2389	0
	Nov	9	25	2049	2
	Dec	13	34	1916	0
	TOTAL	124	328	1938	13
	Jan	13	32	1869	0
	Feb	15	32	1597	0
	Mar	12	27	1582	0
	Apr	15	30	1477	1
	May	17	30	1305	0
	Jun	5	15	2266	0
1968	Jul	6	18	2365	2
	Aug	15	43	2181	1
	Sep	3	12	2531	0
	Oct	6	20	2504	2
	Nov	7	23	2328	0
	Dec	10	29	2077	2
	TOTAL	123	311	1852	8
	Jan	48	73	1131	1
	Feb	34	56	1206	3
	Mar	39	57	1063	0
	Apr	82	66	590	0
	May	84	62	547	4
	Jun	14	25	1361	1
1969	Jul	6	17	2151	4
	Aug	4	14	2391	2
	Sep	9	29	2399	1
	Oct	8	23	2202	0
	Nov	12	29	1831	1
	Dec	12	29	1786	4
	TOTAL	351	481	1007	21
	Jan	13	31	1768	1
	Feb	9	22	1906	0
	Mar	13	29	1655	0
	Apr	4	13	2376	1
	May	5	15	2315	0
	Jun	4	12	2368	0
1970	Jul	6	19	2274	0
	Aug	7	21	2103	0
	Sep	5	16	2336	1
	Oct	5	16	2507	0
	Nov	11	27	1873	3
	Dec	11	25	1696	2
	TOTAL	92	247	1978	8
	Jan	10	24	1701	0
	Feb	9	22	1718	1
	Mar	9	21	1835	0
	Apr	5	15	2181	3
	May	9	19	1621	2
	Jun	4	12	2309	0
1971	Jul	4	13	2336	0
	Aug	19	50	1943	2
	Sep	5	16	2362	0
	Oct	9	28	2232	0
	Nov	10	27	2060	0
	Dec	21	41	1438	0
	TOTAL	114	288	1865	8
	Jan	11	28	1954	0
	Feb	9	24	1961	0
	Mar	6	17	2238	0
	Apr	4	12	2393	1
	May	4	12	2395	0
	Jun	15	49	2384	1
1972	Jul	4	13	2376	1
	Aug	11	24	1584	31
	Sep	24	33	1021	30
	Oct	17	47	1962	0
	Nov	13	30	1775	0
	Dec	12	31	1990	0
	TOTAL	128	321	1837	64

Table 17 – Colorado River Basin – Historical Flow and Quality of Water Data

VIRGIN RIVER AT LITTLEFIELD, ARIZONA

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	11	30	1932	0
	Feb	14	32	1666	0
	Mar	34	58	1255	1
	Apr	67	82	895	0
	May	117	97	612	0
	Jun	24	34	1057	1
1973	Jul	5	16	2422	3
	Aug	5	17	2525	1
	Sep	3	11	2443	0
	Oct	5	17	2353	0
	Nov	11	29	2004	0
	Dec	11	29	1899	3
	TOTAL	306	450	1080	9
	Jan	14	30	1548	4
	Feb	9	23	1894	0
	Mar	10	24	1812	0
	Apr	6	17	2254	0
	May	4	13	2422	0
	Jun	4	12	2417	0
1974	Jul	5	15	2429	0
	Aug	5	17	2516	0
	Sep	7	26	2513	0
	Oct	9	24	1923	0
	Nov	11	28	1841	0
	Dec	9	24	1997	0
	TOTAL	93	254	2015	4
	Jan	9	24	2062	0
	Feb	9	23	1923	0
	Mar	13	29	1681	0
	Apr	7	19	1891	0
	May	15	30	1458	0
	Jun	5	16	2175	0
1975	Jul	9	21	1749	0
	Aug	11	27	1756	0
	Sep	4	13	2480	0
	Oct	6	19	2413	0
	Nov	7	20	2256	0
	Dec	8	18	1606	0
	TOTAL	103	259	1858	0
	Jan	10	25	1907	0
	Feb	17	37	1597	0
	Mar	7	19	1975	0
	Apr	8	20	1849	1
	May	9	22	1808	0
	Jun	4	13	2498	0
1976	Jul	5	17	2474	0
	Aug	5	16	2539	1
	Sep	7	22	2418	0
	Oct	13	39	2201	0
	Nov	7	21	2295	0
	Dec	7	22	2269	0
	TOTAL	97	271	2052	2
	Jan	9	24	2023	0
	Feb	7	19	2111	0
	Mar	5	17	2421	0
	Apr	4	13	2483	0
	May	6	17	2027	0
	Jun	6	20	2435	0
1977	Jul	7	23	2401	0
	Aug	7	22	2357	0
	Sep	4	14	2465	0
	Oct	4	15	2505	0
	Nov	6	20	2368	0
	Dec	8	23	2214	0
	TOTAL	73	228	2290	0
	Jan	15	32	1542	0
	Feb	22	40	1378	0
	Mar	105	119	834	0
	Apr	50	55	799	0
	May	29	30	748	0
	Jun	5	13	1823	0
1978	Jul	4	14	2484	0
	Aug	4	14	2586	0
	Sep	4	13	2544	0
	Oct	5	17	2437	0
	Nov	12	29	1732	0
	Dec	14	31	1629	0
	TOTAL	270	405	1106	0
	Jan	12	30	1770	0
	Feb	18	37	1516	0
	Mar	37	51	1011	31
	Apr	75	77	756	0
	May	96	70	540	0
	Jun	23	39	1242	0
1979	Jul	4	14	2442	0
	Aug	8	23	2145	0
	Sep	4	13	2439	0
	Oct	6	18	2380	0
	Nov	10	28	2046	0
	Dec	12	32	1952	0
	TOTAL	305	433	1042	31
	Jan	37	51	1020	0
	Feb	134	157	862	0
	Mar	43	68	1172	0
	Apr	56	61	804	0
	May	91	71	575	0
	Jun	27	38	1032	0
1980	Jul	9	22	1862	0
	Aug	7	18	2069	0
	Sep	19	57	2209	0
	Oct	14	37	1944	0
	Nov	16	39	1787	0
	Dec	17	37	1640	0
	TOTAL	469	658	1031	0
	Jan	14	34	1799	0
	Feb	14	32	1720	0
	Mar	21	40	1437	0
	Apr	25	46	1357	0
	May	13	34	1884	0
	Jun	6	18	2115	0
1981	Jul	8	26	2323	0
	Aug	10	29	2202	0
	Sep	7	21	2247	0
	Oct	11	33	2104	0
	Nov	11	29	1901	0
	Dec	12	31	1857	0
	TOTAL	152	371	1799	0
	Jan	14	34	1760	0
	Feb	14	32	1705	0
	Mar	22	41	1354	0
	Apr	21	46	1607	0
	May	22	39	1317	0
	Jun	6	18	2322	0
1982	Jul	6	21	2635	0
	Aug	14	37	1895	0
	Sep	11	33	2185	0
	Oct	12	35	2117	0
	Nov	17	37	1576	0
	Dec	31	61	1447	0
	TOTAL	191	435	1675	0
	Jan	18	39	1594	1
	Feb	19	38	1435	1
	Mar	101	114	832	2
	Apr	68	85	928	18
	May	120	80	487	1
	Jun	67	64	709	16
1983	Jul	16	42	1896	0
	Aug	24	42	1303	31
	Sep	11	26	1690	30
	Oct	19	38	1484	31
	Nov	19	39	1480	30
	Dec	31	52	1242	18
	TOTAL	513	659	945	179

Table 17

Colorado River Basin

Historical Flow and Quality of Water Data

VIRGIN RIVER AT LITTLEFIELD, ARIZONA

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	427	583	1.37	1004	*			
1942	186	375	2.02	1482	*			
1943	179	385	2.15	1582	*			
1944	181	347	1.92	1410	*			
1945	181	441	2.44	1792	*			
1946	169	409	2.42	1780	*			
1947	131	327	2.50	1836	*			
1948	111	288	2.60	1913	29	0.0	1.6	13.8
1949	163	370	2.27	1667	29	0.0	1.6	13.8
1950	118	302	2.56	1883	41	0.0	2.1	12.3
1951	112	285	2.54	1869	38	0.0	2.2	12.6
1952	267	544	2.04	1498	30	0.0	2.5	6.2
1953	98	271	2.78	2044	52	1.3	3.1	14.4
1954	140	366	2.62	1924	89	1.1	3.4	17.3
1955	133	346	2.59	1906	106	.9	3.3	16.2
1956	82	248	3.04	2232	72	0.0	3.2	13.4
1957	133	351	2.64	1939	35	0.0	1.9	7.6
1958	272	590	2.17	1596	13	0.0	1.5	8.9
1959	91	257	2.83	2084	29	0.0	3.2	17.8
1960	84	237	2.81	2063	42	0.0	2.9	15.9
1961	108	259	2.41	1769	57	43.9	3.9	23.0
1962	137	299	2.19	1609	67	76.1	4.1	26.2
1963	85	223	2.63	1934	74	94.6	5.0	26.5
1964	86	230	2.66	1958	69	98.6	4.9	26.3
1965	154	316	2.05	1506	94	92.6	6.4	20.6
1966	168	371	2.21	1623	126	89.7	6.1	23.6
1967	124	328	2.64	1938	145	82.1	6.0	23.5
1968	123	311	2.52	1852	130	80.0	4.5	26.2
1969	351	481	1.37	1007	90	65.6	4.3	22.6
1970	92	247	2.69	1978	57	52.6	4.4	20.3
1971	114	288	2.54	1865	30	0.0	3.4	7.1
1972	128	321	2.50	1837	31	0.0	5.3	23.9
1973	306	450	1.47	1080	32	0.0	5.1	23.3
1974	93	254	2.74	2015	38	0.0	7.6	21.1
1975	103	259	2.53	1858	37	0.0	5.5	7.0
1976	97	271	2.79	2052	38	0.0	7.0	11.8
1977	73	228	3.11	2290	38	0.0	5.1	15.8
1978	270	405	1.50	1106	38	5.3	4.7	17.8
1979	305	433	1.42	1042	39	12.8	5.4	17.7
1980	469	658	1.40	1031	37	13.5	5.0	17.3
1981	152	371	2.45	1799	37	10.8	5.0	17.9
1982	191	435	2.28	1675	37	2.7	5.0	17.6
1983	513	659	1.29	945	40	2.5	5.1	17.0
Total	7501	15421						
Average	174	359	2.06	1512				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 18 - Colorado River Basin - Historical Flow and Quality of Water Data

COLORADO RIVER BELOW HOOVER DAM, ARIZ. - NEV.

