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REPORTS

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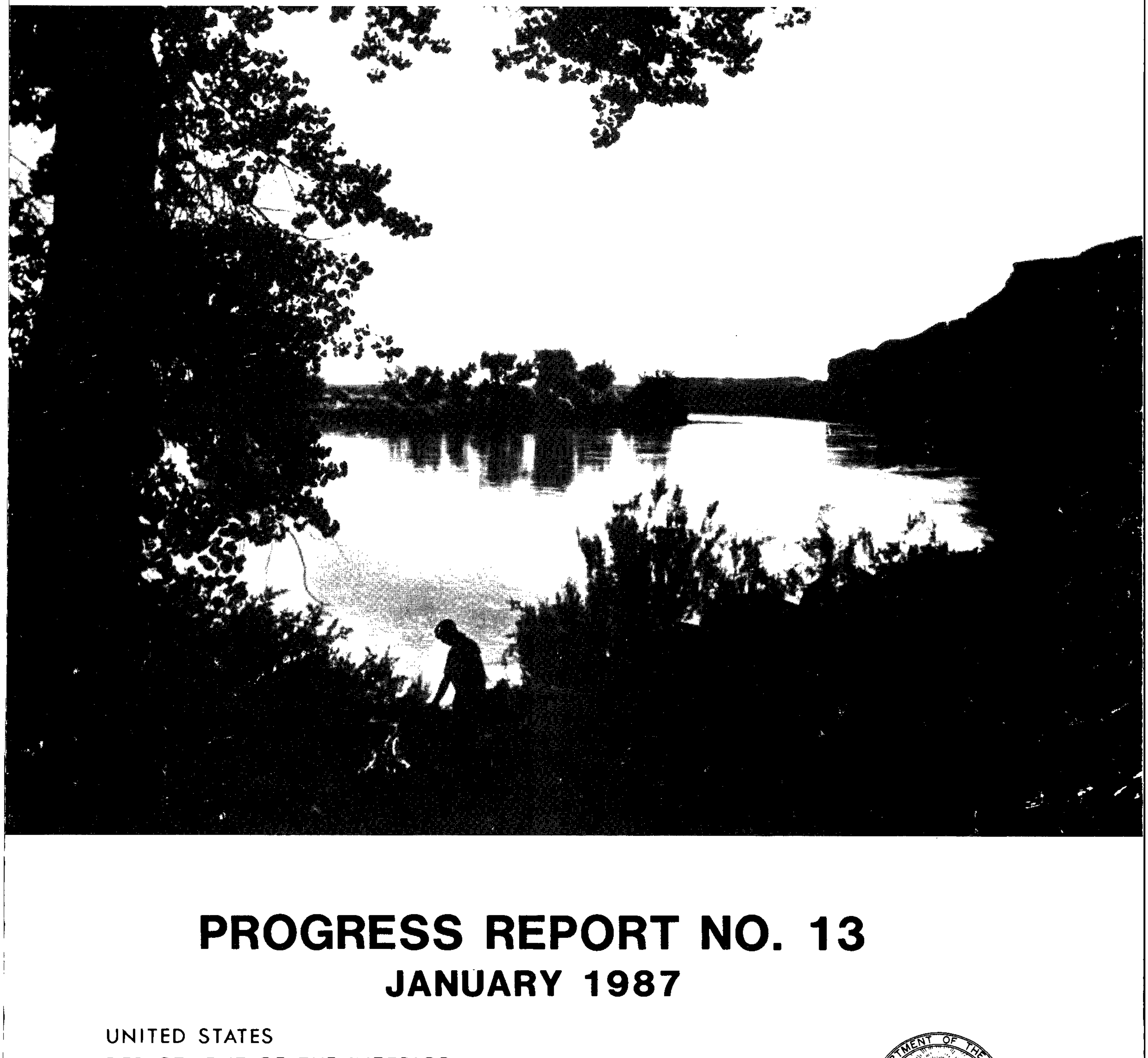
QUALITY OF WATER
COLORADO RIVER BASIN



PROGRESS REPORT NO. 13
JANUARY 1987

UNITED STATES
DEPARTMENT OF THE INTERIOR
Donald P. Hodel, Secretary

QUALITY OF WATER
COLORADO RIVER BASIN

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DONALD P. HODEL, SECRETARY

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SUMMARY

The Quality of Water, Colorado River Basin, Progress Report is prepared and updated every 2 years to summarize the status of water quality in the Colorado River Basin (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 Colorado River provides municipal and industrial water for over 18 million people in 7 states and irrigation water to over 1.7 million acres of land. The Colorado River Basin reservoirs now have a combined storage capacity of about 60 million acre-feet. While water quality is generally adequate for industries, wildlife and livestock watering, and public water supplies, nutrient loading to the main stem reservoirs is becoming a problem as development and its associated pollution increase.

Increases in phosphorus and nitrogen compounds that 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 in Parts III and IX which help to define and resolve some of these problems in the Colorado River Basin.

Another major concern in the Colorado River Basin is the threat of salinity in both the United States and the Republic of Mexico. Increases in salinity are important in the Basin because of the impact of salinity on crops and on municipal and industrial users. The higher salinity increases water treatment costs, damages plumbing and fixtures, increases maintainance on pumps and distributions systems, lowers crop yields, and increases the need for special drainage facilities on farms.

Historically, the Colorado River carries about 9 million tons of salt past Hoover Dam in 10 million acre-feet of water per year. The salinity comes from natural diffuse sources, saline springs, and agricultural sources; natural sources add almost half the total salt load, irrigation return flows add over one-third, and a minor part of the salt load added is from municipal and industrial sources.

Development in the Basin, which reduces the flow of the river and its ability to dilute the salt in the river, is projected to reduce the flow in the river by 2.7 million acre-feet per year by 2010, causing salinity to increase dramatically. To maintain the salinity at acceptable levels in the United States and to meet our obligations with Mexico, several laws have been passed by Congress.

Public Laws 93-320 and 98-569 authorized the Secretaries of the Department of the Interior and Department of Agriculture to enhance and protect the quality of water available in the Colorado River for use in the United States and the Republic of Mexico. Under Title I a desalting plant, brine discharge canal, and other features will enable the United States to deliver water to Mexico having an average salinity no greater than 115 parts per million (ppm) ± 30 ppm over the annual average salinity of the Colorado River at Imperial Dam.

The acts also authorized the Secretary of the Interior to construct five salinity control units. Another unit was completed in a verification program. Further, the Secretary was directed to undertake research on additional methods to control salinity and to cooperate with the Department of Agriculture and others.

In 1985, the salinity level in the Colorado River at Imperial Dam was 607 milligrams per liter (mg/L). Reclamation and Agriculture controls to date are removing 126,800 tons of salt annually from the river system. The salinity at Imperial Dam is projected to reach an average of 963 mg/L by the year 2010 without further controls. Peak salinities are predicted to approach 1,200 mg/L in some years. Over a million tons of salt per year will need to be removed by the year 2010 to maintain average salinity below the numeric criteria level of 879 mg/L at Imperial Dam. Even at this level of salinity reduction, there will still be temporary but significant excursions beyond 879 mg/L due to the natural variations in climatic conditions and water usage.

PART I. INTRODUCTION

The Quality of Water, Progress Report, No. 13 (Progress Report) was prepared by the U.S. Bureau of Reclamation (Reclamation) of the Department of the Interior (DOI), in cooperation with the U.S. Department of Agriculture (USDA), other agencies of the Department of the Interior including the U.S. Geological Survey (USGS) and the Bureau of Land Management (BLM); the Environmental Protection Agency (EPA); and the Colorado River Basin States of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming. This Progress Report is the latest in a series of 13 biennial reports beginning in 1963.

Part I covers the authorization and legal aspects of this report. Part II gives a brief decription of the Colorado River Basin, the subject of this report. Part III summarizes several perspectives by the Basin States and Federal Government on the water quality in the Basin. Part IV reviews the causes and effects of the most significant problem in the basin, salinity. Part V looks at the salinity problem in more depth, discussing many of the factors which affect salinity. Part VI details present and future developments which will affect salinity in Basin. Part VII summarizes details of the Colorado River Salinity Control Program which is meant to offset the effects of development and preserve the resource for irrigation, municipal, industrial, and other uses. Part VIII summarizes the results of the Colorado River Simulation System (CRSS) salinity projections. The projections start at present conditions in 1986 and predict flow and salinity through the year 2010. Finally, Part IX summarizes water quality studies which are relevant to the purpose of this report.

A. Authorization for Report

This is the 13th 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. 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 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 mainstream 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. Water Quality

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 as ammended, and the Clean Water Act of 1977 as ammended. 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.

The 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 milligrams per liter (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 the Colorado River 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.

Public Law 98-569, signed October 30, 1984, amends Public Law 93-320. 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, compliance with the numeric criteria at least through the year 2005.

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. Public Law 98-569 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.

C. Participants in the Salinity Control Program

Reclamation was delegated the coordinating role for the Secretary of the Interior; and the Chief, Colorado River Water Quality Office, was appointed the designated salinity control liaison officer for the Department of the Interior. As liaison officer, he coordinates the overall salinity control program with the U.S. Department of Agriculture (USDA), the Environmental Protection Agency (EPA), the Colorado River Basin Salinity Control Advisory Council, and the Colorado River Basin Salinity Control Forum (Forum).

In 1985, a USDA Basin Coordinator position was established to assist in carrying out the Colorado River salinity program. The position is responsible for coordination and evaluation of USDA salinity control activities in the Basin. The Coordinator, headquartered at the Bureau of Reclamation, Colorado River Water Quality Office in Denver, Colorado, is the primary point of contact between the Reclamation and USDA agencies. The coordinator is also responsible for providing salinity control program assistance for the seven Basin State conservationists of SCS; Director, West National Technical Center; and other Federal, State, and local entities and organizations.

USDA involvement is provided primarily by the Agricultural Conservation and Stabilization Service and the SCS. Working through the USDA Salinity Control Coordinating Committee and the Director of Land Treatment Program Division as the designated USDA salinity control liaison officer, ASCS and SCS provide major program management leadership and overall program coordination with Reclamation. However, USDA agencies and Title II on-farm salinity control programs are funded and implemented separately from Reclamation programs.

Currently, USDA implementation efforts are administered under existing program authorities since line item funding has not been authorized as of 1986. Financial assistance and landowner cost-share funding are being provided through specific appropriation language for the Agricultural Conservation Program (ACP) within the ASCS. SCS funding for technical assistance and monitoring are not specifically appropriated; therefore, the agency must rely upon the existing Conservation Technical Assistance support to implement on-farm salinity control measures.

The Agricultural Research Service (ARS), the Cooperative State Research Service, and the Extension Service also play a vital role in the salinity control program. The ARS conducts research on irrigation water and soil management, water delivery system design, and operational practices. The Extension Service carries out educational programs to advise irrigators on water, soil, and crop management in saline areas.

The Fish and Wildlife Service (FWS) also participate in the implementation and progress of the CRWQIP. FWS provides guidance for replacing wildlife habitat potentially lost primarily through canal and lateral lining and on-farm programs.

The U.S. Geological Survey (USGS), Water Resources Division operates and maintains a network of 22 streamflow and water quality stations in the Colorado River drainage basin that are used in salinity program analysis. In addition to maintaining this hydrologic data network, the USGS has been conducting studies which analyze the time variations in salinity and define the influence of development on salinity. These studies will be completed by the end of fiscal year 1986 with reports available early in fiscal year 1987. Summaries of some of the draft reports are included in Part IX.

The Bureau of Land Management (BLM) has identified many salinity source areas on public lands. Effective management of these areas, which may include structures, is currently being considered.

The major EPA programs dealing with salinity control (Water Quality Standards, Water Quality Management Planning, and NPDES permits) are largely delegated to the States. EPA maintains oversight and/or approval responsibilities for these delegated programs.

The Colorado River Basin Salinity Control Advisory Council was established by Public Law 93-320. The Advisory Council is composed of up to three representatives appointed by the governor of each Basin State. It receives reports from the various Federal agencies working on the salinity control program and makes recommendations to the Secretaries of the Department of the Interior and USDA and the Administrator of the EPA on the progress of implementation of the salinity control program.

The Colorado River Basin Salinity Control Forum was established in 1973 as a mechanism for interstate cooperation and to develop and adopt water quality standards for salinity, including numeric criteria, on the Colorado River.

The standards were published in 1975 and were based on the objective of maintaining salinity concentrations at or below the 1972 levels found in the lower main stem while allowing the Basin States to continue to develop their compact apportioned waters. The Forum is composed of up to three representatives appointed by the governor of each of the Basin States. The seven Colorado River Basin States--Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming have an important role in the salinity control effort. They are responsible for the control of the discharge of total dissolved solids from point discharges through the NPDES permit program. California, Colorado, Nevada, and Wyoming have authority to issue all types of NPDES permits; New Mexico and Arizona prepare permits and forward them to EPA for issuance; and Utah issues its minor industrial permits while EPA handles the major industrial permits.

The States have primary responsibility for the adoption and enforcement of water quality standards. The numeric criteria (standards) established at Hoover, Parker, and Imperial Dams are 723 mg/L, 747 mg/L, and 879 mg/L, respectively. In addition to NPDES permits, the States have developed water quality management plans to conform with the requirements of Section 208 of the Clean Water Act.

PART II. DESCRIPTION OF BASIN

The Colorado River Basin encompasses portions of seven states: Wyoming, Utah, Colorado, Nevada, New Mexico, Arizona, and California. The river flows over 1,400 miles from its headwaters in Wyoming and Colorado. It joins with tributaries from Utah and New Mexico; flows through the Grand Canyon; provides state boundaries for Nevada, Arizona, and California; flows through the Republic of Mexico; and terminates in the Gulf of California.

The Colorado River provides municipal and industrial water for over 18 million people and irrigation water to 1.7 million acres. The river, however, carries about 9 million tons of salt annually past Hoover Dam. Projections indicate salinity levels increasing beyond numeric standards if controls are not implemented, even though recent high flows have flushed the major reservoirs. The result has been significantly lowered salinity levels at Imperial Dam--from an annual average of 826 mg/L in 1982 to 607 mg/L in 1985.

A. Climate

Extremes of temperature in the Colorado River Basin range from -50 to 130 degrees 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 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 Rocky Mountain National Park in Colorado, 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 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 River which drains a much smaller area.

Table II-1. Comparison of river basin drainage and runoff.

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 wide fluctuations from month to month and considerable variations from year to year. The storage reservoirs presently 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 to over 20 million acre-feet per year. The reservoir system allows sufficient storage 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 flow of the San Juan River is 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, supplies most of the storage and regulation in the Lower Colorado River Basin, providing for irrigation, municipal and industrial uses, power generation, flood control, recreation, and many 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 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. 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. Section H, Main Stem Reservoir Quality, summarizes some of the water quality concerns of the Bureau of Reclamation.

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 Flaming Gorge 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 concerned with this problem. Studies are being conducted by Reclamation, the University of Wyoming, Utah State University, and Western Wyoming College in cooperation with the Wyoming Department of Environmental Quality and the EPA to evaluate possible solutions.

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 concentrations. 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 a National Pollutant Discharge Elimination System (NPDES) 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

Data analyzed from October 1983 through September 1985 generally indicate that total phosphate levels are moderately exceeding the criteria for assigned beneficial uses statewide. Concentrations of total phosphates 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. Total phosphates come from natural, agricultural, constructional, recreational, mining, and municipal sources. Natural sources of total phosphates are from rock minerals which contain phosphorus. These minerals, namely calcium orthophosphate, are widespread and found in igneous rock and in marine sediments. Phosphate fertilizers contribute total phosphate to stream systems from overland runoff where these fertilizers have been applied. Phosphorus is also a component of domestic wastewater and is carried through the treatment process.

Point sources of pollution can present water quality problems anywhere they are located but are usually more significant in highly populated areas. Wastewater treatment facilities concentrated in certain drainages because of increasing populations can seriously impact receiving streams.

Many of the remaining water quality problems result from nonpoint sources rather than point source discharges. Nonpoint sources of pollutants include natural geologic formations, failing individual wastewater disposal systems, urban sources, hydrologic modifications, agriculture, mining, recreation, construction, and silviculture. Natural sandstone formations in eastern and southern Utah contribute significant amounts of sediments through erosion. Natural deposits of salts, phosphates, fluorides, nutrients, and arsenic also contribute to water quality degradation.

Most of the water allocated in Utah is for agricultural use, resulting in 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. Return flow discharges add salts, nutrients, and sediments from croplands into stream channels. Overland runoff contributes salts, sediments, and nutrients from nonirrigated croplands and coliform bacteria from pastureland. Minimum till and no till conservation measures, implemented and supported by Utah agricultural agencies, reduce runoff and runoff associated chemicals. These conservation tillage measures are beneficial advantages in controlling and reducing agricultural nonpoint source contributions.

Salinity will remain a water quality problem in Utah. High runoff has decreased total dissolved solid concentrations, but increased flows have increased total loadings to the Colorado River system. Salinity control is being implemented in the Uinta Basin. Investigations for salinity control alternatives are continuing in the Price, San Rafael, and Dirty Devil drainages. The State will continue to pursue the implementation of salinity control projects.

C. Colorado

The most significant water quality problems in the Colorado portion of the Basin relate to the maintenance of the existing high quality waters in streams and lakes that may be threatened by wastewater from growing communities and to the rehabilitation of 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 were expanded during the last several years to accommodate the expected increase in population brought about by growth in the recreation and energy sectors of the economy. The soft market for all energy fuel sources and high unemployment have left many communities with excess wastewater treatment capacity.

Ammonia in the un-ionized ammonia form occurs in low concentrations, particularly in the wintertime. Wasteload allocations for ammonia requiring advanced wastewater treatment have been developed for the Yampa, Roaring Fork, and Eagle Rivers. If the winter recreational population continues to grow, the un-ionized ammonia standard for aquatic life may not be met without advanced wastewater treatment along the San Miguel, Fraser, and East Rivers.

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. The mill has been closed for the past few years, and ammonia concentration in the river has dropped.

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. The State is seeking damages from companies owning mining properties through NRDS suits on several of these stream segments.

Improvement to the quality of Coal Creek by the AMAX Corporation treating wastewaters of the abandoned Keystone Mine 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 re-enter 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, possibly, to a lesser extent, in McPhee Reservoir. If these reservoirs act as permanent traps for heavy metals, downstream water quality could benefit. Municipal and industrial water from 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.

Several major sources of salt loading to the Colorado River 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 determine whether or not these standards are being met, a sampling program has been implemented. In 1983 and 1984, 13 locations were sampled in the Colorado River in Arizona. Six of these locations were sampled ten or more times; seven locations were sampled one to nine times. The parameters sampled were general field data, general chemistry, nutrients, dissolved and total metals, microbiology, radiochemicals, and priority pollutants. The sampling program has helped identify areas of concern within Arizona and is described in the State Water Quality Assessment Report prepared to satisfy Sec. 305(b) of the Federal Clean Water Act.

There is continued concern about meeting secondary drinking water quality criteria. At Parker Dam, average concentrations of some constituents exceed the U.S. Public Health Service drinking water recommendations.

A second concern, now that Colorado River water is being delivered to Central Arizona through the Central Arizona Project, is salinity. Municipal entities have raised concerns over any increase in salinity. They fear that an increase in salinity could limit their use of Colorado River water.

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 and suspended solids loading from these municipal sources to the wash and the lake. Monitoring conducted during 1983 indicated a 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 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 a mg/L of phosphorus for all point sources. The major point sources are the three large municipal facilities along the Las Vegas Wash.

Salinity, 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.

Another major concern is the high concentration of ammonia in Las Vegas Bay. During 1985-86, un-ionized ammonia was observed to be above the chronic toxicity level. Also, a large blue-green algae bloom occurred in 1986 and had an adverse effect on the beneficial uses of the bay.

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 fruits, 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 salinity and 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 water 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

No specific salinity problems have been identified within the Colorado River drainage in New Mexico. Water quality monitoring throughout New Mexico indicates that stream water quality generally good and is consistent with standards in over 90 percent of the perennial streams in the State; however, more than 500,000 tons of salt per year are picked up in the San Juan River below Farmington, New Mexico. In October 1985, the Bureau of Reclamation initiated the San Juan River Salinity Study to identify these and other salt sources in the San Juan Basin. The study is scheduled to be completed in FY 1989.

H. Main Stem Reservoir Quality

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 the 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 biological oxygen demand (BOD) loading reductions to the Flaming Gorge 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.

Other reservoirs on the Colorado River were found to be nutrient poor in 1981 and 1982 [1]. Lake Powell and Lake Mead were oligotrophic, low in productivity in the primary food chain, on the basis of area-weighted, average chlorophyll-a concentrations. Lake Mohave and Lake Havasu were found to be mesotrophic (medium productivity) 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 middle to lower Colorado River.

Since, most of the phosphorus is 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 contributes to the higher productivity 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 Bay during the winter and a tightening of the standards, as proposed by Nevada, may be warranted considering the low productivity in the river system and the damage occurring to the beneficial uses in Las Vegas Bay.

PART IV. CAUSES AND IMPACTS OF SALINITY

A. Causes of Salinity

The natural or background salinity of the Colorado River has been changed by the development of water resources in two major ways, the addition of salts and the depletion of water. One of the original studies by Iorns [2] on the pickup of salts showed that irrigated lands in the Upper Colorado River Basin contribute about 3.4 million tons of salt per year. This source of salt is one of the 2 major factors increasing salinity in the Colorado River. The other major factor which increases salinity is the consumptive use of water. The consumptive use of water has and will further reduce the dilution of both natural sources of salt and the new sources of salt caused by irrigation and other developments. Since irrigation is not likely to increase significantly, depletions will be the major cause of future increases in salinity.

1. Natural Sources of Salinity

Flow and quality records reveal that along certain reaches of the Colorado River large increases exist in salt loads occur that cannot be attributed to irrigation or other development related activities. These increases are 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 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. The natural salt load for the Colorado River at Lees Ferry, Arizona was estimated to be about 5.3 million tons per year [2,3]. 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

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

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. About 1.5 million acres were irrigated in 1980.

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 1980, nearly 400,000 acres were being irrigated from the Colorado River mainstream, total irrigated lands for the entire Lower Basin were about 1.5 million acres.

Irrigation in the Colorado River Basin has increased the salinity 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.

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.

4. Increased Salinity 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 water reduces the dilution of saline inflow, increasing the salinity of the Colorado River.

With the exception of the Central Arizona Project (CAP), the Lower Basin has already developed most of its water supply. CAP will soon be responsible for the last major additional depletion (approximately 1.5 million acre-feet per year) in the Lower Basin. Depletions in the Upper Colorado Basin were estimated at 4.1 million acre-feet in 1985.

Consumptive use of water for irrigation within the Basin is responsible for the largest depletions of the Colorado River. Exports, reservoir evaporation, and municipal and industrial uses also account for lesser but significant depletions. The following table summarizes both the Upper and Lower Colorado River Basin uses, including tributaries to the Colorado River in the Lower Basin [4].

Table IV-1. Average water use in the Colorado River Basin for 1976-80 (in 1,000 acre-feet)

Type of use	Upper Basin	Lower Basin
Reservoir evaporation and channel losses	758	1,682
Irrigated agriculture	1,984	5,180
Municipal and industrial	178	453
Fish, wildlife, and recreation	0	50
Transbasin exports	3,647	11,604

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 are projected to 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.

B. 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, waterskiing, 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 influences the temperature and nutrient releases from a reservoir. These releases can now be controlled to some degree by the use of selective withdrawal structures; however, conflicts have occurred in the operation of these facilities. The conflict stems from the difference in the optimum temperatures for cold water fish like trout and warm water endemic or endangered species like the squawfish.

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

A consortium of water resource 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.[6]

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.[7] 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 $610,200 per mg/L in 1986 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. This study is currently being updated, see Part IX, Economic Update to Salinity Impacts, for a summary.

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.

3. Health

The Environmental Protection Agency, Drinking Water Office, Health Impacts Laboratory sponsored a conference in May 1984 on Inorganics in Drinking Water and Cardiovascular Disease. 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 schoolchildren in two Massachusetts communities that sparked the 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 pressure among schoolchildren 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 water, 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 versus soft water primarily concluded that soft water was not harmful, but 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 are 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 health effect of a reduction in sodium and hardness expected from the Colorado River Salinity Control Program would be negligible.

PART V. HISTORICAL SALINITY CONDITIONS

A. Quality of Water Records

Salinity in the Colorado River Basin is monitored at 20 key 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 methods developed jointly between Reclamation and the USGS [8].

Historical streamflow, salinity concentrations, and salt load data at 20 key stations for January 1941 through December 1985 are presented in Tables 1 through 20 at the end of this report. Figure V-1 shows the historical salinity at Imperial Dam.

B. Historical Salinity

Salinity concentrations at Imperial Dam decreased steadily from 1970-79, dropped notably in 1980, increased sharply in 1981-82, and dropped again in 1983-84. 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 (see Figure V-2), 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 and the relatively high runoff in the Basin, salinities at Imperial Dam remained low through 1986. Under more normal conditions, salinity is expected to increase quickly back to 800 mg/L or more; however, as long as the runoff remains high, salinity will remain low.

C. Factors in Salinity Trends

The downward fluctuation of salinity at Imperial Dam during the 1970's is within the expected range and was simulated using the Colorado River Simulation System (CRSS), a computer model of the Colorado River Basin. Several factors complicate the analysis of the decline and leveling off of 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 salinity concentrations than years of higher flows. Combining this characteristic with the lag time in the reservoir system because of storage

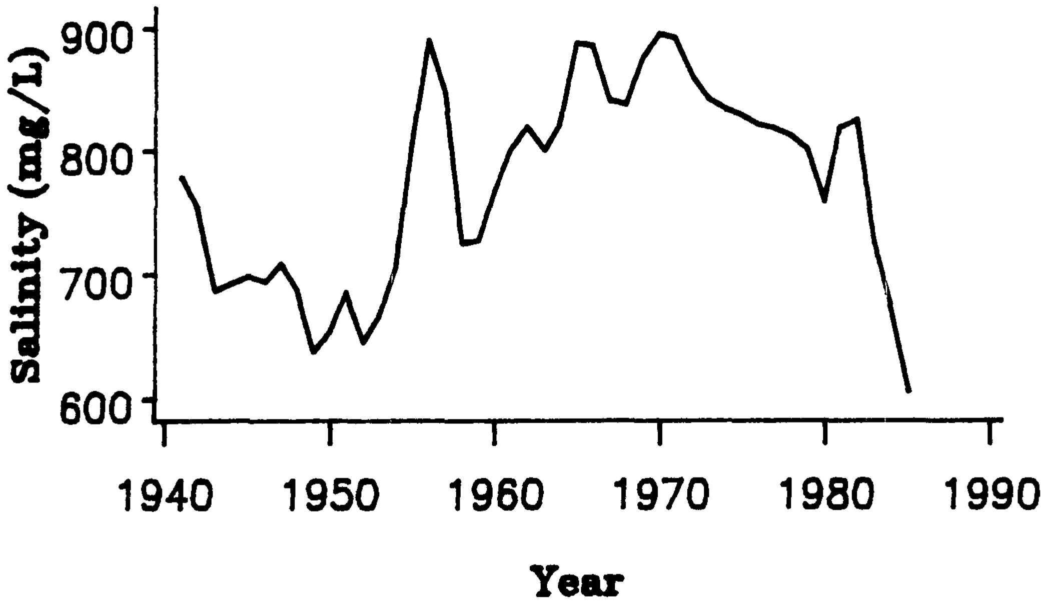

Figure V-1. Mean annual salinity at Imperial Dam (1941-85).

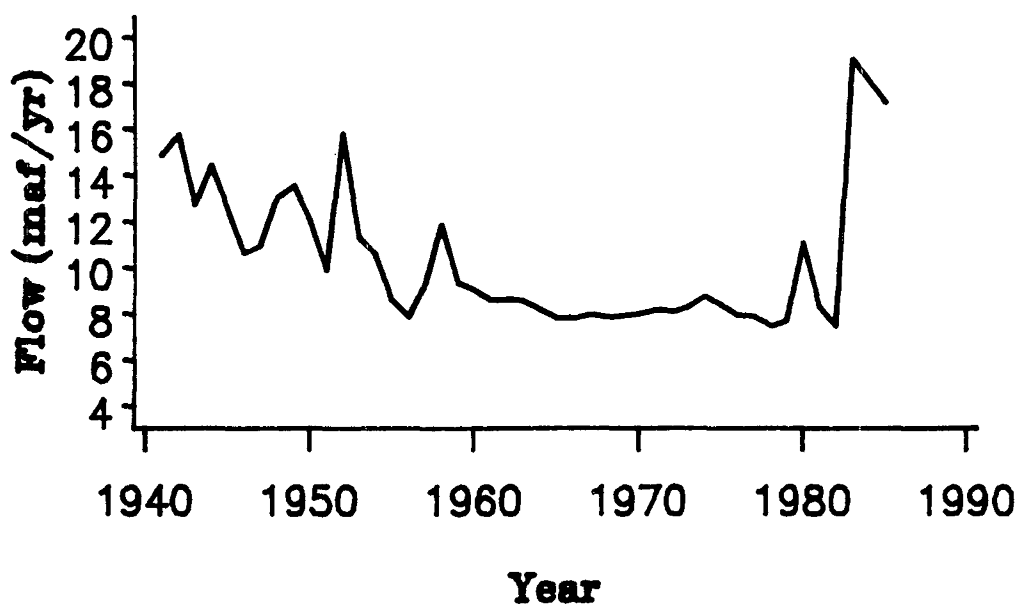

Figure V-2. Mean annual flow at Hoover Dam (1941-85).

suggests the decline of salinity 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 portion of the decrease in the salinity concentration observed at Imperial Dam.

The more recent period (1983-86) was even more extreme with some flows well above those ever recorded. This was probably the major cause of the near 200 mg/L drop in salinity over the last few years. A statistical analysis of the CRSS projections for salinity indicates that salinity will usually range between 635 and 1,035 mg/L, with an average of 820 mg/L under the present level of development; however, about 5 percent of the time salinity could vary outside this range, as it did in 1985 with a salinity of 607 mg/L.

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. One study [3] shows that storage in Lake Powell reduced the month to month variation from the mean salinity below Glen Canyon Dam from 299 mg/L to 72 mg/L. This is readily apparent in a plot of the data, Figure V-3.

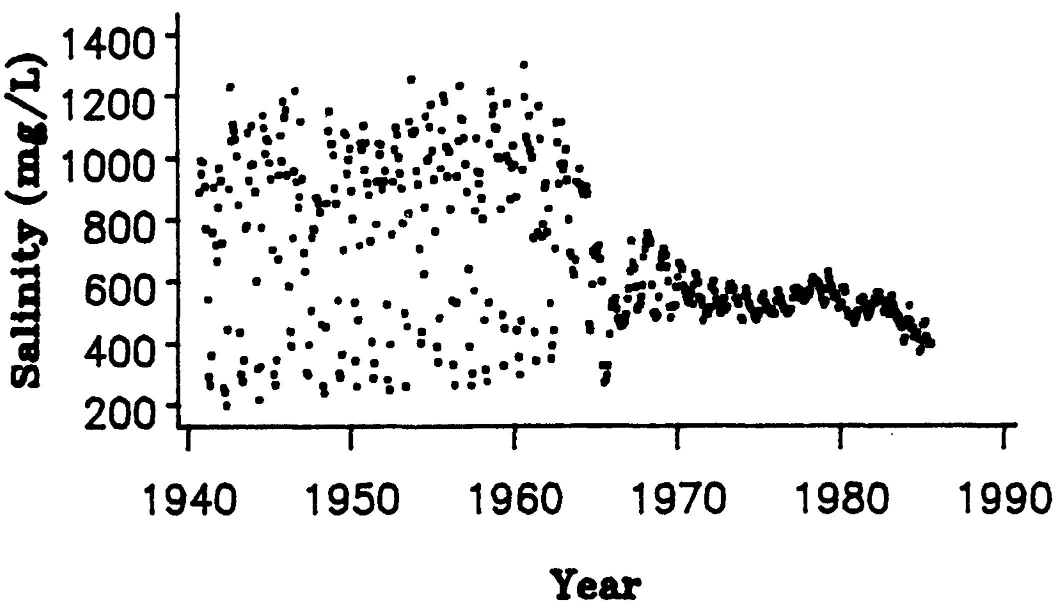

Figure V-3. Monthly salinity below Lake Powell (1941-85).

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. Water which was being used to fill the mainstem reservoirs is now being released. This has increased the flow to the

Lower Basin over the flows during the filling period (1963-80). Salinity would have been much higher now without these additional releases.

During the initial filling, significant leaching of gypsum (calcium sulfate) was documented at Flaming Gorge [9] and Ruedi Reservoirs[10] and at Lake Mead,[11] 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 salinity. There is strong evidence that Flaming Gorge Reservoir and Lake Powell have stored more saline water and routed the less saline spring runoff downstream from 1965 through 1980. These more saline waters were subject to bank storage, chemical precipitation, ion exchange, oxidation-reduction, and various biological activities.

Sedimentation in reservoirs may influence both salinity and the mix 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.

Another possible loss of salinity in reservoirs is due to chemical precipitation. This possible loss in salinity was investigated by Reclamation for the two largest storage reservoirs in the Basin, Lakes Powell and Mead. A thermal-hydrodynamics reservoir model, which incorporated chemical equilibria, was applied to each of the two reservoirs.

The estimated potential for calcite precipitation (the salt that precipitates from solution first) was found to be 20,000 tons per year for Lake Powell and 40,000 tons per year for Lake Mead. These estimates represent the upper limit of potential precipitation, as it assumes that there is sufficient nuclei for the calcium carbonate crystallization 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 which were based on inflow-outflow budgets using rather incomplete or inadequate data.

3. Irrigation and Increased Depletions

Most of the irrigation projects that deplete water and increase salt pickup to the river were 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.

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. Energy Exploration and Development

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. 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.

The development of energy resources, specifically coal, oil and gas, and oil shale, in the Colorado River Basin may contribute significant quantities of salt to the Colorado River. Salinity can be increased either by dissolution of minerals or consumption of good quality water. The location of fossil fuels are associated with marine derived formations. Any disturbance of the saline materials will increase the contact surfaces allowing for the dissolutions of previously unavailable soluble minerals.

Salinity increases associated with the mining of coal can be attributed to leaching of coal spoil materials, discharge of saline ground waters, and increased sediment yields resulting from surface disturbing activities. Spoil materials have a greater permeability than undisturbed overburden, allowing most of the precipitation falling on the spoils to infiltrate instead of running off. The water percolates through the unconfined spoils allowing greater opportunities for dissolving soluble minerals through increases in both contact surfaces and residence time. The water moves vertically until it encounters undisturbed bedrock where new springs can be created. The usual result is an increase in the volume of water because of reduced evapotranspiration and an increase in total dissolved solids.

Studies[12,13,14] conducted on post-mining spoils in northwestern Colorado indicate that the resulting TDS concentration of spoil derived waters ranges from approximately 3,000 mg/L to 3,900 mg/L. The variability in concentration is dependent upon water residence time and the chemical and physical properties of the spoil.

Saline water is a byproduct of the production of oil and gas in the Basin. It is not uncommon to produce several times the amount of saline waters as oil. Approximately 25,000,000 barrels of saline waters were produced during the December 1985 in Colorado from oil and gas operators. The salinity of production waters varies greatly from location to location and is dependent upon the producing formation. Common disposal techniques include evaporation, injection, and discharge to local drainages.

The future development of the oil shale resources in Colorado, Utah, and Wyoming has the potential to increase salt loading to the Colorado River. Salt increases can be attributed to the consumptive use of good quality water, mine dewatering, and, if surface retorting is used, the leaching of spoil materials similar to that of surface coal mining.

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 are probably 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 unit 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. Salinity Control Projects

The implementation of salinity control units prevented 126,800 tons per year of salts from reaching the river in 1985. By 2010, salinity control units will need to prevent slightly more than a million tons per year of salt from entering the Colorado River. To achieve this goal, a mix of salinity control methods are being investigated and constructed. Saline springs and seeps may be collected for disposal by evaportation, industrial use, or deep well injection. See Part VII, the Paradox Unit, for an example of a deep well injection alternative. Other methods include both on and off farm delivery system and irrigation improvements which reduce the loss of water and reduce salt pickup by improving irrigation practices and by lining canals, laterals, and ditches. See the Grand Valley Unit as an example of these kinds of improvements.

7. Erosion

Several researchers[15,16,17,18] have shown that erosion of saline shales and dissolution of efflorescence increase salinity during runoff events. These and previous studies have primarily focused on conditions caused by summer and fall thundershowers. Lower elevation snowmelt on marine (saline) geologic formations may contribute more significantly to salinity. Analyses of the Green River near the Green River station indicate that electrical conductivity (a measure of salinity) remains high or may increase with flow peaks associated with snowmelt runoff events in January through April.

During Reclamation studies on the McElmo Creek Salinity Control Unit, 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.

Studies [19] conducted on Mancos Shale within the Upper Basin of the Colorado river drainage have demonstrated a positive relationship between sediment yield and salt production. Sediment yield occurs as a result of either upland erosion, or streambank and gully erosion. Upland erosion is attributed to rill and interill. Salt and sediment yields are dependent upon storm period, landform type, and the soluble mineral content of the geologic formation.

Studies [20] conducted in the Price River Basin have demonstrated that the highest salt and sediment concentrations occur in the first streamflow event following a long period of no discharge. The accumulation of salts in the channel may be attributed to efflorescence resulting from the drying of the channel. Salt yields occurring after the initial flushing of the channel are similar to those found in the surrounding watershed soils.

Sediment and the resulting salt yield is highly dependent upon landform type. Three major landform types--badlands, pediments, and alluvial valleys--are associated with the Mancos Shale terrain.

Badlands are the most erosionally unstable, with sediment yields as large as 15 tons per acre [21]. Rilling accounts for approximately 80 percent of the erosion [20]. Because salt production is closely related to sediment yield and the badland soils have not been leached of their soluble minerals, they produce the greatest amount of salt of the landform types.

Pediments are gently inclined planate erosion surface carved in bedrock and generally veneered with fluvial gravels. The surface slopes of pediments are gentle, making them relatively stable. Pediments have deeper soils and higher infiltration rates than badlands, thus they support a greater vegetation cover and are less erosive.

Alluvial valleys are formed by a change in gradient and the deposition of sediment. They are stable except along the channel where headcutting and gullying occur. Most of the salts have been leached from the alluvial deposits, thus erosion of their landform type yields less salts per unit volume of sediment than the other two landform types. However, channels incised into alluvium incorporate both sediment and salt from sloughed channel backs and salts from efflorescence at the alluvium-bedrock contacts [19].

The soluble mineral content of saline formations is variable and can be significantly different within one stratigraphic unit. The variability is a result of the parent material, topography, microclimate, and leaching. As a result, the salts being contributed from any stratigraphic unit are very site specific.

The determination of the soluble mineral contact of surficial soils is highly dependent upon the sampling and analytical methods used. The effects of contact time and sediment to water ratios on rate and extent of dissolution are extremely important. Since much of the salt is dependent upon sediment load, contact time and sediment to water ratio must be considered. Laronne [22] recommends a sediment to water ratio of 1 to 99. This ratio allows for greater dissolution of salts and a better estimate of salinity being contributed from erosion.

8. Geochemistry

Water quality in the Colorado River Basin varies greatly. Most surface runoff originates from precipitation and is very low in salinity. Salinity 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 salinity. Runoff from snowmelt and thunderstorms, which causes 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. Salinity can, therefore, be very high, often exceeding 10,000 mg/L. Such spring waters vary in composition in the Basin. The waters of highest salinity 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). 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 salinity 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 salinity.

An intensive water and sediment sampling study [23] was performed in the Dirty Devil River Basin. Results of this study show that little additional salt loading would occur due to dissolution of sediments. 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.

PART VI. PRESENT AND FUTURE DEVELOPMENT

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

Table VI-1 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 1985 through 2010 represent the best estimate by the Bureau of Reclamation of how water use will be developed over the next 25 years. The projections were made after consultation with individual States within the Colorado River Basin; however, the States do not necessarily concur with the projections adopted by Reclamation for planning purposes.

A. Upper Basin Depletions

Table VI-1 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 1985 were developed by updating depletions reported in the Upper Colorado Region Comprehensive Framework Study published in June 1971. Projections of water use beyond 1985 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 VI-1 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 Arizona, Colorado, New Mexico, Utah, and Wyoming will share in the consumptive use of water available in the Upper Basin in the following proportions: Arizona 50,000 acre-feet, Colorado 51.75 percent of remainder, New Mexico 11.25 percent of the remainder, Utah 23.00 percent of the remainder, and Wyoming 14.00 percent of the remainder.

