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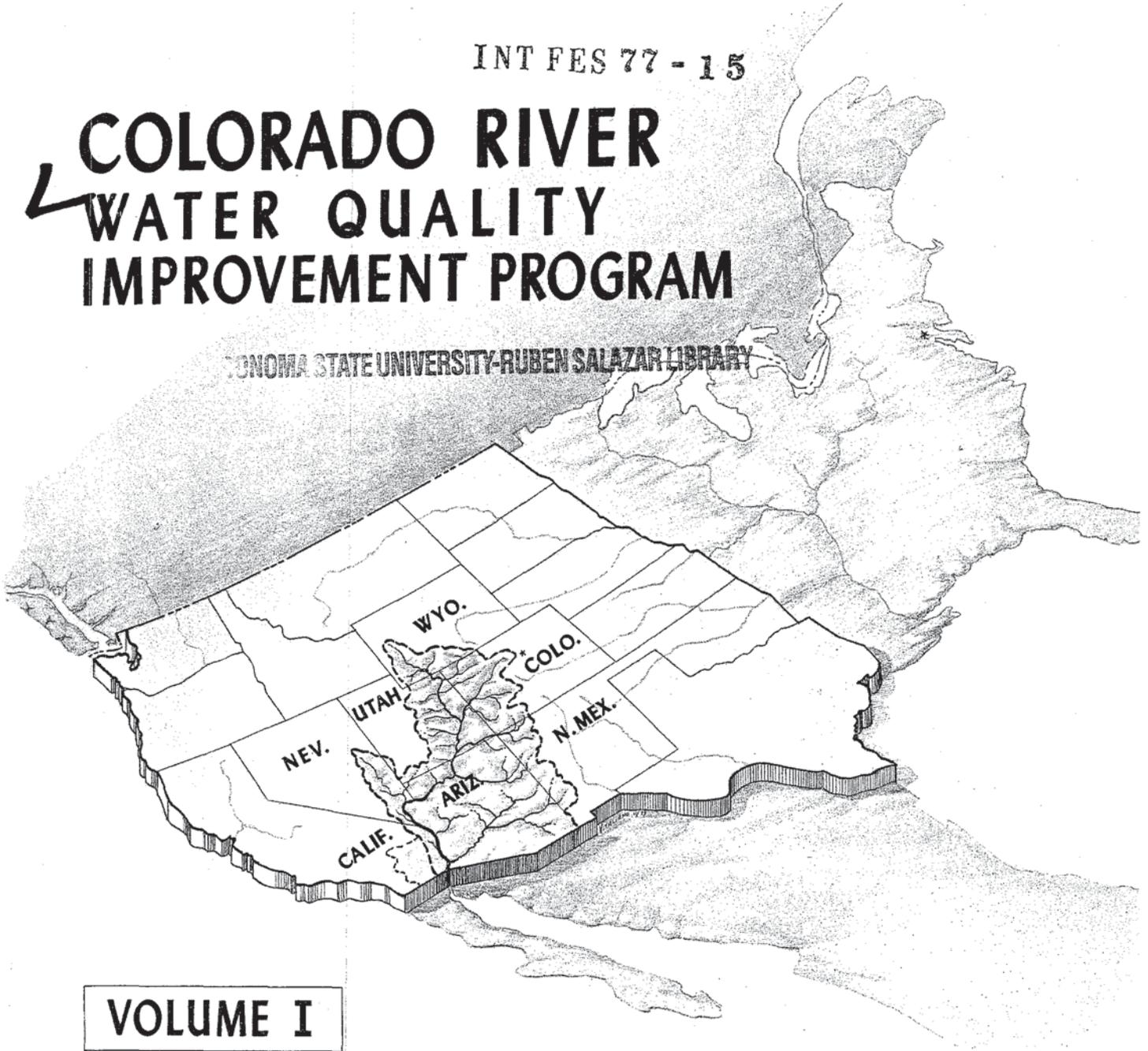
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ENVIRONMENTAL STATEMENT