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	589	628	784	31
	Feb	500	558	820	28
	Mar	552	608	809	31
	Apr	518	564	800	30
	May	1435	1546	792	31
	Jun	1810	1930	784	30
1941	Jul	951	1000	774	31
	Aug	1429	1376	708	31
	Sep	1576	1487	694	30
	Oct	1641	1548	694	31
	Nov	1817	1693	685	30
	Dec	2071	1964	697	31
	TOTAL	14888	14901	736	365
	Jan	2011	1968	720	31
	Feb	1550	1522	722	28
	Mar	1425	1402	724	31
	Apr	1301	1288	728	30
	May	1343	1345	736	31
	Jun	1561	1560	735	30
1942	Jul	1285	1266	724	31
	Aug	846	833	723	31
	Sep	1025	989	709	30
	Oct	1163	1105	699	31
	Nov	1095	966	649	30
	Dec	1157	973	619	31
	TOTAL	15762	15219	710	365
	Jan	1109	955	633	31
	Feb	823	741	662	28
	Mar	971	888	673	31
	Apr	915	850	683	30
	May	1029	957	684	31
	Jun	1040	956	676	30
1943	Jul	1109	1015	673	31
	Aug	1042	969	684	31
	Sep	1042	957	676	30
	Oct	1179	1061	662	31
	Nov	1179	1026	640	30
	Dec	1277	1094	630	31
	TOTAL	12715	11469	663	365
	Jan	1303	1162	656	31
	Feb	1269	1210	701	29
	Mar	1307	1245	700	31
	Apr	1170	1126	707	30
	May	1216	1170	708	31
	Jun	1097	1038	695	30
1944	Jul	1111	1035	685	31
	Aug	1211	1109	673	31
	Sep	1132	1010	656	30
	Oct	1226	1102	661	31
	Nov	1186	1097	680	30
	Dec	1199	1119	686	31
	TOTAL	14427	13422	684	366
	Jan	1239	1151	683	31
	Feb	1100	1020	682	28
	Mar	1250	1158	681	31
	Apr	1042	958	676	30
	May	1068	980	675	31
	Jun	1014	929	673	30
1945	Jul	861	774	662	31
	Aug	885	767	638	31
	Sep	869	723	612	30
	Oct	1080	937	638	8
	Nov	1042	938	662	10
	Dec	1062	945	654	12
	TOTAL	12512	11282	663	303
	Jan	1116	981	646	8
	Feb	1047	941	661	8
	Mar	1004	907	664	10
	Apr	872	786	663	8
	May	903	812	662	9
	Jun	817	731	658	10
1946	Jul	838	741	650	9
	Aug	751	668	654	8
	Sep	759	675	654	10
	Oct	857	766	657	10
	Nov	762	681	657	12
	Dec	859	768	657	10
	TOTAL	10585	9457	657	112
	Jan	984	877	656	10
	Feb	886	803	666	8
	Mar	956	874	672	11
	Apr	859	786	673	9
	May	951	872	674	10
	Jun	918	841	673	10
1947	Jul	925	849	674	10
	Aug	865	792	673	12
	Sep	843	744	649	9
	Oct	828	713	633	8
	Nov	880	724	605	13
	Dec	1063	950	657	9
	TOTAL	10959	9825	659	119
	Jan	1169	1032	649	10
	Feb	1138	998	645	10
	Mar	1150	1009	645	9
	Apr	1202	1054	645	8
	May	1142	1011	651	11
	Jun	1076	950	649	9
1948	Jul	1156	999	636	10
	Aug	968	834	634	10
	Sep	981	826	619	9
	Oct	917	735	589	10
	Nov	1028	888	635	13
	Dec	1124	995	651	8
	TOTAL	13050	11332	638	117
	Jan	1212	984	597	10
	Feb	1214	989	599	9
	Mar	1291	1086	618	10
	Apr	1178	1004	626	10
	May	1026	870	623	10
	Jun	986	842	628	10
1949	Jul	1020	840	605	13
	Aug	1062	857	593	8
	Sep	1141	899	580	9
	Oct	1176	906	567	31
	Nov	1022	842	606	30
	Dec	1238	1061	630	31
	TOTAL	13567	11178	606	181
	Jan	1277	1053	606	31
	Feb	1132	944	613	28
	Mar	1246	1063	627	31
	Apr	1089	922	622	30
	May	1120	926	608	31
	Jun	960	777	596	30
1950	Jul	982	785	588	31
	Aug	872	721	608	31
	Sep	824	702	627	30
	Oct	848	744	645	31
	Nov	815	714	644	30
	Dec	851	730	631	31
	TOTAL	12016	10080	617	365
	Jan	928	787	624	31
	Feb	756	655	637	28
	Mar	860	769	658	31
	Apr	797	726	670	30
	May	898	807	660	31
	Jun	691	617	657	30
1951	Jul	783	701	658	31
	Aug	907	803	651	31
	Sep	848	748	649	30
	Oct	756	672	654	31
	Nov	818	714	642	30
	Dec	829	724	642	31
	TOTAL	9870	8724	650	365
	Jan	1070	943	648	31
	Feb	1213	1106	671	29
	Mar	1371	1289	691	31
	Apr	1385	1306	694	30
	May	1532	1438	690	31
	Jun	1432	1288	661	30
1952	Jul	1304	1079	609	31
	Aug	1307	1028	578	31
	Sep	1359	996	539	30
	Oct	1291	882	502	31
	Nov	1215	820	496	30
	Dec	1338	1206	663	31
	TOTAL	15816	13381	622	366
	Jan	1227	1125	674	31
	Feb	1043	946	667	28
	Mar	1046	973	684	31
	Apr	971	897	679	30
	May	998	888	654	31
	Jun	819	718	644	30
1953	Jul	897	788	646	31
	Aug	968	839	638	31
	Sep	968	830	631	30
	Oct	802	687	630	31
	Nov	749	644	633	30
	Dec	814	693	626	31
	TOTAL	11300	10029	653	365
	Jan	836	731	643	31
	Feb	721	674	687	28
	Mar	911	885	715	31
	Apr	975	939	708	30
	May	1101	1045	698	31
	Jun	929	881	697	30
1954	Jul	1027	974	697	31
	Aug	888	844	699	31
	Sep	933	886	698	30
	Oct	776	737	699	31
	Nov	676	644	701	30
	Dec	741	714	708	31
	TOTAL	10514	9955	696	365
	Jan	725	713	723	31
	Feb	705	723	754	28
	Mar	906	985	799	31
	Apr	883	975	813	30
	May	928	1022	810	31
	Jun	680	771	835	30
1955	Jul	847	938	814	31
	Aug	789	888	828	31
	Sep	621	699	827	30
	Oct	526	584	817	31
	Nov	487	536	808	30
	Dec	492	535	799	31
	TOTAL	8588	9369	802	365
	Jan	583	637	804	31
	Feb	499	548	808	29
	Mar	769	863	825	31
	Apr	840	959	839	30
	May	748	854	839	31
	Jun	784	907	851	30
1956	Jul	782	907	853	31
	Aug	696	799	845	31
	Sep	610	706	851	30
	Oct	490	574	862	31
	Nov	554	612	812	30
	Dec	457	483	777	31
	TOTAL	7813	8850	833	366

Missing EC estimated by interpolation after regulation of flow.

Table 18 - Colorado River Basin - Historical Flow and Quality of Water Data

COLORADO RIVER BELOW HOOVER DAM, ARIZ. - NEV.