Table VI-1. Colorado River depletion projections.

(Unit--1,000 acre-feet/year)

Upper Basin projects	1985	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	10	34
San Juan-Chama	110	110	110	110
Navajo Indian irrigation	132	134	267	267
Hammond	10	10	10	10
Hogback Extension	7	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	429	504	651	663
Evaporation, storage units	58	58	58	58
Total	487	562	709	721
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	53	136	166	166
Upalco Unit	0	0	12	12
Jensen Unit	3	15	15	15
Uintah Unit	0	0	28	28
Emery County	10	10	10	10
Ute Indian lands	4	4	84	84
Division of Water Resources projects	15	16	20	24
Thermal electric powerplants				
Emery County	30	30	30	30
Conversion of irrigation to power	-9	-9	-9	-9
Other Utah Power & Light Company plants	0	0	2	6
Deseret Generation Co-op	0	6	12	12
Municipal and industrial				
White River Dam	0	0	0	6
Oil shale	0	0	1	20
Tar sands	0	0	6	18
Total depletions	774	877	1,048	1,095
Evaporation, storage units	120	120	120	120
Total	894	997	1,168	1,215
Upper Colorado River Basin totals				
Total depletions	3,563	3,934	4,495	4,810
Evaporation, storage units	520	520	520	520
Total	4,083	4,454	5,015	5,330

Table VI-1. Colorado River depletion projections (continued).

(Unit—1,000 acre-feet/year)

Upper Basin projects	1985	1990	2000	2010
Arizona				
Comprehensive Framework Study	10	10	10	10
Miscellaneous additional depletions				
Irrigation	6	6	6	6
Municipal and domestic	6	8	10	12
Navajo Powerplant	22	22	22	22
Gallup-Navajo Indian				
Water Supply Project (temporary)	0	(5)	(7)	(7)
Total depletions	44	46	48	50
Wyoming				
Comprehensive Framework Study	282	282	282	282
Miscellaneous additional depletions				
Irrigation and livestock	6	8	26	32
Municipal	6	8	11	13
Reclamation projects				
Seedskadee	6	17	20	20
Lyman	10	10	10	10
Savery-Pot Hook	0	0	0	0
La Barge	0	0	0	0
Transmountain diversions	11	19	39	50
Industrial uses				
Thermal electric	29	41	51	71
Mineral	30	40	56	62
Coal gasification	0	0	19	50
Oil shale	0	0	4	10
Proposed reservoir evaporation	0	0	6	6
Total depletions	380	425	524	606
Evaporation, storage units	73	73	73	73
Total	453	498	597	679
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	28	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	2	54	54	54
Reclamation projects				
Animas-La Plata	0	0	20	121
Bostwick Park	4	4	4	4
Dallas Creek	0	9	10	17
Dolores	7	36	80	81
Fruitland Mesa	0	0	0	0
San Miguel	0	0	0	0
Savery-Pot Hook	0	0	0	0
Upper Gunnison River Basin	1	5	10	15
West Divide	0	0	0	0
Municipal, industrial, and domestic				
Taylor Draw Reservoir	2	2	4	7
Stagecoach Project	0	2	4	4
Ruedi contracts	0	0	0	16
Blue Mesa contracts	0	5	10	10
Oil shale	0	0	2	8
Rock Creek	0	15	15	15
Bluestone	0	4	4	4
Green Mountain	0	2	2	2
Thermal-electric powerplants				
Craig-Hayden	17	18	18	18
Colorado Ute-Southwest Project	0	0	5	5
Total depletions	1,936	2,082	2,224	2,396
Evaporation, storage units	269	269	269	269
Total	2,205	2,351	2,493	2,665

Table VI-1. Colorado River depletion projections (continued).

(Unit--1,000 acre-feet/year)

Lower Basin projects	1985	1990	2000	2010
Nevada				
Las Vegas Valley	78	143	203	225
Boulder City, Nev.	5	6	8	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	6	18	22	0
Fort Mohave Indian Reservation	0	4	8	8
Laughlin and miscellaneous users below Hoover Dam	1	5	7	7
Total	92	178	250	250
Arizona				
Imperial Wildlife Refuge	13	13	13	13
Havasu Wildlife Refuge	37	37	37	37
Fort Mohave Indian Reservation	36	60	60	60
Kingman, Boulder Canyon Project	0	0	9	18
Mohave Valley Irrigation and Drainage District	24	30	41	41
Lake Havasu Irrigation and Drainage District	14	14	14	14
Central Arizona Project	54	1,515	1,488	1,464
Colorado River Indian Reservation	346	383	398	398
Cibola Wildlife Refuge	17	17	17	17
Gila Project	450	450	450	450
Welton-Mohawk Division				
Yuma Mesa Division				
City of Yuma	10	13	18	23
Yuma Project and Yuma Auxiliary Project	212	212	212	212
Cocopah Indian Reservation	2	2	2	2
Other uses	83	54	41	51
Total	1,298	2,800	2,800	2,800
California				
City of Needles	3	1	1	1
Metropolitan Water District	800	518	497	497
Fort Mohave Indian Reservation	9	9	9	9
Chemehuevi Indian Reservation	3	5	8	8
Colorado River Indian Reservation	12	15	33	33
Palo Verde Irrigation District	423	423	423	423
Yuma Project				
Indian Unit	24	24	24	24
Bard Unit	35	30	30	30
Imperial Irrigation District	2,943	3,029	3,029	3,029
Coachella Valley Water District	344	344	344	344
Other uses	27	2	2	2
Total	4,623	4,400	4,400	4,400

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.

1. Arizona

a. Miscellaneous Additional Depletions

Consumptive uses due to irrigation and stockpond evaporation have increased by about 6,000 acre-feet since the Comprehensive Framework Study estimates were prepared. Municipal and domestic uses have increased by about 6,000 acre-feet. It is expected that an additional 6,000 acre-feet will be used for municipal purposes for the Navajo Indian Nation and for the city of Page, Arizona. 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 22,000 acre-feet over the 1980-85 period. The contract for sale of water out of Lake Powell allows for annual uses of up to 34,100 acre-feet; however, present physical limitations preclude this level of use.

2. Wyoming

a. Miscellaneous Additional Depletions

Values used for 1985 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.

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. Repairs now underway at Fontenelle Dam will severely restrict storage capacity until the expected completion date of 1989.

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 have yielded up to 125,000 acre-feet of additional water for use in Wyoming. This additional yield was based on the assumption that Reclamation's direct flow irrigation water right could be converted to a direct flow municipal and industrial right. In 1983, the Wyoming Supreme Court ruled, in another case, that the State Engineer does not have the power to grant a change of use for unexercised rights. This has put a cloud of doubt over what the ultimate yield of the reservoir will be. The State Engineer is currently considering an application from Reclamation to convert the large inactive capacity to active capacity. The outcome will determine the scale of development and resulting yield that can be expected from Fontenelle Reservoir. Existing and projected uses of water under these contracts are discussed below under industrial uses. The projections assume that uses will be determined by needs and not by a limitation in reservoir yield.

The Seedskadee Project provided for the development of the Seedskadee National Wildlife Refuge located on the Green River below the dam. In 1985, 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 1985, 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. The total transmountain diversions for 1985 was estimated to be 11,000 acre-feet.

(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, and it is believed that this figure remains unchanged.

(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, and it is believed that this figure remains unchanged.

(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 9,807 acre-feet in 1985. Over the period 1971-85, however, deliveries averaged 6,602 acre-feet.

In 1980 the Wyoming State Engineer stated that he anticipated that out-of-basin diversions will increase to 50,000 acre-feet by 2010. The 50,000-acre-foot depletion to the Little Snake River will occur not only as a result of the Cheyenne-Laramie Diversion (estimated to ultimately amount to 20,000 acre-feet), but also as a result of the development of Stage III of the proposed Little Snake River Water Management Project which will 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 has stated 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 the Seedskadee Project.

(1) Thermal Electric Power

Major thermal electric powerplants in operation in 1985 are as listed below.

Powerplant	Megawatt (MW)
Viva Naughton No. 1	160
Viva Naughton No. 2	220
Viva Naughton No. 3	330
Jim Bridger No. 1	500
Jim Bridger No. 2	500
Jim Bridger No. 3	500
Jim Bridger No. 4	500
	2,710

The Viva 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 Viva 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 1985 for thermal electric units built since 1965 are estimated to be 29,000 acre-feet a year.

The Wyoming State Engineer estimates that water uses for new thermal electric power generation will increase by 12,000 and 22,000 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 Viva 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 estimated that 23,700 acre-feet of additional depletions had occurred in the mineral industry since 1965.

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 under construction 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 process water.

(3) Coal Gasification

The Wyoming State Engineer has estimated that by the year 2000 the coal gasification industry will deplete about 19,000 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 has estimated a depletion by this use of about 3,500 acre-feet in the year 2000.

Projections of industrial uses beyond the year 2000 are largely arbitrary and reflect a growing use until the year 2010. No attempt has been made to identify individual industrial uses.

3. New Mexico

a. Adjusted Comprehensive Framework Study

Several water uses listed in Table VI-1 were included in the Comprehensive Framework Study. The Comprehensive Framework Study values in Table VI-1 were adjusted by subtracting out the following values to avoid double accounting: Navajo Reservoir evaporation, 31,000 acre-feet; Hammond Project irrigation, 10,000 acre-feet; and Four Corners Powerplant, 15,000 acre-feet.

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)

Reclamation estimates a depletion level of 10,000 acre-feet by 2000 and 34,000 acre-feet by 2010.
See the discussion of the Animas-La Plata Project in the Colorado section.

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 1985, Blocks 1 through 5 were in production and some water had been delivered to Block 6. Historical net diversion from Navajo Reservoir in 1985 was 131,815 acre-feet, rounded to 132,000 acre-feet for the report. Some return flow from the project have been observed; however, it has been assumed that the depletion of river flow is 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.

If satisfactory funding of the project continues, it could be completed in 1995, so the ultimate depletion of 267,000 acre-feet is shown for 2000. Half that amount has been arbitrarily assumed for 1990.

g. Hammond Project

In 1985, the Hammond Project delivered 14,850 acre-feet of water to irrigate 2,972 acres of farmland at an average of 5.0 acre-feet per acre. The project depletes 10,000 acre-feet per year if all of the project lands (3,930 acres) are fully irrigated.

h. Hogback Extension

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 7,000 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. By letter dated July 10, 1985, the New Mexico Interstate Stream Commission recommended to the Secretary of the Interior that a contract be awarded to the Jicarilla Apache Tribe in the amount of 3,000 acre-feet per year to the year 2025.

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 1985 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 1985, 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, a value of 16,000 was used 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. By letter dated July 10, 1985, the New Mexico Interstate Stream Commission recommended to the Secretary of the Interior that the existing contract with the Public Service Company of New Mexico be extended to the year 2025.

(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. By letter dated July 10, 1985, the New Mexico Interstate Stream Commission recommended to the Secretary of the Interior that the existing contract with UII be extended to the year 2025.

(3) Gallup-Navajo Indian Water Supply Project

The Bureau of Reclamation, Southwest Region, is currently conducting project investigations to supply water to Gallup, Navajo Indian communities and the proposed New Mexico Generation Station. Total project needs identified at this time are 56,500 acre-feet per year of which close to 100 percent would be depleted. Reclamation has been asked not to address the legal water availability issues of the project. So until a viable plan is identified and accepted, and until water right and water availability issues are agreed upon, this report will use the values published in the Regional Director's 1984 Planning Report.

(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 used for 1985 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 1985 values of "Miscellaneous Additional Depletions" may be either real additions or differences resulting from new depletion accounting procedures. Colorado depletion values through the year 2010 were provided by the Colorado Water Conservation Board, the Colorado River Water Conservation District, or were estimated by Reclamation staff.

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 through the year 2010 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 2000 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 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 longtime 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

Windy Gap Dam has been completed and is in operation. Facilities of the Colorado-Big Thompson Project are 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.

g. Animas-La Plata Project

A Feasibility Report was prepared by Reclamation 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 a total depletion of 154,800 acre-feet per year for irrigation and municipal and industrial use with 120,700 acre-feet in Colorado and 34,100 acre-feet in New Mexico. Depletions will not begin until the late 1990's when Ridges Basin Reservoir is completed. Uses will build up rapidly as other project facilities are constructed.

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. Initial storage will commence in 1987. 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 9,000 acre-feet by 1990, 10,000 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. 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 36,000 acre-feet in 1990, 80,000 by 2000, and by 2010 the project will be fully operational. Present uses are about 7,000 acre-feet.

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 administrative 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 to be 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 Planning Report has been prepared by Reclamation 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. Somewhat arbitrary levels of development were used for the period 1990 to 2010.

o. West Divide Project

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. Taylor Draw Reservoir Project

Taylor Draw Dam filled in 1984. Depletion values were supplied by the Colorado River Water Conservation District.

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 9,000 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

Previous 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 were 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. Present estimates suggest that there will be no significant use of Ruedi water until 2000; therefore, the depletion values have been set back 20 years, and a value of 16,000 acre-feet is shown for the year 2010.

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 2000 and that it will be 100 percent consumed.

t. Oil Shale

Projections of water depletions for oil shale development contain a high degree of uncertainty. Values shown in Progress Report No. 12 were provided by the Colorado Water Conservation Board. For the present table, Reclamation has chosen to assume that development will be deferred by one decade, so all depletion values have been postponed 10 years. These values do not include water contracted out of Ruedi Reservoir for the oil shale industry.

u. Rock Creek, Bluestone, and Green Mountain Sales

These projects and depletion values have been added to the table at the suggestion of the Colorado River Water Conservation District. Rock Creek is located on the Upper Colorado River near Kremmling. It is a transmountain exchange for municipal and industrial uses. Bluestone is located near DeBeque and will be used for industrial and oil shale uses. Sale of water out of Green Mountain Reservoir will be used for augmenting water rights, for irrigation, and at ski areas.

v. Craig-Hayden Powerplants

In 1985, two units at Hayden and three units at Craig were on line. Present use of water is estimated to be about 17,000 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.

w. Colorado Ute-Southwest Project

Colorado-Ute Electric Association is planning two 400-MW units in western Colorado. Four 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 of 9,000 acre-feet.

5. Utah

a. Miscellaneous Additional Depletions

Values used for 1985 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 1985 are estimated to be about 53,000 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; however, recent decisions have been made by Reclamation to suspend activity on this unit indefinitely. 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 3,000 acre-feet in 1985. 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 the 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. Recent negotiations between Reclamation, the power company, and the water district resulted in the purchase of 2,000 acre-feet of additional project water. It is estimated that this has resulted in a decrease of Emery County depletions to 10,000 acre-feet in 1985. This assumes a two to one conversion rate, i.e., 8,000 acre-feet of project water sold to Utah Power & Light Company will result in a 4,000-acre-foot reduction in irrigation depletion.

g. 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.

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.

h. Division of Water Resources Projects

In August 1984 the Division of Water Resources (DWR) of the State of Utah made a determination which showed that about 15,000 acre-feet of water would be depleted in 1985 by DWR sponsored projects. The division estimates that depletions will increase to 28,000 acre-feet by 2020.

i. 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. Construction of the fourth unit has been suspended indefinitely. It was assumed that each unit will require 6,000 acre-feet a year. These figures result in an estimated 1985 use of 30,000 acre-feet.

Water from these two powerplants is and will come from (1) the purchase of 8,000 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.

j. 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. 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.

It is estimated that 18,000 acre-feet of diversion rights were used by the plants in 1985. This translates into a decrease in irrigation depletion of 9,000 acre-feet.

k. Other Utah Power & Light Company Powerplants

Utah Power & Light Company provided the values shown. Locations of the new units will depend on how the loads develop.

l. 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 began in 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 1995.

m. 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 2010.

n. 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 suggested by the Utah Division of Water Resources.

o. 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 recommended 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 will become fully operational (in 1992). In California, the Seven Party Agreement (August 18, 1931) also serves as a basis for estimates of future use within that State. Depletions for 1985 presented in Table VI-1 and used in projecting future salinity, see Part VIII, were estimated using 1984 use levels in the absence of more current data.

1. Nevada

a. Las Vegas Valley

The Las Vegas Valley consumed about 79,900 acre-feet of municipal and industrial water in 1984 and includes diversions from the Basic Management, Inc. (BMI) pipeline and the Robert B. Griffith (RBG) water project. The latter project delivers water to Las Vegas Valley Water District, North Las Vegas, Henderson, and Nellis Air Force Base. The BMI pipeline serves municipal water to Henderson and BM industries in Henderson.

b. Boulder City

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 1984, Boulder City diverted about 5,400 acre-feet from RBG, and less than 50 acre-feet from its older, separate federally constructed system.

c. 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 1984, 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.

d. Miscellaneous Users Above Hoover Dam

Two corporations have contracts permitting diversion of 1,048 acre-feet per year of Lake Mead water. In 1984, only 616 acre-feet were diverted. It was projected that 1,000 acre-feet, on the average, will be consumed through the year 2010.

e. Mohave Steamplant, Southern California Edison Company

A portion of the allotment for Nevada 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.

f. Fort Mohave Indian Reservation

There are 1,939 acres of Fort Mohave Indian Reservation land located in Nevada. In 1984, 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.

g. Laughlin and Miscellaneous Users below Hoover Dam

Uses in the Laughlin area totalled 31 acre-feet in 1984, 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 1984, the refuge diverted no water. 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 1984, it was estimated the refuge diverted no water. 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 mainstream depletion of about 75,900 acre-feet annually.

In 1984, the estimated consumptive use for that portion of the Fort Mohave Indian Reservation located in Arizona was 41,400 acre-feet.

d. Kingman, Boulder Canyon Project

A contract was signed with the city of Kingman, Arizona, 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 1984 decree accounting shows that the Mohave Valley Irrigation and Drainage District diverted 23,500 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. The decree accounting is in accordance with Article V of the Supreme Court Decree in Arizona vs. California.

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 9,100 acre-feet from the Colorado River in 1984. 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 1991 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.

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 mainstream 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 1984, the refuge used 5,400 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 10,800 acre-feet of water in 1984 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. The decree accounting now credits unmeasured return flow for the water user in these projects within broad limits.

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 1984, its water use amounted to about 4,300 acre-feet.

n. Other Uses Below Imperial Dam

It is estimated that the many small users with water use contracts will have a consumptive use ranging from about 28,000 acre-feet in 1990 to 15,000 in 2010.

o. Bullhead City

There is a contract for 8,200 acre-feet per year included in other uses below Imperial Dam.

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 1984, it was estimated the city consumptively used 2,800 acre-feet. At this time, Needles does not have a water use contract with the Secretary of the Interior and so possibly could lose this source in the future if a contract is not signed.

A proposed plan was developed under the Lower Colorado Water Supply Study to provide Needles and other noncontract users an assured water supply. Under this plan, water would be pumped from wells into the All-American Canal for exchange with the Imperial Irrigation District and the Coachella Valley Water District. This would allow the city of Needles to pump an equal amount of water annually from the Colorado River. The plan would be accomplished by Reclamation installing wells along the southwest side of the All-American Canal in the sand dune area west of Yuma. The city of Needles then would be allowed to continue the existing use of Colorado River water by paying a portion of the operation and maintenance costs of these wells.

b. Metropolitan Water District

In 1984 the Metropolitan Water District used approximately 1,234,000 acre-feet. Future use may be reduced as indicated in the tables so that California does not exceed 4.4 million acre-feet per year 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 1984, its consumptive use was about 20,800 acre-feet but will be reduced when the Central Arizona Project becomes fully operational.

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 mainstream 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 24,000 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 1984, the Imperial Irrigation District diverted about 2,667,000 acre-feet. Its projected diversions will reach 3,029,000 acre-feet in 1990.

i. Coachella Valley Water District

In 1984 the District diverted about 356,000 acre-feet.

PART VII. COLORADO RIVER BASIN 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 biennial Quality of Water, Colorado River Basin, Progress Report.

Figure VII-1, on the following page, shows the location of the Title I and Title II program study areas for both the Department of the Interior and the Department of Agriculture.

A. 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 obligations of the United States 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.

1. Coachella Canal Lining (Reclamation)

To assist in meeting the salinity control objectives of Title I, the Secretary of the Interior 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 Water District for partial repayment of the cost of the work.

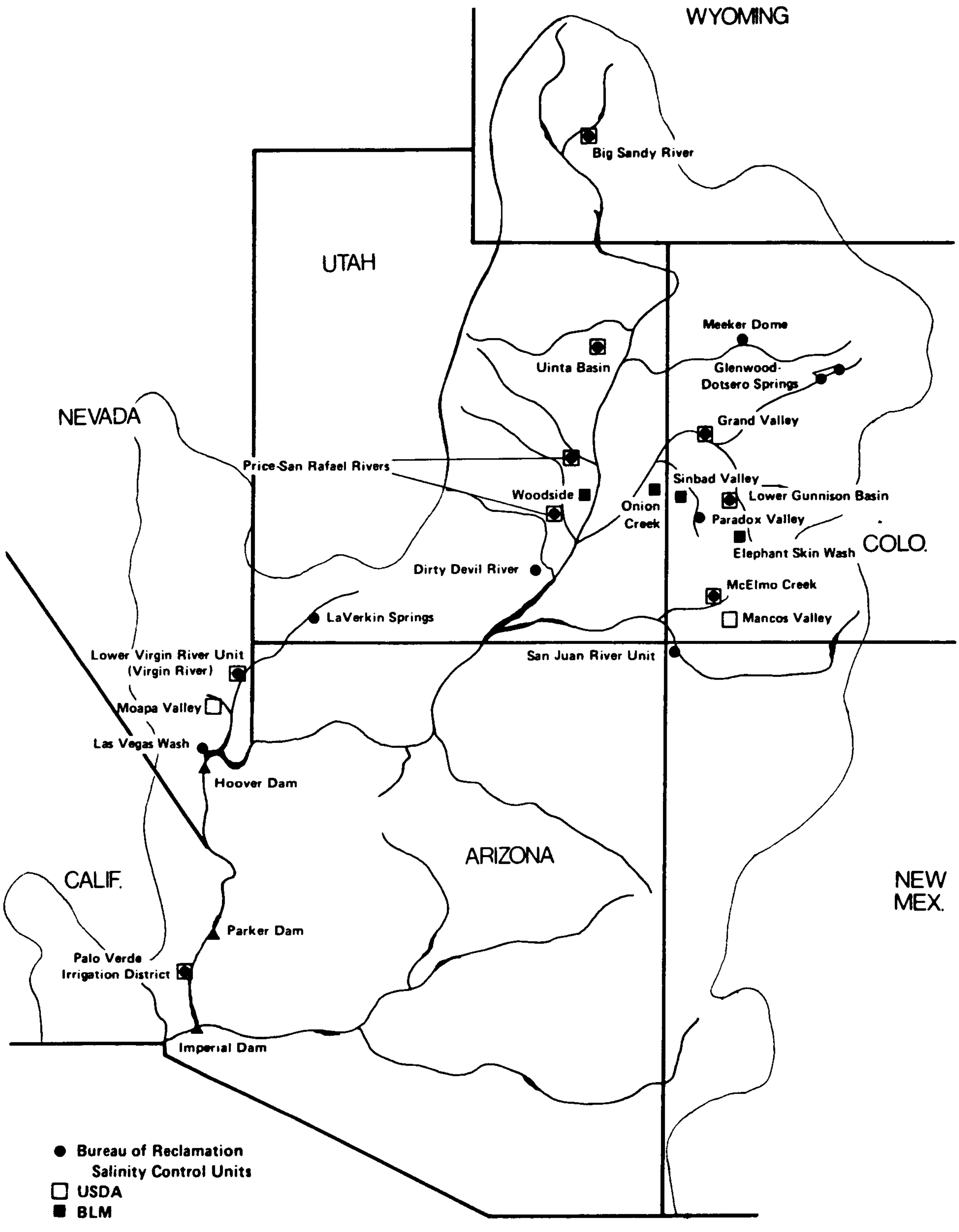

Figure VII-1. Map of Colorado River Basin Water Quality Improvement Program.

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 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 mainstream 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 Water District will then be the major beneficiary of this saved water. Construction of the canal was completed and put into service in 1980.

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 served from and adjacent to the lined canal would remain in production.

The contract with the Coachella Valley 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 Water District.

The Coachella Valley 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.

2. Protective and Regulatory Pumping (Reclamation)

The ground water reservoir underlying United States lands in the Yuma, Arizona, 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, Arizona. The well field, known as the Protective and Regulatory Pumping Unit, would have the capacity to produce approximately 130,000 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 in the 5-mile zone 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.

3. Yuma Desalting Plant (Reclamation)

The Yuma Desalting Plant is being built on a 60-acre tract of land 6 miles west of Yuma, Arizona. 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.

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 drain water 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 per 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.

In March 1985, Reclamation awarded the last of three major contracts for the construction of the Yuma Desalting Plant. The $35 million was awarded to complete the desalting plant pretreatment facilities and to construct equipment and office buildings. The contractor has 3.5 years to complete the work. Pretreatment start-up is planned for mid-1987, and the desalting plant is scheduled for completion in late 1989 or 1990.

4. Wellton-Mohawk Irrigation and Drainage District (USDA)

USDA's involvement relates specifically to on-farm treatments and water management improvements in the Wellton-Mohawk Irrigation and Drainage District (WMIDD) in Yuma, Arizona. Any reduction of drainage return flows would reduce the demands and costs of operating the desalting plant. By improving irrigation efficiencies, a reduction of deep percolation into ground water reduces the amount of drainage return flows leaving the 65,000 acre WMIDD.

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.

The Wellton-Mohawk on-farm Federal cost-sharing program was fully funded by Reclamation. Under authority of a Bureau of Reclamation and Soil Conservation Service Title I Memorandum of Agreement (December 1974), Reclamation reimbursed SCS for cost-sharing and technical assistance provided to individual participants through long-term contracts. The initial program for 23,800 acres was expanded during the annual renewal of the agreement in 1984 to 48,000 acres.

This last renewal provided that all SCS contracting would be completed by September 30, 1985, and that all water management and salinity control land treatment practices would be installed by December 31, 1985.

In 1985, 55 contracts were developed and signed covering 4,519 acres. Practices applied included 31 miles of ditch lining, 4,822 acres of laser land leveling, and 787 structures for water control and measurement.

The SCS designed irrigation systems and assisted farmers in their installation to reduce irrigation return flow. As of January 30, 1986, 366 contracts had been developed for assistance on 48,195 acres, which exceeds the project goals. Since implementation of the Colorado River salinity program began in 1975, the irrigation return flows have been reduced about half or approximately 100,000 acre-feet. This has been accomplished through the installation of over 1,386,000 feet (262.6 miles) of concrete ditch linings, 44,724 acres of land leveling, and 10,635 water control structures in addition to a concerted effort to obtain irrigation water management (IWM) on all 48,195 planned acres. There remains 112 active contracts covering 13,541 acres for which additional IWM activity will be carried out by the Wellton Field Office staff.

All construction work has been completed and all payment applications and final status reviews have been submitted during this final year of implementation. Federal costs were $2,426,879 while local individual farmer cost was $808,960. To date Federal cost for installation of all facilities has been $18,209,268.

The SCS will be conducting post-project studies to evaluate the effectiveness of the on farm treatment and water management improvements.

B. Title II Program Summaries

1. Bureau of Reclamation

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 now included in the Dolores Project, and the Paradox Valley Unit. Another unit, the Meeker Dome Unit, was completed in a verification well plugging program. No additional actions are planned for this unit.

Title II further 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).

In order to insure the effectiveness of Reclamation projects, several projects are being staged. Staging allows additional time to monitor actual results of salinity control methods and fine tune the techniques used to predict just how effective the project will be. In the Grand Valley Unit, the results of the Stage One monitoring program have significantly improved the confidence in the techniques used to predict effectiveness of both the Reclamation and USDA programs in the Grand Valley Unit. The results of this monitoring program have also improved confidence in similar applications in other units.

In 1985, Reclamation and the USDA formed the Technical Policy Coordination Committee (TPCC) to improve the coordination of salinity control investigations and construction of salinity control units. In the Grand Valley Unit, coordination of the data and methods used to evaluate the potential effectiveness of various salinity control techniques has improved the ultimate effectiveness of the programs by both Reclamation and the USDA.

Reclamation and the USDA are evaluating an alternative in the Price and San Rafael Basins which would combine the on-farm and off-farm delivery systems into one pressurized system. The combined system would allow farmers to use the pressure to help convert to a more water efficient sprinkler system and reduce salinity at a lower cost than would be possible with a more traditional delivery system.

Some of the Basin States have raised water rights issues over disposal of collected saline water in evaporation ponds, the primary disposal methods proposed early in the investigation of salinity control. 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.

At this point in time, there are only a few methods of salinity control which have passed all the tests of viability and are presently implementable: the lining of irrigation delivery systems, the deep well injection of brines (but only in the case of beneficial use), the plugging of flowing brine wells, the control of erosion in arid lands, and the control of deep percolation on-farm management systems such as sprinkler systems.

The use of saline water by industry has not proven to be very implementable due to a reluctance by industry to invest in new, unproven, and relatively expensive technologies. The problem is compounded greatly by the difficulty in timing the Federal portion of construction with that of industry. Industry is very often reluctant to depend on funding from Congress when the success of their business rests on their ability to get into production quickly. On the other hand, Reclamation cannot wait with money in hand to use when opportunities arise due to limitations in how Reclamation is funded.

2. Bureau of Land Management

The present salinity efforts of the Bureau of Land Management (BLM) have concentrated on the identification and recommendation for control of significant saline source areas on public lands. BLM has developed a resource management planning system that is multiple-use oriented but emphasizes solutions to specific issues.

Passage of amendments to the Colorado River Basin Salinity Control Act in 1984 required BLM to develop a comprehensive salinity control program, and to report to Congress and the Colorado River Basin Salinity Control Advisory Council concerning this program. Utilizing the planning system, saline source areas and management options for control of these sources are being identified. Watershed activity plans addressing salinity and implementation actions will be conducted 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, Colorado, as estimated by the Soil Conservation Service, is approximately \$30 to \$40 per ton of salt removed. 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.

Several activity plans have been completed in the States of Colorado, Utah, and Wyoming. Portions of these plans have been implemented with one, Elephant Skin Wash in Colorado, being fully implemented in 1985. This verification project is designed to prevent approximately 600 tons of salt from reaching the Colorado River annually at a cost of \$29 per ton.

In addition to nonpoint-source salinity control, BLM has also implemented point-source control measures. Point-source control measures include the plugging of abandoned oil and gas wells. The condition of two plugged saline flowing wells in the Piceance Creek Basin was monitored in 1985. These wells originally had a flow rate of 90 gallons per minute (gpm) with a dissolved solid concentration of 30,000 mg/L. This is equal to approximately 5,000 tons of salt per year. The plugs are still in place with no seepage to the creek.

3. U.S. Geological Survey

Determination of the overall goals and accomplishments of the salinity control program relies heavily on streamflow and dissolved solids data from key sampling stations in the Colorado River Basin. Since 1984, the U.S. Geological Survey has been analyzing the available data in order to develop a consistent, accurate data base for salinity studies in the Basin. This analysis has included consolidating historical records and studies, extending the historical record for certain stations, and generating a natural record of dissolved solids discharge which would have occurred if no water resource development existed in the Basin. The natural record was required specifically for prediction of future salinity by Reclamation.

Specific objectives of the data analysis project were: (1) generate annual and monthly loads and concentrations of dissolved solids and the major constituents for all stations with adequate record; (2) determine source areas of dissolved solids; (3) determine trends in streamflow, dissolved solids, and the major constituents; (4) identify causes of trends whenever possible; (5) develop a method for calculating natural salt load at the key Reclamation input points for CRSS; and (6) develop a technique based on hydrologic, hydraulic, and statistical principles to estimate complete monthly and annual dissolved solids load data sets for the period 1941-83, at 12 of the 20 stations in the Colorado River Basin which have varying lengths of record.

4. U.S. Department of Agriculture

The passage of Public Law 98-569 provides a separate authority for implementing a basin-wide USDA on-farm program. Funds, however, have not yet been appropriated for the program. Until then, as prescribed by the provisions of Title II of Public Law 93-320, USDA will continue to use existing program authorities.

Within USDA, planning activities are a responsibility of the SCS. Once irrigated agricultural salt source areas have been identified, SCS undertakes salinity control studies and investigations to determine the extent and severity of salt source loadings. These studies and investigations are conducted under the river basin authorities of Section 6 of Public Law 83-566, Watershed Protection and Flood Prevention Act. These studies are fully coordinated with Reclamation activities and serve as the basis for detailed project implementation plans.

In 1985, only a minimal planning effort was undertaken due to limited funding. The two reports released in 1985 were the Mancos Valley, published in September 1984, and the Colorado River Indian Reservation, published in May 1985.

Current implementation activities are concentrated in the Uinta Basin, Utah, and the Grand Valley, Colorado. Implementation of the USDA on-farm program is the responsibility of the ASCS and SCS. Currently, USDA is relying on the existing program authorities and funding for project implementation. The Agricultural Conservation Program (ACP) of ASCS is providing special cost-share funding for water management and salinity control practices. SCS is using funds allocated through their ongoing Conservation Technical Assistance (CTA) program to provide the necessary technical support staff to plan and implement the water management and salinity control practices.

The current implementation schedule is controlled by annual appropriations. While USDA developed a modified implementation schedule in 1982, funding has only supported the two ongoing projects. Other project implementation starts are scheduled to be phased in over a period of years as program funding levels increase.

A new implementation schedule was formulated as a result of new legislation, closer coordination with Reclamation, and inputs from the Basin States. The new implementation schedule is based upon projected salt load reduction needs, cost-effectiveness analysis, the likelihood of Federal funding, and Basin Fund repayment capability.

Monitoring and evaluation of the accomplishments of USDA actions in salinity control has a threefold objective. First and most important is to develop information about actual (rather than planned) on-farm effects that have occurred in the area. This information will enable farmers to make informed choices about voluntary implementation of salinity control practices. The information includes cost of practices, changes in water use, labor use, and other farm inputs, and finally, observed changes in crop yield and potential changes in net farm income. The second purpose is to enable SCS to confirm or correct the data used to plan salinity control projects to do a more reliable job of planning other projects. The final purpose is to collect data to be used to evaluate the overall effectiveness and efficiency of USDA salinity control activities from a program standpoint.

Although continuing to be hampered by shortage of staff and funding, SCS monitoring and evaluation activities moved ahead sharply during fiscal year 1985. In the Grand Valley Unit in Colorado, 16 automated irrigation monitoring and evaluation sites are now operational, and full-season irrigation data have been collected on 13 fields. Development of the software to process the monitoring and evaluation data proved to be a much larger task than initially estimated. Significant progress was made toward developing the needed software, but additional programming time will be required.

On the Uinta Basin Unit in Utah, ground water tubes have been installed on 15 farms, and efforts will begin to monitor ground water levels using neutron probes. Water inflow and outflow measurements on these farms will be combined with data from six potential evapotranspiration sites to measure deep percolation. The SCS staff is also working with Cooperative Extension in Utah to establish and monitor progress in irrigation water management on four farms.

A plan of study for the economics monitoring and evaluation effort was developed and approved for the Grand Valley Unit, and a worksheet to collect farm operations data was developed and field tested, and is ready for the staff to begin collecting data regarding the on-farm effect of salinity reduction activities.

Wildlife habitat monitoring and evaluation efforts have been strongly pushed during FY 1985. Baseline wildlife habitat conditions have been established for 30 additional sites in the Uinta Unit bringing the total sites evaluated to 60. Microcomputer programs have also been developed to calculate a habitat suitability index (HSI) for six species for each of the sites. These programs will enable the ready comparison of site habitat condition over time. On the Grand Valley Unit, a Wildlife M&E Annual Report for FY 1984 was prepared. The report gives preliminary data regarding changes that have occurred in wildlife habitat since the inception of the project.

Information and educational support activities have been provided through the USDA Federal Extension Service and the State Cooperative Extension Service (CES) agencies. Like ASCS and SCS, the Extension Service and the State CES agencies have relied on existing authorities and funding mechanisms to provide the extension education support. Existing extension staffs such as Extension Agents and Extension Irrigation Water Management Specialists have provided some general levels of limited education support. These include newsletters, water management workshops, and other educational efforts as a part of their ongoing extension education programs.

A special full-time irrigation extension agent in Grand Valley was the most significant extension education support in recent years. Lack of funding caused termination of the position in 1985. This sort of extension education support could play a valuable and important role in project visibility, local understanding, and local acceptance.

Research and demonstration activities continue to be important to the development of new technologies and improvement of water management practices for control of soil and water salinity. The Agricultural Research Service (ARS) provides national leadership for salinity related research and demonstration activities. In addition, the Cooperative State Research Service (CSRS) and State Agricultural Experiment Stations (SAES) provide the leadership and conduct research funded from Federal and State sources.

The majority of the ARS salinity activities are conducted at the U.S. Salinity Laboratory in Riverside, California; the U.S. Water Conservation Laboratory in Phoenix, Arizona; the Agricultural Engineering Research Center in Ft. Collins, Colorado; and the Snake River Conservation Research Center at Kimberly, Idaho.

C. Title II Unit Summaries

For comparison purposes, Table VII-1 on the following page summmarizes salinity control unit cost-effectiveness based on the same (8 5/8 percent) interest or discount rate and are indexed to January 1986 prices.

1. Big Sandy River Unit (Reclamation and USDA)

The Big Sandy River Unit is located in southwestern Wyoming, in Sweetwater County. The Big Sandy River begins in the Wind River Mountains where the water is good. 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.

Drilling investigations have shown that the shallow aquifers near the river are the source of saline seeps. Saline seeps and springs below the Eden Project contribute an estimated 116,000 tons of salt. Along with other tributaries, a total of approximately 164,000 tons of salt is contributed annually to the Green River. Test well pumping indicates that the saline water could be intercepted before seeping into the river.

Table VII-1. Salinity control unit cost-effectiveness summary.

Units 1/	Potential Salt Reduction (kton/yr)	Salt Reduction to Date (kton/yr)	Cost-effectiveness ($/ton)
Meeker Dome (Reclamation)	48.0	48 2/	14
Las Vegas Wash, Whitney (Reclamation)	10.0		16
Las Vegas Wash, Stage II (Reclamation)	66.0		17
Virgin Valley (USDA)	37.2		20
Las Vegas Wash, Pittman (Reclamation)	7.0	7	24
Big Sandy (USDA)	52.9		25
Grand Valley (USDA)	230.0	27.3	25
Lower Gunnison Winter Water (Reclamation)	78.5		28
Paradox Valley (Reclamation)	180.0		38
Lower Gunnison 2 Delta (USDA)	104.7		39
Moapa Valley (USDA)	19.5		41
Lower Gunnison 1 (USDA)	82.1		61
Lower Gunnison 2 Montrose (USDA)	81.7		65
Mancos Valley (USDA)	8.8		67
Price-San Rafael Rivers (Reclamation/USDA)	52.3		70
Lower Gunnison 3 (USDA)	12.0		70
McElmo Creek (USDA)	38.0		78
Uinta Basin (USDA)	98.2	15.6	82
Uinta Basin Stage I (Reclamation)	25.5		88
Dolores Project (Reclamation)	23.0		95
Grand Valley Stage Two (Reclamation)	120.3		96
Dirty Devil River (Reclamation)	20.9		98
Sinbad Valley (BLM)	7.5		102
Lower Virgin River (Reclamation)	44.4 3/		113
Glenwood-Dotsero Springs (Reclamation)	287.0		117
Grand Valley Stage One (Reclamation)	24.0	21.9	121
Lower Gunnison Stage I Balance (Reclamation)	66.3		190
Grand Valley Stage Two Balance (Reclamation)	23.2		307

Note: for comparability, all costs are based on interest or discount rates of 8-5/8 percent and are indexed to January 1986.

1/ Investigations and plan formulation have not progressed far enough to quantify the potential salt reduction on the Lower Gunnison North Fork Unit, San Juan River Unit, Uinta Basin Unit Stage II, and the Big Sandy River Unit.

2/ Cost effectiveness based on 19,000 tons. Almost 29,000 tons were removed prior to salinity control program.

3/ Includes 24,000 tons attributed to use of wastewater; cost effectiveness is basedon a reduction of 20,400 tons.

The State of Wyoming has been involved in the study from the beginning and has provided information, guidance, and funds. It has also supported further funding for advance planning studies.

Planning investigations have been ongoing since October 1980. The first recommended plan, the Chevron-Texasgulf Alternative, proved to be nonviable. Both the Chevron Chemical Company fertilizer plant and the Texasgulf Trona Plant near Green River did not experience expected growth. The next two alternatives involved piping saline water to Divide Basin for evaporation or piping it to the Jim Bridger Powerplant for cooling. The Divide Basin alternative was rejected and the Jim Bridger Powerplant and Chevron-Texasgulf alternatives were studied further. They were both determined to be uneconomical.