INT FES 77 - 15

COLORADO RIVER WATER QUALITY IMPROVEMENT PROGRAM

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VOLUME I

STATEMENT AND APPENDICES

**UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION**

**UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE**

MAY 19 1977

DEPARTMENT OF THE INTERIOR

DEPARTMENT OF AGRICULTURE

FINAL
ENVIRONMENTAL STATEMENT

INT FES 77 - 15

COLORADO RIVER
WATER QUALITY
IMPROVEMENT PROGRAM

Prepared by

Bureau of Reclamation (Lead Agency)

and

Soil Conservation Service

in support of P.L. 93-320, Title II

Volume I of II

MAY 19 1977



Acting Commissioner, Bureau of Reclamation



Administrator, Soil Conservation Service

'95

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SUMMARY

() Draft

(X) Final

Department of the Interior, Bureau of Reclamation, Engineering and Research Center (Lead Agency) and the Soil Conservation Service, USDA.

1. Type of Action: (X) Administrative () Legislative

2. Brief description of action: Title II of Public Law 93-320 authorizes the construction of four salinity control units as part of the initial stage of the Colorado River Water Quality Improvement Program. These units include Paradox Valley Unit, Colorado; the Grand Valley Unit, Colorado; the Crystal Geyser Unit, Utah; and the Las Vegas Wash Unit, Nevada. Major structural features of the initial control units involve construction of facilities such as wells, dikes, pipelines, pumps, desalters, and evaporation ponds to collect and dispose of saline water. Nonstructural unit features consist of management assistance to water users for limiting excess water applications to irrigated lands. Title II also authorizes further study and research on other salinity control units for the Colorado River Basin.

This statement presents cumulative impacts of the program and detailed impacts of the Las Vegas Wash and Crystal Geyser Units sufficient to comply with N.E.P.A. requirements. In addition, preliminary information is presented for continuing investigation of other control units, and future detailed environmental statements will be provided as necessary. Program control units and related impacts will affect the Basin States of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming as well as the Republic of Mexico

3. Summary of environmental impacts and adverse environmental effects: Implementation of all salinity control units addressed under Title II of P.L. 93-320 will reduce the salinity of the Colorado River at Imperial Dam by about 150 milligrams per liter (mg/l). The cumulative impact of the four initial salinity control units will provide an initial reduction of 43 mg/l. On an annual basis, the estimated reductions amount to 1,589,000 and 460,000 tons of salt removed from the river system for full program implementation and the initial control units, respectively. The beneficial impacts of salinity reduction will be reflected in all the Basin States in improved water quality deliveries to over 1 million acres of irrigated farmland and over 17 million people. Principal adverse effects are modification of about 8,500 acres of range lands, water loss (up to 116,000 acre-feet per year) from the river system, and additional use of energy resources (119 x 10⁶ kWh/yr). Existing biota and esthetic values at the project sites will be influenced by construction of evaporation reservoirs and other physical modifications of topography and vegetation resulting from the various control unit features.

4. Alternatives considered:

- a. Moratorium on future water resources development in the Basin
- b. Retirement of irrigated, agricultural land
- c. The alternative of no action
- d. Alternative methods of river augmentation

5. List of entities from whom comments have been requested or received:

See attached list.

6. Date made available to CEQ and the public:

Draft Statement: Mar. 5, 1976 (DES 76-9)

Final Statement: MAY 19 1977

Control Project was issued August 24, 1974, to provide for the protective and regulatory ground-water pumping. Minute No. 242 does not address itself to the measures required to stabilize the salinity of the Colorado River above Imperial Dam. Therefore, the report on the Colorado River International Salinity Control Project and environmental statements were limited to measures necessary downstream from Imperial Dam.

Title II of the Law provides for the construction, operation, and maintenance of four salinity control units as the initial stage of the CRWQIP, located upstream from Imperial Dam, and are identified as: the Paradox Valley Unit and the Grand Valley Unit in Colorado; the Crystal Geyser Unit, Utah; and the Las Vegas Wash Unit, Nevada. Funds were included in the Public Works Appropriation Act of 1975, for the start of advance planning activities on the four authorized units. Title II of the Law also provides for expediting the feasibility investigations and planning and implementing the other units of the CRWQIP.