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	535	554	762	31
	Feb	470	504	788	28
	Mar	739	808	804	31
	Apr	890	965	797	30
	May	769	817	782	31
	Jun	828	867	770	30
1957	Jul	786	823	769	31
	Aug	786	816	764	31
	Sep	785	803	752	30
	Oct	697	699	738	31
	Nov	958	931	714	30
	Dec	1081	981	667	31
	TOTAL	9323	9567	755	365
	Jan	1245	1104	652	31
	Feb	846	749	651	28
	Mar	1435	1231	631	31
	Apr	1473	1226	612	30
	May	1116	901	594	31
	Jun	819	668	600	30
1958	Jul	894	727	598	31
	Aug	911	738	596	31
	Sep	792	642	596	30
	Oct	728	593	599	31
	Nov	746	606	598	30
	Dec	873	715	602	31
	TOTAL	11878	9901	613	365
	Jan	795	657	608	31
	Feb	648	544	617	28
	Mar	827	718	638	31
	Apr	916	799	642	30
	May	949	809	627	31
	Jun	760	643	622	30
1959	Jul	848	706	612	31
	Aug	894	728	599	31
	Sep	773	627	596	30
	Oct	693	567	602	31
	Nov	607	493	597	30
	Dec	572	469	603	31
	TOTAL	9282	7760	615	365
	Jan	629	534	625	31
	Feb	512	446	640	29
	Mar	710	631	653	31
	Apr	909	830	672	30
	May	856	777	668	31
	Jun	1015	913	662	30
1960	Jul	984	885	661	31
	Aug	959	863	661	31
	Sep	806	724	660	30
	Oct	556	502	664	31
	Nov	489	441	663	30
	Dec	572	518	667	31
	TOTAL	8996	8063	659	366
	Jan	591	543	676	31
	Feb	577	535	681	28
	Mar	936	878	690	31
	Apr	904	850	691	30
	May	943	876	683	31
	Jun	842	792	692	30
1961	Jul	821	774	693	31
	Aug	739	691	688	31
	Sep	690	649	691	30
	Oct	539	502	685	31
	Nov	517	480	683	30
	Dec	486	451	681	31
	TOTAL	8586	8020	687	365
	Jan	482	449	685	31
	Feb	497	471	696	28
	Mar	798	770	709	31
	Apr	902	883	720	30
	May	887	873	724	31
	Jun	799	785	722	30
1962	Jul	824	808	721	31
	Aug	857	840	720	31
	Sep	716	697	716	30
	Oct	634	634	735	31
	Nov	613	607	728	30
	Dec	606	594	721	31
	TOTAL	8615	8412	718	365
	Jan	482	471	718	31
	Feb	575	552	705	28
	Mar	871	821	693	31
	Apr	865	805	685	30
	May	911	839	677	31
	Jun	764	698	672	30
1963	Jul	908	818	662	31
	Aug	857	764	656	31
	Sep	724	641	651	30
	Oct	527	470	655	31
	Nov	464	410	650	30
	Dec	585	522	656	31
	TOTAL	8533	7811	673	365
	Jan	633	578	672	31
	Feb	583	540	681	29
	Mar	800	754	693	31
	Apr	859	823	704	30
	May	844	812	707	31
	Jun	719	690	706	30
1964	Jul	866	837	711	31
	Aug	731	702	706	31
	Sep	623	608	719	30
	Oct	587	588	737	31
	Nov	445	451	745	30
	Dec	469	482	755	31
	TOTAL	8159	7866	709	366
	Jan	489	509	764	31
	Feb	498	523	772	28
	Mar	786	839	785	31
	Apr	698	751	790	30
	May	872	941	793	31
	Jun	785	843	789	30
1965	Jul	815	873	787	31
	Aug	817	871	784	31
	Sep	655	695	780	30
	Oct	535	563	775	31
	Nov	418	439	773	30
	Dec	424	447	776	31
	TOTAL	7792	8292	782	365
	Jan	253	260	758	31
	Feb	440	456	762	28
	Mar	785	816	765	31
	Apr	846	881	766	30
	May	887	918	761	31
	Jun	784	798	749	30
1966	Jul	889	887	734	28
	Aug	839	818	717	28
	Sep	672	646	707	27
	Oct	467	438	690	31
	Nov	473	439	683	30
	Dec	448	416	682	31
	TOTAL	7781	7772	734	356
	Jan	500	471	694	31
	Feb	574	539	691	28
	Mar	847	775	673	31
	Apr	771	700	667	30
	May	889	815	674	31
	Jun	782	718	676	30
1967	Jul	832	760	672	31
	Aug	755	687	669	31
	Sep	494	447	665	30
	Oct	576	520	664	31
	Nov	556	508	671	30
	Dec	356	332	687	31
	TOTAL	7932	7273	674	365
	Jan	396	374	695	31
	Feb	496	469	696	29
	Mar	850	804	696	31
	Apr	883	840	699	30
	May	853	812	700	31
	Jun	752	720	704	30
1968	Jul	757	730	709	31
	Aug	693	668	709	31
	Sep	663	640	709	30
	Oct	486	472	713	28
	Nov	457	449	723	27
	Dec	553	545	725	28
	TOTAL	7838	7522	706	357
	Jan	549	551	739	29
	Feb	552	553	736	25
	Mar	825	837	746	28
	Apr	894	888	731	27
	May	834	832	733	28
	Jun	753	755	737	27
1969	Jul	772	776	739	28
	Aug	693	698	741	28
	Sep	618	621	739	27
	Oct	523	520	731	31
	Nov	426	426	735	30
	Dec	453	467	757	31
	TOTAL	7892	7923	738	339
	Jan	603	620	756	31
	Feb	536	548	752	28
	Mar	753	761	743	31
	Apr	919	925	741	30
	May	927	923	732	31
	Jun	780	791	745	30
1970	Jul	792	800	742	31
	Aug	676	668	726	31
	Sep	507	497	721	30
	Oct	583	589	742	31
	Nov	450	474	776	30
	Dec	497	514	761	31
	TOTAL	8023	8110	743	365
	Jan	561	572	750	31
	Feb	663	674	748	28
	Mar	860	873	747	31
	Apr	913	927	746	30
	May	861	880	752	31
	Jun	741	753	747	30
1971	Jul	740	745	741	31
	Aug	742	737	731	31
	Sep	623	635	750	30
	Oct	503	516	755	31
	Nov	452	465	755	30
	Dec	506	524	761	31
	TOTAL	8164	8301	748	365
	Jan	568	608	787	31
	Feb	636	655	757	29
	Mar	905	890	723	31
	Apr	877	856	718	30
	May	866	832	707	31
	Jun	795	784	724	30
1972	Jul	769	766	733	31
	Aug	756	746	725	31
	Sep	634	625	725	30
	Oct	517	487	693	16
	Nov	397	373	690	28
	Dec	379	358	694	14
	TOTAL	8099	7979	724	332

Missing EC estimated by interpolation after regulation of flow.

Table 18 - Colorado River Basin - Historical Flow and Quality of Water Data

COLORADO RIVER BELOW HOOVER DAM, ARIZ. - NEV.

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	581	551	697	0
	Feb	554	516	685	0
	Mar	611	556	669	0
	Apr	865	776	660	0
	May	1011	912	663	14
	Jun	683	636	684	30
1973	Jul	823	760	679	23
	Aug	857	781	671	0
	Sep	659	606	675	0
	Oct	560	504	662	0
	Nov	526	480	670	1
	Dec	571	540	695	0
	TOTAL	8301	7618	675	68
	Jan	436	420	707	0
	Feb	589	554	692	0
	Mar	864	778	662	0
	Apr	951	883	682	12
	May	960	906	694	23
	Jun	880	821	686	0
1974	Jul	847	785	681	0
	Aug	948	873	678	0
	Sep	714	663	683	0
	Oct	614	559	670	31
	Nov	504	461	673	30
	Dec	425	389	673	31
	TOTAL	8732	8092	681	127
	Jan	515	475	677	31
	Feb	617	570	679	28
	Mar	749	695	682	31
	Apr	871	798	673	30
	May	968	898	682	31
	Jun	807	742	676	8
1975	Jul	830	766	679	25
	Aug	805	749	684	31
	Sep	668	624	688	30
	Oct	549	514	688	31
	Nov	486	445	674	30
	Dec	501	461	677	31
	TOTAL	8367	7736	680	337
	Jan	509	472	682	31
	Feb	496	457	679	29
	Mar	910	837	677	8
	Apr	880	805	673	7
	May	929	849	672	0
	Jun	716	657	674	2
1976	Jul	843	771	673	0
	Aug	894	814	669	0
	Sep	609	555	671	0
	Oct	351	324	679	0
	Nov	304	281	679	0
	Dec	487	444	670	0
	TOTAL	7927	7266	674	77
	Jan	250	230	674	0
	Feb	608	556	672	8
	Mar	854	773	665	6
	Apr	988	894	665	0
	May	761	689	666	0
	Jun	720	654	667	0
1977	Jul	893	812	669	0
	Aug	876	794	666	1
	Sep	469	419	657	0
	Oct	428	380	652	0
	Nov	463	417	663	0
	Dec	563	509	665	0
	TOTAL	7873	7125	665	15
	Jan	235	213	667	0
	Feb	429	396	678	0
	Mar	740	680	675	0
	Apr	902	832	679	0
	May	860	792	677	0
	Jun	654	605	680	0
1978	Jul	831	765	677	0
	Aug	892	827	682	0
	Sep	688	637	681	0
	Oct	502	457	669	0
	Nov	375	347	679	0
	Dec	368	341	682	0
	TOTAL	7476	6893	678	0
	Jan	218	203	687	0
	Feb	291	275	695	0
	Mar	618	580	690	0
	Apr	703	658	688	0
	May	1011	949	690	0
	Jun	865	813	691	0
1979	Jul	858	801	687	0
	Aug	876	819	688	0
	Sep	703	657	687	0
	Oct	530	490	680	0
	Nov	543	510	690	0
	Dec	505	472	687	0
	TOTAL	7721	7228	688	0
	Jan	472	441	687	0
	Feb	268	251	689	0
	Mar	930	874	691	0
	Apr	1129	1066	694	0
	May	1260	1193	696	0
	Jun	1057	999	695	0
1980	Jul	1190	1120	692	0
	Aug	1194	1123	691	3
	Sep	879	824	689	8
	Oct	987	924	689	31
	Nov	837	783	688	3
	Dec	885	829	688	0
	TOTAL	11088	10425	691	45
	Jan	619	578	687	0
	Feb	536	499	684	0
	Mar	815	754	681	0
	Apr	1016	942	682	0
	May	857	794	681	5
	Jun	835	773	681	9
1981	Jul	864	801	681	0
	Aug	915	848	681	3
	Sep	663	610	677	0
	Oct	379	350	678	19
	Nov	388	358	678	7
	Dec	397	366	678	0
	TOTAL	8284	7672	681	43
	Jan	463	427	679	0
	Feb	548	507	680	0
	Mar	792	732	680	0
	Apr	1042	964	680	0
	May	843	780	680	0
	Jun	635	588	681	0
1982	Jul	735	679	679	24
	Aug	764	706	679	31
	Sep	394	363	678	30
	Oct	393	362	678	31
	Nov	379	350	679	30
	Dec	464	427	677	14
	TOTAL	7454	6886	679	160
	Jan	1176	1092	683	0
	Feb	365	338	683	0
	Mar	633	587	681	0
	Apr	1060	981	681	0
	May	1216	1125	681	0
	Jun	1886	1745	680	0
1983	Jul	2574	2376	679	0
	Aug	2422	2202	668	31
	Sep	2187	1937	651	30
	Oct	2106	1851	647	31
	Nov	1750	1536	645	30
	Dec	1692	1476	641	31
	TOTAL	19067	17247	665	153

Missing EC estimated by interpolation after regulation of flow.