Additional studies were undertaken in the off-farm portion of the irrigated area of the Eden Project. Studies showed that lining some currently unlined canals in the Eden Project area could be a cost-effective solution to reducing salt in the Big Sandy River. The SCS completed a separate on-farm salinity control draft report in early calendar year 1986. The report recommends converting the existing gravity irrigation systems to low-head sprinkler irrigation systems. A combination of a lined delivery system and an on-farm sprinkler irrigation system could possibly achieve maximum benefits.

Ongoing studies are focused on the selective lining alternative. Field verification of canal seepage rates was completed in the fall of 1986. Results will help determine the cost effectiveness and will be documented in a plan formulation working document in early 1987. The State of Wyoming has been involved in the study from the beginning and has provided information, guidance, and funds. It has also supported further funding for advance planning activities.

A low pressure sprinkler system alternative appears to be cost effective for the 15,000 acre irrigation salt source area if supplemental, low interest loans and cost sharing at the 70 percent level were obtained. The State of Wyoming supports this USDA low pressure sprinkler alternative and has requested SCS to proceed with development of a selected plan.

The State of Wyoming has also requested Reclamation to refine the salt and water budget related to selected lining of canals and laterals in the Eden-Farson area. Planning will be targeted toward selected lining of unlined segments of the canal and lateral system.

The combination of an off-farm delivery system and on-farm irrigation efficiency allows SCS to recommend low pressure sprinkler systems for on-farm salinity program elements.

2. Blue Springs Unit (Reclamation)

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 a 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.

3. <u>Colorado River Indian Reservation Unit</u> (Reclamation and USDA)

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, Arizona, and the eastern part of the San Bernardino and Riverside Counties, California.

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.

A Cooperative River Basin Study has been completed by USDA on the Colorado River Indian Reservation. Data available from this study support the hypothesis that a minimal amount of salt is picked up on the reservation and that long-term benefits of better irrigation systems and practices appear to have a relatively small effect on downstream salinity. The final USDA report on the study, Water Conservation and Resource Development, Colorado River Indian Reservation, which did not identify a recommended plan, was recently published and distributed under authority of Section 6 of the Watershed Protection and Flood Prevention Act (Public Law 83-566).

4. <u>Dirty Devil River Unit</u> (Reclamation)

The Dirty Devil River Unit is located in Emery and Wayne Counties in southern Utah. The study area includes the Muddy Creek, the Fremont and Dirty Devil Rivers, and the tributaries of Muddy Creek, Hanksville Salt Wash, and Emery South Salt Wash. The Dirty Devil River drainage contributes approximately 150,000 tons each year to the Colorado River. The Muddy Creek tributary contributes the most salt, an average of 86,000 tons of salt annually. No significant sources of salt or potential alternatives were identified on the Fremont River or its tributaries. Approximately 28 percent of the Muddy Creek salt load, 24,200 tons per year, comes from springs in Hanksville Salt Wash and Emery South Salt Wash.

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.

The unit would be designed to reduce the salinity of the Dirty Devil and Colorado Rivers by collecting saline spring water in Hanksville Salt Wash and Emery South Salt Wash and disposing of it by deep well injection. Collection would be accomplished by pumping surface and alluvial water from shallow wells. This water would be filtered and chemically stabilized after which it would be injected into a deeply buried geologic formation, the Coconino Sandstone, where it would be stored indefinitely, and isolated from any fresh water aquifer now in use. This means of disposal would reduce the salt contribution to the Colorado River by 20,900 tons annually. The only alternative to the recommended plan is no action.

The Preliminary Findings Report was completed in 1983, the Plan Formulation Working Document in 1984, and the Field Draft Planning Report/Environmental Compliance Document in 1985. The field review was completed in May 1986, and the Draft Planning Report/Environmental Assessment was prepared in October 1986.

The Colorado River Salinity Control Forum recommended the study not continue into advanced planning because the State of Utah would not commit to granting a water right from a portion of its Colorado River Compact water allocation. All field investigations and advance planning activities ceased in 1985.

5. Glenwood-Dotsero Springs Unit (Reclamation)

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, and transporting the salt water 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 units being implemented and, under Colorado water law, evaporation is not considered a beneficial use of water. A planning report concluding the study was completed in February 1986. Other alternatives are being considered which involve a beneficial use of the saline water.

6. Grand Valley Unit (Reclamation and USDA)

The Grand Valley Unit is located in western Mesa County in west-central Colorado. For the most part, the unit area includes 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 the underlying Mancos Formation 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.

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

Development of the Grand Valley 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 moss and debris removal structure. This work was 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, was instrumented to monitor surface and ground water inflow and outflows. The canal and lateral salt loading reduction in Stage One was determined to be 21,900 tons.

Detailed information on surface and ground water inflows and outflows to selected basins within the unit were collected and used to develop water and salt budgets. In addition, an intensive drilling and aquifer testing program was conducted in both the areas underlaid by cobble deposits and in the weathered Mancos Shale areas. The purpose of this program was 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 Grand Valley. Stage Two investigations, which began in November 1981, included a reevaluation of various alternatives. In addition to lining with various types of material, measures studied included installing barriers, consolidating conveyance systems, and industrial use of saline water.

In May 1983, the recommended plan was selected for Stage Two. The plan provides for replacing existing open earth laterals with buried pipe and membrane lining three reaches of the Government Highline Canal. Construction of the west end of the canal is scheduled to begin in the fall of 1986 and construction of the west end portion of the Government Highline Canal laterals is scheduled to begin in fiscal year 1988. The remaining lateral systems will be improved approximately in order of cost effectiveness, with construction concluding about the year 2005. The supplement to the definite plan report and the final environmental impact statement were filed with the Environmental Protection Agency May 23, 1986.

USDA's on-farm and off-farm lateral improvements in Stage One and Stage Two Grand Valley have been accomplished primarily through the annual practice cost-share provision of the ASCS's ACP program. On-farm pipeline and ditch lining installed during calendar year 1985 was 135,944 feet and 18,148 feet, respectively. Total on-farm pipeline and ditch lining accomplishments thus far are approximately 141 miles of pipeline and 41 miles of ditch lining. Combined, these accomplishments represent about 27 percent of the total Grand Valley project goal.

USDA's off-farm lateral improvements for calendar year 1985 consisted of 18,717 feet of pipeline improvements and 2,956 feet of ditch lining. Cumulative off-farm lateral accomplishments for the project are 37.1 miles of pipeline and 11.4 miles of ditch lining, representing 25.5 percent of USDA's overall project goals.

USDA's on-farm seepage or deep percolation reductions from all treatments to date are estimated to be 4,159 acre-feet per year for an average salt load reduction of 20,675 tons per year. Off-farm lateral seepage reductions from all treatments to date are 2,281 acre-feet per year for 11,470 tons of salt load reductions per year. Total seepage/deep percolation reductions are 6,439 acre-feet through calendar year 1985 for a 32,145 tons per year salt load reduction from USDA activities in both Stage One and Stage Two.

7. La Verkin Springs Unit (Reclamation)

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.

8. Las Vegas Wash Unit (Reclamation)

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 1,500 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 150,000 tons per year; however, the wastewater leaches an additional 80,000 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 by the Pittman Verification Program. Once-through cooling water discharged by industries near Pittman has been diverted form unlined ditches to a 3.5 mile pipeline. Piezometers in the Pittman area are being used to monitor ground water levels and quality. The curtailment of seepage from the unlined ditches was followed by a drop in ground water levels, which is a good indicator of reduced saline ground water inflow to the Wash. A long term reduction of 7,000 tons per year is expected.

The ground water flow reduction strategy is being studied by the Whitney Verification Program. A ground water detention basin (formed by a peripheral slurry trench/wall) would be constructed near the historic community of Whitney. The detention of ground water upstream of the wall is expected to reduce the deep percolation of less saline surface water.

The completion of the Pittman and Whitney Verification Programs is expected near the end of 1989. The information learned from these programs would then be used to develop a salinity control plan that will have local support.

9. Lower Gunnison Basin Unit (Reclamation and USDA)

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 Delta and Montrose Counties. The area which encompasses the communities of Delta, Montrose, 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 program is expected to be completed in 1987. 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 water systems. Water users who use winter stock water have been identified through a pre-application form sponsored by the Uncompahgre Valley Water Users Association.

The SCS on-farm report completed in September 1981 outlines an implementation plan that is compatible with the Reclamation plan. Four cost-effective subareas have been identified for high priority implementation.

10. Lower Gunnison Basin Unit, North Fork Area (Reclamation)

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, Crawford, Hotchkiss, and Paonia. The study area includes about 67,750 acres of irrigated land which includes farms, ranches, and orchards. A large portion of the study area is undeveloped land composed of soils derived from the Mancos Formation. Portions of the study area have been investigated by Reclamation for irrigation projects thus providing some information.

The major source of salt in the study area appears to be primarily gypsum from the Mancos Formation and from its soils. The distribution of this salt does not appear to be uniform; 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; however, a significant amount of salt loading appears to be contributed by nonirrigation (natural) sources due to the large drainage area and the extent to which it is underlain by Mancos Shale soils, abandoned gas, and oil exploration wells.

Although this investigation is in its very early stages and salinity studies are in initial stages, an estimated 480,000 tons of salt per year is believed to be contributed from the North Fork area. SCS determined, from its on-farm Lower Gunnison Basin salinity study, that a total of 840,000 tons of salt is contributed from the North Fork area and Uncompahgre Valley. Reclamation has completed a study of the Uncompahgre Valley and found that about 360,000 tons of salt is contributed from that area; the remaining 480,000 tons is assumed to be contributed by the North Fork area.

Preliminary salinity control concepts to be considered for this study include selectively lining canals and laterals and providing piped winter stock water rather than operating canals and laterals year round. Other concepts will be considered as the investigation proceeds.

Water quality and quantity monitoring in surface streams is underway. A contract for aerial photography was completed during the fall of 1984 providing information for environmental, hydrosalinity, and engineering studies. A synoptic river survey will be conducted and a river budget completed during the summer of 1986. This data will aid in identifying the highly saline areas within the study area for more detailed study.

11. Lower Virgin River Unit (Reclamation)

This unit is located along the Lower Virgin River in northeastern Clark County, Nevada, and northwestern Mohave County, Arizona. The unit includes natural saline springs averaging 2,900 mg/L near Littlefield, Arizona, 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, Arizona." The object of that investigation was to determine the best method of collecting and disposing of the water and returning the fresh water 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, Nevada, 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 dual purpose water supply and salinity control project would be feasible. The power company presently plans to construct a new 1,000 MW powerplant in the area for a 1994 startup. Consequently the study is focussing on formulation of a project to supply the water needed, about 4,000 acre-feet per year. Salinity of the available subsurface water ranges from 2,000 to 10,000 mg/L.

12. Mancos Valley Unit (USDA)

This unit has also met the prerequisite for construction and is awaiting funding. The Mancos Valley Unit is a 9,200-acre irrigated area along the Mancos River, a tributary to the San Juan River. The report, Irrigation Improvements for Mancos Valley, was completed in 1985.

The recommended implementation plan includes 3,200 acres of sprinkler systems and other water management/salinity control treatment on about 5,500 total acres. About 17 miles of canal and lateral lining would combine many old earthen laterals. Total salt load reductions are estimated to be 8,800 tons per year with about 7,700 tons resulting from lateral improvements. About 57 landowners and 15 lateral companies or groups of landowners would be involved.

13. McElmo Creek Unit - Dolores Project (Reclamation and USDA)

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 and diffuse sources, with irrigation being the main contributor.

The total irrigation diversion into the drainage area averages 105,200 acre-feet per year. The average salt load contributed by the Basin is estimated at 119,000 tons per year. The Montezuma Valley Irrigation Company diverts water from the Dolores River that serves the McElmo Creek Basin. The salinity of the diversion averages 130 mg/L, while McElmo Creek salinity is about 2,600 mg/L 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.

The McElmo Creek Unit was authorized 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 McElmo Creek USDA salinity control report was published in 1983. The recommended implementation plans call for treatment of about 19,700 acres with sprinkler irrigation systems (10,400 acres gravity and 9,300 acres pumped) and about 270 miles of onfarm ditch and lateral lining.

By combining the Dolores Project and the McElmo Creek salinity project, the more efficient gravity pressure sprinkler systems can be installed to an additional 9,000 acres over the original USDA implementation plan. The DOI and USDA projects are fully compatible; however, a fully coordinated effort has been initiated so the design and implementation of DOI delivery and distribution systems complement the design and installation of onfarm systems. A reevaluation of the USDA implementation schedule is underway to allow for coordinated on-farm and off-farm planning.

14. Meeker Dome Unit (Reclamation)

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 the same year in four areas within a mile radius of the plugged Meeker Well in the same year.

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, four were adequately plugged. The other four--James, Marland, Meeker, and Scott 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 James, Marland, Meeker, and Scott Wells. A network of observation wells and seep measurement stations were installed to monitor the effects of the verification program.

The bores of the James and Scott 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 by 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.

Ground water levels in observation wells and flows from saline springs have decreased significantly from the conditions existing at the time of the verification well plugging. This information appears to confirm the hypothesis that the wells acted as conduits for saline water. In September 1984, salt loading from the dome had decreased by 19,000 tons per year from the preplugging level of about 26,000 tons per year to about 7,000 tons per year. At the end of fiscal year 1985, monitoring of seeps and wells was terminated. Water levels in the observation wells had stabilized, and springs and seeps remained dry or filled with standing water indicating the well plugs remained intact. The estimated cost effectiveness of this reduction is $14 per ton. A planning report concluding the Meeker Dome Unit study was published July 1985.

15. Moapa Valley Unit (USDA)

The project covers a 5,000-acre irrigated area on Muddy River upstream of Lake Mead. The project includes installation of 17 miles of underground piped delivery system, on-farm water management, and salinity control practices. By reducing overirrigation and excessive deep percolation, it is estimated average annual salt load reductions to the Colorado River system will be 19,200 tons. This unit has met the prerequisite for construction and is awaiting funding. SCS published its report on Moapa Valley in February 1981.

16. Palo Verde Irrigation District (Reclamation and USDA)

The Palo Verde Irrigation District (PVID) is a privately developed district located in Riverside and Imperial Counties, California. Water for irrigation is diverted from the Colorado River at the Palo Verde Diversion Dam and is conveyed through 253 miles of main canals and laterals to serve approximately 90,000 acres of cultivated land. The irrigation return flows are collected in a 149-mile drainage system and returned to the Colorado River. PVID is downstream of Parker Dam, where the major Colorado River diversions are made to areas impacted by salinity. Control of PVID's return flow would not have the damage reduction impact of other units upstream of Parker Dam.

A record of water and salt budget for PVID since 1951 shows that for most years the return flow carried about 10 percent more salt to the river than was diverted form the river. Because the drainage flow is so large (about 500 ft^3/s), no alternative beneficial use for the water has been apparent. Consequently, investigations have focused on ways to minimize the increment of salt load that the drainage carries in excess of the salt load diverted with the irrigation water.

The most recent land brought into production is in the southern end of Palo Verde Valley, and drains there collect water with the highest salinity concentrations. This land has been under irrigation for only 20 to 30 years, a relatively short time in comparison to the irrigation history of the valley which began about 1880. During the 1960's many drains were deepened 5 to 6 feet. This accounts for a drop in the water table from an average of 5.5 feet in 1957 to 9.5 feet in 1983.

The most recent investigation by Reclamation focused on the possible sources of the incremental increase of salt load, apparently coming primarily from the southern end of the valley. Several new observation wells were completed at various depth intervals. The different hydrostatic heads of the different intervals indicate no evidence of a rising saline ground water flow. Ground water table elevations indicate that saline water is not flowing horizontally into the valley. Electrical conductivity of extracts of saturated soil samples taken from various depths do not indicate the presence of undissolved salt. The vertical distribution of dissolved mineral concentrations show the near-surface influence of Colorado River water and deeper saline ground water. The incremental salt load appears to be resulting primarily from the displacement of ancient saline ground water by the recent application of fresh Colorado River irrigation water.

Reclamation is currently examining drainage records to identify and describe trends that would help predict a probable decline of the incremental salt load. These trends will help Reclamation, USDA, and PVID determine the need for further studies.

17. Paradox Valley Unit (Reclamation)

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, and 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 the Bureau of 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 (September 1978), 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.

A draft environmental statement was prepared for this plan and made public on May 11, 1978, with a final statement filed with the Environmental Protection Agency (EPA) on March 20, 1979, and made public. Deep well injection was one of the alternatives to pumping and evaporation of brine that was discussed briefly in the statement.

Before installing permanent facilities, a verification pumping program was initiated to determine, among other things, what pumping rate would be required to reduce the brine inflow. This program showed that by pumping at a rate of 2 ft^3/s, approximately 90 percent of the brine inflow can be controlled. 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 to be 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, it was concluded that deep well injection was the preferred disposal method. Reclamation then contracted with a second consulting firm to do a more detailed study of injection as a disposal method and to design the disposal system including injection well and surface facilities. Some of the items studied included: capacity of the injection zone, depth and difficulty of drilling, water quality of the brine to be injected, water quality of the formation water, seismicity, the effects of injection brine on seismicity, and surface treatment facilities. Based on this new information and data, a final design for the test injection well was completed in August 1985. Design of the surface facilities is scheduled to be completed in late 1986.

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 1986 and 1987. 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 within the State, is achieved.

18. Price-San Rafael Rivers Unit (Reclamation and USDA)

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.

Five alternative plans have been evaluated to date for controlling salt loading by Reclamation. These alternatives include irrigation systems improvement; using drain water 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 had been selected as the preferred plan. The plan was to consist of two components--lining canals with the highest amount of leakage and lining stockwatering ponds to improve winter watering practices. However, field verification tests conducted during November 1984 indicated that the canal seepage is not as great as expected; consequently, the canal lining component of the plan was deleted.

Reclamation and SCS are looking at new combined alternatives that would include placement of laterals in pipe and a combination of the laterals with the gravity sprinkler irrigation systems. SCS and Reclamation are evaluating potential for a joint and fully coordinated salinity project.

USDA has participated in public meetings to discuss on-farm salinity program and has kept the local sponsors informed on opportunities for funding and technical assistance.

19. Saline Water Use and Disposal Opportunities Unit (Reclamation)

Powerplant Cooling.--Installation of a test loop for saline water cooling has been completed at the Etiwanda Powerplant near Ontario, California. The selected hardware will be evaluated under actual field conditions to verify technical performance and operation. A parallel study of the economic impacts of the test loop and selected hardware is also underway. The economic study is tailored after previous studies completed at the Hunter and Jim Bridger powerplants. An earlier contract study of saline water use in Jim Bridger Powerplant found that by using side stream softeners and disposal ponds, about 8,000 acre-feet per year of Big Sandy River water could be used. Total in-plant costs were about $70 per ton; however, when the costs of well construction features and pipeline costs were included, the total increased to between $146 to $152 per ton. These costs were not competitive with other salinity control units.

A letter of agreement for cost sharing the hardware study has been extended to December 1986. Cost sharing for the program is provided by Reclamation, EPA, State of California, Sephton Water Technology, Pacific Gas and Electric, and Southern California Edison.

Under an existing basic agreement with consultant Jack Laughlin, a final study contract will examine the technical and economic feasibility of using Lower Virgin River Water at the proposed 1,000 MW Harry Allen Powerplant near Las Vegas, Nevada. The study will establish the in-plant costs of using brackish water from the Lower Virgin River as compared to alternative supplies. Opportunities for cost sharing further studies and construction of a water supply system for the proposed (1996) powerplant will be pursued with Nevada Power Company. Test results from the Etiwanda study will be incorporated into the process concepts proposed for the Harry Allen Plant.

Aquaculture.--International Bio Resources, Inc. and Denver Engineering Corporation completed a contract study for the use of a Salt Tolerant Emergent Plant (STEP) process to beneficially use, concentrate, and dispose of saline water. Economics of the STEP process were applied to the Glenwood-Dotsero Springs Unit. Although unit costs under $100 per ton were claimed in the study, technical issues related to production rate, evaporation rate, forage value, etc., could not be addressed due to lack of field experience. Moreover, remaining questions related to beneficial use and water rights of Glenwood Springs, coupled with lack of government funding for continued research, have halted the study effort.

20. San Juan River Unit (Reclamation)

The San Juan River Unit investigations began in November 1985 with the objectives of locating salt sources and identifying control methods. The study area includes the entire 23,000-square-mile watershed from its headwaters in south-central Colorado to its mouth at Lake Powell. The drainage contributes approximately one million tons of salt annually to the Colorado River Basin. Early reconnaissance shows significant salt loading in the river between Shiprock, New Mexico, and the Four Corners. At Bluff, Utah, the annual flow of 2,047,000 acre-feet of water contains 1,165,000 tons of salt. About 18 percent of this salt loading occurs between Shiprock and Bluff, but only 7 percent of the water is added in this reach.

The study area was broken into about 20 sub-watersheds and geographic areas. Since November 1985, water quality sampling and flow measurements throughout these subbasins have been made to gain an understanding of salinity mechanisms. The study area covers many thousands of square miles of natural resource lands as well as agricultural, municipal and industrial areas which may contribute controllable salt. Most of the natural source of salt is contributed by surface runoff and ground water discharge from the Nacimiento Formation and Mancos Shale. Many thousands of acres of vegetation, along the streams and washes, worsen the conditions by concentrating the salts. Irrigation projects, coal-fired powerplants, surface mining operations, oil and gas fields, and refinery operations also contribute to the salinity problems.

The sparsely vegetated Mancos Shale and Nacimiento Formation badlands, covering much of the Basin, contribute large amounts of sediment and salinity particularly during summer thunderstorms. The Mancos Shale is also the source of saline springs and ground water.

This shale is exposed to the river's alluvium from the hogback, almost 30 miles east of Shiprock to just upstream of the confluence with the Mancos River near Four Corners. The Mancos River cuts across the Mancos Shale for about 25 miles before entering the San Juan River.

The Hammond Project, Navajo Indian Irrigation Project (NIIP), and the Hogback Irrigation Project (also a Navajo Indian project) are the principal irrigation sources of salt in the Basin. Preliminary canal seepage and drainage investigations have been made on the Hammond Project and justify the need for more detailed testing. Historic flow and water quality data show that the irrigated area contributes over 18,500 tons of salt annually.

The NIIP irrigated area has recently started discharging water above 3,000 mg/L, mostly in the Gallegos and Ojo Amarillo Washes. These are both wide and deep sandy washes and the drainage water could be collected in them if disposal or industrial use alternatives appear feasible.

The Hogback Project contributes heavy salt loading but the mechanisms have not yet been explored. Ground water accruing to the San Juan alluvium in this vicinity have salinity concentrations of over 15,000 mg/L. Other manmade salt contributions include abandoned gas or oil wells which have developed leaks at the wellhead, coolant discharges from powerplants, and wastewater from a petroleum refinery.

As the information in this early stage of investigation is gathered, potential solutions are being developed. Costs for lining the canals in the area are being estimated, methods of controlling the salt discharge from those areas north of the river are being identified, and potential industrial users will be contacted. Environmental and other planning considerations, such as water rights, are being evaluated. The conclusions from this appraisal of the Basin will be made by the fall of 1986.

If at least one cost-effective and acceptable alternative can be identified, the study will continue toward identifying the best plans for reducing salinity in the Basin. A Planning and Environmental Document is scheduled for the fall of 1989.

21. Sinbad Valley Unit (BLM and Reclamation)

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 contributing an estimated 5,000 to 8,000 tons per year of salts to the Colorado River system. 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 BLM initiated a feasibility report for the interception and disposal of these saline waters during fiscal year 1982 and prepared a report on Sinbad Valley in April 1983. This report recommended that lead responsibility and funding be assumed by Reclamation.

Six appraisal level alternatives for the Sinbad Valley Salinity Study were developed. The cost effectiveness of the three most attractive alternatives ranged from $65 to $69 per ton reduction at Imperial Dam. Before a preferred alternative can be selected, an environmental assessment 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 a powerline alignment, and has Peregrine falcons nesting in it.

The Sinbad Valley feasibility study 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 one year); third, the abandoned wildcat well, No. 1, Sinbad Unit, should be evaluated for injection suitability. Other questions which need to be resolved include water rights and the compatibility of the project with existing land uses.

22. Uinta Basin Unit (Reclamation and USDA)

The Uinta Basin Unit is located in northeastern Utah. The unit area includes portions of Duchesne and Uintah Counties and is situated between the Uinta Mountains on the north and the Tavaputs Plateau on the south. The principal communities within the area are Duchesne, Roosevelt, and Vernal.

Most of the salt pickup from the unit area is from the dissolution of salts from the soil and subsurface materials, principally from soils of marine origin which underlie most of the Uinta Basin. Seepage from conveyance systems and deep percolation resulting from irrigation are the primary processes which dissolve salts from the soils and shales and convey the salts through the ground water system to natural drainages and ultimately to the Colorado River. An estimated 450,000 tons of salt from the Uinta Basin annually reach the Colorado River.

Phase I.—Uinta Basin Unit alternatives which were evaluated 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, transportation of coal through a coal-slurry pipeline, or cooling purposes at a local powerplant; and the retirement from irrigation of high salt contributing lands. As determined by the four tests of viability (completeness, effectiveness, efficiency, and acceptability), the only viable alternative is canal lining.

Under the canal lining alternative, 55.5 miles of the total of about 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 an estimated 21,000 to 30,000 tons per year and reduce canal seepage by about 16,800 acre-feet per year, of which about 4,600 acre-feet could be used to reduce irrigation shortages.

An integrated planning report/draft environmental impact statement on the unit has been prepared and was released to the public on April 25, 1986. The final document is scheduled to be completed and filed with the Environmental Protection Agency in March 1987. Design-data collection and other advance-planning activities are scheduled to begin in October 1987. Construction of the unit is scheduled to begin in fiscal year 1990.

Phase II.—Uinta Basin Unit Phase II alternatives which will be evaluated include a joint Bureau of Reclamation-Soil Conservation Service program of lining canals and laterals in conjunction with on-farm irrigation system improvements, lining canals and laterals not considered under the phase I study, eliminating canals by combining them with other canals which would be lined, eliminating winter water now diverted through canal systems, retiring high salt contributing lands from irrigation, and using saline water for industrial purposes.

A draft plan of study was completed and approved in September 1986. Planning activities are scheduled to begin in October 1986, with a preliminary findings report prepared by November 1987.

To date, over 80 percent of the Uinta Basin USDA on-farm and supportive off-farm salinity control improvements have been implemented through the use of Long Term Agreements (LTA). More than 90 percent of the participants who entered into LTA's have done so through pooling arrangements whereby two or more participants develop mutually beneficial plans. A major emphasis has been placed on comprehensive planning and LTA preparation. Participants are assisted in implementing a well-balanced improvement program of structural and management practices that address salinity reduction and wildlife habitat enhancement.

In calendar year 1985, 70 LTAs were authorized for implementation. These agreements, when completed, will minimize salt loading impacts from 3,368 acres of irrigated cropland and 4,500 linear feet of off-farm irrigation system laterals. In addition to practices in LTAs, 55 annual practices were installed which partially treated 1,485 acres of irrigated cropland.

At the end of 1985, salinity program participants had achieved irrigation water management on 18,000 acres and reduced salt loading to the Colorado River by an estimated 15,447 tons. Treatment of 23,169 linear feet of off-farm laterals has reduced salt loading by an additional 3,711 tons. Overall, average annual salt reduction to date has been 19,158 tons. Approximately 26 percent of project funds have been obligated and approximately 19 percent of projected salt load reduction benefits have been achieved.

23. Virgin Valley Unit (USDA)

The area consists of about 5,000 acres of irrigated land owned by about 50 individuals. Four irrigation companies or districts would also be involved with improvements of about 6 miles of off-farm canal and lateral improvement. Deep percolation reduction is estimated to be 19,000 acre-feet per year and salt load reductions are estimated to be 37,200 tons per year.

While the Virgin Valley is independent of any Reclamation salinity control project, the downstream impacts on the Bureau of Reclamation Lower Virgin River Unit are to be evaluated by Reclamation and SCS collectively. Otherwise, this unit has met the prerequisite for construction and is awaiting funding. The Virgin Valley report was published in March 1982.

D. State NPDES 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 water. The 1982 policy more clearly defines those aspects dealing with intercepted ground water 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.

Arizona.--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 31 municipalities or quasi-public NPDES permittees in the watersheds of Arizona above Imperial Dam.

California.--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. There are 333 permits in the Colorado River Basin portion of the State. Most of these are for minor municipal or industrial facilities. Of these 333 permits, 13 are major or significant industrial permits and 21 are major or significant municipal permits.

All new or reissued permits have been brought into compliance with the Water Quality Control Commission regulation for implementation of the Colorado River salinity standards. This is being accomplished through the discharge permit program. Actions of particular note in the past year include requirements that three major municipal dischargers demonstrate the non-practicability of preventing a greater than 400 mg/L increase in salinity in their wastewater systems and amendment of all industrial permits which lacked salinity monitoring requirements.

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. When the permit is reissued, the stat will insure that the requirements of the Forum dicharge permit policy are fully implemented.

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 17 industrial, 10 Federal, and 6 municipal discharge permits issued in the State of New Mexico within the Colorado River drainage. Some permits are not in compliance with Forum policy due to monitoring requirements, although corrective measures are being taken. Many expired permits are currently under administrative extension by EPA. Permits will require compliance with Forum policy as they are reissued.

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 28 municipal permits in the State in that drainage. Twelve 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. EFFECTS OF DEVELOPMENT ON SALINITY

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.

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 Colorado River system.

The model simulates operation of the river system on a monthly time frame, using historical (virgin) flow records, present and future depletion schedules, present and future levels of salinity control (optionally), and present and future salt loading estimates to predict salinity throughout the Basin. Salts and water are routed through the system by a simple mass balance accounting procedure in which salinity is modeled as a conservative parameter. 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.

Among the assumptions used is 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 salinity. 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 salinity concentration. The development and use of CRSS is an ongoing 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 predicitive tool available.

B. Initial Salinity Conditions

For these simulations, Table VI-1 summarizes the estimated present and projected future development used in CRSS through the year 2010 for the Upper Basin and the Lower Colorado mainstream of the Colorado River. The virgin flow data base used included monthly flow data for 1906-83. The mean virgin flow for this period was 15 million acre-feet per year at Lees Ferry.

Long-term historical flow and salinity conditions for the Colorado River at Imperial Dam are depicted in Figures VIII-2 and VIII-3, respectively. Figure VIII-2 shows the amount of water that reached Imperial Dam in the years 1983-85 was unusually high compared to the last 2 decades. Since the 1966 closure of Glen Canyon Dam, with few exceptions, flows at Imperial Dam have fluctuated within the narrow range of 5 to 6 million acre-feet, primarily due to the filling of Lake Powell (1963-80) and the ability to control the releases from the Upper Basin with the storage available in Lake Powell. With Lake Powell at near capacity, more water has been released, reducing the salinity in the Lower Basin.

The additional water in 1980, 1983, 1984, 1985, and 1986 had a dramatic dilution effect on the salinity concentrations at Imperial Dam. Figure VIII-3 shows an average annual value of 607 mg/L in 1985, the lowest level of the period 1941-85. It appears that the 1986 salinity level will be even lower than the 1985 value.

The 1986 salinity levels at Imperial Dam were again due to excess flow and are expected to have a continuing but temporary impact on future salinity projections. Due to the flushing out of more saline water in the major reservoirs, current salinity reductions will also have a short-term impact on salinity projections but will have little impact on long-term projections. Reclamation estimates that normal flows would increase the salinity levels back to the 800 mg/L range in 6 to 7 years.

The base condition from which all salinity projections are made assumes a starting salinity condition at present 1986 levels, existing levels of development as a starting point, scheduled developments for predictions in the future, and existing salinity control units operating at existing levels (126,800 tons per year).

The base condition for the evaluation assumes that no more funds would be expended on salinity control after FY 1986. Consequently, only the completed salinity control units or portions of units shown below are considered in the base:

Table VIII-1. Existing salinity control unit summary.

Unit	Tons/Year Removed as of 1985
Grand Valley Stage One (Reclamation)	21,900
Grand Valley (USDA)	27,300
Meeker Dome (Reclamation)	48,000
Uinta (USDA)	15,600
Las Vegas Wash (Pittman Bypass)	7,000
BLM well plugging	7,000
Total	126,800

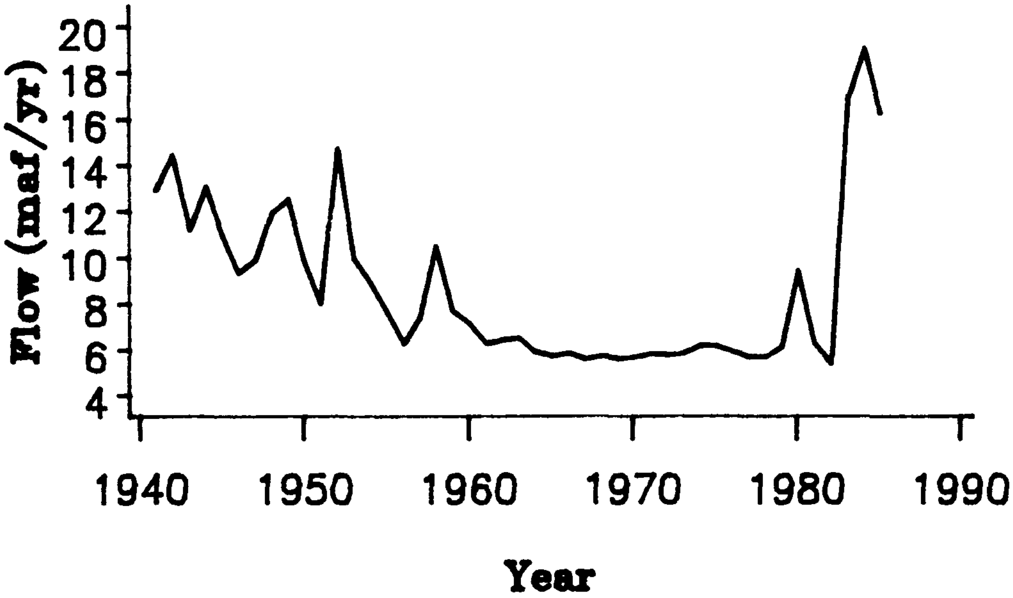

Figure VIII-1. Mean annual flow at Imperial Dam (1941-85).

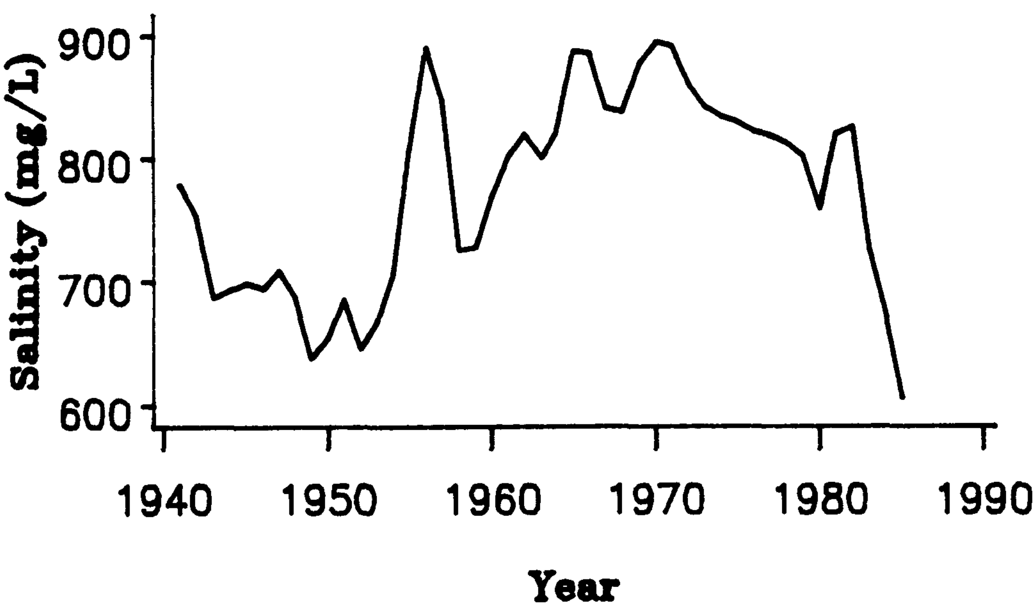

Figure VIII-2. Mean annual salinity at Imperial Dam (1941-85).

C. Salinity Projections

Since CRSS predicts future salinity based on a series of years (a trace) from the past, several traces were needed to show what the minimum, maximun, and average salinity might be. In all, 15 individual runs of the model were made to estimate these values. Table VIII-2 on the following page shows a summary of the CRSS for the Basin. Figure VIII-3 shows the aggregate results of the 15 individual runs at Imperial Dam. The range shown in the figure is by no means the minimum and maximum possible; however, the figure does demonstrate how salinity can vary due to the combined effects of development and the virgin flow of the river.

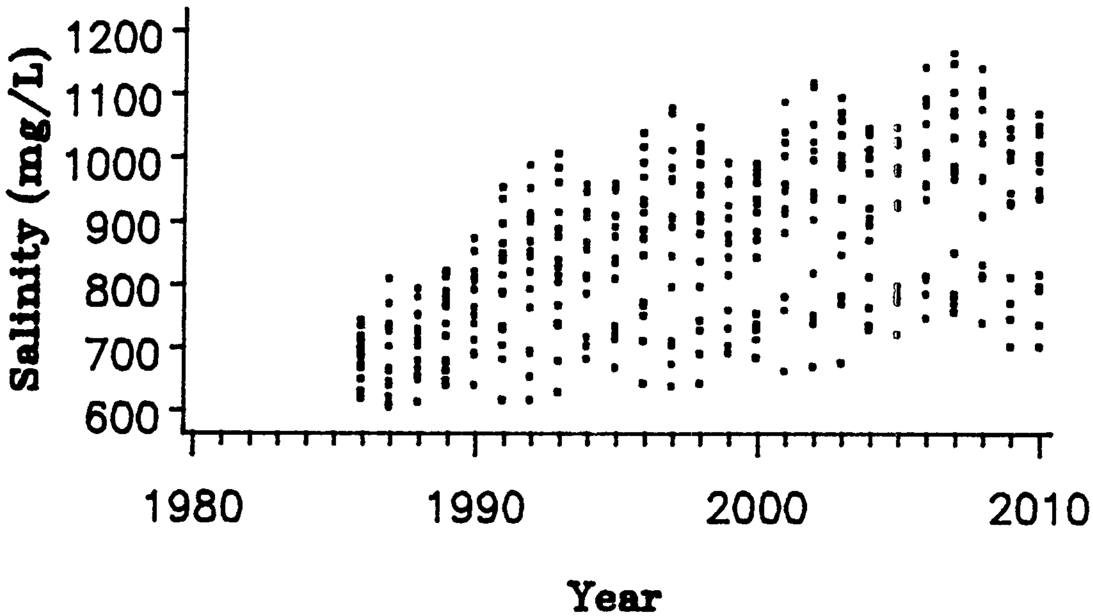

Figure VIII-3. Range of mean annual salinity at Imperial Dam (1986-2010).

The general trend in Figure VIII-3 of increasing salinity with time is due to 2 components. The most obvious one is due the increase in development. The increased use of water reduces the dilution of salinity in the river. The less obvious component is the rebounding of the salinity from the abnormally low levels of salinity observed in 1985-86 which were used as the starting point for these projections. At the present level of development, more normal levels of salinity at Imperial Dam would have been in the range of 820 mg/L instead of 607 mg/L. This demonstrates an important aspect of the projections shown in Figure VIII-3, that natural variations in the hydrologic and climatic conditions can have a dramatic impact on the year to year variation in salinity. The figure shows this variation as the scatter in the possible salinity for any one year in the future. The possible salinity for that year could vary 100 to 200 mg/L on either side of the mean depending on how wet or dry it is.