The Salinity Control Act requires full coordination, cooperation, and liaison between the Departments of Interior and Agriculture in achieving improved irrigation efficiency through research and demonstrations, implementation of onfarm irrigation system improvements, better irrigation management practices, and other activities that would further the objectives of the Salinity Control Act. As such, the Soil Conservation Service, USDA, participated in the preparation of the final statement with the Bureau of Reclamation as lead agency.

This environmental statement is intended to provide a regional analysis of the basinwide alternatives and cumulative effects of both authorized and proposed salinity control works, measures, and facilities. In addition, two units of the four salinity control units authorized for initial construction under P.L. 93-320, namely Las Vegas Wash and Crystal Geyser Units, are addressed in this statement in a more detailed manner, since construction action is pending. As such, this document will serve as the environmental statement for the Las Vegas Wash Unit since this overall statement contains sufficient detail and analysis of environmental impact of the proposed unit as well as presentation of mitigation concepts, alternate proposals and other pertinent discussion. An environmental assessment of the Crystal Geyser Unit indicates that impacts associated with this unit will be minor and will not have adverse effects on the environment. The Bureau of Reclamation has prepared a Negative Determination of Environmental Impact for this unit (Aug. 6, 1976). Preliminary data and analysis is also presented on other authorized units as well as appraisal-level control plans under the CRWQIP. The other units and appraisal-level plans are discussed in

more general terms to allow future decisions to proceed in the public eye before any additional construction is authorized.

Since data collection and planning is still underway on several features, it is proposed to submit individual or supplemental environmental statements or negative determination of environmental impact as more exact information becomes available on major program features except Las Vegas Wash and Crystal Geysers, prior to initiation of any Federal action.

Under Title II, Measures Upstream from Imperial Dam, the following control units are discussed in this statement:

- a. The Las Vegas Wash Unit, Nevada, consisting of facilities for collecting and disposing saline ground water of Las Vegas Wash.
- b. The Crystal Geysers Unit, Utah, consisting of facilities for collecting and disposing saline geysers discharges.
- c. The Paradox Valley Unit, Colorado, consisting of facilities for collection and disposition of saline ground water of Paradox Valley. Wells, pumps, pipelines, solar evaporation ponds, and other necessary associated works may be included.
- d. The Grand Valley Unit, Colorado, consisting of measures and works to reduce the seepage of irrigation water and limit excess water applications to irrigated lands.

In addition to these authorized control units, the Secretary is directed to expedite the investigation and planning efforts for the other units described under the CRWQIP.

These additional control units are presently under varying degrees of planning activity and are addressed in this statement according to the amount of data available. All the units under the CRWQIP are located in the following States and counties:

AUTHORIZED FOR CONSTRUCTION

<u>Unit</u>	<u>State</u>	<u>County</u>
Las Vegas Wash	Nevada	Clark
Crystal Geysers	Utah	Grand

<u>Unit</u>	<u>State</u>	<u>County</u>
Paradox Valley	Colorado	Montrose/San Miguel
Grand Valley	Colorado	Mesa

AUTHORIZED FOR FURTHER STUDY

<u>Unit</u>	<u>State</u>	<u>County</u>
LaVerkin Springs	Utah	Washington
Littlefield Springs	Arizona	Mohave
Glenwood-Dotsero Springs	Colorado	Garfield
Palo Verde Irrigation District	California	Imperial/Riverside
Colorado River Indian Reservation	California//Arizona	Imperial/Riverside Yuma
Uinta Basin	Utah	Duchesne/Uintah
Lower Gunnison Basin	Colorado	Delta/Montrose/Ou
Big Sandy River	Wyoming	Sweetwater
Price, San Rafael, and Dirty Devil Rivers	Utah	Emery/Carbon/Wayn Garfield
McElmo Creek	Colorado//Utah	Montezuma//San Ju

OTHER MEASURES UNDER CONSIDERATION

<u>Unit</u>	<u>State</u>	<u>County</u>
San Juan Collector	New Mexico	San Juan
Grand Valley Collector	Colorado	Mesa
Blue Springs	Arizona	Coconino
Meeker Dome	Colorado	Rio Blanco

Other areas are being studied where significant salt contributions are being added to the Colorado River System. Preliminary investigations would be needed to identify (1) opportunities for improving irrigation efficiency on 330,000 acres to reduce return flows and salt pickup and (2) opportunities for reducing excessive erosion and associated salt load by watershed treatment. Those areas which have a significant impact on salt loading would be selected for additional detailed study.