Table 18

Colorado River Basin

Historical Flow and Quality of Water Data

COLORADO RIVER BELOW HOOVER DAM, ARIZ. - NEV.

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	14888	14901	1.00	736	107	0.0	1.4	6.5
1942	15762	15219	.97	710	107	0.0	1.4	6.5
1943	12715	11469	.90	663	106	0.0	1.7	4.8
1944	14427	13422	.93	684	74	0.0	1.6	4.1
1945	12512	11282	.90	663	44	0.0	1.7	4.5
1946	10585	9457	.89	657	16	6.3	1.9	2.4
1947	10959	9825	.90	659	13	7.7	2.1	2.5
1948	13050	11332	.87	639	14	7.1	1.6	4.1
1949	13567	11178	.82	606	18	0.0	1.5	4.4
1950	12016	10080	.84	617	53	0.0	1.8	3.8
1951	9870	8724	.88	650	82	23.2	2.8	6.2
1952	15816	13381	.85	622	107	47.7	2.7	8.4
1953	11300	10029	.89	653	105	76.2	2.3	9.0
1954	10514	9955	.95	696	103	88.3	1.9	10.3
1955	8588	9369	1.09	802	103	88.3	1.9	9.6
1956	7813	8850	1.13	833	102	82.4	2.1	5.9
1957	9323	9567	1.03	755	80	67.5	2.2	8.6
1958	11878	9901	.83	613	56	51.8	2.4	10.2
1959	9282	7760	.84	615	36	38.9	2.0	5.9
1960	8996	8063	.90	659	36	52.8	2.1	5.7
1961	8586	8020	.93	687	27	44.4	2.3	5.3
1962	8615	8412	.98	718	15	33.3	2.3	3.0
1963	8533	7811	.92	673	15	26.7	1.8	3.5
1964	8159	7866	.96	709	24	16.7	1.7	6.4
1965	7792	8292	1.06	783	36	11.1	1.7	6.4
1966	7781	7772	1.00	735	36	0.0	1.1	6.5
1967	7932	7273	.92	674	36	0.0	1.5	5.2
1968	7838	7522	.96	706	36	0.0	1.7	4.2
1969	7892	7923	1.00	738	40	0.0	1.6	3.8
1970	8023	8110	1.01	743	40	0.0	2.1	2.7
1971	8164	8301	1.02	748	39	0.0	2.3	3.3
1972	8099	7979	.99	724	33	0.0	2.6	3.9
1973	8301	7618	.92	675	33	0.0	2.2	3.8
1974	8732	8092	.93	681	33	0.0	2.6	2.9
1975	8367	7736	.92	680	35	0.0	2.0	2.3
1976	7927	7266	.92	674	35	0.0	2.0	2.2
1977	7873	7125	.91	665	36	0.0	2.0	2.2
1978	7476	6893	.92	678	36	2.8	2.2	2.8
1979	7721	7228	.94	688	37	2.7	2.3	2.7
1980	11088	10425	.94	691	37	2.7	2.6	2.7
1981	8284	7672	.93	681	31	0.0	2.4	2.6
1982	7454	6886	.92	679	24	0.0	1.9	1.9
1983	19067	17247	.90	665	29	0.0	2.2	3.3
Total	433566	403233						
Average	10083	9378	.93	684				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 19 - Colorado River Basin - Historical Flow and Quality of Water Data

COLORADO RIVER BELOW PARKER DAM, ARIZ. - CALIF.

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	627	698	819	*
	Feb	561	642	842	*
	Mar	750	854	838	*
	Apr	608	679	821	*
	May	1359	1524	825	*
	Jun	1628	1808	817	*
1941	Jul	998	1098	809	*
	Aug	1332	1381	762	*
	Sep	1528	1495	719	*
	Oct	1585	1550	719	*
	Nov	1731	1641	697	*
	Dec	2042	2116	762	*
	TOTAL	14748	15486	772	0
	Jan	1957	1963	738	*
	Feb	1482	1480	734	*
	Mar	1494	1476	726	*
	Apr	1136	1143	740	*
	May	1588	1602	742	*
	Jun	1536	1549	742	*
1942	Jul	1226	1197	718	*
	Aug	880	939	785	*
	Sep	797	794	732	*
	Oct	845	833	725	*
	Nov	1041	1028	726	*
	Dec	1213	1084	657	*
	TOTAL	15196	15088	730	0
	Jan	1015	948	687	*
	Feb	746	657	648	*
	Mar	886	863	716	*
	Apr	877	837	702	*
	May	957	933	717	*
	Jun	976	961	724	*
1943	Jul	1086	981	664	*
	Aug	991	904	671	*
	Sep	1006	908	664	*
	Oct	1160	1062	673	*
	Nov	1149	1003	642	*
	Dec	1231	1076	643	*
	TOTAL	12079	11133	678	0
	Jan	1241	1121	664	*
	Feb	1223	1131	680	*
	Mar	1297	1240	703	*
	Apr	1164	1136	718	*
	May	1116	1089	718	*
	Jun	983	969	725	*
1944	Jul	1035	988	702	*
	Aug	1148	1098	703	*
	Sep	1114	994	656	*
	Oct	1178	1042	650	*
	Nov	1156	1023	651	*
	Dec	1187	1110	688	*
	TOTAL	13842	12941	687	0
	Jan	1186	1121	695	*
	Feb	1061	969	672	*
	Mar	1232	1152	688	*
	Apr	985	929	694	*
	May	970	915	694	*
	Jun	920	914	731	*
1945	Jul	913	844	680	*
	Aug	770	694	663	*
	Sep	824	751	670	*
	Oct	1038	884	626	*
	Nov	1036	924	656	*
	Dec	1099	992	664	*
	TOTAL	12033	11089	678	0
	Jan	1041	939	663	*
	Feb	1028	991	709	*
	Mar	944	843	657	*
	Apr	830	867	768	*
	May	873	825	695	*
	Jun	754	696	679	*
1946	Jul	801	731	671	*
	Aug	722	642	654	*
	Sep	730	665	670	*
	Oct	759	691	670	*
	Nov	789	720	671	*
	Dec	870	794	671	*
	TOTAL	10141	9404	682	0
	Jan	953	870	672	*
	Feb	899	829	678	*
	Mar	940	888	695	*
	Apr	797	777	717	*
	May	905	892	725	*
	Jun	860	847	724	*
1947	Jul	844	822	716	*
	Aug	892	860	709	*
	Sep	819	800	718	*
	Oct	836	765	673	*
	Nov	880	768	642	*
	Dec	1037	862	611	*
	TOTAL	10662	9980	688	0
	Jan	1160	1109	703	*
	Feb	1160	1062	673	*
	Mar	1107	1009	670	*
	Apr	1083	999	678	*
	May	1115	1016	670	*
	Jun	989	923	686	*
1948	Jul	1108	999	663	*
	Aug	986	880	656	*
	Sep	941	831	650	*
	Oct	918	791	634	*
	Nov	978	793	596	*
	Dec	1106	1019	678	*
	TOTAL	12650	11431	664	0
	Jan	1229	1099	658	*
	Feb	1192	1015	626	*
	Mar	1236	1044	621	*
	Apr	1116	985	649	*
	May	983	866	648	*
	Jun	923	824	656	*
1949	Jul	952	849	656	*
	Aug	1013	852	618	*
	Sep	1099	913	611	*
	Oct	1148	918	588	*
	Nov	1011	778	566	*
	Dec	1158	855	543	*
	TOTAL	13060	10998	619	0
	Jan	1080	931	634	*
	Feb	1036	882	626	*
	Mar	1209	1017	619	*
	Apr	998	879	648	*
	May	1066	941	649	*
	Jun	900	785	641	*
1950	Jul	897	765	627	*
	Aug	833	698	616	*
	Sep	704	590	616	*
	Oct	651	558	630	*
	Nov	542	473	642	*
	Dec	557	494	652	*
	TOTAL	10473	9013	633	0
	Jan	550	488	652	*
	Feb	501	448	658	*
	Mar	730	657	662	*
	Apr	765	682	656	*
	May	675	607	661	*
	Jun	862	779	665	*
1951	Jul	945	862	671	*
	Aug	945	840	654	*
	Sep	723	636	647	*
	Oct	709	638	662	*
	Nov	561	502	659	*
	Dec	707	642	668	*
	TOTAL	8672	7781	660	0
	Jan	1104	1008	671	*
	Feb	1134	1012	656	*
	Mar	1424	1273	657	*
	Apr	1300	1202	680	*
	May	1443	1366	696	*
	Jun	1419	1341	695	*
1952	Jul	1263	1142	665	*
	Aug	1296	1105	627	*
	Sep	1321	1074	598	*
	Oct	1234	935	557	*
	Nov	1172	829	520	*
	Dec	1303	895	505	*
	TOTAL	15413	13182	629	0
	Jan	1198	813	499	*
	Feb	1020	848	611	*
	Mar	947	853	662	*
	Apr	808	753	685	*
	May	953	880	679	*
	Jun	956	882	679	*
1953	Jul	1093	973	655	*
	Aug	1056	909	633	*
	Sep	823	700	626	*
	Oct	634	544	631	*
	Nov	527	455	634	*
	Dec	634	550	638	*
	TOTAL	10649	9160	632	0
	Jan	797	685	632	*
	Feb	661	560	623	*
	Mar	782	673	633	*
	Apr	864	746	635	*
	May	1015	927	672	*
	Jun	883	834	695	*
1954	Jul	1000	934	687	*
	Aug	982	918	688	*
	Sep	755	706	688	*
	Oct	636	599	692	*
	Nov	638	601	693	*
	Dec	659	618	690	*
	TOTAL	9671	8801	669	0
	Jan	734	699	700	*
	Feb	598	574	706	*
	Mar	733	722	725	*
	Apr	758	753	730	*
	May	792	804	746	*
	Jun	866	914	776	*
1955	Jul	963	1060	809	*
	Aug	849	924	801	*
	Sep	694	740	785	*
	Oct	499	540	796	*
	Nov	369	407	810	*
	Dec	286	312	802	*
	TOTAL	8141	8449	763	0
	Jan	317	352	816	*
	Feb	366	407	819	*
	Mar	628	708	829	*
	Apr	684	766	824	*
	May	671	735	806	*
	Jun	787	880	822	*
1956	Jul	865	976	830	*
	Aug	823	920	822	*
	Sep	634	728	844	*
	Oct	486	536	810	*
	Nov	321	359	822	*
	Dec	288	330	843	*
	TOTAL	6869	7697	824	0