Table VIII-2. Salinity projections for the Colorado River Basin.

station	Present (1974-84) Flow (1,000 acre-feet)	Present (1974-84) Salinity (mg/L)	Future (2010) Flow (1,000 acre-feet)	Future (2010) Salinity (mg/L)	Future (2010) Salinity P≤ 0.2 (mg/L)
Green River near Green River, WY	1,359	325	1,261	319	512
Green River near Greendale, UT	1,697	483	1,627	406	569
Yampa River near Maybell, CO	1,237	176	1,129	155	196
Duchesne River near Randlett, UT	448	721	211	1,795	2,938
White River near Watson, UT	550	391	513	454	579
Green River at Green River, UT	4,691	456	3,987	555	699
San Rafael River near Green River, UT	117	1,976	104	1,212	1,837
Colorado River near Glenwoood Springs, CO	1,692	261	1,368	424	678
Colorado River near Cameo, CO	2,951	404	2,811	403	565
Gunnison River near Grand Junction, CO	1,938	566	1,845	624	980
Dolores River near Cisco, CO	749	784	619	857	1,898
Colorado River near Cisco, CO	5,508	590	4,826	717	1,170
San Juan River near Archuleta, NM	866	163	643	186	233
San Juan River near Bluff, UT	1,592	462	1,202	1,052	1,761
Colorado River at Lees Ferry, AZ	10,867	534	9,879	698	843
Colorado River near Grand Canyon, AZ	11,152	581	10,247	732	882
Virgin River at Littlefield, AZ	221	1,604	134	1,608	2,114
Colorado River below Hoover Dam	10,490	670	9,755	794	904
Colorado River above Parker Dam	n/a	n/a	9,386	823	936
Colorado River below Parker Dam	9,514	691	7,198	826	952
Colorado River at Imperial Dam	8,450	793	6,249	963	1,123

Note: The P≤ 0.2 level of salinity is based on the highest 3 of 15 CRSS runs and is an estimate of the salinity level which may be exceeded by about 20 percent of the time.

D. Salt Load Reduction Objective

To maintain the average salinity level at 879 mg/L at Imperial Dam in the future, additional salinity control measures are needed beyond those which are in place. To estimate the salt load reduction needed by the year 2010, the data from the 15 runs of the model were analyized statistically. The results of this analysis are shown in Figure VIII-4.

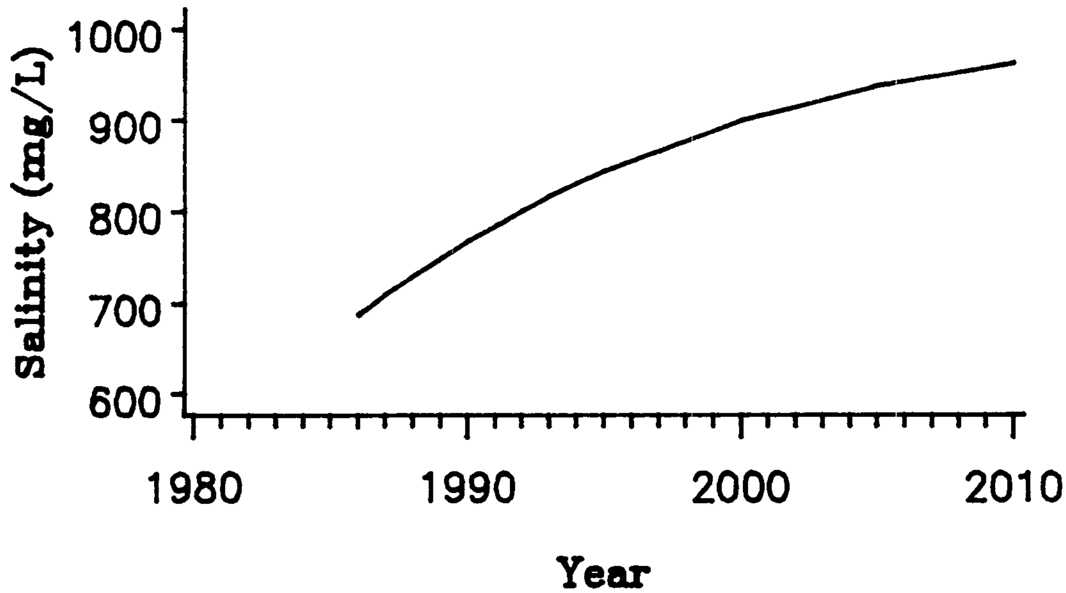

Figure VIII-4. Mean annual salinity at Imperial Dam (1986-2010).

The average salinity at Imperial Dam is projected to reach about 963 mg/L by the year 2010. Using the salinity projections at Imperial Dam, the salt load reductions needed to reduce projected salinity levels to the numeric criteria level of 879 mg/L were estimated to be 1.09 million tons per year by the year 2010. The required salt load reductions are in addition to those already removed.

It is important to understand that the salt load reduction projection is very highly dependent on the rate of development in the Basin and will change as rapidly as the depletions change in Table VI-1. For instance, if the price of oil were to go up, oil shale development, which has been postponed by a decade due to the low price of oil, may suddenly take off again. This would increase the need for more salinity control. Or, conversely, development of water resources may decline, reducing the need for salinity control. However, this is less likely than it was 10 years ago, since most all of the optimism in the development schedule has been removed.

PART IX. SPECIAL STUDIES

A. U.S. Department of Interior--Salinity Research

Through funding and direction by the Bureau of Reclamation (Reclamation), the U.S. Geological Survey (USGS) has become more involved in several aspects contributing to the analysis of the Colorado River Salinity Control Program. These include the gathering of basic data, extending data records, automating the analysis of data using new computer techniques, documenting the methods and results, and helping to identify and quantify sources of salt loading.

Beyond investigating potential salinity control units, Reclamation has also contracted to review the economic impacts of salinity, develop new methods of evaluating the implementation schedule of the salinity program, and test new technologies for the use of saline water.

1. Characteristics and Trends in Dissolved Solids in the Upper Colorado River Basin [24]

This study evaluates historical water use in relation to dissolved solids concentration in the Upper Colorado River Basin. The report also identifies sources of dissolved solids loads, trends, and concentrations. Annual and monthly dissolved solids were estimated for 70 streamflow stations using regression techniques. Major dissolved constituents were also estimated. Nonparametric trend analysis was used to determine long-term trends resulting from major interventions upstream.

a. Source Areas of Dissolved Solids

The mean dissolved solids concentration of the Colorado River increases from 29 mg/L at the Adams Tunnel diversion to 590 mg/L near Cisco. The concentration at Lees Ferry is lower because it is diluted slightly by large inflows from both the Green and San Juan Rivers. Of the mean annual dissolved solids load of the Colorado River at Lees Ferry, Arizona, 42 percent is dissolved sulfate, 16 percent is bicarbonate, 14 percent is sodium, 14 percent is calcium, 9 percent is chloride, and 5 percent is magnesium.

In headwater areas, the water in streams is predominantly of a calcium bicarbonate water type. Lower in the Basin, in areas underlain by sedimentary rocks, large amounts of dissolved sulfate, sodium, and other constituents are carried into the stream system. Many streams in the Colorado Plateau region typically contain 60 percent of the dissolved solids load as dissolved sulfate. The range of mean dissolved solids concentration at the 70 stations is from 29 mg/L, with a calcium bicarbonate water type, to 6,700 mg/L, with a sodium sulfate water type. The mean concentration is greater than 1,000 mg/L at 17 stations on small tributaries. On all of the major rivers in the Basin, the mean dissolved solids concentration does not exceed 600 mg/L.

As a result of geologic history and climatic influences, the interior of the Upper Colorado River Basin generally contains an abundance of saline rocks near the surface; however, because of the aridity of these lands, runoff is slight, and the natural opportunities for dissolved solids to be carried into the stream system are limited. Large, natural point sources of dissolved solids include the Glenwood Springs area (475,000 tons per year) and the Paradox Valley area (223,000 tons per year). These two sources contribute 56 percent of the dissolved chloride carried out of the basin and 25 percent of the dissolved sodium. Large but unquantified amounts of dissolved sodium and chloride are also contributed from salt anticlines near Moab, Utah. Other rivers and their tributaries--including the Price, San Rafael, and Dirty Devil Rivers and the Bitter Creek in Wyoming--intercept saline discharge from other geologic formations.

Of stations on streams having a mean annual streamflow greater than 25,000 acre-feet, the greatest concentrations were found on McElmo Creek, Big Sandy River, Price River, San Rafael River, Reed Wash, Salt Wash, Uncompahgre River, and the Dirty Devil River, in that order. All of these stations were downstream from areas where irrigated agriculture has major impacts on streamflow and dissolved solids. Irrigated agriculture in the Upper Colorado River Basin diverts several million acre-feet per year in excess of the amount consumed by harvesting and evapotranspiration. This excess water eventually returns to the stream system, providing overland and subsurface flow areas where little or none would occur under natural conditions.

The largest tracts of irrigated land in the Basin lie on Mancos Shale which tends to form flat benches suitable for agriculture, often near rivers. About two million tons of dissolved solids per year result from irrigation on Mancos Shale. They are: parts of the Roaring Fork basin; the lower reaches of the Uncompahgre (340,000 tons) and Gunnison Rivers (480,000 tons); the Grand Valley area (more than 400,000 tons); the Price (240,000 tons), San Rafael (190,000 tons) and Dirty Devil (85,000 tons) Rivers; and the Mancos (more than 40,000 tons) and McElmo (110,000 tons) Creeks. For streamflow at stations downstream from these areas, sulfate is the major anion, but the cation composition may be one of two types. The first type has calcium or magnesium is the dominant cation, with a smaller proportion of dissolved sodium. This type is found in the Grand division and the San Juan region--the Roaring Fork River, Uncompahgre River, Gunnison River, Reed Wash and others, Mancos Creek, and McElmo Creek. The second type has sodium as the dominant cation and is found on the western side of the Colorado Plateau--the Price, San Rafael, and Dirty Devil Rivers. The high proportion of dissolved sodium occurs as a result of greater exchange with calcium on Mancos clays and also as these three rivers pass the Carmel Formation in their lower reaches.

Other irrigated areas also contribute large dissolved solids loads. Irrigation on the Laney Shale Member of the Green River Formation in the Big Sandy River basin contributes about 160,000 tons per year, mostly as dissolved sodium and sulfate. In the Duchesne River Basin, irrigation on the Uinta formation contributes more than 300,000 tons per year, also mostly as dissolved sodium and sulfate. Contributions from other agricultural areas were not estimated in this study.

Two reservoirs in the Upper Colorado River Basin have increased the dissolved solids load because of net leaching from the beds around the reservoir. Fontenelle Reservoir has caused a net increase of 70,000 tons per year; Flaming Gorge has caused a net increase of 163,000 tons per year. Both reservoirs have inundated outcrops of the Laney Shale Member of the Green River Formation. Dissolved sulfate comprised 49 percent of the increase from

Fontenelle Reservoir and 76 percent of the increase from Flaming Gorge Reservoir. In this study, leaching was not detected at other reservoirs in the Basin.

b. Trends in Streamflow and Dissolved Solids

The major changes in streamflow and dissolved solids in the Upper Colorado River Basin, during the period of record have been caused by the construction of Glen Canyon Dam (Lake Powell). Controlled outflows and mixing of seasonal inflows stored in the reservoir have greatly reduced the seasonal and annual variability in discharge and dissolved solids concentrations and loads. In general, other trends detected at stations are of a local nature and do not reflect basinwide changes.

Because irrigation projects in the Basin generally predate the water quality records, trend analysis based on the historical records does not directly show the impacts of irrigated agriculture. One exception is the Big Sandy River Basin where return flows from the Eden agricultural project increased the annual dissolved solids load by more than 35,000 tons during the period 1962 to 1981, primarily as dissolved sodium and sulfate. In the Price River Basin, dissolved solids concentration and flow adjusted concentration decreased by about 800 mg/L during the period 1949 to 1983. The decrease, 89 percent as dissolved sodium and sulfate, may be the result of abandonment of agricultural land because of increasing soil salinity problems.

Upstream from Lake Powell, decreases in streamflow are principally from construction of facilities for transbasin exports. In the headwaters region of the Colorado River, the historical record was long enough to detect increased dissolved solids concentration resulting from exports at sites 2 and 5 on the Colorado River near Hot Sulfur Springs and near Glenwood Springs, Colorado.

Significant monthly trends downstream from large reservoirs reflect the decrease in the seasonal variability of discharge on all of the major rivers--the Gunnison, Colorado, Green, and San Juan. Discharge and dissolved solids loads have decreased during the high flow season and increased during the low flow season. Dissolved solids concentration has increased during the high flow season and decreased during the low flow season.

Increased dissolved solids loads were detected downstream from Fontenelle and Flaming Gorge Reservoirs where leaching has occurred. Streamflow and dissolved solids loads decreased greatly on the Colorado River at Lees Ferry, during the filling period of Lake Powell. However, since the reservoir filled in 1980, streamflow and load apparently have returned to approximately the same levels as before construction of Glen Canyon Dam.

Trends that reflect salinity control efforts were detected at two stations. At the White River near Watson, Utah station, dissolved solids concentration decreased by 89 mg/L (57,000 tons per year) after the plugging of abandoned oil wells in the Meeker Dome area. At the Reed Wash near Loma, Colorado station, which drains the Stage One area of the Grand Valley Unit, annual dissolved solids loads decreased by about 28,000 tons during the period 1974 through 1983 despite increasing streamflow.

Dissolved solids concentration decreased in the Gunnison River Basin, after construction of Blue Mesa Reservoir. This decrease was also reflected downstream at the Colorado River near Cisco, Utah. During the period 1951 to 1983 at the Dolores River near Cisco, flow adjusted concentration increased by about 150 mg/L and annual dissolved solids load increased by about 150,000 tons. For the period 1951 to 1983 at the Yampa River near Maybell, Colorado, flow adjusted concentration increased by 40 mg/L and annual dissolved solids load increased by 110,000 tons; these increases possibly are the result of increased surface mining of coal in the area. During the period 1942 to 1962 at the Colorado River at Lees Ferry, the mean dissolved solids concentration increased by about 150 mg/L and the flow adjusted concentration increased by about 69 mg/L. Since the closure of Glen Canyon dam in 1966, concentration has not changed significantly.

2. Estimation of Natural Dissolved Solids Discharge in the Upper Colorado River Basin [3]

A statistical method was developed to estimate the monthly natural dissolved solids discharge at selected sites in the Upper Colorado River Basin. Natural dissolved solids discharge was defined as the rate of inorganic solute flow past a specific site that would have occurred if there had been no water resources development in the Basin upstream from the site. The method used weighted least squares regression to fit a model of dissolved solids discharge as a function of streamflow and several variables representing development. After the model had been calibrated for an individual station, the development variables were removed leaving the relation between dissolved solids discharge and streamflow for conditions of no upstream development. The natural dissolved-solids discharge was calculated using this relation and estimates of natural streamflow provided by Reclamation.

Limitations of the method included a lack of data to verify the natural dissolved solids discharge estimates and to adequately represent all the effects of development. Model statistics; however, indicated a good fit to historical data. Also, mean annual natural dissolved solids discharge values were approximately equal to mass balance estimates.

Some additional items included in the report are also of interest. The natural (pre-development) annual salt load for the Colorado River at Lees Ferry, Arizona, was estimated in the study to be 5.3 million tons per year. The average salt load from 1941 to 1983 was 7.7 million tons per year. Apparently, development is responsible for an increase in salinity of approximately 2.4 million tons per year; or, in other terms, the effect of development has caused salinity at Lees Ferry to increase from an average of 250 mg/L to 551 mg/L.

It was also noted in the report that the effect of Lake Powell reduced the monthly variation in salinity below Glen Canyon Dam from 299 mg/L to 72 mg/L. The annual variation was similarly reduced from 106 mg/L to 42 mg/L.

3. Extension of Streamflow and Dissolved-solids Records at Selected Sites in the Colorado River Basin [25]

Techniques were evaluated for extending records of streamflow and dissolved-solids concentration at sites in the Colorado River Basin. These techniques included weighted least-squares regression and maintenance of variance methods. The best technique for a particular site and data type was determined by comparison of several statistical indicators of estimation accuracy. The selected techniques were applied to extend records of streamflow at 5 sites and records of dissolved-solids concentration at 13 sites for which monthly data are tabulated in the appendix of the Quality of Water Progress Report. Records were extended back through 1941 to provide a completely concurrent data set for all sites. The extension results were examined qualitatively to determine consistency with the historical records at each site.

4. Salinity Loading in Las Vegas Wash

During FY 1986, the Bureau of Reclamation and the U.S. Geological Survey developed a cooperative investigation with the major purpose of determining whether proposed engineering plans aimed at reducing salt loading to the Las Vegas Wash near Henderson are feasible and effective. One plan proposes building a detention basin which includes a dike and slurry wall (vertically through the aquifer) to capture and retard saline ground water flow from entering the wash. The hypothesis is that the saline water behind the slurry wall and dike will stratify leaving fresher water at the surface which will flow out of the detention basin and into the wash. Ultimately, a series of 14 detention basins would be built along the wash if it is determined that these basins are effective in reducing the salt entering Lake Mead. The second part of the plan has already been completed by Reclamation and consists of a pipeline which carries cooling water from 2 chemical plants directly to the Wash about 3.5 miles downgradient. The cooling water entered an unlined channel where it infiltrated into the gypsum-rich alluvium.

The objective is to determine whether these two measures are a feasible and effective means to reduce the salt load entering Lake Mead. After sufficient data have been collected, SUTRA will be used as the primary tool to meet the objective. SUTRA is a two-dimensional single-species solute transport model which can handle density dependent flow. After accurately identifying the flow system in these areas, various scenarios will be tested as to how to best model the transport of salts. Further geochemical studies are still needed to define the processes involved.

The study is currently in the data collection stage. About 120 wells in the 2 areas have been used to obtain water levels, water quality samples, and aquifer parameters needed to understand the system. More drilling and well installation is planned to help understand more fully the hydrologic and geochemical processes that influence this complex setting.

5. Estimation of Salinity Loads, Lower Colorado River

Salinity concentrations in the Colorado River are associated with water use, agriculture, municipal and industrial development, transbasin diversions, and natural sources. To fulfill management responsibilities, the Bureau of Reclamation must determine the degree to which the various sources of salinity impact river quality as well as the effectiveness of alternate salinity control technologies. A tool in the management of the river is a data base of sufficient duration that will allow for projections of flows and salinities to some point in the future.

The objective of this study is to develop a data base of monthly discharges and salt loads for the calendar year period 1935 to current year or, as appropriate, for selected sites on the Colorado River from Imperial Dam to the southerly international boundary. This includes estimating monthly salt loads and monthly flow data, whereever data are missing, and documenting procedures.

To fulfill the objectives the following approach will be used: (1) determine the availability and completeness of flow records and water quality records at 10 to 11 stations below Imperial Dam; (2) enter data into a computerized data base; (3) utilize appropriate statistical programs and develop techniques to fill in missing periods of record for flow and salinity; (4) prepare an open-file report summarizing the techniques used to estimate salinity loads and furnish a review copy to Reclamation.

6. Economic Update to Salinity Impacts

While the concept of cost effectiveness generally supports project selection and order of implementation, the determination of the overall economic benefits due to program implementation remains an important aspect. Estimates of economic benefits addressed formally in planning reports and are frequently used in public documents.

A preliminary analysis of economic impacts of salinity was initiated in 1974 resulting in a 1980 report entitled Economic Impacts on Agricultural, Municipal, and Industrial Users by Kleinman and Brown. Since this earlier work, there have been many changes in water use, treatment, equipment costs, etc., that affect present and future salinity damage levels.

A contract study was initiated in June 1986 to provide a better estimate of present and future salinity damages under various water use scenarios and economic conditions. The study will focus primarily on the municipal and industrial water use sectors in the Lower Basin. The study contractor, Milliken-Chapman Research Group, Littleton, Colorado, will submit a final report to Reclamation by January 1987.

B. U.S. Department of Agriculture - Salinity Research

The U.S. Department of Agricultural (USDA), through the Agricultural Research Service (ARS), continues to provide the Salinity Control Program with valuable basic research. Some of their studies are summarized below.

1. Isotope Determination of Water Sources

Existing methodology to determine sources of return flow and salt loading requires prohibitively time-consuming and expensive studies of water and salt fluxes on and off individual fields and determination of hydrologic gradients and flow rates. An alternative methodology with relatively low costs involves use of stable isotopes as well as the chemical compositions of surface and ground waters. In Grand Valley, the isotopic differences between local ground water (as measured in the upland areas) and the Colorado River water used for irrigation are sufficiently large enough to enable estimating the relative contributions from these two sources. Water samples were taken in the winter from all the washes in Grand Valley.

Since there were no irrigation nor surface flows from upland areas, the flow in the washes should represent the composition of the ground water recharging into the Colorado River. This isotopic composition of the washes was very uniform, indicating that approximately 85 percent of the return flows are drainage waters from irrigation and only 15 percent from non-irrigated recharge. Analysis of well water revealed that the most saline water had a smaller contribution of irrigation water than did the more diluted water. The salt contribution in return flows, due to irrigation, is less than the contribution of irrigation to return flow volumes. The contribution of on-farm deep percolation could not be accurately separated from canal and lateral seepage based on stable isotopes and solution composition. Based on these procedures, it is estimated that these processes contribute roughly equal volumes of water to the subsurface.

2. Soil Salinity Monitoring Instrumentation

A limiting factor in evaluating the salinity status of soils and the maintenance of a productive irrigated agriculture is the availability of practical methods of measuring soil salinity on a large area basis. Developmental work is continuing on the field use of time domain reflectometry for the simultaneous measurement of soil water content and electrical conductivity over identical sampling volumes. Experimental work has shown that a small correction factor is needed for the theoretically derived attenuation coefficient. Successful electrode insertion and measuring techniques have been developed and used for field sampling of water content and salinity. Contractual work on measuring the soil dielectric constant (water content) with a 4-probe electrode configuration is in progress.

3. Irrigation with Saline Water

Reuse of drain water for irrigation would reduce the volume of brackish water returned to the Colorado River. A strategy has been developed to reuse this water while maintaining a suitable agricultural water supply and crop production. Using this management strategy, drainage water is substituted for irrigation water when irrigating certain crops in a tolerant growth stage. The salt buildup resulting from irrigating salt tolerant crops with drainage water is subsequently alleviated by irrigating salt sensitive crops with low salinity water. Since previous reports, cantaloupes were grown without loss of yield in successive crop rotation fields for the second time, concluding the repeat of the 2 year rotation of wheat-sugarbeets-melons in which 75 percent of the irrigation needs of wheat and sugar beets were supplied with 3,500 mg/L drainage water. Alfalfa was grown for a year (six cuttings) without yield loss, concluding a 4-year rotation of cotton-cotton-wheat-alfalfa in which substantial brackish water was used to irrigate cotton.

4. Computer Mapping of Irrigated Areas

Salinity maps are needed to assess the extent, nature, and severity of salinity problems. These maps can serve as a basis for planning, monitoring, and managing salinity in irrigated lands. The developed technique includes instrumental measurement techniques and a computerized geographic information system.

A 15-square-mile irrigated area was sampled on an approximately 1/8-mile-grid basis. The desired sampling point was located using a LORAN system. At each point, soil salinity was measured using electromagnetic instruments, a wide spacing 4-probe electrical resistivity array, and a vertical 4-probe array; water content was determined using time domain reflectometry. Surface soil samples were taken for laboratory analysis of water content and salinity. Evaluation of this data will enable development of a suitable instrumental procedure for large scale salinity mapping. The salinity information will be input to an appropriate computerized geographic information system. This system will be developed to allow for overlay, as well as single parameter mapping, and to make statistical evaluations of spatial relations among the mapped attributes such as cropping patterns, depth and salinity of ground water, soil type, and irrigation management. This information will be evaluated for its suitability for salinity assessment, prognosis, and inventorying.

5. Canal Delivery Systems

For irrigated agriculture to respond to changing markets, to new crops and to new practices to reduce salt loading, a flexible irrigation delivery system is required. Such flexibility exists on farms that obtain water from wells but not on most existing canal delivery systems.

Detailed monitoring of lateral canals has begun in the Wellton-Mohawk Irrigation and Drainage District (WMIDD) and the Imperial Irrigation District (IID). Inflows, outflows, and water levels are being precisely measured to provide a data base from which the effects of system management and structures on flow transients and delivery uniformities can be studied.

The Wellton-Mohawk Irrigation and Drainage District, located along the Gila River east of Yuma in southwestern Arizona, provides water to about 50,000 acres of farmland. Water is ordered with 3 days notice for any duration and standard deliveries of 15 ft^3/s (with 20 to 25 ft^3/s more common); ditchriders are on 24-hour call. A cooperative agreement was reached with the WMIDD to study canal operations, principally through the detailed monitoring of flow along two lateral canals--one near the upstream end of the district where main canal levels and flow should be reasonably stable and the other near the downstream end where main canal flows vary widely.

The Imperial Irrigation District provides water to 500,000 acres of farmland in the Imperial Valley. Water is ordered from IID with 3 days notice for 24-hour durations at standard deliveries of 11 ft^3/s (but less can be requested); the ditchriders work 8-hour shifts. A monitoring project similar to that in WMIDD has been initiated in IID to compare the differences in scale and operating procedures. This project dovetails very well with an ongoing IID conservation project aimed at reducing tailwater losses. Under cooperative arrangement with IID, the ARS principal responsibility will be data analysis while IID will install the monitoring equipment and collect most of the data.

6. Dual-Acting Controlled Leak Control Scheme

There are basically four existing techniques for regulating flow rates into canal laterals: (1) manual control of gates or valve openings, (2) Neyrtec or Neyrpic constant-discharge modules, (3) manual or mechanically operated movable weirs, and (4) automatic downstream local control structures in conjunction with weirs or flumes.

The controlled leak or Denaidean system is used on several Arizona and California canals. The limitations on this system are that the skimming weir mechanism is rather cumbersome and costly to construct in an adjustable mode and control levels achieved are on the order of ±0.1 foot.

A new controlled leak mechanism has been developed to eliminate these problems and to increase the control accuracy. The new system is called the Dual-Acting Controlled Leak System in that the piston chamber inflow and outflow are manipulated by the deviation in the controlled water surface instead of just the weir inflow rate on previous versions. The mechanism is small enough to be easily adjusted to any flow level and sensitive enough to control the water surface to ± 3mm (1/8 inch).

7. Canal Control Schemes

Accurate measurement of flow rates and hydraulic heads that drive a system are required to assure accurate flow rates at a canal branch as incoming flow rates change. A computer program is being developed to assess the sensitivity of branching structures to inaccurate flow or hydraulic head measurements.

8. Variability of Infiltration Rates

Two recirculating infiltrometers were used during the 1985 irrigation season in Grand Valley in western Colorado to evaluate the effects of tillage methods on intake and to quantify infiltration variability on a given field. Infiltration parameters have been calculated for three major Grand Valley soils based on data from inflow-outflow measurements. For a typical opportunity time, intake was commonly twice as high for non-wheel as for wheel track furrows. Variation between nearby wheel track furrows for a single irrigation was sometimes more than two-fold while variation from early to late season was five or six fold.

9. High Water Table Effects on Irrigation Water Requirements

Weighing lysimeters containing water tables of varying depth and salinity were used to determine effects of these conditions on irrigation requirements of spring wheat. Poor wheat growth surrounding the lysimeters limits the validity of the data for the first year. Measurements on spring wheat will be continued for two more years. Studies on corn, in prior years, indicated that irrigation applications could be reduced about two-thirds for a water table depth of 60-cm and about one-third for a 105-cm water table depth for values of ground water salinity up to 6 deciSiemens per meter, the highest tested.

10. Level Basin Systems in Western Colorado

Studies of level basin irrigation in western Colorado show that salt additions to the root zone are minor, considering the low leaching that occurs with efficient application. Nitrogen can be applied efficiently in the irrigation water supply to level basins because there is no runoff. Deep percolation can be closely controlled, and nitrogen can be applied throughout the season when tall crops make tractor traffic impossible. Soil fertility variations caused by basin leveling in 1977 were no longer detectable in 1983.

11. Real Time Crop Coefficients from Remote Sensing

Reflected visible and near infrared canopy radiation data obtained over corn in 1984 were analyzed for use as a real time crop coefficient (K_c). A modified vegetation index (MVI) was compared to the basal K_c obtained from lysimeter measured evapotranspiration. The MVI followed the basal K_c curve very well during vegetative growth. Analysis of the data during this growth period by the Richards function showed that the asymptotic value of the MVI occurred on the effective cover date. A linear regression between the seasonal MVI and the basal K_c prior to senescence produced a slope of 1.01 and a correlation coefficient of 0.95. Thus, the MVI in its current form may be used directly as a crop coefficient for corn in regions with light to medium colored soils. Advantages of the MVI over the traditional crop coefficient are its independence of time base parameters and its ability for periods of slow and rapid growth.

12. Improving Irrigation Systems

Salt loading results from excessive deep percolation caused by applying excessive water and from non-uniform distribution of water. Accurate application of the desired amount of water is essential to reduce deep percolation which generally requires some form of automation of surface irrigation systems. Excess application usually occurs at the upper end of fields during the first irrigation after plowing. Minimum tillage or recompaction of furrows can enable light, uniform water applications.

Two additional cablegation systems were installed in Grand Valley in Colorado bringing the total number of systems there to seven. All seven systems were used for all irrigations, and the operators were pleased with their performance. A 2-day cablegation training course was given to Colorado SCS personnel, including several working in Grand Valley.

Two cablegation systems in Grand Valley were evaluated for the total 1985 season. Both farmers applied water an average of every 10 to 11 days after July 1, the normal interval for the area. Net application depths varied from 27 mm to 60 mm with a seasonal total of 390 mm (15 in) on one field and from 62 mm to 140 mm with a seasonal total of 770 mm (30 in) on the other field. Corn consumptive use for the area was about 570 mm with about 100 mm of that provided by precipitation. One farmer deep percolated very little water and may have stressed portions of his field, while the other deep percolated about 300 mm or 25 percent of his gross application and 40 percent of his net application; 32 percent and 40 percent of the gross applications ran off the two fields, respectively.

Due to the relatively low base infiltration rates (2 to 3 mm/h) of the fields and the higher initial inflow rates cablegation provides, water distribution down the furrows, calculated from measured intake opportunity times and base infiltration rates, was good with no more than 15 percent of the water applied to the top of the field than the bottom, even during the initial irrigation.

Four cablegation systems in Grand Valley, two in southern Idaho, and several in western Nebraska have been evaluated over the last two years. These evaluations show that cablegation systems can be, and often are, operated to irrigate efficiently; however, poor performance, primarily in the form of excessive application and runoff, has been observed due primarily to the farmer not monitoring and adjusting his system to the varying soil conditions.

13. Improving Furrow Infiltration Uniformity

Furrow-to-furrow infiltration variability was measured on five fields in Grand Valley. The infiltration coefficient of variation ranged from 21 to 44 percent and averaged 29 percent. On four of the five fields, one or two of every three furrows infiltrated at significantly higher rates than the remaining furrow(s) due to tractor wheel compaction during cultivation and planting. Unpacked or soft furrows infiltrated an average of 46 percent more water. This implies that if the packed furrows received the desired amount of water, 46 percent of that applied to the soft furrows or 15 percent of the net application to the field (assuming one-third of the furrows are soft) will deep percolate due to wheel compaction alone. Elimination of wheel packing differences will reduce the furrow-to-furrow infiltration variance by 30 to 50 percent. Both random and tillage-caused infiltration variability will result in significant deep percolation even when net water applications are not greater than the available soil moisture storage capacity.

Techniques such as furrow compaction and flow interruption (surge) can be applied to decrease infiltration rates, while organic matter incorporation and furrow chiseling can be used to increase infiltration. During 1985, these factors were studied in Grand Valley on both Youngston fine sandy loam (Colorado State University Fruit Research Center) and Billings clay (Roy Hood Farm, 1049 22nd Road) soils.

Wheel packing reduced intake rates in the two loam soils by 35 percent and the wheel packing effect decreases but persists throughout the season. Packing only a portion of the irrigated furrows was a primary factor causing infiltration variability. Packing, or avoiding packing of all irrigated furrows, would eliminate the primary source of non-uniform water distribution from furrow to furrow. Irrigating only packed furrows during the first irrigation permits lighter, more uniform water application. Moist compaction is a highly effective means of reducing infiltration on both Grand Valley soils.

Flow interruption reduced infiltration rates 20 to 40 percent on the two loam soils during the first irrigation after spring tillage. The reduction was only 10 to 15 percent for the remainder of the year on the Youngston soil. Flow interruption had no effect on infiltration into the Billings clay.

Furrow chiseling increased infiltration into the Billings clay by 25 percent only on the first irrigation, with no residual effects. On both loams, chiseling greatly increased initial infiltration rates and slowed advance times during the first irrigation following chiseling. On the Youngston soil, the infiltration remained higher in the non-wheel than in wheel-packed furrows throughout the irrigation season. The chiseled furrows were repacked by tractor wheels during cultivation between the first and succeeding irrigations. Furrow chiseling can be an effective way to increase initial infiltration. Because sustained infiltration rates are not greatly changed, the distribution uniformity would not be greatly affected.

On the Youngston soil, the high manure applications increased the cumulative infiltration about 25 percent, mainly through a 100 percent increase in the sustained rate. The manure effects may have been limited by soil compaction due to driving loaded manure spreaders and incorporation equipment on the moist soil in the spring.

C. Universities--Salinity Research

1. Reuse of Blowdown Water for Irrigation

Research by Utah State University scientists in cooperation with Utah Power & Light since 1977 relates to the use of wastewater from the coal-fired powerplant at Huntington, Utah. Crops have been grown for 8 years, and soil salinity has been monitored. Wastewater was applied by specialized line source equipment at various rates. The saline water from the powerplant is about ten times saltier than the normal creek irrigation water. The buildup of total salts was sufficient to cause some minor yield depressions. Tests made in 1985 definitely show the major detrimental effect found was boron toxicity, which was highly dependent on the crop.

The forage crops tested showed no yield depression due to these boron rates, but potato yields were decreased to 20 percent of normal. The susceptibility of crops was found to be (from high to low susceptibility) potatoes, corn, barley, wheat, alfalfa, and wheatgrass. A model of water-boron-crop-irrigation-yield has been developed and is in the process of being tested against field data.

2. Carbonate Chemistry and Mineralogy

A University of California-Davis study of factors influencing carbonate chemistry and mineralogy in salt affected soils was carried out over a 3-year period. Plots were designed to provide delivery of variable quantities of irrigation water and salts through parallel line source sprinklers. The plots were cropped to sorghum during summer seasons and to wheat during winter and early spring. Soil solutions and soil gases were collected periodically to study seasonal and diurnal periods, varying temperature, moisture, and salinity regimes on cropped and noncropped conditions. Data applied to a water equilibrium model showed that soil solutions at all profiles were supersaturated with calcite.

There were 15 subsurface drains that were sampled for 27 consecutive weeks on 23 acres of irrigated land, established by Nevada Agricultural Experiment Station scientists in salinity research at Fallon, Nevada. The time period and spacing variabilities of electrical conductivity, temperature, pH, dissolved oxygen, and nitrate nitrogen were evaluated using time series and geostatistical analyses. Optimum spacings for subsurface drains were compared with the resulting information. Models were developed to relate water management plans with water quality control.

An improved experimental setup is in use at the University of California-Davis to study dissolution kinetics of carbonate minerals in aqueous systems. Dissolution studies were carried out to determine the influence of different surface areas. The same experimental setup was used to study the dissolution kinetics of gypsum and phosphogypsum. Understanding dissolution chemistry of minerals will help develop practices to minimize contribution of salts in return flows.

D. Non-Salinity Water Quality Studies

Included in this section of the report are studies other than those related to salinity. These may include any water quality issue within the Colorado River Basin including research into trace elements, heavy metals, reservoir limnology, nuclear wastes, acid rain, pesticides, herbicides, or any other water quality parameters which might significantly impact the quality of the river as identified in the Part III.

1. Glen Canyon Management Plan

With a few exceptions, the report by the National Park Service (NPS) found that the present quality of the water resources in Glen Canyon National Recreation Area (Lake Powell) is generally good. However, changes in water management practices in the Upper Colorado River Basin; increased mineral development in or adjacent to Glen Canyon National Recreation Area; or increased grazing activities in the vicinity of springs, seeps, and waterpockets could all adversely influence the present situation.

Although it exhibits good water quality overall, Lake Powell frequently exceeds primary contact recreation standards for bacterial contamination at popular swimming areas. Additionally, the lake serves as a sink for both nutrients and naturally eroding heavy metals. Some of the heavy metals appear to be incorporated into the food chain and are bioaccumulating in species near the top of the trophic structure. The rapid depletion of nutrients available for primary productivity is well documented, but the impact of long-term fisheries management is not understood. Baseline monitoring activities related to lake water management being conducted by the Bureau of Reclamation, the U.S. Geological Survey, and the Utah Division of Wildlife Resources will yield much useful data. Still, information linking nutrient dynamics to productivity and fisheries management is limited, and one of the recommended study designs should be implemented.

Similarly, backcountry recreational waters occasionally exceed contact recreation standards, and the water must be treated prior to consumption. For these waters also, an additional short-term study may be warranted. Of the special resource management issues discussed, several require further assessment and the establishment of a more thorough data base.

Because of the potential for adverse water quality impacts and the need for additional data on some existing problems, proper management of the Glen Canyon National Recreation Area water resources dictates the consideration and implementation of a number of water quality related studies and monitoring programs as part of research, resource management, and public health monitoring activities.

Recommended activities include the (1) continued liaison among the Bureau of Reclamation, U.S. Geological Survey, and NPS to discuss any changes in the long-term lake water quality or major tributary monitoring program; (2) implementation of a cooperative study sponsored by the Bureau of Reclamation, NPS and the Utah Division of Wildlife Resources to obtain data relating to Lake Powell primary and secondary productivity and the relationship between nutrient input and fisheries management; (3) development of a routine bacterial water quality monitoring program focused on shoreline contact recreation; (4) implementation of a limited duration reconnaissance assessment of backcountry bacterial water quality and gray water contamination; (5) establishment of liaison with the U.S. Fish and Wildlife Service resource contaminant specialists (Arizona and Utah) to assure the continuation of effective heavy metal and pesticide contaminant monitoring activities; (6) development and sponsorship of proposals for the continued assessment and inventory of waterpockets, springs, seeps, and of fisheries habitat of significant minor tributaries; and (7) establishment of liaison with the Salt River Project and Utah Bureau of Water Pollution Control to discuss monitoring activities related to powerplant waste disposal and mining and milling activities. A phased approach to the activities recommended in this report could yield important information in the next 5 years which may prove invaluable in management decision making.

2. 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.

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, 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 has been 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 has contributed funding, expertise, or work items for a 3-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. A specific work plan and funding have been developed for a Flaming Gorge water quality study. Field monitoring began in 1984 and continued through October 1986. Data analysis will continue through 1987.

Data on Flaming Gorge Reservoir provides a unique opportunity 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.

3. Lower Colorado River Basin Reservoir Monitoring Program

Part I.--The Lower Colorado Region of the Bureau of Reclamation implemented a 2-year monitoring program on Lakes Mead, Mohave, and Havasu in December 1985. Monthly data are being collected at 13 stations on Lake Mead, 3 stations on Lake Havasu (2 of the Havasu stations are collected quarterly). In-situ measurements of water temperature, electrical conductivity, dissolved oxygen, and pH are being made at various depths. Secchi depths and limnophotometer measurements are being made. Water samples from various depths are being collected to analyze for the major ions.

The following data are also being collected at various depths at selected stations: current velocity measurements and water samples for the analysis of nutrients, zooplankton, and chlorophyll.

Part II.--Studies conducted by the Arizona Game and Fish Department (AGFD) and Nevada Department of Wildlife (NDOW) indicate that improvements in the fertility of Lake Mead would benefit the black bass fishery. Recommendations were made by AGF and NDOW in the Lake Mead Black Bass Study to further evaluate nutrient enhancement as a means of restoring the fishery.

The University of Nevada, Las Vegas (UNLV) submitted a proposal to the Reclamation to artificially fertilize about 30,000 acres in the Overton Arm and 10,000 acres in Gregg Basin with ammonia phosphate. AGFD and NDOW have since made revisions to that proposal and are in the process of making recommendations for large-scale fertilization in the upper basin of Lake Mead. A considerable amount of preliminary research should be conducted before actual fertilization begins. It will be necessary to determine what type(s) of fertilizer is most suitable for application in Lake Mead, the method(s) of fertilizer application, and the frequency of application.

UNLV has already started laboratory tests on one grade of granular ammonia phosphate fertilizer. That work needs to be expanded to include other grades of fertilizer, and field application methods and frequency of applications.

4. Irrigation Drainage Studies in the Lower Colorado and Gila River Valleys

The annual flow of the Lower Colorado River is vital to the economic well-being of millions of people in Arizona, California, and northern Mexico. The hydrologic environment of the river has been altered greatly by man in his attempts to utilize more fully the flow of the river. Demands for water include not only municipal, irrigation, and electrical power generation demands, but also recreational and wildlife habitat demands.