The direct benefits of measures taken under Title II of P.L. 93-320 will accrue mainly to the Lower Colorado River Basin States of Arizona, California, and Nevada, and to the Republic of Mexico. Potential salinity reduction will result in improved water quality for over 1 million acres of irrigated farmland and will affect over 17 million people, mostly in the lower basin of the river.

The salinity control program area under the CRWQIP is generally located within the 254,000-square-mile drainage area of the Colorado River and its principal tributaries upstream from Imperial Dam to the upper reaches of tributaries in Nevada, Utah, Colorado, New Mexico, and Wyoming. Major control units under the CRWQIP are shown in figure I-1.

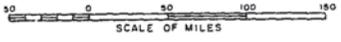
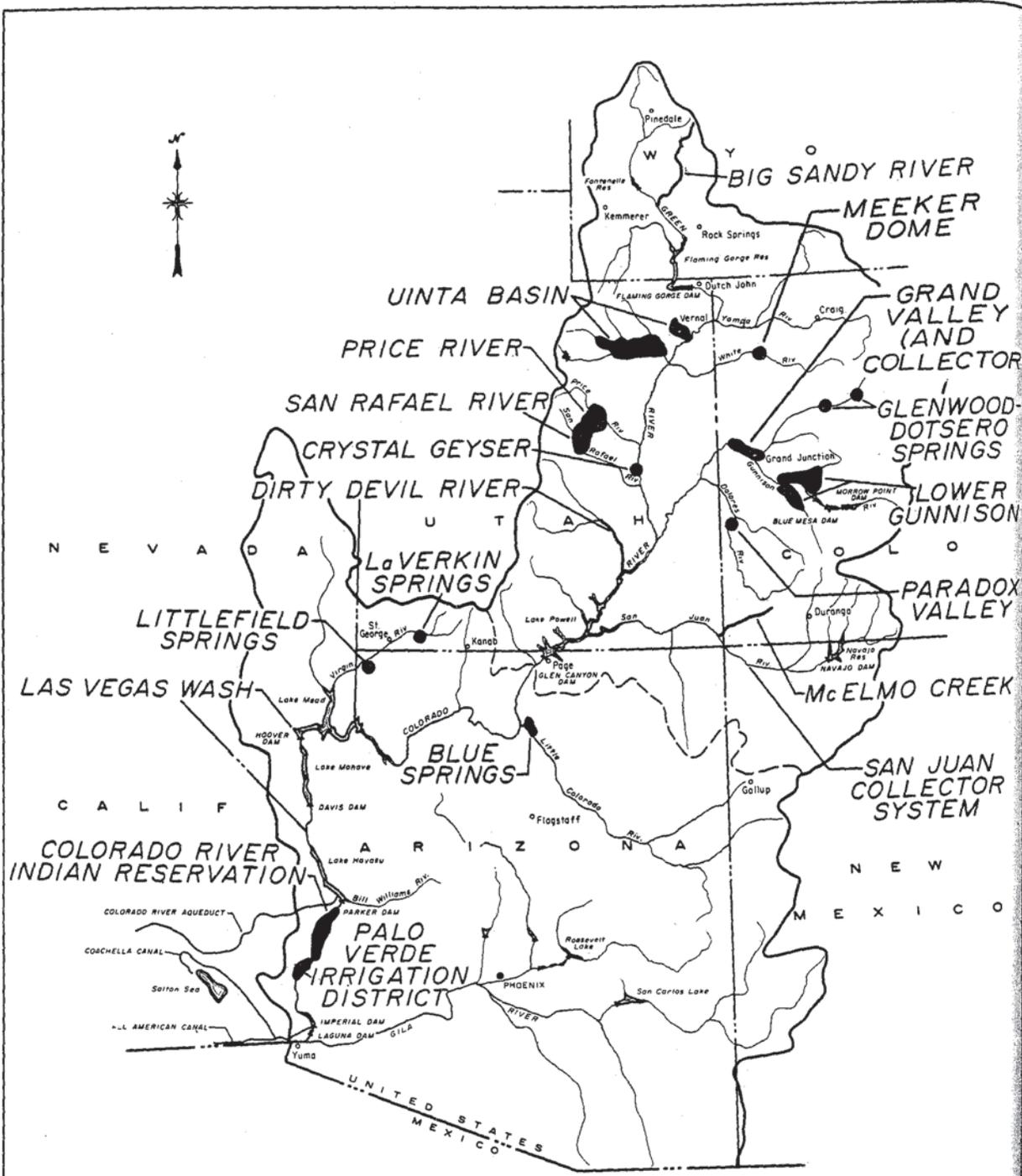
This environmental statement for the CRWQIP is submitted in compliance with the National Environmental Policy Act of 1969 (83 Stat. 852, 42 U.S.C. 4321, et seq.), the Council on Environmental Quality Guidelines, Department of the Interior Guidelines, and Bureau of Reclamation revised instructions.