* See 'Notes' preceding Table 1.

Table 19 - Colorado River Basin - Historical Flow and Quality of Water Data

COLORADO RIVER BELOW PARKER DAM, ARIZ. - CALIF.

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	243	279	845	*
	Feb	349	395	833	*
	Mar	589	657	820	*
	Apr	732	796	800	*
	May	645	704	803	*
	Jun	783	845	794	*
1957	Jul	891	941	777	*
	Aug	817	848	764	*
	Sep	661	670	745	*
	Oct	503	513	750	*
	Nov	781	802	755	*
	Dec	1005	1044	764	*
	TOTAL	7997	8494	781	0
	Jan	1285	1280	732	*
	Feb	565	536	698	*
	Mar	1345	1229	672	*
	Apr	1333	1191	657	*
	May	1013	883	641	*
	Jun	854	735	633	*
1958	Jul	930	803	635	*
	Aug	867	729	619	*
	Sep	714	590	608	*
	Oct	610	510	615	*
	Nov	623	521	615	*
	Dec	753	639	624	*
	TOTAL	10890	9646	651	0
	Jan	677	566	615	*
	Feb	593	495	614	*
	Mar	690	579	617	*
	Apr	832	707	625	*
	May	706	620	646	*
	Jun	797	709	654	*
1959	Jul	962	829	633	*
	Aug	873	706	594	*
	Sep	682	557	600	*
	Oct	558	471	621	*
	Nov	405	342	621	*
	Dec	411	343	614	*
	TOTAL	8186	6924	622	0
	Jan	428	353	607	*
	Feb	474	388	602	*
	Mar	760	630	610	*
	Apr	810	705	640	*
	May	740	651	647	*
	Jun	879	794	664	*
1960	Jul	986	880	656	*
	Aug	868	780	661	*
	Sep	639	568	653	*
	Oct	490	428	643	*
	Nov	397	356	659	*
	Dec	322	293	668	*
	TOTAL	7794	6826	644	0
	Jan	379	347	673	*
	Feb	453	414	672	*
	Mar	742	684	678	*
	Apr	725	669	679	*
	May	705	664	693	*
	Jun	823	776	694	*
1961	Jul	900	841	687	*
	Aug	710	661	685	*
	Sep	606	556	675	*
	Oct	412	374	668	*
	Nov	319	300	691	*
	Dec	202	186	678	*
	TOTAL	6975	6472	682	0
	Jan	334	310	683	*
	Feb	374	346	681	*
	Mar	692	652	693	*
	Apr	757	729	709	*
	May	686	667	715	*
	Jun	778	775	732	*
1962	Jul	882	859	716	*
	Aug	821	816	731	*
	Sep	644	627	716	*
	Oct	471	460	718	*
	Nov	434	423	716	*
	Dec	287	286	734	*
	TOTAL	7159	6950	714	0
	Jan	350	349	734	*
	Feb	467	466	733	*
	Mar	735	731	732	*
	Apr	690	685	730	*
	May	708	687	714	*
	Jun	840	802	702	*
1963	Jul	933	862	679	*
	Aug	819	747	671	*
	Sep	630	572	668	*
	Oct	438	390	654	31
	Nov	334	298	655	30
	Dec	306	275	660	31
	TOTAL	7251	6864	696	92
	Jan	363	328	664	31
	Feb	479	433	665	29
	Mar	640	579	665	31
	Apr	652	596	672	30
	May	598	557	685	31
	Jun	742	705	699	30
1964	Jul	864	825	702	31
	Aug	795	762	704	31
	Sep	589	574	717	30
	Oct	409	401	720	31
	Nov	275	274	732	30
	Dec	245	247	740	31
	TOTAL	6653	6280	694	366
	Jan	289	291	740	31
	Feb	423	427	743	28
	Mar	634	652	755	31
	Apr	581	605	765	30
	May	604	645	785	31
	Jun	710	775	803	30
1965	Jul	846	927	806	31
	Aug	867	946	803	31
	Sep	599	655	804	30
	Oct	385	426	812	31
	Nov	220	231	771	30
	Dec	197	169	631	31
	TOTAL	6356	6747	781	365
	Jan	177	157	654	31
	Feb	413	443	790	28
	Mar	604	662	806	31
	Apr	729	793	800	30
	May	699	744	783	31
	Jun	790	836	778	30
1966	Jul	901	948	774	31
	Aug	852	877	756	31
	Sep	585	582	732	30
	Oct	356	347	718	31
	Nov	254	250	723	30
	Dec	320	316	725	31
	TOTAL	6680	6956	766	365
	Jan	306	309	743	31
	Feb	431	427	729	28
	Mar	677	658	714	31
	Apr	608	594	718	30
	May	648	627	711	31
	Jun	726	688	697	30
1967	Jul	835	780	686	31
	Aug	749	693	680	31
	Sep	490	457	685	30
	Oct	435	410	694	31
	Nov	247	233	692	30
	Dec	170	161	697	31
	TOTAL	6322	6036	702	365
	Jan	350	324	679	31
	Feb	450	418	682	29
	Mar	680	646	698	31
	Apr	699	672	706	30
	May	626	604	710	31
	Jun	722	693	705	30
1968	Jul	779	752	710	31
	Aug	725	702	712	31
	Sep	583	568	717	30
	Oct	404	398	723	31
	Nov	309	305	726	30
	Dec	312	310	729	31
	TOTAL	6642	6391	708	366
	Jan	254	253	733	31
	Feb	467	451	711	28
	Mar	740	717	713	31
	Apr	712	725	749	30
	May	641	640	734	31
	Jun	674	696	758	30
1969	Jul	765	794	764	31
	Aug	733	749	752	31
	Sep	488	484	729	30
	Oct	434	439	744	31
	Nov	220	226	756	30
	Dec	310	321	760	31
	TOTAL	6438	6495	742	365
	Jan	367	383	768	31
	Feb	442	457	760	28
	Mar	654	675	759	31
	Apr	750	778	763	30
	May	657	685	766	31
	Jun	706	733	764	30
1970	Jul	792	815	756	31
	Aug	675	688	750	31
	Sep	530	541	751	30
	Oct	454	467	757	31
	Nov	304	317	768	30
	Dec	328	343	770	31
	TOTAL	6658	6882	760	365
	Jan	339	350	761	31
	Feb	486	505	765	28
	Mar	743	765	757	31
	Apr	746	777	766	30
	May	661	685	762	31
	Jun	743	776	768	30
1971	Jul	878	897	751	31
	Aug	690	703	749	31
	Sep	565	570	742	30
	Oct	397	409	757	31
	Nov	309	314	747	30
	Dec	355	371	767	31
	TOTAL	6911	7121	758	365
	Jan	346	363	771	31
	Feb	480	491	753	29
	Mar	747	758	746	31
	Apr	767	780	748	30
	May	700	706	742	31
	Jun	689	671	717	30
1972	Jul	875	858	721	31
	Aug	716	705	724	31
	Sep	574	559	717	30
	Oct	224	218	716	31
	Nov	283	276	718	30
	Dec	389	394	745	31
	TOTAL	6788	6779	734	366

* See 'Notes' preceding Table 1.
Missing EC estimated by interpolation after regulation of flow.

Table 19 – Colorado River Basin – Historical Flow and Quality of Water Data

COLORADO RIVER BELOW PARKER DAM, ARIZ. – CALIF.