The Department of the Interior has four important functions as land and water steward in the Lower Colorado and Gila River Valleys. These are: (1) the Bureau of Reclamation manages Colorado River diversions to private irrigation districts which irrigate hundreds of thousands of acres of intensively farmed agricultural areas in Arizona and California; (2) the Bureau of Indian Affairs manages agricultural areas irrigated by Colorado River diversions within the Colorado River Indian Reservation; (3) the Bureau of Land Management manages Fred J. Weiler Green Belt for wildlife and fisheries habitat and public use recreation. The Bureau of Land Management also leases irrigated agricultural land above the respective national wildlife refuges along the Colorado River; and (4) the U.S. Fish and Wildlife Service manages the Havasu, Cibola, and Imperial national wildlife refuges for migratory and endangered wildlife habitat, warm water fish habitat, and public use recreation.

Agricultural practices in this area are dominated by production of cotton and alfalfa, which are subject to frequent chemical treatments. All the refuges are located near intensively farmed agricultural areas and are influenced chemically by irrigation return flows.

The purpose of this initial study is to determine from existing data and reconnaissance field sampling whether irrigation drainage waters have caused or have the potential to cause harmful effects on human health, fish and wildlife, or other water uses. The field screening will determine whether corrective action is needed and lay the groundwork for more detailed investigations, if needed, to determine the extent, magnitude, and causes of the irrigation drainage quality problem.

Water, bottom material, and plant and animal tissues are being collected and analyzed for trace elements and organic contaminants in order to determine existing or potential toxic effects on humans or fish and wildlife. Contaminants of particular concern are selenium, thallium, toxaphene, and DDT and its derivatives. All samples are being collected using approved collection techniques.

Water, bottom material, and plant and animal tissue samples and field observations will be collected at 11 sites along the Lower Colorado River from Davis Dam to below Laguna Dam. A concerted effort was made to distribute sampling sites upstream and downstream from irrigation districts and national wildlife refuges.

A good control site does not appear to exist within a reasonable distance from or within the Lower Colorado River Basin due in part to widespread agricultural practices; therefore, the Colorado River below Davis Dam will serve as an upstream ambient/background site.

Water, bottom material, and plant and animal tissue samples and field observations will be collected only once at the 11 sites. Sampling will be accomplished at a time when irrigation returns are likely to have a high percentage of flow that has passed through the soil horizons. Because irrigated agriculture is a 12-month-per-year activity in the Lower Colorado River valley and the Colorado River is so highly regulated, early to late spring will be the best time to sample for maximum impact. This sampling schedule will allow for optimum information for a minimum cost for a reconnaissance (phase 1) study. This is the minimum effort necessary to evaluate whether or no a problem exists.

Water and bottom materials are being analyzed by the USGS. Tissue analyses are being performed by the U.S. Fish and Wildlife Service or commercial contract laboratories. All analyses performed follow prescribed analytical procedures.

Quarterly progress reports will be submitted to discuss progress and present significant findings of the study. After all the data have been collected, analyzed, and assembled, a report will be written that includes the basic data, interpretation of the data, and conclusions. The title of the report will be "A Reconnaissance Study of Selected Organics and Trace Metals Along the Lower Colorado and Gila River Valley Ecosystems."

Similar irrigation drainage toxicity studies are being planned and initiated in the Upper Colorado River Basin. The results of these studies will be presented in the next Progress Report.

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.

Cablegation is irrigation from a piped ditch were the rate of dicharge to the furrow is controlled by a cable attached to a plug in the pipe.

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 (ft3/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.)

Gauging 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 gauging 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 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 degrees C. Specific conductance is related to the type and concentration of ions in water and can be used to estimate salinity or the dissolved solids content of the water.

Streamflow is the discharge of water that occurs in a natural channel.

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.

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 degrees C, evaporation at 180 degrees 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 degrees 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

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 [8] 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 when available, conductivity (S): $L = aQ^bS^c$. For days without specific conductivity data, a slight variation of the equation for load as a function of discharge was used: $L = a'Q^{b'}$.

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 1983 were derived with data from 1982 through 1984. Since the October through December 1985 data was not yet available from the U.S. Geological Survey, the results of the 1984-85 are may change slightly as more data becomes available in the next Progress Report; just as 1982 and 1983 have been updated for this report.

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, a measure of 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 degrees 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.

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 [25] for synthesizing loads and discharge for periods of missing data have been used. 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.

All of the data contained in Tables 1 through 20 are available on magnetic computer tape from the Bureau of Reclamation, Planning Division, P.O. Box 11568, Salt Lake City, Utah 84109. Plots of the data in the tables are also available upon request.

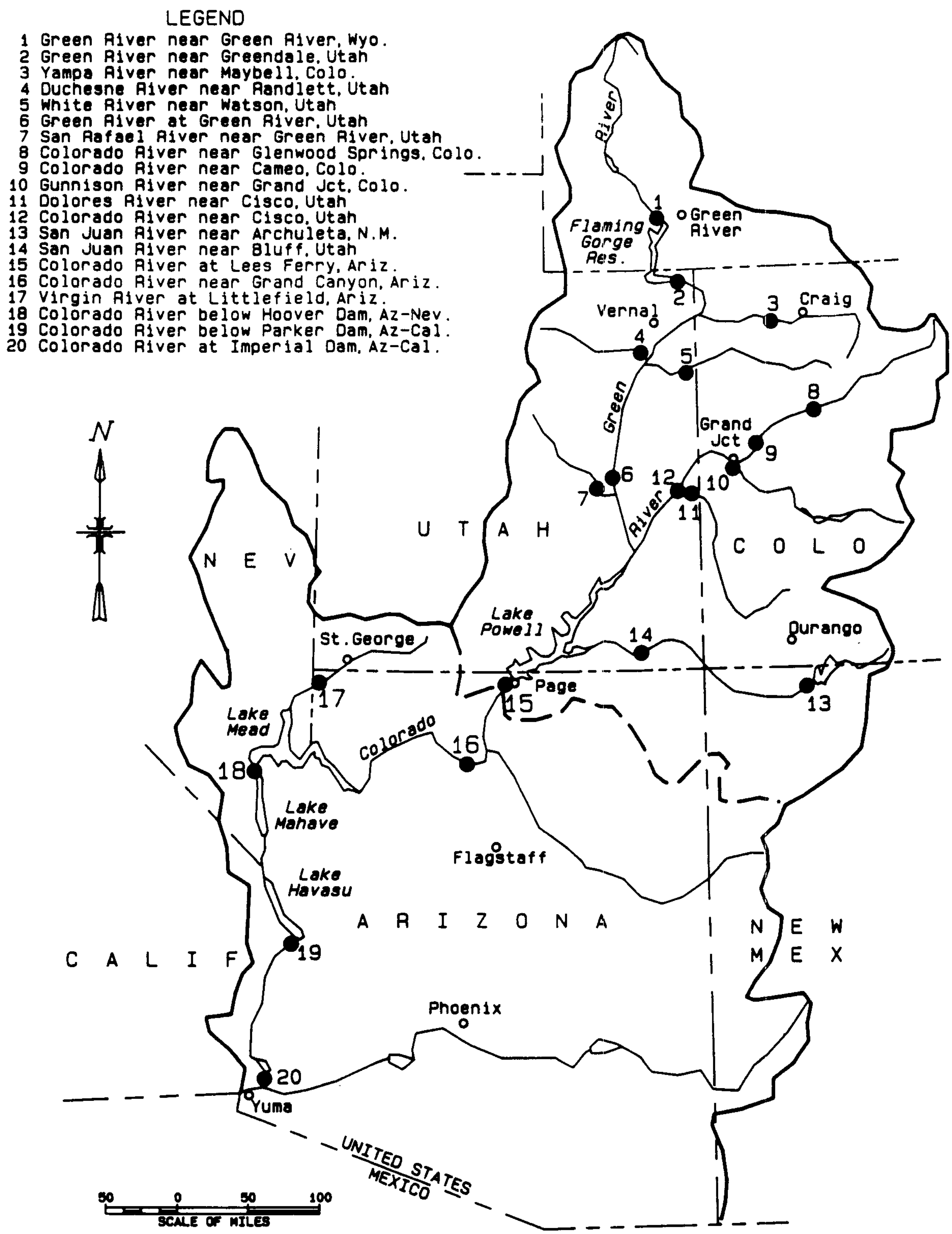

Figure D-1. Map of Colorado River Quality of Water monitoring stations.

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	447	0.40	296	*			
1942	1135	443	0.39	287	*			
1943	1648	572	0.35	255	*			
1944	1233	464	0.38	277	*			
1945	1135	457	0.40	296	*			
1946	1211	484	0.40	294	*			
1947	1870	633	0.34	249	*			
1948	1124	444	0.39	290	*			
1949	1189	464	0.39	287	*			
1950	2068	677	0.33	241	*			
1951	1875	648	0.35	254	*			
1952	1496	587	0.39	289	86	7.0	1.5	14.9
1953	1084	448	0.41	304	109	0.9	1.5	14.6
1954	1183	443	0.37	276	110	0.9	1.8	13.9
1955	833	364	0.44	322	113	1.8	2.0	14.6
1956	1611	592	0.37	270	110	1.8	2.1	16.5
1957	1543	562	0.36	268	85	2.4	1.7	16.3
1958	1047	446	0.43	314	61	1.6	1.6	17.3
1959	952	398	0.42	308	42	2.4	1.7	20.6
1960	698	314	0.45	331	43	0.0	1.5	23.0
1961	559	269	0.48	354	47	29.8	1.8	22.3
1962	1453	524	0.36	265	49	59.2	1.7	18.2
1963	1002	410	0.41	301	57	78.9	5.6	17.2
1964	1136	443	0.39	287	68	79.4	6.2	23.1
1965	1963	835	0.43	313	85	45.9	6.6	24.6
1966	911	470	0.52	379	91	50.5	5.0	22.2
1967	1523	572	0.38	276	72	31.9	4.4	19.0
1968	975	457	0.47	345	72	31.9	3.1	15.8
1969	1362	559	0.41	302	68	0.0	2.3	14.6
1970	933	465	0.50	367	71	0.0	2.7	15.5
1971	1748	682	0.39	287	46	0.0	2.5	21.8
1972	2008	771	0.38	282	35	0.0	3.3	22.7
1973	1193	568	0.48	350	35	0.0	2.9	21.1
1974	1494	622	0.42	306	36	0.0	6.0	10.2
1975	1385	612	0.44	325	36	0.0	7.5	13.4
1976	1487	623	0.42	308	37	0.0	8.2	12.8
1977	431	302	0.70	516	37	0.0	8.3	14.9
1978	1532	572	0.37	274	37	0.0	7.7	14.1
1979	968	443	0.46	337	35	0.0	9.6	15.9
1980	1359	560	0.41	303	29	0.0	9.5	14.5
1981	712	368	0.52	380	23	0.0	11.0	14.9
1982	1832	643	0.35	258	18	0.0	6.4	15.1
1983	2152	808	0.38	276	18	0.0	5.9	14.9
1984	1594	631	0.40	291	18	0.0	7.7	12.9
Total	57754	23097						
Average	1313	525	0.40	294				

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

Table 1 - Colorado River Basin - Historical Flow and Quality of Water Data
GREEN RIVER NEAR GREEN RIVER, WYOMING

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	17	15	624	*
	Feb	16	14	628	*
	Mar	55	31	415	*
	Apr	105	46	320	*
	May	197	67	249	*
	Jun	330	90	201	*
1941	Jul	126	45	262	*
	Aug	81	33	305	*
	Sep	46	24	378	*
	Oct	63	32	368	*
	Nov	50	29	425	*
	Dec	22	17	569	*
	TOTAL	1108	441	293	0
	Jan	19	15	610	*
	Feb	20	16	585	*
	Mar	52	30	422	*
	Apr	213	75	259	*
	May	170	60	260	*
	Jun	325	89	202	*
1942	Jul	188	59	233	*
	Aug	53	25	345	*
	Sep	28	16	439	*
	Oct	23	16	495	*
	Nov	22	16	543	*
	Dec	22	17	572	*
	TOTAL	1134	435	282	0
	Jan	22	17	582	*
	Feb	25	19	547	*
	Mar	75	38	379	*
	Apr	214	75	259	*
	May	269	83	226	*
	Jun	458	114	182	*
1943	Jul	328	88	197	*
	Aug	130	47	265	*
	Sep	49	25	371	*
	Oct	44	24	411	*
	Nov	39	24	456	*
	Dec	25	19	544	*
	TOTAL	1677	573	251	0
	Jan	20	16	600	*
	Feb	22	17	573	*
	Mar	34	22	478	*
	Apr	283	92	238	*
	May	176	61	257	*
	Jun	339	92	200	*
1944	Jul	210	64	225	*
	Aug	55	26	341	*
	Sep	25	16	450	*
	Oct	33	20	448	*
	Nov	27	19	510	*
	Dec	16	14	622	*
	TOTAL	1240	458	272	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	19	15	608	*
	Feb	23	18	561	*
	Mar	48	28	432	*
	Apr	87	40	339	*
	May	126	49	284	*
	Jun	238	72	222	*
1945	Jul	260	75	211	*
	Aug	134	48	262	*
	Sep	80	35	320	*
	Oct	55	29	384	*
	Nov	37	23	463	*
	Dec	29	20	525	*
	TOTAL	1135	451	292	0
	Jan	27	20	545	*
	Feb	23	17	566	*
	Mar	68	36	389	*
	Apr	185	68	271	*
	May	240	76	234	*
	Jun	293	83	208	*
1946	Jul	131	46	260	*
	Aug	62	28	329	*
	Sep	46	24	378	*
	Oct	50	27	394	*
	Nov	45	27	438	*
	Dec	46	28	457	*
	TOTAL	1215	480	291	0
	Jan	21	17	586	*
	Feb	26	19	546	*
	Mar	157	65	303	*
	Apr	105	46	320	*
	May	403	110	201	*
	Jun	496	120	178	*
1947	Jul	296	82	203	*
	Aug	176	58	241	*
	Sep	71	32	332	*
	Oct	69	34	359	*
	Nov	53	30	418	*
	Dec	40	26	476	*
	TOTAL	1912	637	245	0
	Jan	33	23	511	*
	Feb	28	20	531	*
	Mar	80	40	372	*
	Apr	120	50	308	*
	May	250	79	231	*
	Jun	369	97	195	*
1948	Jul	102	39	280	*
	Aug	46	22	361	*
	Sep	25	15	455	*
	Oct	28	18	469	*
	Nov	23	17	531	*
	Dec	21	16	579	*
	TOTAL	1124	437	286	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	21	17	591	*
	Feb	20	16	588	*
	Mar	55	31	415	*
	Apr	119	50	309	*
	May	234	75	236	*
	Jun	371	98	194	*
1949	Jul	159	53	245	*
	Aug	55	26	342	*
	Sep	31	18	426	*
	Oct	51	27	392	*
	Nov	48	28	428	*
	Dec	28	20	530	*
	TOTAL	1192	458	283	0
	Jan	24	19	562	*
	Feb	33	23	507	*
	Mar	122	54	327	*
	Apr	267	88	242	*
	May	334	96	212	*
	Jun	603	138	168	*
1950	Jul	381	98	189	*
	Aug	125	45	267	*
	Sep	68	31	336	*
	Oct	57	30	379	*
	Nov	63	34	396	*
	Dec	45	28	459	*
	TOTAL	2122	683	237	0
	Jan	30	21	528	*
	Feb	43	27	466	*
	Mar	75	39	378	*
	Apr	176	66	274	*
	May	339	97	211	*
	Jun	509	122	177	*
1951	Jul	305	84	202	*
	Aug	191	61	236	*
	Sep	81	35	319	*
	Oct	81	42	384	0
	Nov	50	32	474	0
	Dec	43	28	482	0
	TOTAL	1924	656	251	0
	Jan	41	25	448	0
	Feb	42	25	439	0
	Mar	52	32	450	0
	Apr	190	98	378	0
	May	348	110	232	0
	Jun	399	102	188	0
1952	Jul	171	60	259	0
	Aug	99	38	279	0
	Sep	57	28	368	0
	Oct	42	27	473	0
	Nov	28	23	592	0
	Dec	27	20	553	0
	TOTAL	1496	587	289	0

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	32	22	503	0
	Feb	33	23	513	0
	Mar	44	29	479	0
	Apr	77	43	408	0
	May	74	41	402	0
	Jun	381	101	195	0
1953	Jul	206	59	209	0
	Aug	104	40	279	0
	Sep	39	22	408	0
	Oct	34	24	528	0
	Nov	36	26	531	0
	Dec	24	20	615	0
	TOTAL	1084	448	304	0
	Jan	26	20	575	0
	Feb	27	19	514	0
	Mar	48	31	482	0
	Apr	88	46	388	0
	May	281	73	191	0
	Jun	232	68	216	0
1954	Jul	250	60	177	0
	Aug	86	33	278	0
	Sep	47	24	376	0
	Oct	40	26	474	0
	Nov	39	27	505	0
	Dec	18	15	640	0
	TOTAL	1183	443	276	0
	Jan	20	16	602	0
	Feb	20	15	553	0
	Mar	33	25	549	0
	Apr	74	44	432	0
	May	127	45	261	0
	Jun	244	64	193	0
1955	Jul	116	41	261	0
	Aug	68	28	300	0
	Sep	35	19	412	0
	Oct	33	22	504	0
	Nov	27	20	547	0
	Dec	35	24	507	0
	TOTAL	833	364	321	0
	Jan	37	25	488	0
	Feb	29	19	481	0
	Mar	91	51	413	0
	Apr	158	71	330	0
	May	310	106	253	0
	Jun	555	136	180	0
1956	Jul	197	60	224	0
	Aug	98	37	275	0
	Sep	41	22	389	0
	Oct	35	23	475	1
	Nov	35	24	505	0
	Dec	26	19	545	0
	TOTAL	1611	592	270	1

Table 1 - Colorado River Basin - Historical Flow and Quality of Water Data
GREEN RIVER NEAR GREEN RIVER, WYOMING

Calendar Year	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	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	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	Month	Flow 1000 (ACFT)	Load Load (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	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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	65	249	0
	Nov	55	29	384	0
	Dec	61	31	379	0
	TOTAL	1832	643	258	0
	Jan	77	38	360	0
	Feb	73	38	379	0
	Mar	106	54	377	0
	Apr	165	73	323	0
	May	179	80	328	0
	Jun	507	154	223	0
1983	Jul	478	128	197	0
	Aug	178	65	266	0
	Sep	108	46	314	0
	Oct	117	52	331	31
	Nov	110	50	334	30
	Dec	54	32	434	31
	TOTAL	2152	808	276	92
	Jan	44	28	466	31
	Feb	40	26	475	29
	Mar	50	30	448	31
	Apr	136	56	304	30
	May	269	88	240	31
	Jun	333	102	225	30
1984	Jul	284	92	238	31
	Aug	156	62	292	31
	Sep	84	42	364	30
	Oct	92	45	359	31
	Nov	75	39	379	30
	Dec	30	22	535	31
	TOTAL	1594	631	291	366

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	30	22	538	31
	Feb	31	22	510	28
	Mar	53	31	435	31
	Apr	169	65	284	30
	May	338	101	220	31
	Jun	174	67	282	30
1985	Jul	97	46	352	31
	Aug	53	31	430	31
	Sep	40	26	479	30
	Oct				
	Nov				
	Dec				
	TOTAL				

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	1410	727	0.52	380	*			
1942	1442	729	0.51	372	*			
1943	2100	1002	0.48	351	*			
1944	1568	778	0.50	365	*			
1945	1443	746	0.52	380	*			
1946	1539	793	0.51	379	*			
1947	2384	1127	0.47	348	*			
1948	1428	726	0.51	374	*			
1949	1512	765	0.51	372	*			
1950	2636	1223	0.46	341	*			
1951	2329	1109	0.48	350	*			
1952	2135	1009	0.47	348	*			
1953	1276	664	0.52	382	*			
1954	1246	649	0.52	383	*			
1955	1018	553	0.54	399	*			
1956	1884	917	0.49	358	*			
1957	2008	893	0.44	327	47	2.1	2.0	30.8
1958	1311	626	0.48	351	47	2.1	2.0	30.8
1959	1187	629	0.53	390	37	2.7	2.0	36.4
1960	972	548	0.56	414	45	2.2	2.0	36.4
1961	780	457	0.59	431	59	39.0	1.9	27.3
1962	2021	1033	0.51	376	58	55.2	2.1	25.0
1963	170	132	0.78	572	51	86.3	2.8	21.0
1964	1258	757	0.60	442	37	56.8	6.5	16.0
1965	1435	1019	0.71	522	35	34.3	6.6	14.6
1966	1188	838	0.71	519	38	0.0	5.6	12.6
1967	1804	1388	0.77	566	41	0.0	2.7	7.9
1968	1691	1204	0.71	524	46	0.0	3.2	8.0
1969	1988	1349	0.68	499	41	0.0	3.3	10.4
1970	1088	684	0.63	462	38	0.0	3.4	6.5
1971	1309	825	0.63	464	34	0.0	3.5	7.2
1972	2083	1300	0.62	459	33	0.0	3.4	7.7
1973	1931	1272	0.66	484	33	0.0	2.9	7.3
1974	1438	986	0.69	504	33	0.0	2.9	5.2
1975	1754	1202	0.69	504	35	0.0	3.4	4.0
1976	2028	1370	0.68	497	34	0.0	3.3	3.7
1977	1633	1081	0.66	487	30	0.0	4.0	4.9
1978	1101	800	0.73	534	30	0.0	4.1	7.2
1979	1377	921	0.67	492	31	0.0	5.6	10.6
1980	1139	730	0.64	472	35	0.0	5.8	8.2
1981	1022	666	0.65	479	34	0.0	4.7	6.6
1982	1616	1063	0.66	484	33	0.0	3.0	6.6
1983	3033	1735	0.57	421	34	0.0	3.1	9.4
1984	2524	1488	0.59	433	35	0.0	3.4	7.2
Total	70237	40511						
Average	1596	921	0.58	424				

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	20	558	*
	Feb	25	19	553	*
	Mar	72	45	455	*
	Apr	133	71	394	*
	May	244	115	346	*
	Jun	404	173	314	*
1941	Jul	159	78	360	*
	Aug	104	55	392	*
	Sep	61	37	442	*
	Oct	82	50	443	*
	Nov	66	43	478	*
	Dec	33	24	542	*
	TOTAL	1410	729	380	0
	Jan	29	22	553	*
	Feb	30	22	538	*
	Mar	69	43	459	*
	Apr	263	128	356	*
	May	212	102	353	*
	Jun	398	170	315	*
1942	Jul	233	108	340	*
	Aug	71	40	415	*
	Sep	39	25	472	*
	Oct	35	24	503	*
	Nov	32	23	530	*
	Dec	32	24	543	*
	TOTAL	1443	730	372	0
	Jan	32	24	543	*
	Feb	36	26	524	*
	Mar	96	57	437	*
	Apr	264	128	356	*
	May	331	149	331	*
	Jun	559	228	300	*
1943	Jul	402	172	314	*
	Aug	163	81	367	*
	Sep	65	39	438	*
	Oct	59	37	465	*
	Nov	54	36	492	*
	Dec	37	27	533	*
	TOTAL	2098	1003	352	0
	Jan	30	22	549	*
	Feb	32	23	533	*
	Mar	48	31	484	*
	Apr	347	161	342	*
	May	218	104	352	*
	Jun	415	177	313	*
1944	Jul	260	118	335	*
	Aug	73	41	413	*
	Sep	37	24	476	*
	Oct	46	30	483	*
	Nov	39	27	517	*
	Dec	26	20	561	*
	TOTAL	1569	779	365	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	29	22	552	*
	Feb	34	24	529	*
	Mar	64	40	463	*
	Apr	111	61	404	*
	May	158	79	369	*
	Jun	293	131	330	*
1945	Jul	320	141	325	*
	Aug	168	84	365	*
	Sep	102	57	410	*
	Oct	72	44	452	*
	Nov	51	34	496	*
	Dec	41	29	525	*
	TOTAL	1443	748	381	0
	Jan	39	28	529	*
	Feb	33	24	531	*
	Mar	88	53	442	*
	Apr	229	113	364	*
	May	296	135	337	*
	Jun	359	156	320	*
1946	Jul	164	80	358	*
	Aug	81	45	406	*
	Sep	61	37	442	*
	Oct	67	42	457	*
	Nov	60	40	484	*
	Dec	61	41	495	*
	TOTAL	1539	794	379	0
	Jan	32	24	545	*
	Feb	36	26	523	*
	Mar	196	105	394	*
	Apr	133	71	394	*
	May	493	209	312	*
	Jun	604	244	296	*
1947	Jul	363	157	319	*
	Aug	219	104	352	*
	Sep	92	52	417	*
	Oct	89	53	438	*
	Nov	70	45	474	*
	Dec	54	37	503	*
	TOTAL	2381	1127	348	0
	Jan	47	33	515	*
	Feb	40	28	517	*
	Mar	102	60	433	*
	Apr	151	79	387	*
	May	308	140	335	*
	Jun	451	190	309	*
1948	Jul	129	65	371	*
	Aug	62	35	423	*
	Sep	36	23	478	*
	Oct	40	27	492	*
	Nov	34	25	525	*
	Dec	31	23	546	*
	TOTAL	1430	728	374	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	31	23	546	*
	Feb	30	22	539	*
	Mar	73	45	455	*
	Apr	150	79	387	*
	May	289	133	338	*
	Jun	454	191	309	*
1949	Jul	198	94	348	*
	Aug	73	41	413	*
	Sep	43	27	465	*
	Oct	68	42	456	*
	Nov	65	42	479	*
	Dec	40	29	527	*
	TOTAL	1512	766	373	0
	Jan	36	26	535	*
	Feb	45	31	507	*
	Mar	154	85	408	*
	Apr	328	154	345	*
	May	409	179	321	*
	Jun	733	287	288	*
1950	Jul	466	195	307	*
	Aug	157	79	369	*
	Sep	88	50	419	*
	Oct	76	46	449	*
	Nov	80	50	465	*
	Dec	61	41	495	*
	TOTAL	2631	1223	342	0
	Jan	45	31	518	*
	Feb	61	40	485	*
	Mar	93	55	439	*
	Apr	212	106	368	*
	May	392	172	323	*
	Jun	625	251	295	*
1951	Jul	365	158	318	*
	Aug	228	108	349	*
	Sep	98	55	413	*
	Oct	99	58	431	*
	Nov	57	38	488	*
	Dec	54	37	504	*
	TOTAL	2329	1110	351	0
	Jan	49	34	510	*
	Feb	50	34	499	*
	Mar	63	40	464	*
	Apr	317	149	347	*
	May	591	244	304	*
	Jun	553	226	300	*
1952	Jul	204	96	347	*
	Aug	121	63	384	*
	Sep	67	40	437	*
	Oct	50	32	477	*
	Nov	37	26	520	*
	Dec	34	25	539	*
	TOTAL	2135	1009	348	0

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	48	33	513	*
	Feb	48	33	502	*
	Mar	73	45	455	*
	Apr	96	54	413	*
	May	107	57	390	*
	Jun	451	190	309	*
1953	Jul	197	93	349	*
	Aug	105	56	392	*
	Sep	43	27	466	*
	Oct	35	24	502	*
	Nov	42	29	511	*
	Dec	32	23	545	*
	TOTAL	1276	664	383	0
	Jan	28	21	555	*
	Feb	39	27	518	*
	Mar	62	39	466	*
	Apr	101	56	410	*
	May	299	137	336	*
	Jun	222	104	343	*
1954	Jul	265	120	334	*
	Aug	81	45	407	*
	Sep	45	28	462	*
	Oct	43	28	488	*
	Nov	41	28	512	*
	Dec	20	16	583	*
	TOTAL	1246	650	384	0
	Jan	24	19	567	*
	Feb	25	19	554	*
	Mar	44	29	490	*
	Apr	106	59	407	*
	May	166	83	366	*
	Jun	287	129	331	*
1955	Jul	130	65	370	*
	Aug	80	44	408	*
	Sep	38	25	474	*
	Oct	38	26	497	*
	Nov	36	26	521	*
	Dec	45	32	517	*
	TOTAL	1018	554	400	0
	Jan	50	35	510	*
	Feb	36	26	524	*
	Mar	150	83	409	*
	Apr	203	102	370	*
	May	366	162	326	*
	Jun	612	246	296	*
1956	Jul	205	97	346	*
	Aug	104	56	392	*
	Sep	48	30	458	*
	Oct	46	32	512	24
	Nov	39	28	538	23
	Dec	26	21	598	23
	TOTAL	1884	917	358	70

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 Load (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	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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	157	481	11
	Nov	218	135	457	10
	Dec	180	115	470	19
	TOTAL	1616	1063	484	126
	Jan	184	115	461	10
	Feb	132	82	458	9
	Mar	151	93	455	8
	Apr	169	102	444	10
	May	189	105	410	10
	Jun	474	275	426	8
1983	Jul	623	343	405	11
	Aug	311	174	411	8
	Sep	222	122	406	9
	Oct	194	105	399	11
	Nov	189	104	403	13
	Dec	196	115	430	10
	TOTAL	3033	1735	421	117
	Jan	230	136	436	14
	Feb	235	138	430	9
	Mar	232	136	430	9
	Apr	233	139	440	10
	May	326	188	424	9
	Jun	137	72	387	9
1984	Jul	221	121	402	10
	Aug	211	126	439	8
	Sep	132	80	448	11
	Oct	170	104	451	9
	Nov	177	110	458	11
	Dec	221	138	458	12
	TOTAL	2524	1488	433	121

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	255	162	467	9
	Feb	214	136	466	9
	Mar	168	105	459	10
	Apr	166	101	445	8
	May	160	95	438	9
	Jun	99	58	430	11
1985	Jul	144	86	442	9
	Aug	99	64	472	10
	Sep	90	56	452	10
	Oct				
	Nov				
	Dec				
	TOTAL				

Missing EC estimated by interpolation after regulation of flow.

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	222	0.22	159	*			
1942	1134	235	0.21	152	*			
1943	903	205	0.23	167	*			
1944	851	181	0.21	156	*			
1945	1258	248	0.20	145	*			
1946	868	204	0.24	173	*			
1947	1332	270	0.20	149	*			
1948	1143	242	0.21	156	*			
1949	1332	262	0.20	144	*			
1950	942	206	0.22	161	*			
1951	1016	174	0.17	126	99	0.0	3.1	23.6
1952	1436	266	0.19	136	99	0.0	3.1	23.6
1953	828	159	0.19	141	105	0.0	2.0	21.4
1954	538	115	0.21	157	106	0.0	2.0	21.3
1955	764	148	0.19	142	109	0.0	2.1	21.5
1956	1022	185	0.18	133	105	0.0	2.5	23.7
1957	1832	353	0.19	142	85	0.0	2.6	24.7
1958	1227	250	0.20	150	65	0.0	2.6	27.9
1959	869	164	0.19	139	55	0.0	2.5	28.9
1960	955	181	0.19	139	62	0.0	2.2	25.4
1961	706	147	0.21	154	73	30.1	3.3	31.6
1962	1423	312	0.22	161	82	61.0	4.6	32.3
1963	610	135	0.22	163	83	90.4	4.9	32.2
1964	879	178	0.20	149	83	90.4	5.2	26.4
1965	1355	242	0.18	132	71	90.1	5.8	25.6
1966	663	154	0.23	171	77	85.7	8.1	23.7
1967	908	196	0.22	159	63	69.8	6.9	22.7
1968	1158	245	0.21	156	64	43.8	8.4	22.1
1969	1120	238	0.21	156	46	2.2	3.3	28.0
1970	1352	300	0.22	163	45	2.2	4.0	31.4
1971	1453	324	0.22	164	37	0.0	4.1	33.8
1972	919	192	0.21	154	35	0.0	4.1	31.1
1973	1221	255	0.21	154	33	0.0	4.2	34.4
1974	1398	278	0.20	146	28	0.0	5.8	33.8
1975	1219	266	0.22	161	28	0.0	7.8	35.8
1976	810	183	0.23	166	29	3.3	7.5	28.6
1977	345	122	0.35	260	34	2.9	7.8	30.8
1978	1456	260	0.18	131	33	3.0	7.5	33.0
1979	1313	268	0.20	150	31	0.0	7.5	41.0
1980	1276	270	0.21	156	29	0.0	5.3	38.4
1981	570	155	0.27	200	25	0.0	4.6	39.8
1982	1413	302	0.21	157	20	0.0	5.1	39.4
1983	1576	370	0.23	173	14	0.0	4.2	45.9
1984	2227	715	0.32	236	12	0.0	2.9	39.3
Total	48646	10379						
Average	1106	236	0.21	157				

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	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	14	7	358	*
	Feb	16	8	341	*
	Mar	39	14	261	*
	Apr	92	24	193	*
	May	451	68	112	*
	Jun	240	43	132	*
1941	Jul	50	14	203	*
	Aug	21	7	261	*
	Sep	11	5	321	*
	Oct	40	12	228	*
	Nov	28	10	268	*
	Dec	24	10	292	*
	TOTAL	1027	222	159	0
	Jan	21	9	313	*
	Feb	19	8	325	*
	Mar	50	17	243	*
	Apr	239	47	145	*
	May	361	59	119	*
	Jun	329	54	120	*
1942	Jul	59	15	194	*
	Aug	14	6	295	*
	Sep	5	3	413	*
	Oct	11	5	343	*
	Nov	15	7	327	*
	Dec	13	6	354	*
	TOTAL	1134	235	152	0
	Jan	12	6	376	*
	Feb	14	7	362	*
	Mar	46	16	249	*
	Apr	190	40	155	*
	May	237	44	136	*
	Jun	270	47	128	*
1943	Jul	70	18	183	*
	Aug	20	7	264	*
	Sep	9	4	350	*
	Oct	10	5	346	*
	Nov	14	6	331	*
	Dec	12	6	359	*
	TOTAL	903	205	167	0
	Jan	10	5	389	*
	Feb	10	5	398	*
	Mar	18	8	332	*
	Apr	44	14	242	*
	May	311	53	125	*
	Jun	347	56	118	*
1944	Jul	64	16	189	*
	Aug	8	4	348	*
	Sep	2	1	549	*
	Oct	9	4	363	*
	Nov	16	7	319	*
	Dec	13	6	354	*
	TOTAL	851	181	156	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	12	6	371	*
	Feb	10	5	399	*
	Mar	23	10	306	*
	Apr	89	24	195	*
	May	439	67	113	*
	Jun	393	61	114	*
1945	Jul	163	31	142	*
	Aug	56	15	193	*
	Sep	20	7	271	*
	Oct	17	7	297	*
	Nov	19	8	303	*
	Dec	16	7	330	*
	TOTAL	1258	248	145	0
	Jan	14	7	355	*
	Feb	18	8	330	*
	Mar	40	14	261	*
	Apr	215	44	150	*
	May	220	42	139	*
	Jun	228	42	134	*
1946	Jul	43	12	212	*
	Aug	16	6	282	*
	Sep	9	4	346	*
	Oct	20	8	280	*
	Nov	25	9	280	*
	Dec	20	8	311	*
	TOTAL	868	204	173	0
	Jan	14	7	356	*
	Feb	15	7	351	*
	Mar	76	22	214	*
	Apr	164	36	162	*
	May	492	73	109	*
	Jun	317	52	122	*
1947	Jul	119	25	156	*
	Aug	32	10	228	*
	Sep	17	6	286	*
	Oct	22	8	275	*
	Nov	27	10	274	*
	Dec	38	13	254	*
	TOTAL	1332	270	149	0
	Jan	37	13	263	*
	Feb	36	13	270	*
	Mar	57	18	234	*
	Apr	195	41	154	*
	May	453	69	112	*
	Jun	240	43	132	*
1948	Jul	51	14	201	*
	Aug	20	7	266	*
	Sep	6	3	395	*
	Oct	16	7	301	*
	Nov	17	7	316	*
	Dec	16	7	332	*
	TOTAL	1143	242	156	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	15	7	345	*
	Feb	16	7	344	*
	Mar	44	15	253	*
	Apr	192	40	155	*
	May	422	65	114	*
	Jun	433	65	111	*
1949	Jul	120	25	156	*
	Aug	21	7	262	*
	Sep	11	5	328	*
	Oct	24	9	267	*
	Nov	20	8	298	*
	Dec	16	7	334	*
	TOTAL	1332	262	144	0
	Jan	15	7	347	*
	Feb	15	7	348	*
	Mar	28	11	291	*
	Apr	133	31	173	*
	May	271	48	130	*
	Jun	327	54	120	*
1950	Jul	78	19	177	*
	Aug	13	5	298	*
	Sep	11	5	321	*
	Oct	15	6	293	31
	Nov	17	6	278	28
	Dec	16	6	281	0
	TOTAL	942	206	161	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

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	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

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	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 Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	13	6	325	22		Jan	12	5	319	22		Jan	17	7	312	18		Jan	17	9	367	0
	Feb	13	6	314	20		Feb	12	5	308	20		Feb	15	6	319	16		Feb	16	8	375	0
	Mar	29	13	321	13		Mar	19	8	308	14		Mar	18	8	316	17		Mar	26	10	286	31
	Apr	125	44	261	1		Apr	56	21	269	1		Apr	156	37	174	3		Apr	248	43	128	30
	May	440	91	152	0		May	233	34	108	0		May	386	52	99	0		May	400	60	111	31
	Jun	680	95	103	0		Jun	195	23	88	3		Jun	455	55	89	1		Jun	222	36	119	0
1957	Jul	358	43	89	1	1961	Jul	22	6	212	2	1965	Jul	150	23	113	0	1969	Jul	75	24	234	0
	Aug	65	16	176	0		Aug	8	4	330	0		Aug	46	13	212	2		Aug	21	8	270	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	260	0		Oct	28	12	319	0
	Nov	29	11	286	0		Nov	34	10	212	0		Nov	25	12	339	0		Nov	25	11	341	0
	Dec	25	10	298	11		Dec	22	8	269	13		Dec	20	8	300	7		Dec	22	10	332	0
	TOTAL	1832	353	142	72		TOTAL	706	147	154	75		TOTAL	1355	242	132	64		TOTAL	1120	238	156	92
	Jan	20	8	293	17		Jan	20	8	282	17		Jan	21	8	302	18		Jan	22	10	332	0
	Feb	28	11	285	16		Feb	41	16	283	15		Feb	16	7	316	16		Feb	22	13	437	0
	Mar	41	19	334	5		Mar	45	20	326	14		Mar	88	19	161	14		Mar	30	19	455	0
	Apr	162	55	249	3		Apr	387	105	200	1		Apr	122	21	124	0		Apr	82	43	390	0
	May	549	87	117	0		May	439	72	120	5		May	237	43	134	31		May	510	75	108	0
	Jun	330	34	76	0		Jun	305	41	98	12		Jun	110	25	165	30		Jun	443	61	102	20
1958	Jul	35	9	190	0	1962	Jul	113	18	115	2	1966	Jul	18	7	292	31	1970	Jul	122	28	168	31
	Aug	11	5	322	0		Aug	18	6	263	0		Aug	8	4	362	28		Aug	27	10	258	3
	Sep	10	5	345	0		Sep	7	4	444	0		Sep	3	1	354	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	338	0		Nov	26	12	352	0
	Dec	13	6	333	17		Dec	13	7	377	6		Dec	13	6	337	15		Dec	21	10	363	0
	TOTAL	1227	250	150	77		TOTAL	1423	312	161	73		TOTAL	663	154	171	183		TOTAL	1352	300	163	54
	Jan	14	6	330	18		Jan	13	7	370	18		Jan	12	5	341	11		Jan	23	13	407	0
	Feb	15	6	324	16		Feb	22	9	313	16		Feb	13	6	345	0		Feb	21	9	306	28
	Mar	22	9	316	11		Mar	29	13	336	0		Mar	42	20	352	0		Mar	66	18	204	31
	Apr	89	31	256	0		Apr	79	23	218	0		Apr	88	25	206	0		Apr	277	56	148	30
	May	265	36	99	0		May	251	31	92	0		May	250	42	124	0		May	394	73	136	31
	Jun	287	25	65	0		Jun	147	19	97	1		Jun	316	41	95	0		Jun	462	81	129	30
1959	Jul	48	10	146	0	1963	Jul	17	6	254	0	1967	Jul	109	24	163	0	1971	Jul	117	30	187	31
	Aug	22	7	244	1		Aug	13	6	356	1		Aug	21	9	293	0		Aug	20	8	311	23
	Sep	12	5	306	0		Sep	12	5	324	0		Sep	14	6	288	0		Sep	15	6	314	0
	Oct	41	11	198	0		Oct	7	4	397	0		Oct	17	7	293	0		Oct	19	8	306	0
	Nov	32	9	207	0		Nov	12	6	386	0		Nov	15	7	352	0		Nov	21	13	443	0
	Dec	23	8	266	18		Dec	8	5	418	18		Dec	12	5	326	0		Dec	19	9	344	0
	TOTAL	869	164	139	64		TOTAL	610	135	163	54		TOTAL	908	196	159	11		TOTAL	1453	324	164	204
	Jan	14	6	296	18		Jan	8	4	365	17		Jan	14	6	310	1		Jan	21	10	341	0
	Feb	13	5	295	16		Feb	9	4	355	17		Feb	14	6	317	0		Feb	25	12	361	0
	Mar	41	15	268	13		Mar	14	6	328	18		Mar	28	14	357	0		Mar	72	27	278	0
	Apr	240	51	157	1		Apr	67	25	277	9		Apr	89	27	226	0		Apr	126	28	161	0
	May	287	42	107	0		May	334	58	128	0		May	343	57	122	0		May	261	41	115	0
	Jun	268	29	79	1		Jun	293	33	83	1		Jun	466	67	105	30		Jun	290	33	84	0
1960	Jul	36	8	168	0	1964	Jul	83	18	162	0	1968	Jul	94	22	176	31	1972	Jul	33	9	196	1
	Aug	10	5	352	0		Aug	19	6	240	0		Aug	37	12	247	31		Aug	9	4	320	0
	Sep	6	3	409	18		Sep	11	4	287	0		Sep	15	6	285	0		Sep	12	6	387	0
	Oct	12	5	313	21		Oct	11	5	320	0		Oct	22	10	331	0		Oct	25	8	244	0
	Nov	15	6	303	22		Nov	14	6	333	8		Nov	19	10	377	0		Nov	23	7	216	0
	Dec	13	6	318	22		Dec	17	7	322	18		Dec	17	8	363	0		Dec	22	7	239	0
	TOTAL	955	181	139	132		TOTAL	879	178	149	88		TOTAL	1158	245	156	93		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	24	182	28
	May	473	73	114	31
	Jun	358	60	124	30
1973	Jul	131	30	171	31
	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	255	154	273
	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	7	316	9
	Nov	18	8	329	8
	Dec	17	8	333	31
	TOTAL	1219	266	161	277
	Jan	15	7	327	11
	Feb	20	10	362	0
	Mar	33	21	465	0
	Apr	87	34	285	7
	May	308	45	107	0
	Jun	221	25	84	0
1976	Jul	61	13	153	2
	Aug	22	8	255	1
	Sep	10	5	357	0
	Oct	13	7	366	0
	Nov	11	5	331	5
	Dec	9	5	425	17
	TOTAL	810	183	166	43