1. Relationships of the Colorado River Water Quality Improvement Program to Other Federal Programs

The Colorado River Water Quality Improvement Program was initiated as a general investigations program by the Bureau of Reclamation in 1971. Most of the control units under the ongoing CRWQIP investigations were either authorized for construction or expedited study by Public Law 93-320. Thus, the all-inclusive CRWQIP, with additional control measures yet to be fully evaluated, is viewed in a supportive role in carrying out the stated intent of P.L. 93-320.

The general goals and objectives governing salinity control in the basin and the CRWQIP have been established by two key pieces of Federal legislation: The Federal Water Pollution Control Act, as amended, P.L. 92-500, and P.L. 93-320.

Public Law 92-500 set forth public policy in terms of a nondegradation policy for water quality, pollution effluent discharge limitations and eventual zero pollution discharge by 1985. In response



LOCATION OF UNITS - CRWQIP

Figure I-1
I-6

to this policy and related Federal and State program enforcement guidelines, the CRWQIP has the specific objective of identifying and evaluating control measures that would prevent salinity concentrations from exceeding levels presently found in the lower main stem of the river.

Thus, the two Federal Acts and related programs are compatible in that P.L. 92-500 authorizes water quality standards for receiving waters, while P.L. 93-320 authorizes construction of 4 units and studies of 12 other units that would assist in complying with salinity standards. Moreover, the control units are included as part of the proposal plan of implementation, which along with numeric criteria, make up the standards.

Another important relationship can be identified between the CRWQIP and Federal irrigation development programs, particularly in the Upper Colorado River Basin. It is readily evident that future development and utilization of the Basin water resources for expansion of irrigated agriculture, increases in population, and energy resources development will be accompanied by progressive increases in consumptive uses of water and attendant increases in river salinity. The overall goal of CRWQIP is to maintain Lower Basin water salinity at or below present levels while the Basin States continue to develop its compact-apportioned waters. As such, the Bureau of Reclamation is presently reformulating federally authorized but unconstructed projects within the Colorado River Basin to determine what changes in project features can be made to minimize salinity impacts of those irrigation projects.

There are other Federal and non-Federal programs underway to minimize salinity increases in the river. The Agriculture Research Service, USDA, is conducting research and demonstration projects aimed at improving onfarm irrigation efficiencies and reducing salt loading. Several programs of the Soil Conservation Service, USDA, would help to minimize sediment and associated salt delivered to the Colorado River. For example, the ongoing Soil Conservation Service Conservation Operations Program is providing technical assistance through local soil and water conservation districts for onfarm soil and water resource management systems.