Calendar Year	Calendar Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	355	359	743	31
	Feb	348	348	736	28
	Mar	642	598	685	31
	Apr	800	758	697	30
	May	696	684	722	31
	Jun	673	650	711	30
1973	Jul	829	808	717	31
	Aug	726	696	705	31
	Sep	644	609	695	30
	Oct	484	461	700	31
	Nov	310	301	715	30
	Dec	340	330	713	31
	TOTAL	6847	6602	709	365
	Jan	245	236	710	31
	Feb	481	468	715	28
	Mar	705	673	702	31
	Apr	864	839	714	30
	May	756	732	712	31
	Jun	791	758	705	30
1974	Jul	874	827	696	31
	Aug	824	772	688	31
	Sep	624	584	688	30
	Oct	399	380	700	31
	Nov	282	269	701	30
	Dec	325	311	704	31
	TOTAL	7171	6849	702	365
	Jan	363	348	707	31
	Feb	447	433	711	28
	Mar	690	663	706	31
	Apr	795	764	706	30
	May	770	745	711	31
	Jun	694	666	706	30
1975	Jul	825	780	695	31
	Aug	803	757	693	31
	Sep	651	613	693	30
	Oct	477	449	693	31
	Nov	337	320	698	30
	Dec	359	343	701	31
	TOTAL	7210	6880	702	365
	Jan	353	338	705	31
	Feb	365	347	699	29
	Mar	805	764	698	31
	Apr	771	726	692	30
	May	694	651	691	31
	Jun	717	674	691	30
1976	Jul	790	734	684	31
	Aug	843	781	682	31
	Sep	400	368	677	30
	Oct	355	326	675	31
	Nov	249	232	685	30
	Dec	356	338	699	31
	TOTAL	6697	6280	690	366
	Jan	258	246	702	31
	Feb	498	477	704	28
	Mar	683	648	698	31
	Apr	812	765	693	30
	May	652	609	686	31
	Jun	760	700	677	30
1977	Jul	956	880	677	31
	Aug	688	631	675	31
	Sep	460	425	679	30
	Oct	348	324	685	31
	Nov	288	270	689	30
	Dec	309	294	700	31
	TOTAL	6711	6270	687	365
	Jan	137	132	709	31
	Feb	398	376	696	28
	Mar	692	643	683	31
	Apr	849	788	682	30
	May	679	636	688	31
	Jun	763	712	686	30
1978	Jul	906	841	683	31
	Aug	791	735	683	31
	Sep	573	537	689	30
	Oct	360	343	699	31
	Nov	267	255	701	30
	Dec	270	261	711	31
	TOTAL	6685	6257	688	365
	Jan	152	146	709	31
	Feb	337	324	707	28
	Mar	576	540	689	31
	Apr	776	737	698	30
	May	783	749	703	31
	Jun	850	812	703	30
1979	Jul	961	909	696	31
	Aug	830	782	693	31
	Sep	709	686	711	30
	Oct	505	481	700	31
	Nov	368	354	707	30
	Dec	349	338	713	30
	TOTAL	7195	6858	701	364
	Jan	304	300	725	31
	Feb	387	377	717	29
	Mar	1056	947	660	31
	Apr	1121	1088	714	30
	May	964	923	704	31
	Jun	1145	1138	731	30
1980	Jul	1247	1220	719	31
	Aug	1164	1146	724	31
	Sep	982	941	705	30
	Oct	879	834	698	31
	Nov	760	757	732	30
	Dec	715	705	725	31
	TOTAL	10723	10375	711	366
	Jan	462	456	725	31
	Feb	454	447	724	28
	Mar	697	683	721	31
	Apr	869	875	740	30
	May	676	661	718	31
	Jun	829	796	706	30
1981	Jul	942	905	707	31
	Aug	881	847	707	31
	Sep	564	540	705	30
	Oct	326	313	707	31
	Nov	234	227	712	30
	Dec	294	289	724	31
	TOTAL	7229	7039	716	365
	Jan	330	327	729	31
	Feb	492	478	714	28
	Mar	653	635	715	31
	Apr	851	832	719	30
	May	658	642	717	31
	Jun	618	597	710	30
1982	Jul	763	734	707	31
	Aug	638	620	715	31
	Sep	501	490	720	30
	Oct	380	375	726	31
	Nov	219	218	730	30
	Dec	264	263	732	31
	TOTAL	6367	6210	717	365
	Jan	1382	1354	720	31
	Feb	453	443	720	28
	Mar	591	559	695	31
	Apr	1051	1010	707	30
	May	1127	1093	713	31
	Jun	1613	1557	710	30
1983	Jul	2440	2342	706	31
	Aug	2422	2328	707	31
	Sep	2266	2178	707	30
	Oct	2202	2026	677	0
	Nov	1604	1449	664	0
	Dec	1473	1343	670	0
	TOTAL	18625	17684	698	273

Missing EC estimated by interpolation after regulation of flow.

Table 19

Colorado River Basin

Historical Flow and Quality of Water Data

COLORADO RIVER BELOW PARKER DAM, ARIZ. - CALIF.

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	14748	15486	1.05	772	*			
1942	15196	15088	.99	730	*			
1943	12079	11133	.92	678	*			
1944	13842	12941	.93	687	*			
1945	12033	11089	.92	678	*			
1946	10141	9404	.93	682	*			
1947	10662	9980	.94	688	*			
1948	12650	11431	.90	664	*			
1949	13060	10998	.84	619	*			
1950	10473	9013	.86	633	*			
1951	8672	7781	.90	660	*			
1952	15413	13182	.86	629	*			
1953	10649	9160	.86	633	*			
1954	9671	8801	.91	669	*			
1955	8141	8449	1.04	763	*			
1956	6869	7697	1.12	824	*			
1957	7997	8494	1.06	781	*			
1958	10890	9646	.89	651	*			
1959	8186	6924	.85	622	*			
1960	7794	6826	.88	644	*			
1961	6975	6472	.93	682	*			
1962	7159	6950	.97	714	*			
1963	7251	6864	.95	696	*			
1964	6653	6280	.94	694	25	0.0	1.3	6.7
1965	6356	6747	1.06	781	37	0.0	1.3	8.9
1966	6680	6956	1.04	766	37	0.0	1.3	7.6
1967	6322	6036	.95	702	36	0.0	1.2	7.8
1968	6642	6391	.96	708	38	0.0	1.7	3.7
1969	6438	6495	1.01	742	46	0.0	1.8	4.1
1970	6658	6882	1.03	760	48	0.0	2.2	2.9
1971	6911	7121	1.03	758	45	0.0	2.1	2.5
1972	6788	6779	1.00	734	39	15.4	2.2	3.7
1973	6847	6602	.96	709	38	15.8	1.8	3.8
1974	7171	6849	.96	702	38	15.8	2.0	3.2
1975	7210	6880	.95	702	36	0.0	2.1	2.6
1976	6697	6280	.94	690	35	0.0	2.3	2.8
1977	6711	6270	.93	687	36	0.0	2.2	2.5
1978	6685	6257	.94	688	45	20.0	2.8	3.7
1979	7195	6858	.95	701	92	58.7	3.0	4.2
1980	10723	10375	.97	712	127	76.4	3.2	4.5
1981	7229	7039	.97	716	152	86.8	3.0	4.0
1982	6367	6210	.98	717	141	87.2	2.6	3.3
1983	18625	17684	.95	698	151	81.5	2.9	4.0
Total	391458	370800						
Average	9104	8623	.95	696				

Regression statistics are defined in the "Notes" preceding Table 1.

Table 20 - Colorado River Basin - Historical Flow and Quality of Water Data

COLORADO RIVER AT IMPERIAL DAM, ARIZ. - CALIF.