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	8	4	391	31
	Feb	12	6	339	24
	Mar	21	11	392	0
	Apr	52	15	219	18
	May	114	28	183	12
	Jun	90	33	268	0
1977	Jul	5	3	472	20
	Aug	5	3	498	17
	Sep	5	3	420	0
	Oct	11	5	334	31
	Nov	12	5	326	30
	Dec	11	5	342	31
	TOTAL	345	122	260	214
	Jan	14	5	268	3
	Feb	15	6	278	12
	Mar	34	15	320	19
	Apr	198	56	210	5
	May	398	66	121	0
	Jun	531	55	76	0
1978	Jul	184	29	117	18
	Aug	32	8	188	9
	Sep	12	5	278	2
	Oct	12	4	279	0
	Nov	14	6	286	0
	Dec	13	6	318	0
	TOTAL	1456	260	131	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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	221	0
	Nov	31	14	324	0
	Dec	21	10	349	0
	TOTAL	1413	302	157	18
	Jan	19	9	348	0
	Feb	19	10	383	0
	Mar	55	37	499	0
	Apr	109	56	380	0
	May	373	78	154	20
	Jun	586	74	93	0
1983	Jul	245	36	107	7
	Aug	57	16	210	6
	Sep	18	10	392	30
	Oct	35	14	294	2
	Nov	31	14	337	0
	Dec	27	15	418	2
	TOTAL	1576	370	173	67
	Jan	26	17	461	0
	Feb	24	17	515	0
	Mar	35	29	620	0
	Apr	192	120	460	3
	May	861	226	193	0
	Jun	652	122	137	0
1984	Jul	215	44	151	0
	Aug	60	27	331	0
	Sep	38	20	392	0
	Oct	45	29	478	0
	Nov	43	34	578	1
	Dec	37	31	616	0
	TOTAL	2227	715	236	4

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	28	24	621	4
	Feb	27	24	663	0
	Mar	65	36	409	13
	Apr	351	156	327	7
	May	585	133	168	7
	Jun	338	52	112	0
1985	Jul	79	29	269	0
	Aug	32	16	365	0
	Sep	17	12	536	0
	Oct				
	Nov				
	Dec				
	TOTAL				

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	635	495	0.78	574	*			
1942	485	422	0.87	639	*			
1943	460	421	0.91	673	*			
1944	697	509	0.73	537	*			
1945	406	400	0.98	724	*			
1946	325	336	1.03	761	*			
1947	568	466	0.82	603	*			
1948	297	303	1.02	750	*			
1949	640	486	0.76	558	*			
1950	574	467	0.81	598	*			
1951	450	416	0.92	680	*			
1952	1034	648	0.63	461	*			
1953	327	332	1.02	748	*			
1954	189	239	1.26	930	*			
1955	245	281	1.15	844	*			
1956	303	301	0.99	731	*			
1957	456	420	0.92	679	88	0.0	1.9	22.9
1958	417	323	0.77	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	0.81	597	101	69.3	2.5	21.7
1963	209	268	1.28	943	113	92.9	3.1	20.9
1964	356	329	0.92	679	128	96.9	3.0	26.8
1965	906	723	0.80	587	127	96.9	2.8	27.2
1966	307	380	1.24	911	136	97.1	3.0	25.3
1967	591	494	0.83	614	134	91.0	3.8	23.1
1968	582	519	0.89	657	148	87.8	4.0	26.2
1969	620	530	0.85	628	112	76.8	4.2	28.1
1970	162	237	1.46	1073	72	58.3	4.3	27.0
1971	360	345	0.96	705	34	0.0	3.5	21.1
1972	366	338	0.92	678	40	0.0	5.5	22.8
1973	566	506	0.89	657	39	0.0	6.3	25.3
1974	284	274	0.96	707	43	0.0	7.1	25.9
1975	446	299	0.67	493	37	0.0	7.3	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	23.5
1980	365	301	0.83	607	35	0.0	7.9	24.9
1981	176	206	1.17	857	36	0.0	7.1	21.1
1982	641	409	0.64	469	34	0.0	7.5	18.4
1983	1312	643	0.49	360	35	0.0	6.2	19.1
1984	850	513	0.60	444	35	0.0	6.4	24.6
Total	19442	16612						
Average	442	378	0.85	628				

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	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	23	27	847	*
	Feb	23	26	830	*
	Mar	21	24	860	*
	Apr	26	28	805	*
	May	162	94	427	*
	Jun	200	113	415	*
1941	Jul	37	40	785	*
	Aug	20	28	1030	*
	Sep	16	25	1122	*
	Oct	42	45	779	*
	Nov	42	43	761	*
	Dec	38	38	744	*
	TOTAL	650	531	601	0
	Jan	36	36	723	*
	Feb	32	32	740	*
	Mar	36	34	704	*
	Apr	67	52	566	*
	May	86	63	539	*
	Jun	138	89	475	*
1942	Jul	20	27	991	*
	Aug	7	14	1543	*
	Sep	6	13	1590	*
	Oct	18	26	1067	*
	Nov	22	29	965	*
	Dec	28	31	837	*
	TOTAL	495	446	662	0
	Jan	26	29	812	*
	Feb	29	30	768	*
	Mar	29	30	759	*
	Apr	43	39	668	*
	May	100	69	510	*
	Jun	103	74	529	*
1943	Jul	28	33	867	*
	Aug	23	31	978	*
	Sep	8	16	1443	*
	Oct	22	30	985	*
	Nov	24	30	936	*
	Dec	25	29	869	*
	TOTAL	460	441	704	0
	Jan	23	27	851	*
	Feb	25	27	807	*
	Mar	43	39	657	*
	Apr	48	42	639	*
	May	128	81	466	*
	Jun	255	131	379	*
1944	Jul	82	65	587	*
	Aug	8	15	1480	*
	Sep	7	14	1529	*
	Oct	24	31	962	*
	Nov	26	32	903	*
	Dec	28	32	830	*
	TOTAL	697	537	567	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	30	32	771	*
	Feb	27	29	784	*
	Mar	32	32	734	*
	Apr	24	27	830	*
	May	59	50	618	*
	Jun	91	68	554	*
1945	Jul	31	35	844	*
	Aug	31	37	880	*
	Sep	12	20	1267	*
	Oct	21	28	1010	*
	Nov	26	32	907	*
	Dec	24	29	882	*
	TOTAL	406	418	757	0
	Jan	23	27	849	*
	Feb	21	25	859	*
	Mar	29	30	759	*
	Apr	40	37	685	*
	May	70	56	580	*
	Jun	47	45	708	*
1946	Jul	5	11	1612	*
	Aug	6	13	1600	*
	Sep	4	10	1863	*
	Oct	16	25	1099	*
	Nov	32	37	836	*
	Dec	30	33	808	*
	TOTAL	325	349	789	0
	Jan	26	29	820	*
	Feb	36	34	707	*
	Mar	35	34	707	*
	Apr	23	26	835	*
	May	143	87	447	*
	Jun	158	97	452	*
1947	Jul	33	37	823	*
	Aug	25	32	958	*
	Sep	12	20	1257	*
	Oct	17	25	1080	*
	Nov	29	34	867	*
	Dec	31	34	803	*
	TOTAL	568	490	634	0
	Jan	29	31	782	*
	Feb	25	27	807	*
	Mar	40	37	679	*
	Apr	31	32	748	*
	May	70	55	581	*
	Jun	51	47	687	*
1948	Jul	3	8	1955	*
	Aug	2	7	2378	*
	Sep	1	5	2800	*
	Oct	5	11	1728	*
	Nov	14	22	1138	*
	Dec	26	30	860	*
	TOTAL	297	312	774	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	24	27	841	*
	Feb	23	26	834	*
	Mar	44	39	654	*
	Apr	46	41	651	*
	May	127	81	467	*
	Jun	230	123	393	*
1949	Jul	50	48	705	*
	Aug	7	14	1542	*
	Sep	8	16	1458	*
	Oct	24	32	950	*
	Nov	29	34	866	*
	Dec	28	32	834	*
	TOTAL	640	512	588	0
	Jan	31	32	767	*
	Feb	26	28	792	*
	Mar	40	37	678	*
	Apr	44	40	660	*
	May	97	68	515	*
	Jun	193	110	420	*
1950	Jul	45	45	731	*
	Aug	9	17	1383	*
	Sep	13	22	1201	*
	Oct	16	24	1124	*
	Nov	27	33	894	*
	Dec	33	35	788	*
	TOTAL	574	490	628	0
	Jan	26	29	814	*
	Feb	26	28	794	*
	Mar	23	26	832	*
	Apr	14	19	999	*
	May	79	60	556	*
	Jun	124	83	494	*
1951	Jul	31	36	836	*
	Aug	26	33	934	*
	Sep	10	18	1356	*
	Oct	25	32	944	*
	Nov	32	37	835	*
	Dec	33	35	788	*
	TOTAL	450	436	713	0
	Jan	28	30	797	*
	Feb	26	28	800	*
	Mar	31	31	741	*
	Apr	111	71	471	*
	May	304	140	339	*
	Jun	302	146	356	*
1952	Jul	70	59	622	*
	Aug	49	49	743	*
	Sep	30	36	893	*
	Oct	21	28	1010	*
	Nov	26	32	907	*
	Dec	37	38	753	*
	TOTAL	1034	690	491	0

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	39	37	700	*
	Feb	33	33	726	*
	Mar	34	33	716	*
	Apr	13	18	1046	*
	May	15	21	1022	*
	Jun	107	76	521	*
1953	Jul	13	21	1146	*
	Aug	12	20	1258	*
	Sep	5	11	1781	*
	Oct	9	17	1375	*
	Nov	20	27	990	*
	Dec	26	30	857	*
	TOTAL	327	345	776	0
	Jan	27	30	803	*
	Feb	25	27	809	*
	Mar	20	24	871	*
	Apr	13	19	1024	*
	May	36	37	739	*
	Jun	5	11	1600	*
1954	Jul	2	6	2359	*
	Aug	1	5	2925	*
	Sep	6	13	1590	*
	Oct	17	25	1093	*
	Nov	18	26	1030	*
	Dec	18	24	984	*
	TOTAL	189	245	955	0
	Jan	25	28	833	*
	Feb	21	25	858	*
	Mar	34	33	720	*
	Apr	22	26	847	*
	May	45	42	681	*
	Jun	34	37	798	*
1955	Jul	2	6	2407	*
	Aug	8	16	1434	*
	Sep	4	10	1912	*
	Oct	6	13	1579	*
	Nov	15	22	1114	*
	Dec	29	33	820	*
	TOTAL	245	290	870	0
	Jan	27	30	801	*
	Feb	22	25	851	*
	Mar	25	27	807	*
	Apr	17	21	943	*
	May	74	57	571	*
	Jun	90	68	555	*
1956	Jul	4	10	1734	*
	Aug	2	7	2234	*
	Sep	1	5	2863	*
	Oct	4	10	1713	31
	Nov	17	26	1119	6
	Dec	19	22	880	0
	TOTAL	303	310	753	37

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

DUCHESNE RIVER NEAR RANDLETT, UTAH

Calendar Year	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	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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	3	2996	0
	Aug	0	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	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	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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	459	5
	Dec	61	39	475	6
	TOTAL	641	409	469	42
	Jan	60	39	479	8
	Feb	51	34	493	2
	Mar	74	57	567	1
	Apr	50	36	529	3
	May	86	50	432	5
	Jun	475	136	210	5
1983	Jul	153	64	305	4
	Aug	54	40	550	4
	Sep	47	35	554	4
	Oct	94	53	417	6
	Nov	86	49	420	30
	Dec	83	49	432	31
	TOTAL	1312	643	360	103
	Jan	77	47	448	31
	Feb	55	38	500	29
	Mar	62	41	484	31
	Apr	42	32	566	30
	May	141	61	318	31
	Jun	139	64	339	30
1984	Jul	64	42	481	31
	Aug	52	37	525	31
	Sep	44	33	554	30
	Oct	69	44	467	31
	Nov	60	40	488	30
	Dec	43	34	571	31
	TOTAL	850	513	444	366

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	36	31	616	31
	Feb	26	24	681	28
	Mar	44	34	566	31
	Apr	28	25	675	30
	May	73	45	451	31
	Jun	62	40	468	30
1985	Jul	21	22	757	31
	Aug	12	16	996	31
	Sep	21	22	773	30
	Oct				
	Nov				
	Dec				
	TOTAL				

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	317	0.55	403	*			
1942	670	346	0.52	379	*			
1943	422	268	0.63	466	*			
1944	439	266	0.61	446	*			
1945	512	298	0.58	428	*			
1946	397	259	0.65	479	*			
1947	583	321	0.55	405	*			
1948	504	292	0.58	427	*			
1949	589	319	0.54	398	*			
1950	437	271	0.62	456	*			
1951	466	260	0.56	410	70	61.4	6.0	30.6
1952	699	432	0.62	454	70	61.4	6.0	30.6
1953	469	308	0.66	483	79	45.6	6.6	26.8
1954	338	273	0.81	593	117	30.8	5.8	24.7
1955	387	253	0.65	480	114	9.6	4.0	18.0
1956	414	258	0.62	458	75	0.0	1.9	19.3
1957	764	456	0.60	438	37	0.0	2.3	20.5
1958	574	359	0.63	460	18	0.0	3.0	42.3
1959	413	248	0.60	442	42	0.0	2.5	33.1
1960	391	232	0.59	437	67	0.0	2.2	32.0
1961	371	245	0.66	485	75	32.0	1.9	30.2
1962	655	401	0.61	450	89	69.7	2.4	34.8
1963	312	227	0.73	536	91	97.8	2.8	33.0
1964	408	285	0.70	514	93	00.0	3.0	33.5
1965	592	365	0.62	453	88	00.0	2.8	29.0
1966	336	256	0.76	559	105	96.2	2.7	30.1
1967	387	258	0.67	491	112	92.0	4.8	26.1
1968	489	301	0.62	452	135	87.4	4.9	27.2
1969	491	287	0.59	430	104	75.0	5.4	25.0
1970	566	281	0.50	365	81	59.3	4.7	27.7
1971	525	238	0.45	334	37	0.0	5.3	19.7
1972	423	220	0.52	383	36	0.0	4.9	21.6
1973	566	329	0.58	427	37	0.0	6.1	23.8
1974	505	291	0.58	424	48	0.0	8.4	19.9
1975	559	265	0.47	349	55	0.0	8.1	17.5
1976	388	212	0.55	402	54	0.0	7.7	17.0
1977	213	153	0.72	528	36	0.0	5.2	18.2
1978	551	273	0.50	364	26	0.0	7.7	21.7
1979	555	260	0.47	344	21	0.0	5.5	15.2
1980	527	278	0.53	388	26	0.0	5.4	14.3
1981	345	180	0.52	382	30	0.0	6.6	14.0
1982	582	267	0.46	337	29	0.0	7.5	19.4
1983	831	404	0.49	358	26	0.0	6.6	23.5
1984	995	577	0.58	426	20	0.0	6.1	22.5
Total	22219	12888						
Average	505	293	0.58	426				

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	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	18	15	613	*
	Feb	22	17	574	*
	Mar	31	22	513	*
	Apr	34	23	498	*
	May	156	61	285	*
	Jun	118	50	312	*
1941	Jul	40	25	449	*
	Aug	33	21	481	*
	Sep	29	20	502	*
	Oct	44	26	431	*
	Nov	29	20	508	*
	Dec	24	18	552	*
	TOTAL	578	317	403	0
	Jan	23	17	567	*
	Feb	22	17	576	*
	Mar	43	27	457	*
	Apr	107	48	329	*
	May	158	61	284	*
	Jun	144	57	291	*
1942	Jul	44	26	434	*
	Aug	27	19	519	*
	Sep	23	17	544	*
	Oct	29	20	501	*
	Nov	27	19	516	*
	Dec	23	17	562	*
	TOTAL	670	346	379	0
	Jan	21	17	580	*
	Feb	24	18	558	*
	Mar	33	23	503	*
	Apr	40	26	467	*
	May	56	31	412	*
	Jun	87	41	348	*
1943	Jul	31	21	494	*
	Aug	44	26	432	*
	Sep	20	15	572	*
	Oct	21	16	559	*
	Nov	23	17	549	*
	Dec	21	17	574	*
	TOTAL	422	268	466	0
	Jan	19	15	606	*
	Feb	21	17	591	*
	Mar	32	22	508	*
	Apr	29	20	528	*
	May	94	44	342	*
	Jun	112	48	318	*
1944	Jul	40	24	451	*
	Aug	18	15	592	*
	Sep	15	13	631	*
	Oct	19	15	579	*
	Nov	20	16	576	*
	Dec	20	16	588	*
	TOTAL	439	266	446	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	25	19	543	*
	Feb	26	19	546	*
	Mar	28	20	534	*
	Apr	30	21	521	*
	May	108	48	325	*
	Jun	105	46	325	*
1945	Jul	57	31	397	*
	Aug	38	23	458	*
	Sep	23	17	539	*
	Oct	25	18	529	*
	Nov	27	19	521	*
	Dec	21	16	583	*
	TOTAL	512	298	428	0
	Jan	22	17	572	*
	Feb	21	17	589	*
	Mar	30	21	519	*
	Apr	43	27	454	*
	May	68	36	384	*
	Jun	67	35	383	*
1946	Jul	21	16	568	*
	Aug	29	20	501	*
	Sep	21	16	563	*
	Oct	28	19	509	*
	Nov	24	18	538	*
	Dec	23	17	559	*
	TOTAL	397	259	479	0
	Jan	17	14	633	*
	Feb	19	16	602	*
	Mar	43	27	460	*
	Apr	35	23	490	*
	May	140	56	297	*
	Jun	116	50	314	*
1947	Jul	61	32	388	*
	Aug	37	23	459	*
	Sep	26	18	518	*
	Oct	34	22	474	*
	Nov	28	19	513	*
	Dec	27	19	528	*
	TOTAL	583	321	405	0
	Jan	23	18	560	*
	Feb	20	16	595	*
	Mar	38	25	478	*
	Apr	59	33	407	*
	May	128	53	306	*
	Jun	91	42	342	*
1948	Jul	31	21	491	*
	Aug	28	19	511	*
	Sep	19	15	584	*
	Oct	24	17	537	*
	Nov	22	17	554	*
	Dec	19	16	595	*
	TOTAL	504	292	427	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	15	13	657	*
	Feb	14	13	683	*
	Mar	39	25	475	*
	Apr	44	27	451	*
	May	106	47	328	*
	Jun	159	60	281	*
1949	Jul	73	36	363	*
	Aug	31	20	494	*
	Sep	28	19	505	*
	Oct	34	22	474	*
	Nov	26	19	525	*
	Dec	21	16	579	*
	TOTAL	589	319	398	0
	Jan	20	16	588	*
	Feb	17	15	627	*
	Mar	30	21	522	*
	Apr	33	23	500	*
	May	63	34	395	*
	Jun	120	51	310	*
1950	Jul	38	24	459	*
	Aug	20	16	572	*
	Sep	24	17	535	*
	Oct	25	19	569	31
	Nov	23	18	572	30
	Dec	23	17	562	4
	TOTAL	437	271	456	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	Month	Flow 1000 (ACFT)	Load Load (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

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	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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	384	10
	Nov	32	21	482	30
	Dec	22	16	536	31
	TOTAL	582	267	337	109
	Jan	24	17	527	31
	Feb	25	17	505	28
	Mar	45	27	435	31
	Apr	37	23	460	30
	May	123	54	326	31
	Jun	254	96	278	0
1983	Jul	128	48	275	8
	Aug	56	32	413	7
	Sep	33	23	505	0
	Oct	41	26	468	0
	Nov	34	21	449	0
	Dec	29	20	504	10
	TOTAL	831	404	358	176
	Jan	22	18	585	31
	Feb	25	18	519	1
	Mar	47	38	591	0
	Apr	62	57	676	0
	May	215	120	409	0
	Jun	266	109	301	0
1984	Jul	117	58	364	0
	Aug	69	43	458	0
	Sep	48	33	505	15
	Oct	51	34	490	0
	Nov	35	25	525	0
	Dec	38	26	495	0
	TOTAL	995	577	426	47

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	34	25	541	0
	Feb	28	23	615	3
	Mar	40	29	536	3
	Apr	87	48	406	29
	May	204	94	340	5
	Jun	164	64	285	4
1985	Jul	71	42	436	31
	Aug	44	29	487	31
	Sep	33	24	524	30
	Oct				
	Nov				
	Dec				
	TOTAL				

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	0.68	497	70	00.0	00.0	16.2
1942	4622	3060	0.66	487	70	00.0	00.0	16.2
1943	4294	2459	0.57	421	48	75.0	2.0	18.0
1944	4421	2643	0.60	440	24	0.0	2.3	19.0
1945	4260	2488	0.58	430	36	0.0	2.4	19.7
1946	3519	2127	0.60	445	36	0.0	1.7	16.9
1947	5522	2983	0.54	397	36	0.0	1.8	19.9
1948	3928	2219	0.56	415	36	0.0	1.9	19.0
1949	5129	2976	0.58	427	41	0.0	2.0	20.2
1950	5478	3181	0.58	427	65	6.2	1.8	15.5
1951	4738	2727	0.58	423	89	4.5	1.7	18.2
1952	6712	4067	0.61	446	99	5.1	1.8	18.9
1953	3333	2170	0.65	479	96	31.3	1.9	22.5
1954	2638	1787	0.68	498	94	63.8	2.9	20.9
1955	2791	1731	0.62	456	104	56.7	2.7	22.0
1956	4021	2001	0.50	366	110	27.3	2.7	24.5
1957	5807	2989	0.51	379	91	0.0	2.2	24.4
1958	4212	2290	0.54	400	72	0.0	2.3	26.1
1959	2884	1765	0.61	450	55	0.0	2.9	27.1
1960	2864	1572	0.55	404	61	0.0	2.5	33.3
1961	2265	1483	0.65	482	71	32.4	2.5	34.7
1962	5600	2978	0.53	391	77	62.3	3.4	41.9
1963	1576	1319	0.84	615	74	89.2	3.4	37.0
1964	3242	2066	0.64	469	74	59.5	4.4	34.4
1965	5211	3191	0.61	450	70	27.1	4.1	23.9
1966	2966	2257	0.76	560	97	1.0	3.4	23.2
1967	4227	3129	0.74	544	112	0.0	3.6	26.8
1968	4589	3069	0.67	492	137	0.0	4.0	23.7
1969	5022	3420	0.68	501	109	0.9	6.5	22.9
1970	3984	2425	0.61	448	81	1.2	6.6	19.1
1971	4319	2555	0.59	435	44	2.3	7.2	18.7
1972	4182	2571	0.61	452	38	0.0	4.3	19.9
1973	5193	3229	0.62	457	37	0.0	4.9	16.8
1974	4410	2650	0.60	442	38	0.0	7.0	14.2
1975	4937	2888	0.58	430	38	0.0	7.0	13.0
1976	3866	2579	0.67	491	37	0.0	7.2	16.7
1977	2443	1849	0.76	556	35	0.0	6.8	20.6
1978	3930	2248	0.57	421	34	0.0	7.3	24.9
1979	4369	2699	0.62	454	32	0.0	7.1	25.1
1980	4373	2703	0.62	455	33	0.0	6.2	23.4
1981	2500	1796	0.72	528	29	0.0	7.6	23.3
1982	4889	2807	0.57	422	30	0.0	6.8	20.2
1983	8007	4397	0.55	404	28	0.0	6.0	19.8
1984	7875	4429	0.56	414	32	0.0	6.2	16.9
Total	189760	115087						
Average	4313	2616	0.61	446				

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	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	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	542	0
	Sep	71	66	690	0
	Oct	77	82	783	0
	Nov	86	95	306	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	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	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
1973	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
	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
1974	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
	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
1975	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
	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
1976	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
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
1977	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
	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
1978	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
	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
1979	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
	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
1980	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
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
1981	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
	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
1982	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
	Jul	482	217	331	7
	Aug	230	170	542	7
	Sep	267	210	578	7
	Oct	474	319	495	8
	Nov	380	268	519	4
	Dec	333	217	480	8
	TOTAL	4889	2807	422	123
1983	Jan	224	159	521	6
	Feb	257	183	525	2
	Mar	442	328	545	6
	Apr	420	304	533	6
	May	961	506	387	6
	Jun	2258	898	292	5
	Jul	1360	621	336	7
	Aug	577	373	476	5
	Sep	357	256	526	5
	Oct	448	308	506	7
	Nov	372	256	508	4
	Dec	331	205	456	6
	TOTAL	8007	4397	404	65
1984	Jan	274	179	481	4
	Feb	344	234	502	2
	Mar	497	367	544	5
	Apr	641	470	539	2
	May	1827	858	345	0
	Jun	1613	577	263	0
	Jul	761	365	353	0
	Aug	492	350	524	2
	Sep	308	234	560	3
	Oct	425	316	547	4
	Nov	379	279	541	3
	Dec	314	198	464	4
	TOTAL	7875	4429	414	29

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
1985	Jan	353	224	466	4
	Feb	297	210	522	4
	Mar	497	403	596	4
	Apr	758	494	480	4
	May	1240	596	354	6
	Jun	824	329	294	4
	Jul	398	265	491	6
	Aug	225	173	566	4
	Sep	219	195	654	5
	Oct				
	Nov				
	Dec				
	TOTAL				

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	138	247	1.79	1316	*			
1942	131	244	1.86	1365	*			
1943	72	161	2.25	1653	*			
1944	146	243	1.66	1219	*			
1945	97	201	2.08	1531	*			
1946	69	188	2.70	1989	*			
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	24.6
1982	103	199	1.94	1430	33	3.0	6.0	23.5
1983	352	354	1.01	741	32	0.0	4.1	20.5
1984	352	385	1.09	805	30	0.0	3.2	28.0
Total	4341	8804						
Average	99	200	2.03	1491				

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	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	0	4	3963	*
	Feb	0	4	3914	*
	Mar	2	7	3150	*
	Apr	3	10	2608	*
	May	49	75	1128	*
	Jun	49	74	1113	*
1941	Jul	11	26	1700	*
	Aug	5	14	2211	*
	Sep	3	10	2724	*
	Oct	4	13	2557	*
	Nov	3	11	2803	*
	Dec	2	9	3016	*
	TOTAL	131	257	1441	0
	Jan	2	8	3174	*
	Feb	1	7	3288	*
	Mar	3	10	2630	*
	Apr	12	28	1719	*
	May	39	64	1203	*
	Jun	49	74	1114	*
1942	Jul	10	24	1754	*
	Aug	3	11	2405	*
	Sep	2	8	2954	*
	Oct	2	8	3161	*
	Nov	2	7	3371	*
	Dec	2	7	3366	*
	TOTAL	126	254	1486	0
	Jan	1	6	3472	*
	Feb	1	6	3459	*
	Mar	2	7	3003	*
	Apr	11	26	1760	*
	May	24	45	1385	*
	Jun	20	39	1430	*
1943	Jul	6	16	2037	*
	Aug	4	13	2290	*
	Sep	2	7	3131	*
	Oct	2	7	3235	*
	Nov	1	6	3526	*
	Dec	1	6	3625	*
	TOTAL	75	184	1813	0
	Jan	0	4	4107	*
	Feb	0	5	3812	*
	Mar	1	6	3235	*
	Apr	3	10	2563	*
	May	40	66	1190	*
	Jun	65	91	1027	*
1944	Jul	16	34	1528	*
	Aug	4	12	2349	*
	Sep	2	8	2928	*
	Oct	2	8	3133	*
	Nov	2	7	3356	*
	Dec	1	7	3463	*
	TOTAL	138	256	1364	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	1	5	3670	*
	Feb	1	5	3664	*
	Mar	1	5	3483	*
	Apr	2	8	2781	*
	May	28	50	1328	*
	Jun	34	57	1233	*
1945	Jul	11	26	1692	*
	Aug	5	15	2130	*
	Sep	2	9	2823	*
	Oct	3	11	2714	*
	Nov	3	11	2813	*
	Dec	2	9	3098	*
	TOTAL	94	211	1659	0
	Jan	2	8	3188	*
	Feb	4	13	2493	*
	Mar	6	17	2144	*
	Apr	11	26	1760	*
	May	20	39	1458	*
	Jun	8	20	1860	*
1946	Jul	1	5	3291	*
	Aug	7	19	1978	*
	Sep	0	2	4719	*
	Oct	3	10	2878	31
	Nov	5	15	2401	30
	Dec	4	13	2668	31
	TOTAL	69	188	1989	92
	Jan	2	10	3108	31
	Feb	5	17	2275	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	5	3892	25
	Nov	2	8	3481	27
	Dec	2	9	3208	23
	TOTAL	62	163	1927	148

Calendar Year	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	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	Month	Flow 1000 (ACFT)	Load Load (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	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	2	4045	13
	Aug	3	10	2554	11
	Sep	0	0	0	0
	Oct	0	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	4	3343	4
	Aug	0	3	2896	18
	Sep	0	0	0	0
	Oct	0	0	5425	5
	Nov	0	5	4617	3
	Dec	1	5	3860	1
	TOTAL	33	87	1958	66

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	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	4456	23
	Aug	0	3	2889	20
	Sep	1	4	2349	15
	Oct	0	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	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	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	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	5	4213	11
	May	6	13	1575	14
	Jun	10	22	1604	7
1963	Jul	0	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	4913	10
	Nov	1	6	3740	12
	Dec	3	11	2617	7
	TOTAL	59	148	1834	97

Calendar Year	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	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	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	Month	Flow 1000 (ACFT)	Load Load (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	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
1973	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
	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
1974	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
	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
1975	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
	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
1976	Jan	1	6	3179	23
	Feb	3	11	2854	21
	Mar	1	6	3168	23
	Apr	0	4	3359	29
	May	2	10	3235	12
	Jun	2	9	2888	18
	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
1977	Jan	1	5	3260	24
	Feb	1	5	3189	21
	Mar	2	6	3169	23
	Apr	0	2	3507	23
	May	0	1	4064	23
	Jun	0	0	4190	23
	Jul	3	9	2597	21
	Aug	2	7	2416	22
	Sep	0	3	2743	29
	Oct	0	1	3233	27
	Nov	0	2	3569	25
	Dec	0	3	3396	26
	TOTAL	12	46	2942	287
1978	Jan	0	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
	Jul	8	27	2350	26
	Aug	0	4	3071	23
	Sep	0	2	3316	24
	Oct	5	15	2224	25
	Nov	12	31	1938	25
	Dec	1	6	2850	25
	TOTAL	59	175	2159	294
1979	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
	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
1980	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
	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
1981	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
	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
1982	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
	Jul	17	26	1121	24
	Aug	9	19	1606	25
	Sep	10	19	1451	23
	Oct	7	17	1783	24
	Nov	4	13	2234	23
	Dec	3	12	2503	27
	TOTAL	103	199	1430	297
1983	Jan	4	11	2325	30
	Feb	9	19	1523	24
	Mar	14	24	1282	28
	Apr	22	29	955	25
	May	27	33	904	25
	Jun	165	89	399	24
	Jul	59	47	588	26
	Aug	15	26	1254	25
	Sep	11	23	1486	25
	Oct	14	24	1246	31
	Nov	7	16	1753	30
	Dec	5	14	1969	31
	TOTAL	352	354	741	324
1984	Jan	4	11	2235	31
	Feb	4	12	2083	29
	Mar	7	17	1676	31
	Apr	29	38	944	30
	May	67	60	663	31
	Jun	140	96	504	30
	Jul	44	47	790	31
	Aug	20	30	1113	31
	Sep	10	20	1456	30
	Oct	14	23	1258	31
	Nov	8	17	1622	30
	Dec	6	15	1842	31
	TOTAL	352	385	805	366
1985	Jan	4	12	2087	31
	Feb	6	14	1771	28
	Mar	11	22	1412	31
	Apr	13	23	1332	30
	May	41	46	831	31
	Jun	36	41	832	30
	Jul	17	26	1103	31
	Aug	6	14	1871	31
	Sep	7	15	1639	30
	Oct				
	Nov				
	Dec				
	TOTAL				

Note: In the 1985 block the headers read "Load Load (TONS)" instead of "Load 1000 (TONS)".

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	568	0.33	244	*			
1942	1903	602	0.32	232	108	0.0	2.3	10.4
1943	1827	588	0.32	237	108	0.0	2.3	10.4
1944	1494	518	0.35	255	111	0.0	2.3	10.6
1945	1763	541	0.31	226	111	0.0	2.2	10.8
1946	1542	528	0.34	252	110	0.0	2.1	10.1
1947	2298	639	0.28	205	109	0.0	2.8	11.1
1948	1881	580	0.31	227	109	0.0	2.9	10.7
1949	2036	634	0.31	229	93	0.0	3.3	10.2
1950	1458	538	0.37	271	93	0.0	3.3	10.5
1951	1891	586	0.31	228	93	0.0	3.4	13.7
1952	2443	745	0.31	224	104	0.0	3.6	12.9
1953	1562	601	0.38	283	109	34.9	3.1	12.4
1954	855	463	0.54	398	106	63.2	3.6	14.3
1955	1051	510	0.49	357	114	58.8	2.8	17.6
1956	1455	567	0.39	287	112	25.9	2.9	16.5
1957	2462	748	0.30	223	96	0.0	2.8	14.7
1958	1680	561	0.33	245	76	0.0	2.3	10.1
1959	1341	536	0.40	294	56	0.0	1.9	10.5
1960	1466	548	0.37	275	56	0.0	1.6	11.2
1961	1209	521	0.43	317	58	34.5	2.3	11.9
1962	2407	782	0.32	239	64	65.6	2.7	14.8
1963	922	488	0.53	389	71	87.3	3.0	14.2
1964	1021	514	0.50	370	71	84.5	3.2	12.9
1965	1764	661	0.37	275	69	85.5	3.4	11.6
1966	1022	476	0.47	343	83	88.0	3.2	10.3
1967	1210	540	0.45	328	85	64.7	2.8	9.7
1968	1350	540	0.40	294	78	43.6	2.6	10.0
1969	1448	559	0.39	284	52	0.0	2.0	8.6
1970	1927	610	0.32	233	41	0.0	2.8	9.4
1971	2038	640	0.31	231	36	0.0	3.0	8.9
1972	1524	520	0.34	251	35	0.0	2.8	8.5
1973	1885	562	0.30	219	32	0.0	2.3	11.0
1974	1901	614	0.32	237	30	0.0	3.9	11.9
1975	1578	568	0.36	265	30	0.0	5.3	11.6
1976	1253	492	0.39	289	32	0.0	5.5	10.0
1977	804	398	0.49	364	33	0.0	5.5	10.8
1978	1625	547	0.34	247	33	0.0	5.6	11.2
1979	1798	596	0.33	244	61	0.0	4.5	8.9
1980	1706	575	0.34	248	102	0.0	5.4	12.3
1981	887	417	0.47	346	137	0.0	6.9	12.3
1982	1533	522	0.34	250	149	0.0	7.6	11.5
1983	2428	652	0.27	197	157	0.0	6.6	7.8
1984	3097	760	0.25	180	113	0.0	6.8	8.1
Total	72459	25153						
Average	1647	572	0.35	255				

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	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	36	26	534	*
	Feb	37	27	522	*
	Mar	50	31	448	*
	Apr	85	40	347	*
	May	535	95	131	*
	Jun	470	93	146	*
1941	Jul	163	59	266	*
	Aug	84	44	387	*
	Sep	67	39	430	*
	Oct	78	44	414	0
	Nov	59	36	451	0
	Dec	48	34	516	22
	TOTAL	1713	568	244	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	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

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 Load (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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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	42	310	10
	Nov	76	34	328	0
	Dec	62	32	384	0
	TOTAL	1533	522	250	10
	Jan	63	32	366	0
	Feb	58	29	369	1
	Mar	67	34	369	9
	Apr	85	38	328	0
	May	283	72	187	0
	Jun	734	122	123	9
1983	Jul	539	102	139	18
	Aug	219	63	210	7
	Sep	112	44	290	5
	Oct	89	39	326	11
	Nov	91	38	310	0
	Dec	87	38	324	0
	TOTAL	2428	652	197	60
	Jan	82	37	326	0
	Feb	64	31	359	0
	Mar	94	39	310	0
	Apr	165	53	238	0
	May	670	115	126	20
	Jun	793	130	121	30
1984	Jul	493	102	152	18
	Aug	257	69	198	13
	Sep	153	53	258	2
	Oct	118	46	289	0
	Nov	103	42	297	0
	Dec	104	42	295	0
	TOTAL	3097	760	180	83

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	96	40	303	0
	Feb	81	35	319	0
	Mar	101	43	313	0
	Apr	192	60	228	0
	May	495	105	156	0
	Jun	465	98	155	0
1985	Jul	240	74	227	0
	Aug	128	50	288	0
	Sep	86	42	358	0
	Oct				
	Nov				
	Dec				
	TOTAL				

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	0.55	401	108	00.0	4.3	12.4
1942	3488	1834	0.53	387	108	00.0	4.3	12.4
1943	2946	1490	0.51	372	88	81.8	5.0	12.6
1944	2680	1436	0.54	394	63	57.1	5.0	9.3
1945	3027	1475	0.49	358	39	0.0	2.6	7.2
1946	2554	1382	0.54	398	35	0.0	2.4	6.8
1947	3806	1610	0.42	311	36	0.0	2.8	8.5
1948	3226	1565	0.49	357	36	0.0	2.5	8.3
1949	3368	1640	0.49	358	41	0.0	2.3	8.1
1950	2516	1473	0.59	431	65	36.9	2.6	8.8
1951	2948	1473	0.50	367	65	36.9	3.6	10.4
1952	4134	1960	0.47	349	64	39.1	4.0	10.7
1953	2531	1433	0.57	416	50	2.0	3.5	9.9
1954	1565	1246	0.80	585	51	2.0	2.8	7.5
1955	1946	1307	0.67	494	47	0.0	2.4	7.9
1956	2391	1346	0.56	414	40	10.0	3.4	12.1
1957	4325	1838	0.42	312	42	9.5	3.3	10.9
1958	2820	1457	0.52	380	47	10.6	3.2	10.8
1959	2262	1331	0.59	433	54	1.9	1.8	14.8
1960	2413	1341	0.56	409	58	1.7	1.7	14.1
1961	2033	1231	0.61	445	63	9.5	2.1	14.9
1962	3985	1763	0.44	325	63	9.5	2.2	10.0
1963	1571	1206	0.77	565	63	15.9	2.7	10.4
1964	1934	1257	0.65	478	67	32.8	4.0	9.1
1965	3305	1586	0.48	353	68	63.2	4.3	9.7
1966	1800	1277	0.71	521	86	84.9	3.7	9.1
1967	2144	1334	0.62	458	84	67.9	3.7	8.8
1968	2439	1430	0.59	431	81	44.4	3.0	7.9
1969	2655	1512	0.57	419	54	3.7	2.1	7.2
1970	3316	1585	0.48	352	42	0.0	2.6	7.0
1971	3314	1573	0.47	349	34	0.0	2.8	9.3
1972	2585	1468	0.57	418	35	0.0	2.9	9.1
1973	3219	1518	0.47	347	31	0.0	2.2	9.5
1974	2888	1466	0.51	373	29	0.0	3.7	8.5
1975	2908	1524	0.52	385	27	0.0	5.0	6.8
1976	2245	1416	0.63	464	27	0.0	5.5	8.7
1977	1304	1125	0.86	635	27	0.0	5.2	7.8
1978	2614	1370	0.52	385	27	0.0	5.8	8.8
1979	3154	1547	0.49	361	25	0.0	5.6	7.7
1980	2983	1498	0.50	369	16	0.0	6.2	8.8
1981	1529	1124	0.73	540	10	0.0	3.8	6.7
1982	2743	1351	0.49	362	24	0.0	5.6	9.7
1983	4414	1777	0.40	296	36	0.0	5.4	9.3
1984	5677	2123	0.37	275	46	0.0	4.8	10.9
Total	124780	65375						
Average	2836	1486	0.52	385				

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	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	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	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	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	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	Month	Flow 1000 (ACFT)	Load Load (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
	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
1973	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
	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
1974	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
	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
1975	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
	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
1976	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
	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
1977	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
	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
1978	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
	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
1979	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
	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
1980	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
	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
1981	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
	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
1982	Jul	410	143	256	0
	Aug	209	113	398	0
	Sep	177	110	457	0
	Oct	172	118	503	4
	Nov	147	111	555	0
	Dec	117	101	639	3
	TOTAL	2743	1351	362	7
	Jan	104	87	615	21
	Feb	94	81	632	12
	Mar	111	90	602	6
	Apr	132	97	541	0
	May	540	208	284	0
	Jun	1415	333	173	0
1983	Jul	1001	261	192	6
	Aug	402	178	326	9
	Sep	164	113	505	0
	Oct	153	114	545	8
	Nov	151	109	531	0
	Dec	147	105	527	4
	TOTAL	4414	1777	296	66
	Jan	137	103	555	26
	Feb	126	102	593	15
	Mar	167	124	548	0
	Apr	247	126	376	0
	May	1248	339	200	0
	Jun	1537	348	166	0
1984	Jul	950	254	197	0
	Aug	404	181	330	0
	Sep	254	147	426	7
	Oct	229	146	467	0
	Nov	194	127	482	0
	Dec	185	125	499	0
	TOTAL	5677	2123	275	48
	Jan	161	111	509	0
	Feb	138	98	522	0
	Mar	174	128	539	0
	Apr	379	194	376	0
	May	1011	337	245	0
	Jun	1021	284	205	0
1985	Jul	442	191	318	0
	Aug	219	136	457	20
	Sep	151	122	594	0
	Oct				
	Nov				
	Dec				
	TOTAL				

Note: In the 1985 block the Load column is headed "Load Load (TONS)".