The local soil and water conservation districts are made up of locally elected governing boards. These boards establish objectives and priorities for soil and water conservation, which outlines Soil Conservation Service assistance to landowners, operators, and groups. With the priorities and objectives established, the local soil Conservation Service staff assists individual landowners, operators, or groups to develop a conservation plan that contains: (1) a signed agreement between the

landowner or operator and the district board; (2) soils maps with legend and interpretations; (3) a land use and conservation plan map; and (4) farmer's conservation decisions.

For an irrigation farm, the Soil Conservation Service provides engineering and other technical assistance for improvement of irrigation systems and an irrigation system design might be developed. The irrigation system design would vary with the complexity of the system. In simple systems, it may just be shown on the conservation plan map. The more complex systems will usually consist of a plan sheet with topographic features, soils information, existing facilities and structures to be installed, and it usually shows cropping systems. The irrigation system design is developed with the farmer, considering his desires, the alternatives that could be used, and the minimum requirements for a conservation system. In all of this, the farmer's participation is voluntary, but essential.

The Soil Conservation Service also provides technical assistance to individual landowners and operators, as well as groups, in developing conservation plans and applying resource management systems on private woodlands, rangelands, croplands and wildlife lands. The Department of Agriculture can also provide technical and financial assistance for laterals and group water management systems through: (1) P.L. 83-566, Water Protection and Flood Prevention Act (SCS); (2) Resource Conservation and Development Projects (SCS); and (3) through the Agriculture Conservation Program (ASCS). Accelerated technical assistance for onfarm soil and water resource management systems is also available for P.L. 83-566 and Resource Conservation and Development Project areas.

The Bureau of Land Management (BLM) is studying diffuse salinity sources on lands under BLM control. The Environmental Protection Agency (EPA) in administering P.L. 92-500, works actively with State programs to regulate saline discharges to the Colorado River Systems. Non-Federal programs include the control of saline effluents from energy development and the use of saline drainage water for powerplant cooling. Many other research programs conducted by the EPA, Agricultural Research Service, Office of Water Research and Technology, State agencies and research institutions are continuing efforts to control salinity from natural and manmade sources with either point or diffuse flow characteristics.

2. Salinity Control and Water Quality Standards

Increases in the salinity levels of western rivers is not a new or unique situation. Water quality problems in the Colorado

River were recognized as early as 1903. Although other rivers such as the Rio Grande and the Arkansas are also affected by increasing salinity levels, the overall impacts on the Colorado River have received the most attention from national and international interests.

The salinity problem in the Colorado River has been the object of several past studies and investigations. Numerous surveys of salinity sources and control measures have been pursued over the years by the U.S. Bureau of Reclamation, U.S. Geological Survey, Environmental Protection Agency and its predecessors, Water Resources Council, Colorado River Board of California, Basin States, and several universities. [2, 3, 4, 5]

In 1972, a joint Federal-State enforcement conference on the matter of pollution of interstate waters of the Colorado River and its tributaries initiated formal efforts to establish an overall salinity control policy for the river. The seven Basin State conferees and Federal agency representatives concluded that such a policy would have as its objective the maintenance of salinity concentrations at or below levels presently found in the lower main stem. The conferees recognized the rights of the States to continue development of their compact-apportioned waters and that temporary rises in salinity might occur until the control program became effective. Under the guidance of the recently established Colorado River Salinity Control Forum, the States of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming were required to adopt and submit for approval to the Environmental Protection Agency on October 18, 1975:

a. Water quality standards for salinity including numeric criteria for appropriate points in the Colorado River System.

b. A plan to achieve compliance with these standards as expeditiously as practicable providing that:

(1) The plan shall identify Federal and State regulatory authorities and programs necessary to achieve compliance with the plan.

(2) The salinity problem shall be treated as a basinwide problem that needs to be solved to maintain lower main stem salinity at or below 1972 levels while the Basin States continue to develop their compact-apportioned waters.