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	545	553	746	31
	Feb	433	448	761	28
	Mar	607	606	733	31
	Apr	438	455	763	30
	May	962	890	680	31
	Jun	1499	1317	646	30
1941	Jul	843	806	703	31
	Aug	1144	1049	674	31
	Sep	1436	1274	652	30
	Oct	1486	1318	652	31
	Nov	1653	1438	640	30
	Dec	2010	1709	625	31
	TOTAL	13056	11861	668	365
	Jan	1880	1613	631	31
	Feb	1593	1377	635	28
	Mar	1452	1291	654	31
	Apr	1035	956	679	30
	May	1482	1315	652	31
	Jun	1430	1269	653	30
1942	Jul	1176	1072	670	31
	Aug	794	768	712	31
	Sep	711	696	719	30
	Oct	752	733	717	31
	Nov	974	911	688	30
	Dec	1169	1072	674	31
	TOTAL	14449	13071	665	365
	Jan	1003	939	688	31
	Feb	721	680	693	4
	Mar	841	791	691	4
	Apr	792	757	704	4
	May	832	803	710	5
	Jun	867	829	703	4
1943	Jul	964	915	698	4
	Aug	903	860	701	8
	Sep	908	854	692	3
	Oct	1083	1001	680	0
	Nov	1115	1026	676	0
	Dec	1215	1088	658	0
	TOTAL	11243	10544	690	67
	Jan	1201	1071	656	0
	Feb	1207	1124	685	0
	Mar	1279	1218	701	0
	Apr	1115	1101	726	0
	May	1044	1047	738	0
	Jun	891	898	741	0
1944	Jul	912	905	729	0
	Aug	1032	999	711	0
	Sep	1030	971	693	0
	Oct	1113	1021	675	0
	Nov	1133	998	648	0
	Dec	1135	999	647	0
	TOTAL	13094	12353	694	0
	Jan	1152	1127	720	0
	Feb	1006	974	712	0
	Mar	1121	1079	708	0
	Apr	872	855	720	0
	May	842	842	735	0
	Jun	799	790	728	0
1945	Jul	807	775	706	0
	Aug	711	673	697	0
	Sep	736	677	676	0
	Oct	901	799	652	0
	Nov	1000	896	659	0
	Dec	1067	992	684	0
	TOTAL	11013	10479	700	0
	Jan	997	921	679	0
	Feb	994	904	668	0
	Mar	915	862	692	0
	Apr	747	721	711	0
	May	776	761	722	0
	Jun	648	626	711	0
1946	Jul	710	680	704	0
	Aug	656	626	702	0
	Sep	629	598	699	0
	Oct	694	662	701	0
	Nov	746	703	693	0
	Dec	844	771	672	0
	TOTAL	9355	8834	694	0
	Jan	922	872	695	0
	Feb	861	815	697	0
	Mar	921	892	712	0
	Apr	723	729	742	0
	May	816	829	747	0
	Jun	778	792	749	0
1947	Jul	732	737	740	0
	Aug	820	817	733	0
	Sep	722	724	737	0
	Oct	743	705	698	0
	Nov	846	764	664	0
	Dec	1036	902	640	0
	TOTAL	9920	9578	710	0
	Jan	1100	1065	712	0
	Feb	1128	1060	691	0
	Mar	1082	1020	693	0
	Apr	999	955	703	0
	May	1043	999	704	0
	Jun	901	859	701	0
1948	Jul	999	946	697	0
	Aug	901	843	688	0
	Sep	867	799	678	0
	Oct	897	801	657	0
	Nov	941	814	636	0
	Dec	1100	1022	683	0
	TOTAL	11957	11182	688	0
	Jan	1235	1122	668	0
	Feb	1179	1020	636	0
	Mar	1222	1064	640	0
	Apr	1080	982	668	0
	May	923	857	683	0
	Jun	866	802	681	0
1949	Jul	857	782	671	0
	Aug	930	822	650	0
	Sep	993	858	636	0
	Oct	1101	904	604	0
	Nov	997	777	573	0
	Dec	1143	892	573	0
	TOTAL	12527	10882	639	0
	Jan	1085	954	647	0
	Feb	992	871	646	0
	Mar	1166	1016	641	0
	Apr	933	850	670	0
	May	999	917	675	0
	Jun	838	751	659	0
1950	Jul	818	724	651	0
	Aug	754	662	645	0
	Sep	640	561	644	0
	Oct	599	536	658	0
	Nov	506	461	670	0
	Dec	536	495	679	0
	TOTAL	9864	8797	656	0
	Jan	554	512	680	0
	Feb	495	461	686	0
	Mar	631	588	686	0
	Apr	741	688	683	0
	May	603	581	709	0
	Jun	699	667	702	0
1951	Jul	816	772	695	0
	Aug	849	790	685	0
	Sep	693	621	659	0
	Oct	678	632	686	0
	Nov	555	519	688	0
	Dec	694	643	681	0
	TOTAL	8007	7475	686	0
	Jan	1055	944	658	0
	Feb	1103	995	663	0
	Mar	1421	1255	649	0
	Apr	1275	1196	689	0
	May	1344	1300	712	0
	Jun	1306	1268	714	0
1952	Jul	1179	1123	701	0
	Aug	1174	1052	660	0
	Sep	1215	1032	624	0
	Oct	1236	1005	598	0
	Nov	1148	870	557	0
	Dec	1295	933	530	0
	TOTAL	14749	12974	647	0
	Jan	1214	897	543	0
	Feb	1018	885	639	0
	Mar	905	850	691	0
	Apr	748	732	719	0
	May	841	821	718	0
	Jun	803	777	711	0
1953	Jul	972	910	689	0
	Aug	922	849	677	0
	Sep	760	701	678	0
	Oct	635	588	680	0
	Nov	514	472	675	0
	Dec	614	563	674	0
	TOTAL	9946	9045	669	0
	Jan	777	695	658	0
	Feb	656	590	661	0
	Mar	716	646	663	0
	Apr	766	697	670	0
	May	922	896	715	0
	Jun	795	795	735	0
1954	Jul	876	866	726	0
	Aug	879	875	732	0
	Sep	709	706	732	0
	Oct	612	609	732	0
	Nov	595	590	729	0
	Dec	640	636	731	0
	TOTAL	8943	8602	707	0
	Jan	739	728	724	0
	Feb	594	594	736	0
	Mar	678	697	756	0
	Apr	716	756	776	0
	May	729	804	812	0
	Jun	746	846	834	0
1955	Jul	882	1005	837	0
	Aug	810	914	830	0
	Sep	638	722	832	0
	Oct	499	578	852	0
	Nov	379	449	871	0
	Dec	298	369	910	0
	TOTAL	7709	8462	807	0
	Jan	298	370	912	0
	Feb	345	424	905	0
	Mar	546	658	886	0
	Apr	646	768	875	0
	May	594	712	881	0
	Jun	666	796	880	0
1956	Jul	754	899	877	0
	Aug	718	860	881	0
	Sep	584	709	893	0
	Oct	479	583	895	0
	Nov	343	432	925	0
	Dec	297	383	947	0
	TOTAL	6269	7594	891	0

Table 20 – Colorado River Basin – Historical Flow and Quality of Water Data

COLORADO RIVER AT IMPERIAL DAM, ARIZ. – CALIF.

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	260	340	964	0
	Feb	408	519	935	0
	Mar	520	629	889	0
	Apr	666	774	854	0
	May	581	677	857	0
	Jun	651	748	846	0
1957	Jul	795	901	834	0
	Aug	758	855	829	0
	Sep	616	706	843	0
	Oct	512	593	853	0
	Nov	695	776	821	0
	Dec	978	1056	794	0
	TOTAL	7439	8575	848	0
	Jan	1299	1340	758	0
	Feb	629	666	779	0
	Mar	1253	1237	726	0
	Apr	1281	1255	721	0
	May	1017	1004	726	0
	Jun	770	761	727	0
1958	Jul	812	790	715	0
	Aug	802	770	705	0
	Sep	655	645	724	0
	Oct	624	607	715	0
	Nov	592	574	713	0
	Dec	761	714	690	0
	TOTAL	10493	10362	726	0
	Jan	674	642	701	0
	Feb	593	566	702	0
	Mar	618	609	725	0
	Apr	770	750	716	0
	May	647	657	748	0
	Jun	679	688	745	0
1959	Jul	824	805	719	0
	Aug	821	810	726	0
	Sep	643	643	736	0
	Oct	565	579	753	0
	Nov	421	434	758	0
	Dec	441	450	750	0
	TOTAL	7695	7635	730	0
	Jan	449	446	731	0
	Feb	436	429	724	0
	Mar	652	642	725	0
	Apr	762	758	732	0
	May	650	689	779	0
	Jun	735	778	778	0
1960	Jul	845	888	773	0
	Aug	776	825	781	0
	Sep	606	657	798	0
	Oct	481	526	803	10
	Nov	363	402	815	10
	Dec	355	390	809	10
	TOTAL	7109	7430	769	30

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	342	378	812	16
	Feb	400	434	799	9
	Mar	648	692	786	8
	Apr	666	716	791	11
	May	619	676	804	9
	Jun	691	749	797	8
1961	Jul	754	815	794	11
	Aug	671	727	796	8
	Sep	541	591	804	10
	Oct	427	474	815	9
	Nov	312	355	835	10
	Dec	222	259	860	11
	TOTAL	6293	6865	802	120
	Jan	337	377	824	13
	Feb	304	343	829	9
	Mar	597	647	797	9
	Apr	689	748	798	9
	May	619	690	819	9
	Jun	648	729	827	9
1962	Jul	741	828	822	10
	Aug	730	812	818	8
	Sep	593	663	823	11
	Oct	458	517	830	11
	Nov	438	497	833	11
	Dec	303	350	848	12
	TOTAL	6457	7200	820	121
	Jan	337	380	828	14
	Feb	393	436	815	9
	Mar	619	678	806	10
	Apr	652	713	804	8
	May	602	661	808	9
	Jun	692	745	792	10
1963	Jul	775	824	781	9
	Aug	757	800	777	10
	Sep	595	634	783	10
	Oct	461	503	803	8
	Nov	340	384	832	12
	Dec	310	351	833	13
	TOTAL	6532	7108	800	122
	Jan	337	378	826	9
	Feb	415	448	794	10
	Mar	562	598	783	9
	Apr	609	651	786	8
	May	530	586	813	13
	Jun	576	637	812	9
1964	Jul	719	790	808	9
	Aug	679	752	815	11
	Sep	539	616	840	9
	Oct	398	471	871	10
	Nov	280	344	903	13
	Dec	260	324	917	9
	TOTAL	5903	6595	821	119

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	271	330	897	9
	Feb	332	395	876	5
	Mar	548	636	853	4
	Apr	566	639	830	9
	May	548	653	875	6
	Jun	578	693	882	5
1965	Jul	709	859	891	4
	Aug	737	889	888	10
	Sep	540	675	918	4
	Oct	400	513	943	5
	Nov	257	336	962	9
	Dec	237	294	910	9
	TOTAL	5723	6912	888	79
	Jan	203	232	839	3
	Feb	334	401	882	0
	Mar	517	624	887	0
	Apr	622	761	900	2
	May	576	700	893	14
	Jun	637	776	895	0
1966	Jul	729	876	884	0
	Aug	733	866	869	4
	Sep	532	627	866	0
	Oct	390	473	892	4
	Nov	265	337	935	5
	Dec	315	376	878	3
	TOTAL	5854	7049	885	35
	Jan	301	367	896	0
	Feb	369	430	858	3
	Mar	593	671	832	8
	Apr	558	638	841	5
	May	550	633	846	0
	Jun	595	660	816	0
1967	Jul	673	736	805	1
	Aug	672	739	809	7
	Sep	451	518	845	3
	Oct	412	466	831	0
	Nov	268	327	897	7
	Dec	174	238	1008	2
	TOTAL	5616	6425	841	36
	Jan	342	396	850	0
	Feb	366	408	819	3
	Mar	566	622	808	3
	Apr	622	684	809	4
	May	532	607	838	0
	Jun	580	647	820	0
1968	Jul	625	698	821	0
	Aug	609	687	830	2
	Sep	494	572	851	0
	Oct	399	480	886	5
	Nov	298	370	913	4
	Dec	304	371	897	2
	TOTAL	5738	6541	838	23