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	2101	0.84	620	105	00.0	5.3	20.4
1942	2674	1926	0.72	530	105	00.0	4.6	22.0
1943	1785	1564	0.88	644	82	85.4	3.7	21.1
1944	2225	1570	0.71	519	60	60.0	4.2	19.9
1945	1818	1458	0.80	590	36	0.0	2.0	17.8
1946	1262	1317	1.04	767	36	0.0	2.1	21.0
1947	1938	1580	0.82	600	36	0.0	3.0	27.5
1948	2361	1599	0.68	498	36	0.0	2.8	26.5
1949	2121	1573	0.74	545	44	0.0	2.8	26.0
1950	1335	1239	0.93	683	68	0.0	1.9	20.7
1951	1136	1145	1.01	741	94	0.0	2.0	25.2
1952	2672	1740	0.65	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	0.95	696	108	58.3	3.8	20.1
1957	3381	1915	0.57	417	89	34.8	3.6	20.2
1958	2262	1475	0.65	479	69	0.0	1.5	21.0
1959	981	1111	1.13	833	82	0.0	2.2	21.2
1960	1332	1125	0.84	621	104	0.0	2.2	19.8
1961	1106	1147	1.04	763	113	18.6	2.1	18.9
1962	2135	1402	0.66	483	93	50.5	2.9	20.8
1963	892	1145	1.28	945	89	85.4	3.4	23.1
1964	1355	1296	0.96	703	91	85.7	3.4	24.8
1965	2673	1753	0.66	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	0.94	690	115	34.8	4.8	28.8
1969	1932	1559	0.81	593	83	0.0	4.1	28.7
1970	2368	1519	0.64	472	54	0.0	2.7	29.3
1971	2080	1382	0.66	489	36	0.0	2.4	27.5
1972	1190	1031	0.87	637	34	0.0	2.2	30.4
1973	2081	1302	0.63	460	30	0.0	2.4	30.5
1974	1627	1426	0.88	645	27	0.0	3.5	27.2
1975	1907	1392	0.73	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	0.73	536	33	0.0	5.9	19.0
1979	2402	1485	0.62	454	32	0.0	6.4	20.4
1980	2259	1186	0.52	386	32	0.0	6.9	24.4
1981	954	893	0.94	688	28	0.0	7.0	24.6
1982	1918	1251	0.65	480	24	0.0	6.8	25.4
1983	3130	1595	0.51	375	18	0.0	5.5	20.3
1984	3826	1720	0.45	331	18	0.0	4.8	21.0
Total	78481	60464						
Average	1784	1374	0.77	566				

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	1457	2
	Feb	51	101	1476	0
	Mar	63	105	1222	3
	Apr	123	120	715	2
	May	871	333	282	3
	Jun	563	268	350	0
1941	Jul	192	178	683	1
	Aug	95	173	1336	0
	Sep	81	180	1632	2
	Oct	198	248	921	4
	Nov	121	162	982	3
	Dec	84	131	1153	0
	TOTAL	2493	2101	620	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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	155	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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	988	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

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	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	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	969	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	939	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	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	1355	1296	703	69

Calendar Year	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	Month	Flow 1000 (ACFT)	Load Load (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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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	107	481	31
	Nov	150	104	508	15
	Dec	151	101	490	0
	TOTAL	1918	1251	480	82
	Jan	140	84	442	0
	Feb	122	68	408	0
	Mar	143	86	444	0
	Apr	149	93	460	0
	May	489	174	261	0
	Jun	808	283	257	0
1983	Jul	493	197	294	0
	Aug	206	141	504	0
	Sep	131	120	671	0
	Oct	151	132	644	3
	Nov	135	106	580	0
	Dec	162	110	499	0
	TOTAL	3130	1595	375	3
	Jan	185	97	385	0
	Feb	189	105	410	20
	Mar	223	126	416	31
	Apr	259	133	377	11
	May	849	262	227	9
	Jun	864	243	207	0
1984	Jul	405	182	331	3
	Aug	184	134	535	5
	Sep	161	127	583	13
	Oct	192	120	459	26
	Nov	167	103	455	0
	Dec	148	87	433	0
	TOTAL	3826	1720	331	118

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	201	103	377	0
	Feb	188	87	340	0
	Mar	235	107	334	0
	Apr	472	181	281	1
	May	658	218	244	31
	Jun	461	154	245	7
1985	Jul	190	104	402	0
	Aug	105	83	580	6
	Sep	141	124	646	1
	Oct				
	Nov				
	Dec				
	TOTAL				

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	1548	737	0.48	350	*			
1942	1303	621	0.48	350	*			
1943	594	502	0.85	622	*			
1944	980	536	0.55	402	*			
1945	657	501	0.76	560	*			
1946	298	415	1.39	1024	*			
1947	552	514	0.93	686	*			
1948	795	530	0.67	490	*			
1949	816	538	0.66	485	*			
1950	367	409	1.11	818	*			
1951	163	289	1.77	1304	45	0.0	4.1	34.4
1952	1095	542	0.50	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	0.56	409	39	0.0	4.2	39.0
1958	1016	626	0.62	453	28	0.0	3.0	42.2
1959	169	297	1.76	1291	56	0.0	3.8	36.3
1960	480	361	0.75	553	81	0.0	4.1	37.7
1961	367	368	1.00	738	92	37.0	5.0	32.2
1962	530	412	0.78	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	0.67	492	162	92.0	6.3	43.0
1966	464	434	0.94	688	161	89.4	4.9	39.8
1967	228	387	1.70	1249	105	92.4	5.5	42.1
1968	501	472	0.94	694	103	92.2	6.2	40.8
1969	599	476	0.79	584	61	75.4	6.4	40.0
1970	560	500	0.89	656	75	61.3	7.3	41.7
1971	457	449	0.98	722	44	0.0	6.4	51.0
1972	269	397	1.48	1085	50	0.0	6.2	47.0
1973	1289	709	0.55	405	53	5.7	6.1	44.5
1974	329	384	1.17	858	46	6.5	5.1	36.3
1975	891	586	0.66	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	12.9	54.0
1978	735	401	0.55	401	39	0.0	11.9	49.9
1979	1092	627	0.57	422	40	0.0	5.9	42.0
1980	1039	610	0.59	432	35	0.0	4.8	33.4
1981	221	429	1.94	1429	25	0.0	8.0	26.6
1982	719	556	0.77	569	24	0.0	7.8	19.8
1983	1463	762	0.52	383	29	0.0	4.5	21.5
1984	1268	732	0.58	425	34	0.0	5.7	21.2
Total	27983	21155						
Average	636	481	0.76	556				

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	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	14	37	1919	*
	Feb	20	40	1446	*
	Mar	41	49	872	*
	Apr	172	79	336	*
	May	606	120	146	*
	Jun	245	79	238	*
1941	Jul	97	55	412	*
	Aug	31	36	856	*
	Sep	32	40	915	*
	Oct	195	90	342	*
	Nov	61	62	748	*
	Dec	34	51	1111	*
	TOTAL	1548	737	350	0
	Jan	26	47	1323	*
	Feb	22	41	1366	*
	Mar	50	53	778	*
	Apr	509	122	176	*
	May	382	100	192	*
	Jun	210	75	261	*
1942	Jul	46	40	647	*
	Aug	17	29	1229	*
	Sep	9	24	1993	*
	Oct	10	27	2055	*
	Nov	10	30	2154	*
	Dec	12	34	2070	*
	TOTAL	1303	621	350	0
	Jan	12	34	2106	*
	Feb	14	35	1788	*
	Mar	21	37	1312	*
	Apr	209	85	299	*
	May	132	65	363	*
	Jun	97	55	415	*
1943	Jul	24	31	949	*
	Aug	34	38	811	*
	Sep	19	33	1253	*
	Oct	11	29	1894	*
	Nov	10	30	2250	*
	Dec	11	32	2241	*
	TOTAL	594	502	622	0
	Jan	10	32	2359	*
	Feb	12	32	1969	*
	Mar	17	34	1473	*
	Apr	96	62	477	*
	May	456	107	172	*
	Jun	263	81	228	*
1944	Jul	72	48	492	*
	Aug	15	27	1336	*
	Sep	5	19	2693	*
	Oct	8	25	2310	*
	Nov	12	33	1941	*
	Dec	12	34	2077	*
	TOTAL	980	536	402	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	12	35	2091	*
	Feb	16	36	1668	*
	Mar	14	32	1629	*
	Apr	133	71	393	*
	May	292	89	225	*
	Jun	87	52	442	*
1945	Jul	32	35	799	*
	Aug	29	35	892	*
	Sep	6	21	2418	*
	Oct	15	32	1590	*
	Nov	11	31	2098	*
	Dec	9	31	2411	*
	TOTAL	657	501	560	0
	Jan	12	34	2146	*
	Feb	10	31	2155	*
	Mar	16	34	1511	*
	Apr	72	55	569	*
	May	53	45	624	*
	Jun	58	45	562	*
1946	Jul	17	27	1182	*
	Aug	18	29	1185	*
	Sep	11	26	1785	*
	Oct	10	27	2085	*
	Nov	11	31	2076	*
	Dec	10	32	2251	*
	TOTAL	298	415	1024	0
	Jan	9	31	2501	*
	Feb	11	31	2063	*
	Mar	15	33	1570	*
	Apr	49	47	718	*
	May	170	72	311	*
	Jun	109	57	385	*
1947	Jul	48	41	633	*
	Aug	37	39	776	*
	Sep	30	39	954	*
	Oct	38	47	916	*
	Nov	19	39	1482	*
	Dec	16	38	1734	*
	TOTAL	552	514	686	0
	Jan	15	38	1847	*
	Feb	25	43	1286	*
	Mar	26	40	1152	*
	Apr	247	91	271	*
	May	267	86	238	*
	Jun	131	62	346	*
1948	Jul	33	35	793	*
	Aug	19	30	1162	*
	Sep	5	20	2658	*
	Oct	9	26	2210	*
	Nov	9	29	2368	*
	Dec	9	31	2386	*
	TOTAL	795	530	490	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	13	35	2020	*
	Feb	18	38	1563	*
	Mar	24	39	1204	*
	Apr	187	81	320	*
	May	230	81	260	*
	Jun	219	76	255	*
1949	Jul	70	48	501	*
	Aug	20	31	1113	*
	Sep	6	20	2610	*
	Oct	10	27	2052	*
	Nov	10	30	2159	*
	Dec	10	31	2299	*
	TOTAL	816	538	485	0
	Jan	12	35	2081	*
	Feb	16	37	1650	*
	Mar	18	35	1408	*
	Apr	127	70	404	*
	May	77	52	500	*
	Jun	67	47	519	*
1950	Jul	22	30	1009	*
	Aug	5	17	2575	*
	Sep	5	19	2698	*
	Oct	5	21	3094	*
	Nov	5	23	3202	*
	Dec	8	22	2198	31
	TOTAL	367	409	818	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	Month	Flow 1000 (ACFT)	Load Load (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	6	5575	0
	Oct	2	15	6185	0
	Nov	6	23	2733	0
	Dec	5	23	3198	0
	TOTAL	265	311	864	0

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	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

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 Load (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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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	44	1111	5
	Nov	18	47	1950	7
	Dec	18	37	1494	6
	TOTAL	719	556	569	93
	Jan	16	39	1811	6
	Feb	17	35	1529	7
	Mar	49	52	789	6
	Apr	190	95	368	3
	May	522	152	214	3
	Jun	409	107	193	1
1983	Jul	132	59	327	8
	Aug	58	52	664	2
	Sep	21	50	1797	3
	Oct	20	43	1537	31
	Nov	14	38	1922	30
	Dec	16	40	1858	31
	TOTAL	1463	762	383	131
	Jan	13	38	2074	31
	Feb	15	38	1799	29
	Mar	31	50	1166	31
	Apr	224	86	283	30
	May	546	127	172	31
	Jun	219	92	308	30
1984	Jul	79	67	625	31
	Aug	46	57	903	31
	Sep	26	46	1290	30
	Oct	29	48	1232	31
	Nov	20	42	1547	30
	Dec	19	42	1643	31
	TOTAL	1268	732	425	366

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	21	43	1521	31
	Feb	16	37	1688	28
	Mar	78	63	597	31
	Apr	365	108	217	30
	May	303	105	255	31
	Jun	201	89	326	30
1985	Jul	49	58	863	31
	Aug	18	41	1662	31
	Sep	22	42	1414	30
	Oct				
	Nov				
	Dec				
	TOTAL				

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	5552	0.79	578	72	00.0	00.0	13.8
1942	7098	5276	0.74	547	104	00.0	00.0	16.7
1943	5214	4249	0.81	599	82	82.9	3.1	16.6
1944	5840	4259	0.73	536	58	55.2	3.7	15.9
1945	5505	4112	0.75	549	38	0.0	4.0	14.5
1946	4057	3707	0.91	672	36	0.0	3.7	16.5
1947	6258	4539	0.73	533	36	0.0	3.4	18.6
1948	6291	4588	0.73	536	36	0.0	3.7	16.7
1949	6339	4777	0.75	554	41	0.0	4.2	17.3
1950	4074	3708	0.91	669	64	4.7	3.8	15.3
1951	3987	3507	0.88	647	84	4.8	3.5	13.8
1952	7719	4797	0.62	457	92	5.4	3.4	15.1
1953	4061	3934	0.97	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	0.93	687	95	0.0	4.2	18.9
1957	8888	5339	0.60	442	80	0.0	3.9	17.3
1958	6045	4174	0.69	508	65	0.0	3.7	18.3
1959	3214	3391	1.06	776	52	0.0	3.9	20.4
1960	4003	3329	0.83	612	54	0.0	3.8	17.6
1961	3395	3509	1.03	760	67	0.0	4.5	18.8
1962	6575	4354	0.66	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	0.67	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	24.4
1968	4185	3677	0.88	646	131	0.0	4.6	21.4
1969	4906	3842	0.78	576	100	1.0	3.8	17.1
1970	5988	3897	0.65	479	73	1.4	6.3	16.3
1971	5458	3685	0.68	497	38	2.6	7.9	18.5
1972	3549	3279	0.92	679	37	0.0	7.3	18.1
1973	6374	4318	0.68	498	37	0.0	4.9	18.3
1974	4416	3501	0.79	583	37	0.0	5.3	17.5
1975	5303	3824	0.72	530	36	0.0	6.0	16.5
1976	3379	3279	0.97	714	36	0.0	5.3	15.2
1977	1660	2422	1.46	1073	35	0.0	7.2	16.1
1978	4813	3615	0.75	552	33	0.0	6.5	13.8
1979	6607	4325	0.65	481	31	0.0	6.9	16.0
1980	6249	4062	0.65	478	32	0.0	5.1	12.6
1981	2552	2823	1.11	814	28	0.0	6.3	13.5
1982	5309	3815	0.72	528	30	0.0	6.6	13.3
1983	9224	4843	0.53	386	29	0.0	6.6	14.1
1984	11081	5258	0.47	349	35	0.0	5.1	14.7
Total	224780	173853						
Average	5109	3951	0.77	569				

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	294	1554	31
	Feb	153	287	1382	28
	Mar	206	343	1220	31
	Apr	445	454	750	30
	May	2355	923	288	31
	Jun	1582	774	360	30
1941	Jul	579	518	658	31
	Aug	251	368	1080	31
	Sep	237	344	1071	30
	Oct	579	496	630	31
	Nov	311	391	924	30
	Dec	229	359	1150	31
	TOTAL	7068	5552	578	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	945	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	994	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	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 Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	164	300	1342	0		Jan	157	248	1167	31		Jan	162	258	1172	22		Jan	259	269	764	6
	Feb	168	258	1134	0		Feb	140	223	1177	28		Feb	141	236	1233	19		Feb	189	226	882	7
	Mar	168	262	1148	0		Mar	162	251	1140	31		Mar	154	252	1203	15		Mar	250	247	728	10
	Apr	398	309	571	0		Apr	206	267	950	30		Apr	562	353	462	4		Apr	714	380	391	6
	May	1375	579	310	0		May	677	412	448	31		May	1272	500	289	10		May	987	441	328	4
	Jun	2859	817	210	0		Jun	664	401	443	30		Jun	1654	569	253	10		Jun	731	448	451	3
1957	Jul	1952	695	262	0	1961	Jul	130	231	1302	31	1965	Jul	1117	527	347	8	1969	Jul	472	360	561	5
	Aug	661	522	581	0		Aug	138	236	1261	31		Aug	447	371	610	19		Aug	199	258	952	4
	Sep	314	367	861	0		Sep	316	310	721	30		Sep	369	392	780	10		Sep	240	315	967	3
	Oct	292	438	1102	0		Oct	357	357	736	6		Oct	360	395	808	11		Oct	324	341	773	6
	Nov	300	429	1053	0		Nov	252	297	869	22		Nov	249	337	994	14		Nov	289	291	740	5
	Dec	239	363	1119	2		Dec	197	276	1029	28		Dec	237	313	974	15		Dec	252	266	774	10
	TOTAL	8888	5339	442	2		TOTAL	3395	3509	760	329		TOTAL	6723	4503	493	157		TOTAL	4906	3842	576	69
	Jan	200	318	1168	0		Jan	182	260	1050	23		Jan	200	274	1010	13		Jan	236	249	778	7
	Feb	225	305	996	0		Feb	261	303	854	14		Feb	169	242	1052	13		Feb	220	208	695	5
	Mar	254	337	976	0		Mar	246	289	865	21		Mar	278	290	767	12		Mar	277	242	642	6
	Apr	756	396	385	0		Apr	1054	455	317	18		Apr	438	280	470	5		Apr	327	266	597	6
	May	2032	589	213	0		May	1603	580	266	18		May	697	397	419	11		May	1385	503	267	7
	Jun	1560	532	251	0		Jun	1400	545	286	16		Jun	429	342	587	10		Jun	1340	502	276	6
1958	Jul	234	275	865	0	1962	Jul	765	440	424	15	1966	Jul	185	263	1043	7	1970	Jul	538	350	479	5
	Aug	109	224	1504	0		Aug	206	276	987	16		Aug	120	224	1375	20		Aug	245	279	836	9
	Sep	153	302	1449	0		Sep	173	309	1314	14		Sep	145	256	1301	8		Sep	407	405	733	6
	Oct	155	297	1407	0		Oct	262	326	912	23		Oct	174	294	1239	10		Oct	360	333	680	7
	Nov	190	307	1190	0		Nov	243	303	919	20		Nov	153	265	1272	11		Nov	338	287	625	2
	Dec	176	293	1226	0		Dec	180	266	1087	29		Dec	175	278	1172	13		Dec	317	272	632	10
	TOTAL	6045	4174	508	0		TOTAL	6575	4354	487	227		TOTAL	3163	3406	792	133		TOTAL	5988	3897	479	76
	Jan	168	284	1244	0		Jan	163	260	1168	28		Jan	146	245	1234	31		Jan	332	256	567	5
	Feb	153	240	1155	0		Feb	193	268	1020	16		Feb	136	230	1245	11		Feb	321	225	516	6
	Mar	150	253	1242	0		Mar	219	287	963	17		Mar	186	255	1013	18		Mar	413	264	470	5
	Apr	163	219	988	0		Apr	245	258	775	18		Apr	198	268	995	30		Apr	579	291	369	5
	May	536	348	478	0		May	517	357	508	16		May	462	343	546	11		May	768	392	376	6
	Jun	924	412	328	0		Jun	332	317	702	18		Jun	714	431	445	2		Jun	1141	446	287	5
1959	Jul	214	233	800	0	1963	Jul	115	225	1447	19	1967	Jul	327	332	746	3	1971	Jul	535	340	467	6
	Aug	160	280	1292	0		Aug	168	284	1243	13		Aug	175	271	1141	3		Aug	246	271	810	7
	Sep	124	238	1410	0		Sep	183	293	1180	14		Sep	178	278	1152	2		Sep	282	298	776	7
	Oct	251	352	1032	0		Oct	134	258	1416	18		Oct	175	256	1079	31		Oct	280	326	856	9
	Nov	210	277	970	0		Nov	179	272	1121	20		Nov	211	274	956	3		Nov	276	287	766	6
	Dec	163	256	1154	0		Dec	138	250	1330	20		Dec	241	283	863	17		Dec	284	289	749	8
	TOTAL	3214	3391	776	0		TOTAL	2585	3329	947	217		TOTAL	3146	3467	810	162		TOTAL	5458	3685	497	75
	Jan	164	257	1154	0		Jan	132	250	1391	23		Jan	205	226	808	4		Jan	267	267	734	8
	Feb	143	226	1159	0		Feb	121	226	1375	19		Feb	193	228	869	4		Feb	227	232	752	7
	Mar	273	327	881	0		Mar	128	244	1396	20		Mar	171	237	1018	4		Mar	279	257	676	6
	Apr	629	316	369	0		Apr	214	270	926	17		Apr	230	229	732	4		Apr	202	209	761	9
	May	758	351	341	0		May	861	415	355	13		May	667	372	410	3		May	453	310	504	7
	Jun	1068	422	290	0		Jun	780	413	390	18		Jun	1171	478	300	2		Jun	759	368	356	5
1960	Jul	251	251	738	0	1964	Jul	276	295	787	14	1968	Jul	306	317	763	4	1972	Jul	192	226	867	6
	Aug	106	194	1354	0		Aug	241	344	1050	13		Aug	365	420	847	2		Aug	119	196	1205	6
	Sep	117	231	1456	0		Sep	153	255	1228	17		Sep	159	259	1202	3		Sep	201	281	1031	8
	Oct	153	246	1182	31		Oct	164	279	1253	10		Oct	213	317	1093	5		Oct	302	365	889	6
	Nov	177	254	1058	30		Nov	182	299	1210	2		Nov	256	314	900	5		Nov	281	299	782	9
	Dec	165	253	1130	31		Dec	181	273	1108	14		Dec	248	280	828	5		Dec	267	270	742	9
	TOTAL	4003	3329	612	92		TOTAL	3433	3564	763	180		TOTAL	4185	3677	646	45		TOTAL	3549	3279	679	86

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	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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	301	689	1
	Dec	287	266	681	3
	TOTAL	5309	3815	528	68
	Jan	252	239	696	2
	Feb	230	214	684	4
	Mar	299	258	635	1
	Apr	448	321	526	2
	May	1563	683	321	2
	Jun	2740	841	226	1
1983	Jul	1700	616	267	2
	Aug	673	441	482	1
	Sep	308	299	715	2
	Oct	339	313	679	31
	Nov	327	302	679	30
	Dec	345	316	673	31
	TOTAL	9224	4843	386	109
	Jan	336	312	682	31
	Feb	345	304	648	29
	Mar	428	346	595	31
	Apr	730	424	427	30
	May	2588	731	208	31
	Jun	2757	760	203	30
1984	Jul	1504	589	288	31
	Aug	701	428	450	31
	Sep	441	344	574	30
	Oct	478	364	559	31
	Nov	408	333	601	30
	Dec	365	324	651	31
	TOTAL	11081	5258	349	366

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	392	333	626	31
	Feb	351	300	628	28
	Mar	517	375	534	31
	Apr	1260	535	312	30
	May	1966	667	250	31
	Jun	1636	605	272	30
1985	Jul	716	432	444	31
	Aug	342	311	669	31
	Sep	329	302	675	30
	Oct				
	Nov				
	Dec				
	TOTAL				

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	2637	433	0.16	121	*			
1942	1312	251	0.19	141	*			
1943	758	176	0.23	171	*			
1944	1234	232	0.19	138	*			
1945	852	182	0.21	157	*			
1946	408	116	0.28	208	*			
1947	730	173	0.24	174	*			
1948	1183	229	0.19	143	*			
1949	1393	258	0.19	136	*			
1950	513	130	0.25	186	*			
1951	338	93	0.28	203	*			
1952	1499	269	0.18	132	*			
1953	513	130	0.25	187	*			
1954	529	137	0.26	190	*			
1955	537	128	0.24	175	47	72.3	5.3	26.2
1956	539	117	0.22	160	47	72.3	5.3	26.2
1957	1647	329	0.20	147	81	84.0	4.8	27.8
1958	1332	301	0.23	166	101	87.1	4.5	27.3
1959	436	119	0.27	201	94	87.2	3.2	27.4
1960	1029	226	0.22	162	96	87.5	3.7	26.4
1961	750	177	0.24	174	106	88.7	3.6	29.6
1962	872	178	0.20	150	95	87.4	3.9	32.1
1963	232	61	0.26	192	72	83.3	3.8	30.0
1964	437	116	0.27	196	58	79.3	4.1	26.7
1965	1511	327	0.22	159	52	76.9	4.3	26.4
1966	961	225	0.23	172	50	76.0	4.0	26.9
1967	402	108	0.27	198	44	72.7	2.9	23.3
1968	392	101	0.26	190	43	48.8	2.9	15.2
1969	1102	238	0.22	159	39	25.6	3.1	11.5
1970	817	165	0.20	149	37	0.0	3.3	6.7
1971	618	130	0.21	155	35	0.0	3.1	8.3
1972	610	146	0.24	177	35	0.0	3.2	9.9
1973	1540	366	0.24	175	34	0.0	3.4	8.9
1974	596	133	0.22	164	34	0.0	3.9	10.0
1975	1091	257	0.24	173	36	0.0	6.4	10.0
1976	639	141	0.22	162	38	0.0	6.5	9.7
1977	437	97	0.22	163	32	0.0	6.5	6.8
1978	376	95	0.25	186	23	0.0	8.5	11.8
1979	1716	381	0.22	163	15	0.0	7.5	19.3
1980	1080	239	0.22	163	12	0.0	8.2	23.1
1981	576	119	0.21	152	12	0.0	6.1	17.6
1982	826	176	0.21	157	13	0.0	7.7	7.5
1983	1100	232	0.21	155	16	0.0	4.5	4.8
1984	1087	229	0.21	155	18	0.0	4.6	5.0
Total	39185	8467						
Average	891	192	0.22	159				

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
	Jan	21	8	284	*
	Feb	48	15	228	*
	Mar	120	28	171	*
	Apr	265	48	134	*
	May	784	99	93	*
	Jun	565	73	95	*
1941	Jul	305	46	111	*
	Aug	70	16	163	*
	Sep	69	16	174	*
	Oct	257	47	135	*
	Nov	83	21	190	*
	Dec	48	15	229	*
	TOTAL	2637	433	121	0
	Jan	42	14	239	*
	Feb	35	12	246	*
	Mar	62	17	201	*
	Apr	411	67	120	*
	May	303	48	118	*
	Jun	290	44	112	*
1942	Jul	68	15	162	*
	Aug	31	8	200	*
	Sep	22	7	232	*
	Oct	17	6	266	*
	Nov	16	6	287	*
	Dec	15	6	310	*
	TOTAL	1312	251	141	0
	Jan	15	6	307	*
	Feb	24	9	272	*
	Mar	55	16	208	*
	Apr	186	37	146	*
	May	179	33	135	*
	Jun	123	23	139	*
1943	Jul	49	12	176	*
	Aug	36	10	193	*
	Sep	22	7	233	*
	Oct	29	9	232	*
	Nov	20	7	272	*
	Dec	19	8	290	*
	TOTAL	758	176	171	0
	Jan	13	6	319	*
	Feb	14	6	311	*
	Mar	39	12	227	*
	Apr	133	29	159	*
	May	383	58	111	*
	Jun	380	54	105	*
1944	Jul	129	24	138	*
	Aug	34	9	196	*
	Sep	40	11	199	*
	Oct	37	11	219	*
	Nov	17	7	283	*
	Dec	14	6	314	*
	TOTAL	1234	232	138	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	14	6	315	*
	Feb	25	9	270	*
	Mar	41	12	224	*
	Apr	142	30	157	*
	May	277	45	120	*
	Jun	197	33	124	*
1945	Jul	61	14	166	*
	Aug	32	9	200	*
	Sep	12	5	268	*
	Oct	25	8	242	*
	Nov	16	6	290	*
	Dec	11	5	334	*
	TOTAL	852	182	157	0
	Jan	13	6	321	*
	Feb	15	6	306	*
	Mar	24	8	257	*
	Apr	63	16	192	*
	May	72	17	169	*
	Jun	79	17	156	*
1946	Jul	24	7	211	*
	Aug	29	8	204	*
	Sep	24	7	227	*
	Oct	29	9	233	*
	Nov	21	8	269	*
	Dec	17	7	301	*
	TOTAL	408	116	208	0
	Jan	13	6	319	*
	Feb	19	7	288	*
	Mar	31	10	240	*
	Apr	44	12	211	*
	May	187	34	133	*
	Jun	137	25	136	*
1947	Jul	37	9	189	*
	Aug	81	17	158	*
	Sep	53	13	186	*
	Oct	71	18	186	*
	Nov	33	11	240	*
	Dec	25	9	270	*
	TOTAL	730	173	174	0
	Jan	26	9	270	*
	Feb	31	11	255	*
	Mar	44	13	220	*
	Apr	260	47	134	*
	May	315	50	117	*
	Jun	337	50	108	*
1948	Jul	67	15	163	*
	Aug	40	10	188	*
	Sep	17	6	248	*
	Oct	21	7	252	*
	Nov	13	5	301	*
	Dec	13	6	321	*
	TOTAL	1183	229	143	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	16	7	304	*
	Feb	22	8	277	*
	Mar	84	21	187	*
	Apr	231	43	138	*
	May	317	50	116	*
	Jun	403	57	103	*
1949	Jul	194	33	125	*
	Aug	50	12	178	*
	Sep	26	8	223	*
	Oct	25	8	241	*
	Nov	15	6	292	*
	Dec	11	5	335	*
	TOTAL	1393	258	136	0
	Jan	14	6	312	*
	Feb	22	8	277	*
	Mar	31	10	239	*
	Apr	110	25	167	*
	May	124	25	148	*
	Jun	106	21	145	*
1950	Jul	40	10	185	*
	Aug	14	5	245	*
	Sep	22	7	232	*
	Oct	14	5	280	*
	Nov	7	3	354	*
	Dec	8	4	357	*
	TOTAL	513	130	186	0
	Jan	8	4	365	*
	Feb	10	4	341	*
	Mar	18	7	275	*
	Apr	28	9	236	*
	May	111	23	152	*
	Jun	88	18	152	*
1951	Jul	10	4	264	*
	Aug	21	6	222	*
	Sep	9	4	288	*
	Oct	9	4	314	*
	Nov	8	4	340	*
	Dec	19	7	292	*
	TOTAL	338	93	203	0
	Jan	27	10	265	*
	Feb	16	7	299	*
	Mar	58	16	205	*
	Apr	327	56	127	*
	May	390	59	111	*
	Jun	431	60	102	*
1952	Jul	123	23	140	*
	Aug	55	13	174	*
	Sep	26	8	223	*
	Oct	15	6	273	*
	Nov	13	5	306	*
	Dec	17	7	299	*
	TOTAL	1499	269	132	0

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	17	7	298	*
	Feb	16	6	303	*
	Mar	37	12	229	*
	Apr	72	18	186	*
	May	113	23	151	*
	Jun	142	26	135	*
1953	Jul	37	9	189	*
	Aug	23	7	215	*
	Sep	7	3	307	*
	Oct	18	7	262	*
	Nov	18	7	281	*
	Dec	12	5	325	*
	TOTAL	513	130	187	0
	Jan	11	5	335	*
	Feb	20	8	285	*
	Mar	29	10	244	*
	Apr	87	21	177	*
	May	141	27	143	*
	Jun	61	14	166	*
1954	Jul	44	11	181	*
	Aug	40	10	189	*
	Sep	34	10	208	*
	Oct	35	11	222	*
	Nov	15	6	293	*
	Dec	13	5	314	10
	TOTAL	529	137	190	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

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	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

Calendar Year	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	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	Month	Flow 1000 (ACFT)	Load Load (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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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	160	31
	Nov	54	12	160	30
	Dec	91	19	155	31
	TOTAL	826	176	157	365
	Jan	113	23	153	31
	Feb	97	20	153	28
	Mar	127	26	152	31
	Apr	159	33	151	30
	May	106	22	154	31
	Jun	77	17	158	30
1983	Jul	98	21	157	31
	Aug	64	14	157	31
	Sep	66	14	156	30
	Oct	69	15	162	31
	Nov	59	13	163	30
	Dec	66	14	155	31
	TOTAL	1100	232	155	365
	Jan	115	23	150	31
	Feb	136	28	152	29
	Mar	116	24	154	31
	Apr	91	19	157	30
	May	117	25	157	31
	Jun	53	11	158	30
1984	Jul	53	11	157	31
	Aug	53	11	158	31
	Sep	62	13	158	30
	Oct	83	18	157	31
	Nov	96	20	156	30
	Dec	112	23	154	31
	TOTAL	1087	229	155	366

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	111	23	153	31
	Feb	119	25	153	28
	Mar	162	34	154	31
	Apr	218	46	154	30
	May	317	66	153	31
	Jun	275	57	153	30
1985	Jul	108	23	155	31
	Aug	74	16	155	31
	Sep	90	19	155	30
	Oct				
	Nov				
	Dec				
	TOTAL				

Missing EC estimated by interpolation after regulation of flow.

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	2761	0.56	415	108	0.0	2.3	29.5
1942	2248	1169	0.52	383	109	0.0	2.4	26.8
1943	1494	946	0.63	466	108	0.0	1.5	26.3
1944	2291	1096	0.48	352	108	0.0	1.8	24.6
1945	1588	925	0.58	428	107	0.0	2.2	25.1
1946	887	680	0.77	564	111	0.0	2.3	32.7
1947	1677	1087	0.65	477	111	0.0	2.7	33.0
1948	2140	968	0.45	333	112	0.0	2.3	34.0
1949	2487	1159	0.47	343	110	0.0	2.6	26.7
1950	854	574	0.67	494	105	0.0	2.3	25.6
1951	691	495	0.72	527	102	0.0	2.4	26.2
1952	2554	1116	0.44	321	95	0.0	1.8	28.0
1953	967	678	0.70	515	109	2.8	2.1	34.4
1954	1011	761	0.75	554	112	2.7	1.9	35.8
1955	910	653	0.72	527	121	2.5	1.7	37.3
1956	838	513	0.61	450	119	0.8	1.7	34.3
1957	2915	1431	0.49	361	100	1.0	2.0	33.9
1958	2298	1038	0.45	332	80	1.2	2.0	31.2
1959	712	555	0.78	573	68	0.0	5.3	35.3
1960	1607	776	0.48	355	79	0.0	4.9	35.2
1961	1264	806	0.64	469	91	30.8	4.8	34.4
1962	1480	865	0.58	430	87	59.8	2.7	30.4
1963	579	596	1.03	757	86	80.2	3.0	30.6
1964	795	726	0.91	671	91	45.1	2.8	28.3
1965	2546	1331	0.52	385	123	13.8	3.2	25.9
1966	1548	973	0.63	462	158	0.0	3.4	29.0
1967	791	710	0.90	660	177	0.0	4.0	31.0
1968	1060	838	0.79	582	179	0.0	4.0	32.4
1969	1938	1333	0.69	506	133	1.5	4.5	35.6
1970	1523	940	0.62	454	91	2.2	4.0	34.4
1971	1182	860	0.73	535	42	4.8	4.1	32.6
1972	1251	941	0.75	553	41	0.0	3.1	34.6
1973	2897	1679	0.58	426	39	0.0	3.7	33.8
1974	859	648	0.75	555	38	0.0	4.6	38.8
1975	2006	983	0.49	360	34	0.0	5.6	22.1
1976	1014	688	0.68	499	35	0.0	6.0	21.8
1977	569	465	0.82	600	35	0.0	8.5	24.2
1978	991	734	0.74	545	33	0.0	9.2	28.4
1979	3112	1711	0.55	404	31	0.0	8.9	31.0
1980	2183	1378	0.63	464	32	0.0	7.3	28.4
1981	882	654	0.74	545	29	0.0	6.8	25.9
1982	1639	906	0.55	407	30	0.0	7.5	22.6
1983	2276	1152	0.51	372	30	0.0	5.5	24.8
1984	1984	896	0.45	332	36	0.0	5.6	22.9
Total	71437	42196						
Average	1624	959	0.59	434				

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	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	78	77	724	0
	Feb	127	121	703	0
	Mar	211	161	559	0
	Apr	392	256	479	0
	May	1323	708	394	0
	Jun	915	266	213	0
1941	Jul	526	150	209	0
	Aug	174	146	616	0
	Sep	202	194	707	1
	Oct	655	485	545	0
	Nov	191	116	445	0
	Dec	104	83	585	0
	TOTAL	4899	2761	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	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	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	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	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	Month	Flow 1000 (ACFT)	Load Load (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	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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	62	452	27
	Nov	93	60	475	17
	Dec	122	73	441	10
	TOTAL	1639	906	407	327
	Jan	144	73	371	13
	Feb	137	75	405	22
	Mar	240	128	393	14
	Apr	297	183	453	0
	May	329	140	313	11
	Jun	355	129	267	30
1983	Jul	262	107	301	4
	Aug	144	84	429	21
	Sep	70	47	497	21
	Oct	116	65	413	31
	Nov	83	53	476	25
	Dec	101	68	491	19
	TOTAL	2276	1152	372	211
	Jan	130	70	393	20
	Feb	160	79	362	29
	Mar	171	86	371	26
	Apr	173	89	381	0
	May	339	96	209	0
	Jun	218	64	216	4
1984	Jul	131	58	324	7
	Aug	143	74	381	31
	Sep	108	61	415	24
	Oct	138	78	415	0
	Nov	125	66	389	0
	Dec	148	76	377	0
	TOTAL	1984	896	332	141

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	147	75	374	0
	Feb	168	84	365	0
	Mar	226	134	436	0
	Apr	386	146	278	6
	May	505	167	243	31
	Jun	518	167	238	30
1985	Jul	201	93	340	29
	Aug	91	51	409	0
	Sep	145	73	369	0
	Oct				
	Nov				
	Dec				
	TOTAL				

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	11863	0.66	489	*			
1942	14794	8487	0.57	422	33	0.0	1.7	15.7
1943	11413	8143	0.71	525	68	0.0	1.5	17.1
1944	13018	8266	0.63	467	75	0.0	1.6	16.8
1945	11768	8616	0.73	538	43	0.0	1.4	17.1
1946	8751	8204	0.94	689	9	0.0	9.3	13.5
1947	14048	9516	0.68	498	39	0.0	4.8	17.5
1948	12884	8523	0.66	486	74	0.0	3.8	15.3
1949	14605	9874	0.68	497	109	0.0	2.0	16.6
1950	10800	8051	0.75	548	110	0.0	1.9	17.1
1951	9901	7787	0.79	578	110	0.0	1.9	21.4
1952	17904	11297	0.63	464	110	0.0	2.0	20.5
1953	8729	7451	0.85	628	109	0.0	2.0	21.0
1954	6165	6312	1.02	753	110	0.9	2.6	18.7
1955	6967	6430	0.92	679	108	0.9	2.6	19.3
1956	8658	6427	0.74	546	98	1.0	3.4	19.8
1957	18702	12528	0.67	493	92	2.2	3.7	28.2
1958	13140	9232	0.70	517	81	27.2	4.7	28.9
1959	7060	6644	0.94	692	77	51.9	4.0	31.8
1960	8790	7002	0.80	586	83	84.3	3.4	30.8
1961	7315	7193	0.98	723	93	86.0	3.6	30.6
1962	14439	10874	0.75	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	0.75	552	44	25.0	3.2	32.1
1966	7739	5334	0.69	507	42	0.0	2.6	27.0
1967	7560	6279	0.83	611	36	0.0	1.5	20.2
1968	8804	7740	0.88	646	40	0.0	1.9	15.1
1969	9078	7552	0.83	612	52	0.0	2.0	12.9
1970	8139	6683	0.82	604	54	0.0	2.4	11.2
1971	9259	7019	0.76	557	50	0.0	2.2	9.0
1972	9345	6962	0.75	548	38	0.0	2.4	6.6
1973	9044	6961	0.77	566	40	0.0	2.6	7.0
1974	8888	6356	0.72	526	39	0.0	3.0	7.2
1975	8961	6486	0.72	532	39	0.0	3.4	7.1
1976	9400	6863	0.73	537	34	0.0	3.5	6.9
1977	7353	5623	0.76	562	34	0.0	3.7	8.2
1978	9006	7288	0.81	595	34	0.0	3.3	6.9
1979	8109	6287	0.78	570	35	0.0	3.6	6.9
1980	11329	8056	0.71	523	35	0.0	3.8	6.6
1981	7848	5647	0.72	529	29	0.0	4.4	7.9
1982	9017	6722	0.75	548	23	0.0	5.1	8.1
1983	19183	12963	0.68	497	17	0.0	5.8	10.1
1984	20440	12715	0.62	457	17	0.0	4.6	12.7
Total	462424	342180						
Average	10510	7777	0.74	544				

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	1001	*
	Feb	423	530	922	*
	Mar	668	715	787	*
	Apr	1091	825	556	*
	May	4974	2065	305	*
	Jun	4004	1516	278	*
1941	Jul	1666	845	373	*
	Aug	798	839	773	*
	Sep	608	759	918	*
	Oct	1797	1791	733	*
	Nov	903	835	681	*
	Dec	576	669	855	*
	TOTAL	17857	11863	488	0
	Jan	407	543	981	31
	Feb	396	507	940	28
	Mar	630	633	739	31
	Apr	2844	1039	269	30
	May	3209	1121	257	31
	Jun	4202	1210	212	30
1942	Jul	1317	820	458	31
	Aug	454	564	914	31
	Sep	275	467	1246	30
	Oct	334	486	1070	31
	Nov	368	561	1121	5
	Dec	357	535	1102	1
	TOTAL	14794	8487	422	310
	Jan	330	482	1075	3
	Feb	332	461	1021	2
	Mar	516	606	863	4
	Apr	1450	884	448	9
	May	2158	922	314	6
	Jun	2729	1080	291	3
1943	Jul	1429	698	359	7
	Aug	793	847	786	5
	Sep	447	484	795	6
	Oct	377	564	1098	8
	Nov	456	584	940	10
	Dec	395	532	991	4
	TOTAL	11413	8143	525	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	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

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	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	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	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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	591	549	0
	Nov	975	708	534	0
	Dec	976	696	524	21
	TOTAL	9017	6722	548	164
	Jan	914	630	507	31
	Feb	861	645	551	8
	Mar	661	511	569	1
	Apr	951	697	539	8
	May	1259	907	530	3
	Jun	3314	2304	511	1
1983	Jul	3370	2254	492	16
	Aug	1833	1247	500	14
	Sep	1589	1020	472	0
	Oct	1576	1036	484	0
	Nov	1416	894	464	0
	Dec	1441	817	417	27
	TOTAL	19183	12963	497	109
	Jan	1438	840	430	4
	Feb	1383	892	474	19
	Mar	1475	985	491	31
	Apr	1494	1089	536	2
	May	2549	1671	482	30
	Jun	2540	1592	461	0
1984	Jul	2207	1384	461	0
	Aug	1564	916	431	0
	Sep	1417	862	447	0
	Oct	1402	852	447	11
	Nov	1474	853	425	6
	Dec	1498	780	383	0
	TOTAL	20440	12715	457	103

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	1545	825	393	0
	Feb	1485	851	421	0
	Mar	1244	800	473	0
	Apr	1229	805	482	0
	May	2116	1247	433	10
	Jun	2392	1364	419	25
1985	Jul	1747	971	409	1
	Aug	1633	903	406	0
	Sep	1383	774	411	27
	Oct				
	Nov				
	Dec				
	TOTAL				

Missing EC estimated by interpolation after regulation of flow.

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	0.76	558	75	0.0	1.8	20.8
1942	14925	9967	0.67	491	75	0.0	1.8	20.8
1943	11623	10027	0.86	634	74	0.0	3.9	19.0
1944	13328	9954	0.75	549	72	0.0	3.9	14.1
1945	12114	10072	0.83	611	99	0.0	3.9	15.7
1946	9120	8692	0.95	701	100	0.0	2.6	16.8
1947	14349	11107	0.77	569	104	0.0	2.8	17.9
1948	13011	9707	0.75	549	106	0.0	2.6	16.6
1949	14621	11181	0.76	562	106	0.0	2.6	15.4
1950	10836	9332	0.86	633	106	0.9	3.0	15.0
1951	9934	8678	0.87	642	107	0.9	3.0	15.7
1952	18107	13205	0.73	536	107	0.9	2.5	15.3
1953	8803	8683	0.99	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	0.80	591	82	0.0	3.0	25.5
1957	18910	13463	0.71	524	70	0.0	3.3	32.2
1958	13461	9672	0.72	528	61	24.6	4.3	33.1
1959	7308	7448	1.02	749	67	53.7	4.1	35.0
1960	9155	8055	0.88	647	74	86.5	4.3	33.3
1961	7740	7752	1.00	737	85	85.9	4.2	31.3
1962	14840	11345	0.76	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	0.80	589	56	35.7	2.9	27.5
1966	8229	6379	0.78	570	48	0.0	2.0	22.6
1967	8033	7258	0.90	664	45	0.0	2.8	19.1
1968	9372	8814	0.94	692	44	0.0	3.4	13.9
1969	9542	8716	0.91	672	47	0.0	3.6	14.1
1970	8599	7744	0.90	662	41	0.0	2.8	13.3
1971	9589	7720	0.81	592	40	0.0	2.6	12.2
1972	9800	7913	0.81	594	32	0.0	3.1	8.1
1973	9829	7907	0.80	592	33	0.0	2.4	7.8
1974	9115	7404	0.81	597	34	0.0	3.3	7.9
1975	9211	7460	0.81	596	35	0.0	4.4	6.9
1976	9672	7905	0.82	601	35	0.0	5.3	9.6
1977	7597	6393	0.84	619	32	3.1	5.3	10.2
1978	9330	7932	0.85	625	26	3.8	5.4	9.1
1979	8696	7308	0.84	618	22	4.5	6.0	7.5
1980	11766	9155	0.78	572	17	0.0	5.2	8.0
1981	7921	6254	0.79	581	12	0.0	4.0	7.5
1982	9335	7241	0.78	570	10	0.0	4.3	5.4
1983	19545	13630	0.70	513	10	0.0	3.9	9.1
1984	20484	13960	0.68	501	11	0.0	3.8	9.4
Total	475984	387224						
Average	10818	8801	0.81	598				

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	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	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	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	Month	Flow 1000 (ACFT)	Load Load (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	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	8055	647	116

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	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	715	559	30
	Dec	988	750	558	31
	TOTAL	9335	7241	570	365
	Jan	907	692	561	31
	Feb	890	674	557	28
	Mar	758	588	571	31
	Apr	984	742	554	27
	May	1312	967	542	3
	Jun	3326	2241	495	8
1983	Jul	3416	2318	499	27
	Aug	1828	1247	502	1
	Sep	1577	1119	522	0
	Oct	1618	1094	497	0
	Nov	1443	962	490	0
	Dec	1488	986	487	15
	TOTAL	19545	13630	513	171
	Jan	1471	1041	520	31
	Feb	1410	970	506	21
	Mar	1506	1025	500	0
	Apr	1525	1058	510	4
	May	2514	1688	494	21
	Jun	2521	1572	459	0
1984	Jul	2177	1447	489	21
	Aug	1614	1096	500	21
	Sep	1470	1037	519	30
	Oct	1364	967	522	31
	Nov	1435	1014	520	30
	Dec	1476	1044	520	31
	TOTAL	20484	13960	501	241

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	1537	1084	518	31
	Feb	1461	1026	516	28
	Mar	1317	939	524	31
	Apr	1197	856	526	29
	May	2016	1314	479	0
	Jun	2300	1374	439	0
1985	Jul	1680	957	419	0
	Aug	1553	902	427	0
	Sep	1357	934	506	25
	Oct				
	Nov				
	Dec				
	TOTAL				

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	670	1.57	1154	*			
1942	187	391	2.10	1543	*			
1943	179	387	2.16	1586	*			
1944	180	379	2.11	1550	*			
1945	181	398	2.20	1617	*			
1946	169	373	2.21	1625	*			
1947	131	323	2.46	1808	*			
1948	111	286	2.58	1897	*			
1949	163	377	2.30	1695	41	0.0	2.1	12.3
1950	118	302	2.56	1883	41	0.0	2.1	12.3
1951	112	285	2.54	1869	38	0.0	2.2	12.5
1952	267	544	2.04	1498	30	0.0	2.5	6.2
1953	98	271	2.78	2044	52	1.9	3.1	14.4
1954	140	366	2.62	1924	89	1.1	3.4	17.3
1955	133	346	2.59	1906	106	0.9	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	26.1
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	1676	37	2.7	4.9	17.6
1983	506	653	1.29	949	34	2.9	5.2	18.2
1984	171	422	2.48	1821	33	0.0	4.5	15.8
Total	7665	15896						
Average	174	361	2.07	1525				

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	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	15	35	1722	*
	Feb	31	56	1326	*
	Mar	62	87	1028	*
	Apr	62	86	1012	*
	May	130	140	792	*
	Jun	19	38	1462	*
1941	Jul	22	42	1413	*
	Aug	20	41	1487	*
	Sep	5	17	2358	*
	Oct	23	47	1501	*
	Nov	19	42	1612	*
	Dec	17	39	1662	*
	TOTAL	427	670	1154	0
	Jan	20	42	1572	*
	Feb	15	35	1661	*
	Mar	20	41	1485	*
	Apr	50	74	1088	*
	May	28	50	1306	*
	Jun	5	16	2262	*
1942	Jul	4	14	2424	*
	Aug	9	24	1949	*
	Sep	4	14	2603	*
	Oct	9	25	2026	*
	Nov	10	28	1968	*
	Dec	11	29	1916	*
	TOTAL	187	391	1543	0
	Jan	18	40	1619	*
	Feb	21	43	1507	*
	Mar	36	60	1226	*
	Apr	34	57	1233	*
	May	12	28	1749	*
	Jun	4	13	2448	*
1943	Jul	4	14	2441	*
	Aug	13	30	1740	*
	Sep	6	18	2298	*
	Oct	9	24	2058	*
	Nov	10	27	1981	*
	Dec	13	32	1831	*
	TOTAL	179	387	1586	0
	Jan	13	32	1786	*
	Feb	14	33	1698	*
	Mar	26	48	1372	*
	Apr	25	47	1360	*
	May	49	73	1092	*
	Jun	11	26	1777	*
1944	Jul	4	13	2482	*
	Aug	4	14	2521	*
	Sep	4	15	2567	*
	Oct	5	17	2466	*
	Nov	13	32	1828	*
	Dec	12	30	1895	*
	TOTAL	180	379	1550	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	11	29	1882	*
	Feb	18	38	1594	*
	Mar	20	41	1480	*
	Apr	20	39	1478	*
	May	25	46	1363	*
	Jun	5	15	2316	*
1945	Jul	5	15	2358	*
	Aug	26	48	1378	*
	Sep	8	23	2082	*
	Oct	20	42	1573	*
	Nov	10	28	1965	*
	Dec	14	34	1778	*
	TOTAL	181	398	1617	0
	Jan	13	32	1797	*
	Feb	10	25	1938	*
	Mar	11	26	1837	*
	Apr	12	28	1752	*
	May	5	15	2368	*
	Jun	4	13	2453	*
1946	Jul	6	18	2135	*
	Aug	13	31	1710	*
	Sep	4	14	2625	*
	Oct	37	64	1281	*
	Nov	33	60	1346	*
	Dec	22	46	1537	*
	TOTAL	169	373	1625	0
	Jan	15	35	1713	*
	Feb	12	30	1791	*
	Mar	13	31	1698	*
	Apr	16	34	1587	*
	May	17	35	1552	*
	Jun	4	14	2392	*
1947	Jul	5	15	2347	*
	Aug	14	32	1688	*
	Sep	4	15	2566	*
	Oct	8	23	2109	*
	Nov	9	26	2038	*
	Dec	14	34	1792	*
	TOTAL	131	323	1808	0
	Jan	11	28	1924	*
	Feb	12	30	1796	*
	Mar	13	30	1726	*
	Apr	20	40	1468	*
	May	10	25	1825	*
	Jun	4	13	2432	*
1948	Jul	4	14	2424	*
	Aug	5	17	2301	*
	Sep	6	19	2293	*
	Oct	6	18	2258	31
	Nov	9	25	1974	30
	Dec	10	27	1959	31
	TOTAL	111	286	1897	92

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	13	31	1831	31
	Feb	14	33	1692	28
	Mar	18	40	1659	31
	Apr	30	57	1384	30
	May	28	54	1423	31
	Jun	12	28	1729	30
1949	Jul	5	15	2456	31
	Aug	4	14	2575	31
	Sep	7	19	2042	30
	Oct	9	24	2033	31
	Nov	11	28	1880	30
	Dec	13	33	1793	31
	TOTAL	163	377	1695	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

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	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

Table 17 - Colorado River Basin - Historical Flow and Quality of Water Data
VIRGIN RIVER AT LITTLEFIELD, ARIZONA

Calendar Year	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	1	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	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	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	2119	0
	Nov	17	38	1578	0
	Dec	31	61	1453	0
	TOTAL	191	435	1676	0
	Jan	18	39	1596	1
	Feb	19	38	1437	1
	Mar	101	115	838	2
	Apr	68	85	931	18
	May	120	80	489	1
	Jun	67	64	712	16
1983	Jul	16	42	1899	0
	Aug	24	42	1310	31
	Sep	11	26	1702	30
	Oct	20	39	1446	31
	Nov	19	38	1480	30
	Dec	24	44	1358	31
	TOTAL	506	653	948	192
	Jan	18	38	1539	31
	Feb	15	33	1623	29
	Mar	14	34	1785	19
	Apr	17	40	1731	0
	May	14	31	1649	1
	Jun	6	17	2234	0
1984	Jul	18	51	2053	2
	Aug	19	50	1972	3
	Sep	9	28	2181	0
	Oct	11	30	1941	1
	Nov	13	35	1924	1
	Dec	17	38	1637	0
	TOTAL	171	422	1821	87
	Jan	18	40	1667	0
	Feb	16	35	1663	3
	Mar	22	43	1438	0
	Apr	36	44	892	0
	May	21	50	1725	0
	Jun	5	16	2351	3
1985	Jul	5	17	2341	3
	Aug	5	15	2392	0
	Sep	5	18	2407	1
	Oct				
	Nov				
	Dec				
	TOTAL				

Note: In the 1985 column block the header for the load column is printed "Load Load (TONS)".

Table 18
Colorado River Basin
Historical Flow and Quality of Water Data
COLORADO RIVER BELOW HOOVER DAM, ARIZONA - NEVADA
(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	0.97	710	107	0.0	1.4	6.5
1943	12715	11469	0.90	663	106	0.0	1.6	4.8
1944	14427	13422	0.93	684	74	0.0	1.6	4.1
1945	12512	11282	0.90	663	44	0.0	1.7	4.5
1946	10585	9457	0.89	657	16	6.3	1.9	2.4
1947	10959	9825	0.90	659	13	7.7	2.1	2.5
1948	13050	11332	0.87	639	14	7.1	1.6	4.1
1949	13567	11178	0.82	606	18	0.0	1.4	4.4
1950	12016	10080	0.84	617	53	0.0	1.8	3.8
1951	9870	8724	0.88	650	82	23.2	2.8	6.2
1952	15816	13381	0.85	622	107	47.7	2.6	8.4
1953	11300	10029	0.89	653	105	76.2	2.3	9.0
1954	10514	9955	0.95	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	0.83	613	56	51.8	2.4	10.2
1959	9282	7760	0.84	615	36	38.9	2.0	5.9
1960	8996	8063	0.90	659	36	52.8	2.1	5.7
1961	8586	8020	0.93	687	27	44.4	2.3	5.3
1962	8615	8412	0.98	718	15	33.3	2.3	3.0
1963	8533	7811	0.92	673	15	26.7	1.8	3.4
1964	8159	7866	0.96	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	0.92	674	36	0.0	1.5	5.2
1968	7838	7522	0.96	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	0.99	724	33	0.0	2.6	3.8
1973	8301	7618	0.92	675	33	0.0	2.2	3.8
1974	8732	8092	0.93	681	33	0.0	2.6	2.9
1975	8367	7736	0.92	680	35	0.0	2.0	2.3
1976	7927	7266	0.92	674	35	0.0	2.0	2.2
1977	7873	7125	0.90	665	36	0.0	2.0	2.2
1978	7476	6893	0.92	678	36	2.8	2.2	2.8
1979	7721	7228	0.94	688	37	2.7	2.3	2.7
1980	11088	10425	0.94	691	37	2.7	2.6	2.7
1981	8284	7672	0.93	681	31	0.0	2.4	2.6
1982	7454	6886	0.92	679	24	0.0	1.9	1.9
1983	19067	17247	0.90	665	29	0.0	2.2	3.3
1984	0	0	0.00	0	0	0.0	0.0	0.0
Total	433566	403233						
Average	9854	9164	0.93	684				

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, ARIZONA - NEVADA

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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	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

Table 18 - Colorado River Basin - Historical Flow and Quality of Water Data

COLORADO RIVER BELOW HOOVER DAM, ARIZONA - NEVADA

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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	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, ARIZONA - NEVADA

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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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	679	31
	Nov	379	351	680	30
	Dec	464	428	679	14
	TOTAL	7454	6889	680	160
	Jan	1176	1100	688	0
	Feb	365	340	686	0
	Mar	634	590	685	0
	Apr	1060	987	685	0
	May	1216	1132	685	0
	Jun	1886	1756	684	0
1983	Jul	2574	2389	682	0
	Aug	2422	2197	667	31
	Sep	2187	1909	642	30
	Oct	2106	1760	615	31
	Nov	1750	1467	616	30
	Dec	1692	1446	628	31
	TOTAL	19067	17074	658	153
	Jan	1888	1621	631	31
	Feb	1765	1475	615	15
	Mar	1770	1472	612	0
	Apr	1564	1280	602	0
	May	1887	1565	610	21
	Jun	2076	1741	617	19
1984	Jul	2185	1752	590	0
	Aug	1905	1496	578	0
	Sep	1622	1264	573	0
	Oct	1588	1245	576	0
	Nov	1544	1220	581	0
	Dec	1618	1292	587	0
	TOTAL	21411	17423	598	86

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	1752	1395	586	0
	Feb	1582	1254	583	0
	Mar	1402	1088	571	0
	Apr	1330	1022	565	0
	May	1436	1113	570	0
	Jun	1665	1296	573	0
1985	Jul	1735	1337	567	0
	Aug	1684	1285	561	0
	Sep	1281	944	542	0
	Oct				
	Nov				
	Dec				
	TOTAL				

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, ARIZONA - CALIFORNIA
(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	15073	1.02	752	*			
1942	15190	14991	0.99	726	*			
1943	12078	11201	0.93	682	*			
1944	13800	13161	0.95	701	*			
1945	12034	11158	0.93	682	*			
1946	10142	9325	0.92	676	*			
1947	10662	9830	0.92	678	*			
1948	12612	11299	0.90	659	*			
1949	13061	11159	0.85	628	*			
1950	10472	9081	0.87	638	*			
1951	8672	7915	0.91	671	*			
1952	15372	13456	0.88	644	*			
1953	10649	9736	0.91	672	*			
1954	9671	9369	0.97	712	*			
1955	8140	8998	1.11	813	*			
1956	6852	7866	1.15	844	*			
1957	7997	8336	1.04	766	*			
1958	10890	9402	0.86	635	*			
1959	8186	7090	0.87	637	*			
1960	7777	7175	0.92	678	*			
1961	6975	6684	0.96	705	*			
1962	7159	7137	1.00	733	*			
1963	7251	6783	0.94	688	*			
1964	6653	6250	0.94	691	37	0.0	1.3	8.9
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	0.95	702	36	0.0	1.2	7.8
1968	6642	6391	0.96	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	0.96	709	38	15.8	1.8	3.8
1974	7171	6849	0.96	702	38	15.8	2.0	3.2
1975	7210	6880	0.95	702	36	0.0	2.1	2.6
1976	6697	6280	0.94	690	35	0.0	2.3	2.8
1977	6711	6270	0.93	687	36	0.0	2.2	2.5
1978	6685	6257	0.94	688	45	20.0	2.8	3.7
1979	7195	6858	0.95	701	92	58.7	3.0	4.2
1980	10723	10375	0.97	712	127	76.4	3.2	4.5
1981	7229	7039	0.97	716	152	86.8	3.0	4.0
1982	6367	6172	0.97	713	141	87.2	2.6	3.3
1983	18198	16783	0.92	678	146	67.8	3.4	5.2
1984	20464	16992	0.83	611	121	43.8	3.2	9.1
Total	411336	389238						
Average	9349	8846	0.95	696				

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, ARIZONA - CALIFORNIA

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	627	677	795	*
	Feb	561	632	828	*
	Mar	750	834	818	*
	Apr	608	670	810	*
	May	1359	1483	803	*
	Jun	1628	1760	795	*
1941	Jul	998	1065	785	*
	Aug	1332	1311	724	*
	Sep	1528	1477	711	*
	Oct	1585	1531	710	*
	Nov	1731	1653	702	*
	Dec	2042	1982	714	*
	TOTAL	14748	15073	751	0
	Jan	1957	1955	735	*
	Feb	1482	1485	737	*
	Mar	1494	1499	738	*
	Apr	1136	1146	742	*
	May	1588	1620	750	*
	Jun	1530	1557	749	*
1942	Jul	1226	1232	739	*
	Aug	880	883	738	*
	Sep	797	786	725	*
	Oct	845	823	716	*
	Nov	1041	947	669	*
	Dec	1214	1057	641	*
	TOTAL	15190	14991	726	0
	Jan	1015	903	654	*
	Feb	746	690	681	*
	Mar	886	833	691	*
	Apr	877	835	700	*
	May	957	912	701	*
	Jun	975	920	694	*
1943	Jul	1086	1021	692	*
	Aug	991	944	701	*
	Sep	1006	949	694	*
	Oct	1160	1073	681	*
	Nov	1149	1032	661	*
	Dec	1231	1089	651	*
	TOTAL	12078	11201	682	0
	Jan	1241	1140	675	*
	Feb	1181	1152	717	*
	Mar	1297	1264	717	*
	Apr	1164	1144	723	*
	May	1116	1098	723	*
	Jun	983	951	712	*
1944	Jul	1035	987	702	*
	Aug	1148	1080	692	*
	Sep	1114	1023	675	*
	Oct	1178	1090	680	*
	Nov	1156	1097	698	*
	Dec	1187	1136	704	*
	TOTAL	13800	13161	701	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	1186	1130	701	*
	Feb	1061	1008	699	*
	Mar	1232	1171	699	*
	Apr	985	929	694	*
	May	970	913	693	*
	Jun	920	865	692	*
1945	Jul	913	845	681	*
	Aug	770	689	658	*
	Sep	824	711	634	*
	Oct	1038	930	659	*
	Nov	1036	960	681	*
	Dec	1099	1007	674	*
	TOTAL	12034	11158	682	0
	Jan	1041	943	666	*
	Feb	1028	951	680	*
	Mar	944	877	683	*
	Apr	830	769	682	*
	May	873	808	681	*
	Jun	754	694	677	*
1946	Jul	801	730	670	*
	Aug	722	661	673	*
	Sep	730	669	674	*
	Oct	759	698	677	*
	Nov	789	725	676	*
	Dec	870	800	677	*
	TOTAL	10142	9325	676	0
	Jan	953	874	675	*
	Feb	899	837	685	*
	Mar	940	882	690	*
	Apr	797	749	691	*
	May	905	852	692	*
	Jun	860	808	692	*
1947	Jul	844	795	692	*
	Aug	892	839	691	*
	Sep	819	745	669	*
	Oct	836	744	654	*
	Nov	880	751	628	*
	Dec	1037	954	676	*
	TOTAL	10662	9830	678	0
	Jan	1160	1054	669	*
	Feb	1122	1015	665	*
	Mar	1107	1001	665	*
	Apr	1083	979	665	*
	May	1115	1016	671	*
	Jun	989	900	669	*
1948	Jul	1108	990	657	*
	Aug	986	878	655	*
	Sep	941	820	641	*
	Oct	918	765	613	*
	Nov	978	872	656	*
	Dec	1106	1009	671	*
	TOTAL	12612	11299	659	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	1229	1036	620	*
	Feb	1192	1008	622	*
	Mar	1236	1076	640	*
	Apr	1117	983	648	*
	May	983	861	645	*
	Jun	923	814	649	*
1949	Jul	952	813	628	*
	Aug	1013	850	617	*
	Sep	1099	903	604	*
	Oct	1148	924	592	*
	Nov	1011	865	629	*
	Dec	1158	1025	651	*
	TOTAL	13061	11159	628	0
	Jan	1080	924	629	*
	Feb	1036	895	635	*
	Mar	1209	1066	649	*
	Apr	998	874	644	*
	May	1066	913	630	*
	Jun	900	758	619	*
1950	Jul	897	746	612	*
	Aug	833	713	630	*
	Sep	704	620	648	*
	Oct	651	589	665	*
	Nov	542	489	664	*
	Dec	557	494	652	*
	TOTAL	10472	9081	638	0
	Jan	550	483	645	*
	Feb	501	448	658	*
	Mar	730	671	677	*
	Apr	765	716	689	*
	May	675	624	679	*
	Jun	862	793	677	*
1951	Jul	945	870	678	*
	Aug	945	861	671	*
	Sep	723	657	668	*
	Oct	709	649	673	*
	Nov	561	505	662	*
	Dec	707	637	663	*
	TOTAL	8672	7915	671	0
	Jan	1104	1003	668	*
	Feb	1092	1023	689	*
	Mar	1424	1371	708	*
	Apr	1300	1255	710	*
	May	1443	1388	707	*
	Jun	1419	1312	680	*
1952	Jul	1263	1084	631	*
	Aug	1296	1063	603	*
	Sep	1321	1017	566	*
	Oct	1234	893	532	*
	Nov	1172	839	527	*
	Dec	1303	1208	682	*
	TOTAL	15372	13456	644	0

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	1198	1128	693	*
	Feb	1020	951	686	*
	Mar	947	903	701	*
	Apr	808	766	697	*
	May	953	873	674	*
	Jun	956	863	664	*
1953	Jul	1093	989	666	*
	Aug	1056	945	658	*
	Sep	823	730	652	*
	Oct	634	561	651	*
	Nov	527	469	654	*
	Dec	634	559	648	*
	TOTAL	10649	9736	672	0
	Jan	797	719	663	*
	Feb	661	633	704	*
	Mar	782	776	730	*
	Apr	864	850	724	*
	May	1015	986	715	*
	Jun	883	857	714	*
1954	Jul	1000	971	714	*
	Aug	982	955	715	*
	Sep	755	733	715	*
	Oct	636	619	715	*
	Nov	638	622	717	*
	Dec	659	649	724	*
	TOTAL	9671	9369	712	0
	Jan	734	737	738	*
	Feb	598	624	767	*
	Mar	733	806	809	*
	Apr	758	847	821	*
	May	791	881	819	*
	Jun	866	992	842	*
1955	Jul	963	1078	823	*
	Aug	849	964	836	*
	Sep	693	787	835	*
	Oct	499	559	825	*
	Nov	369	410	817	*
	Dec	286	315	809	*
	TOTAL	8140	8998	813	0
	Jan	317	351	813	*
	Feb	349	388	817	*
	Mar	628	711	833	*
	Apr	684	787	846	*
	May	671	771	846	*
	Jun	787	917	857	*
1956	Jul	865	1010	859	*
	Aug	823	953	851	*
	Sep	634	738	857	*
	Oct	486	574	867	*
	Nov	321	358	821	*
	Dec	288	308	788	*
	TOTAL	6852	7866	844	0

Table 19 - Colorado River Basin - Historical Flow and Quality of Water Data
COLORADO RIVER BELOW PARKER DAM, ARIZONA - CALIFORNIA

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	243	256	775	*
	Feb	349	379	799	*
	Mar	589	651	813	*
	Apr	732	802	807	*
	May	645	696	793	*
	Jun	783	832	781	*
1957	Jul	891	946	781	*
	Aug	817	862	776	*
	Sep	661	688	765	*
	Oct	503	514	752	*
	Nov	781	774	730	*
	Dec	1005	937	686	*
	TOTAL	7997	8336	766	0
	Jan	1285	1173	671	*
	Feb	565	515	671	*
	Mar	1345	1192	652	*
	Apr	1333	1149	634	*
	May	1013	850	617	*
	Jun	854	723	623	*
1958	Jul	930	786	621	*
	Aug	867	730	619	*
	Sep	714	601	620	*
	Oct	610	516	622	*
	Nov	623	526	621	*
	Dec	753	640	625	*
	TOTAL	10890	9402	635	0
	Jan	677	580	631	*
	Feb	593	515	639	*
	Mar	690	618	659	*
	Apr	832	748	662	*
	May	706	622	648	*
	Jun	797	697	644	*
1959	Jul	963	830	634	*
	Aug	873	739	623	*
	Sep	682	575	619	*
	Oct	558	474	625	*
	Nov	405	342	621	*
	Dec	411	349	626	*
	TOTAL	8186	7090	637	0
	Jan	428	376	646	*
	Feb	457	411	661	*
	Mar	760	695	673	*
	Apr	810	760	690	*
	May	740	691	686	*
	Jun	879	814	681	*
1960	Jul	986	912	680	*
	Aug	868	803	680	*
	Sep	639	591	679	*
	Oct	490	454	683	*
	Nov	397	368	682	*
	Dec	322	300	685	*
	TOTAL	7777	7175	678	0

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	Jan	379	358	694	*
	Feb	453	430	699	*
	Mar	742	713	707	*
	Apr	725	698	708	*
	May	705	671	700	*
	Jun	823	792	709	*
1961	Jul	900	868	710	*
	Aug	710	680	705	*
	Sep	606	583	708	*
	Oct	412	393	702	*
	Nov	319	304	701	*
	Dec	202	192	699	*
	TOTAL	6975	6684	705	0
	Jan	334	319	702	*
	Feb	374	362	713	*
	Mar	692	682	725	*
	Apr	757	756	735	*
	May	686	689	739	*
	Jun	778	780	737	*
1962	Jul	882	883	736	*
	Aug	821	821	735	*
	Sep	644	641	732	*
	Oct	471	480	749	*
	Nov	434	438	742	*
	Dec	287	287	736	*
	TOTAL	7159	7137	733	0
	Jan	349	348	733	*
	Feb	467	458	721	*
	Mar	735	709	710	*
	Apr	690	659	702	*
	May	708	669	695	*
	Jun	840	789	690	*
1963	Jul	933	865	681	*
	Aug	819	752	675	*
	Sep	630	574	670	*
	Oct	438	388	651	31
	Nov	334	297	653	30
	Dec	306	275	659	31
	TOTAL	7251	6783	688	92
	Jan	363	327	663	31
	Feb	479	431	662	29
	Mar	640	575	661	31
	Apr	652	592	667	30
	May	598	554	681	31
	Jun	742	701	694	30
1964	Jul	864	819	697	31
	Aug	795	757	700	31
	Sep	589	573	715	30
	Oct	409	401	720	31
	Nov	275	274	732	30
	Dec	245	247	740	31
	TOTAL	6653	6250	691	366

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	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

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, ARIZONA - CALIFORNIA

Calendar Year	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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	348	673	0
	Nov	219	212	710	0
	Dec	264	258	720	1
	TOTAL	6367	6172	713	274
	Jan	1007	981	716	0
	Feb	402	390	715	0
	Mar	591	550	684	0
	Apr	1051	999	699	0
	May	1127	1079	704	0
	Jun	1613	1531	698	0
1983	Jul	2440	2283	688	0
	Aug	2422	2277	691	0
	Sep	2266	2081	675	0
	Oct	2202	1946	650	0
	Nov	1604	1381	633	0
	Dec	1473	1285	641	0
	TOTAL	18198	16783	678	0
	Jan	1728	1490	634	0
	Feb	1657	1422	631	0
	Mar	1741	1504	636	0
	Apr	1609	1387	634	0
	May	1662	1400	619	0
	Jun	1932	1613	614	0
1984	Jul	2012	1682	615	0
	Aug	1835	1531	614	0
	Sep	1668	1320	582	0
	Oct	1595	1244	574	0
	Nov	1498	1198	588	0
	Dec	1527	1201	578	0
	TOTAL	20464	16992	611	0

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	1521	1205	582	0
	Feb	1469	1149	575	0
	Mar	1377	1075	574	0
	Apr	1209	936	570	0
	May	1375	1069	572	0
	Jun	1556	1186	560	0
1985	Jul	1609	1213	555	0
	Aug	1602	1194	548	0
	Sep	1363	1009	544	0
	Oct				
	Nov				
	Dec				
	TOTAL				

Missing EC estimated by interpolation after regulation of flow.

Table 20
Colorado River Basin
Historical Flow and Quality of Water Data
COLORADO RIVER AT IMPERIAL DAM, ARIZONA - CALIFORNIA
(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	13825	1.06	779	*			
1942	14449	14809	1.02	754	*			
1943	11243	10518	0.94	688	72	0.0	3.2	4.4
1944	13094	12353	0.94	694	72	0.0	3.2	4.4
1945	11013	10479	0.95	700	72	0.0	1.1	3.7
1946	9355	8834	0.94	694	108	0.0	1.1	3.7
1947	9920	9578	0.97	710	110	0.0	1.2	3.5
1948	11957	11182	0.94	688	107	0.0	1.3	4.1
1949	12527	10882	0.87	639	108	0.0	1.3	5.2
1950	9864	8797	0.89	656	105	0.0	1.2	4.6
1951	8007	7475	0.93	686	107	0.9	1.3	5.3
1952	14749	12974	0.88	647	103	1.0	1.2	7.2
1953	9946	9045	0.91	669	102	2.0	1.3	7.6
1954	8943	8602	0.96	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	0.99	726	36	22.2	2.6	7.9
1959	7695	7635	0.99	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	0.7	5.5
1964	5903	6595	1.12	822	38	0.0	0.8	5.8
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	0.9	2.6
1975	6154	6940	1.13	829	149	0.0	0.7	3.0
1976	5897	6589	1.12	822	152	0.0	0.7	3.9
1977	5706	6352	1.11	819	147	0.0	0.7	4.0
1978	5702	6297	1.10	812	141	0.0	0.4	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	6076	1.12	826	99	0.0	2.5	3.6
1983	16927	16739	0.99	727	62	0.0	2.8	4.7
1984	19108	17548	0.92	675	64	0.0	2.7	9.1
Total	374699	385339						
Average	8516	8758	1.03	756				

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, ARIZONA - CALIFORNIA

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
1941	Jan	545	619	836	*
	Feb	433	516	878	*
	Mar	607	714	865	*
	Apr	438	509	854	*
	May	962	1106	846	*
	Jun	1499	1705	836	*
	Jul	843	945	824	*
	Aug	1144	1165	749	*
	Sep	1436	1430	733	*
	Oct	1486	1479	732	*
	Nov	1653	1624	722	*
	Dec	2010	2013	737	*
	TOTAL	13056	13825	779	0
1942	Jan	1880	1949	762	*
	Feb	1593	1658	765	*
	Mar	1452	1513	767	*
	Apr	1035	1086	771	*
	May	1482	1575	781	*
	Jun	1430	1516	779	*
	Jul	1176	1227	767	*
	Aug	794	827	767	*
	Sep	711	726	750	*
	Oct	752	726	709	31
	Nov	974	918	693	30
	Dec	1169	1090	685	31
	TOTAL	14449	14809	754	92
1943	Jan	1003	946	694	31
	Feb	721	667	679	4
	Mar	841	779	681	4
	Apr	792	750	697	4
	May	832	801	708	5
	Jun	867	829	703	4
	Jul	964	920	702	4
	Aug	903	860	701	8
	Sep	908	851	690	3
	Oct	1083	1001	680	0
	Nov	1115	1026	676	0
	Dec	1215	1088	658	0
	TOTAL	11243	10518	688	67
1944	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
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
1945	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
	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
1946	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
	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
1947	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
	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
1948	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
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
1949	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
	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
1950	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
	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
1951	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
	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
1952	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
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
1953	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
	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
1954	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
	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
1955	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
	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
1956	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
	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, ARIZONA - CALIFORNIA

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	901	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 Load (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, ARIZONA - CALIFORNIA

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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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

Calendar Year	Month	Flow 1000 (ACFT)	Load 1000 (TONS)	TDS (mg/L)	Days W/O EC
	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	437	876	0
	Nov	247	313	932	0
	Dec	238	298	922	0
	TOTAL	5406	6076	826	0
	Jan	862	894	763	0
	Feb	448	496	814	0
	Mar	505	544	792	0
	Apr	840	854	748	0
	May	960	995	762	0
	Jun	1339	1347	740	0
1983	Jul	2226	2176	719	0
	Aug	2320	2200	697	0
	Sep	2142	2041	701	0
	Oct	2219	2121	703	0
	Nov	1609	1599	731	0
	Dec	1456	1471	743	0
	TOTAL	16927	16739	727	0
	Jan	1649	1618	721	0
	Feb	1577	1444	673	0
	Mar	1607	1482	678	0
	Apr	1514	1423	691	0
	May	1510	1431	697	0
	Jun	1705	1576	680	0
1984	Jul	1844	1695	676	0
	Aug	1716	1638	702	0
	Sep	1534	1445	693	0
	Oct	1501	1330	651	0
	Nov	1428	1206	621	0
	Dec	1521	1259	609	0
	TOTAL	19108	17548	675	0

Calendar Year	Month	Flow 1000 (ACFT)	Load Load (TONS)	TDS (mg/L)	Days W/O EC
	Jan	1474	1233	615	0
	Feb	1374	1139	609	0
	Mar	1274	1135	655	0
	Apr	1073	982	673	0
	May	1166	1016	641	0
	Jun	1348	1112	607	0
1985	Jul	1422	1165	603	0
	Aug	1424	1147	592	0
	Sep	1315	1061	593	0
	Oct				
	Nov				
	Dec				
	TOTAL				