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	270	338	918	4
	Feb	376	437	855	3
	Mar	602	683	834	0
	Apr	638	741	854	2
	May	550	657	879	1
	Jun	553	650	865	0
1969	Jul	622	725	857	0
	Aug	628	738	865	2
	Sep	442	544	905	0
	Oct	417	509	898	0
	Nov	225	298	974	4
	Dec	292	379	954	1
	TOTAL	5616	6699	877	17
	Jan	352	437	912	2
	Feb	352	434	907	3
	Mar	558	665	877	2
	Apr	677	802	871	3
	May	540	651	886	0
	Jun	549	671	900	0
1970	Jul	622	743	879	0
	Aug	577	689	878	3
	Sep	440	543	908	0
	Oct	423	524	911	0
	Nov	299	383	942	0
	Dec	315	406	947	0
	TOTAL	5703	6949	896	13
	Jan	324	415	942	0
	Feb	391	474	893	0
	Mar	611	726	873	0
	Apr	627	761	892	0
	May	524	646	908	0
	Jun	578	692	880	0
1971	Jul	675	796	867	0
	Aug	599	711	873	0
	Sep	472	567	884	0
	Oct	389	478	904	0
	Nov	300	381	934	0
	Dec	333	416	917	0
	TOTAL	5823	7064	892	0
	Jan	340	422	911	0
	Feb	389	460	870	0
	Mar	618	711	846	0
	Apr	644	744	850	0
	May	560	658	863	0
	Jun	559	644	847	0
1972	Jul	667	753	831	0
	Aug	632	712	828	0
	Sep	484	557	847	0
	Oct	294	375	936	0
	Nov	267	333	918	0
	Dec	340	415	898	0
	TOTAL	5793	6783	861	0

Table 20 - Colorado River Basin - Historical Flow and Quality of Water Data

COLORADO RIVER AT IMPERIAL DAM, ARIZ. - CALIF.

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	358	434	891	0
	Feb	309	369	879	0
	Mar	535	585	804	0
	Apr	663	725	804	0
	May	575	663	849	0
	Jun	524	603	846	0
1973	Jul	645	718	818	0
	Aug	616	692	827	0
	Sep	545	620	837	0
	Oct	453	525	851	0
	Nov	311	382	904	0
	Dec	329	405	904	0
	TOTAL	5864	6722	843	0
	Jan	253	323	940	0
	Feb	407	466	840	0
	Mar	572	641	823	0
	Apr	710	791	819	0
	May	625	712	838	0
	Jun	621	693	820	0
1974	Jul	726	797	807	0
	Aug	734	798	799	0
	Sep	558	622	820	0
	Oct	408	475	856	0
	Nov	290	358	906	0
	Dec	301	368	898	0
	TOTAL	6206	7042	834	0
	Jan	351	411	861	0
	Feb	382	437	842	0
	Mar	558	621	818	0
	Apr	661	730	812	0
	May	642	722	828	0
	Jun	555	623	826	0
1975	Jul	654	712	801	0
	Aug	661	724	806	0
	Sep	560	623	818	0
	Oct	449	520	852	0
	Nov	333	401	885	0
	Dec	348	414	875	0
	TOTAL	6154	6940	829	0
	Jan	341	402	868	0
	Feb	327	388	872	0
	Mar	658	707	790	0
	Apr	678	741	803	0
	May	591	656	816	0
	Jun	556	615	813	0
1976	Jul	647	698	794	0
	Aug	669	722	793	0
	Sep	449	492	806	0
	Oct	369	427	851	0
	Nov	257	323	926	0
	Dec	355	417	863	0
	TOTAL	5897	6589	822	0
	Jan	264	326	907	0
	Feb	390	436	822	0
	Mar	569	626	809	0
	Apr	681	739	798	0
	May	534	597	823	0
	Jun	586	638	801	0
1977	Jul	734	782	783	0
	Aug	603	658	803	0
	Sep	433	484	823	0
	Oct	325	381	861	0
	Nov	277	327	868	0
	Dec	310	357	847	0
	TOTAL	5706	6352	819	0
	Jan	171	229	985	0
	Feb	340	375	810	0
	Mar	550	578	771	0
	Apr	698	732	771	0
	May	564	618	806	0
	Jun	590	641	799	0
1978	Jul	708	766	795	0
	Aug	664	722	800	0
	Sep	501	556	816	0
	Oct	357	409	844	0
	Nov	274	329	884	0
	Dec	285	343	884	0
	TOTAL	5702	6297	812	0
	Jan	184	238	953	0
	Feb	265	307	852	0
	Mar	447	483	795	0
	Apr	613	655	786	0
	May	644	705	804	0
	Jun	662	713	793	1
1979	Jul	762	808	780	0
	Aug	723	769	783	0
	Sep	624	663	781	0
	Oct	500	541	796	0
	Nov	368	414	825	0
	Dec	340	388	840	0
	TOTAL	6132	6684	802	1
	Jan	317	367	852	0
	Feb	343	386	828	0
	Mar	858	807	692	0
	Apr	979	990	743	0
	May	861	892	762	0
	Jun	922	972	775	0
1980	Jul	1066	1093	754	0
	Aug	986	1012	754	0
	Sep	864	862	734	0
	Oct	818	851	765	0
	Nov	727	778	787	0
	Dec	698	741	781	0
	TOTAL	9439	9751	760	0
	Jan	504	563	820	0
	Feb	368	421	841	0
	Mar	602	661	807	0
	Apr	736	796	795	0
	May	579	651	827	0
	Jun	624	686	807	0
1981	Jul	745	812	801	0
	Aug	726	785	795	0
	Sep	506	555	807	0
	Oct	345	415	884	0
	Nov	257	316	906	0
	Dec	277	336	892	0
	TOTAL	6269	6995	821	0
	Jan	331	391	869	0
	Feb	378	419	814	0
	Mar	539	582	794	0
	Apr	708	749	779	0
	May	535	591	812	0
	Jun	497	554	821	0
1982	Jul	590	641	799	0
	Aug	562	617	807	0
	Sep	415	483	856	0
	Oct	367	436	873	0
	Nov	247	312	930	0
	Dec	238	298	922	0
	TOTAL	5406	6074	826	0
	Jan	863	889	758	0
	Feb	448	494	811	0
	Mar	505	544	792	0
	Apr	840	850	744	0
	May	960	987	756	0
	Jun	1339	1330	730	0
1983	Jul	2227	2138	706	0
	Aug	2321	2165	686	0
	Sep	2142	2009	690	0
	Oct	2219	1996	661	31
	Nov	1609	1509	690	30
	Dec	1456	1439	727	4
	TOTAL	16930	16350	710	65

Table 20

Colorado River Basin

Historical Flow and Quality of Water Data

COLORADO RIVER AT IMPERIAL DAM, ARIZ. - CALIF.

(Annual Summary)

Calendar Year	Flow 1000 (AF)	Load 1000 (TON)	T.D.S. (T/AF)	T.D.S. (mg/L)	Regression Statistics 1	2	3	4
1941	13056	11861	.91	668	37	0.0	4.3	4.5
1942	14449	13071	.90	665	37	0.0	4.3	4.5
1943	11243	10544	.94	690	37	0.0	4.3	4.5
1944	13094	12353	.94	694	72	0.0	3.2	4.4
1945	11013	10479	.95	700	72	0.0	1.1	3.7
1946	9355	8834	.94	694	108	0.0	1.1	3.7
1947	9920	9578	.97	710	110	0.0	1.2	3.5
1948	11957	11182	.94	688	107	0.0	1.3	4.2
1949	12527	10882	.87	639	108	0.0	1.3	5.2
1950	9864	8797	.89	656	105	0.0	1.2	4.6
1951	8007	7475	.93	686	107	.9	1.3	5.3
1952	14749	12974	.88	647	103	1.0	1.2	7.2
1953	9946	9045	.91	669	102	2.0	1.3	7.6
1954	8943	8602	.96	707	98	1.0	1.1	9.7
1955	7709	8462	1.10	807	88	1.1	1.2	9.7
1956	6269	7594	1.21	891	67	0.0	1.6	6.8
1957	7439	8575	1.15	848	47	0.0	1.7	5.9
1958	10493	10362	.99	726	36	22.2	2.6	7.9
1959	7695	7635	.99	730	31	35.5	2.5	5.1
1960	7109	7430	1.05	769	29	58.6	2.8	6.3
1961	6293	6865	1.09	802	35	25.7	2.1	7.5
1962	6457	7200	1.12	820	40	15.0	1.8	5.6
1963	6532	7108	1.09	800	43	0.0	.7	5.5
1964	5903	6595	1.12	822	38	0.0	.8	5.9
1965	5723	6912	1.21	888	43	0.0	1.0	7.1
1966	5854	7049	1.20	886	44	0.0	1.3	6.7
1967	5616	6425	1.14	841	44	0.0	1.5	7.1
1968	5738	6541	1.14	838	46	0.0	2.2	5.4
1969	5616	6699	1.19	877	71	31.0	2.9	4.8
1970	5703	6949	1.22	896	72	30.6	2.9	3.7
1971	5823	7064	1.21	892	71	31.0	2.7	3.8
1972	5793	6783	1.17	861	72	0.0	1.8	3.6
1973	5864	6722	1.15	843	104	0.0	1.3	3.1
1974	6206	7042	1.13	834	137	0.0	1.0	2.6
1975	6154	6940	1.13	829	149	0.0	.7	3.0
1976	5897	6589	1.12	822	152	0.0	.7	3.9
1977	5706	6352	1.11	819	147	0.0	.7	4.0
1978	5702	6297	1.10	812	141	0.0	.5	4.1
1979	6132	6684	1.09	802	151	0.0	1.9	4.2
1980	9439	9751	1.03	760	166	0.0	2.2	4.3
1981	6269	6995	1.12	821	148	0.0	2.7	4.3
1982	5406	6074	1.12	826	99	0.0	2.5	3.6
1983	16930	16350	.97	710	104	0.0	2.5	3.6
Total	355594	363724						
Average	8270	8459	1.02	752				

Regression statistics are defined in the "Notes" preceding Table 1.