(3) The goal of the plan shall be to achieve compliance with the adopted standards by July 1, 1983. The date of

compliance with adopted standards shall take into account the necessity for Federal salinity control actions set forth in the plan. Salinity abatement measures within control of the States shall be implemented as soon as practicable.

With primary emphasis on a nondegradation policy, P.L. 92-500 provides for effluent limitations on quantities, rates, or concentrations from point sources by application of the best available control technology. Moreover, the law calls for comprehensive areawide water quality control planning and adequate financing of those facilities necessary to eliminate the discharge of manmade pollutants into navigable water by 1985.

3. Institutional Considerations

The Colorado River is one of the most physically developed and institutionally regulated rivers in the Nation. The CRWQIP is only a part of the basinwide water management program which must take into account not only salinity control but also future water supply and institutional considerations.

The Secretary of the Interior has broad responsibilities under applicable laws regarding the total water resources of the Colorado River Basin in accordance with:

- a. The Colorado River Compact of 1922.
- b. Commitments to Mexico under the International Water Treaty of 1944 and Minute No. 242 of the International Boundary and Water Commission.
- c. The Upper Colorado River Basin Compact of 1948.
- d. Requirements of the Supreme Court Decree of 1964.
- e. Specific contractual obligations with water users in the United States.
- f. Developing and managing water resources as directed by specific authorized legislation and in the public interest.
- g. Means of protecting the recreation, fish and wildlife, and environmental values of the river system.

Within the context of these responsibilities and legal requirements certain considerations are paramount. There will be fluctuations in the concentration of dissolved solids in the river as a result

of annual variations in precipitation and the management of the available water resources. Moreover, the total available water resources of the river are allocated by interstate compacts and the international treaty. The treaties and decrees apportioned water quantity but did not directly address water quality considerations. In addition, the Department of the Interior, the Environmental Protection Agency, the Colorado River Board of California, and the Water Resources Council have all projected increases in salinity levels unless control measures are taken concurrently with the continued development of water resources in the basin.

A recognized concern within the CRWQIP is the allocation of the anticipated maximum annual depletion of 116,370 acre-feet. This issue has been an item of intense discussion among the seven Basin States. At the present time, there is no mitigation plan to address this depletion either by river augmentation or allocation. The seven Basin States in conjunction with the Bureau of Reclamation will need to resolve this issue through continuing coordination.

Salinity control actions in the future must be designed to be compatible with all the existing institutional considerations and the so-called "Law of the River."

4. Salinity Impacts

The Colorado River Flows for most of its length through arid and semiarid regions of the United States and Mexico. The great river and its tributaries accumulate the solution products of (1) erosion and weathering, (2) irrigation return flows, (3) municipal and industrial wastes, and (4) various point sources such as springs and wells. From headwaters to mouth, a distance of nearly 1,400 miles, the salinity of the river progressively increases.

The waters of the Colorado River System serve the common daily needs of millions of people in many ways. The river is a vital link in sustaining areas of great esthetic value to the Nation. The water is used for producing energy, providing recreation, sustaining livestock and wildlife, and supporting industry. The river is the source of water for cities within the Basin and larger metropolitan areas outside the Basin. A large variety of crops, providing a needed diversity to the national diet, is irrigated by its waters both within and outside the Basin. But the concentration of dissolved solids in the river, now among the highest of the great rivers of North America, is increasing. The increase will further impair the usefulness of the water.

In the United States, the total damages attributable to salinity in the Colorado River System for 1973 are about \$53 million per year. By the year 2000, these damages will amount to \$124 million per year if control measures are not applied. These economic impacts are based on recent studies by the Bureau of Reclamation, which estimated total direct and indirect losses of about \$230,000 per mg/l (also defined as ppm) increase in salinity at Imperial Dam. The estimates of damage do not include effects below 500 mg/l for municipal and industrial water supplies and 750 mg/l for agricultural use. The damages arise in agriculture from decreased crop yields, increased leaching requirements, increased management costs, and application of various adaptive practices. In the municipal and industrial sector, the detriments arise primarily from increased water treatment costs, accelerated pipe corrosion and appliance wear, increased use of soap and detergents, and decreased potability of drinking water.

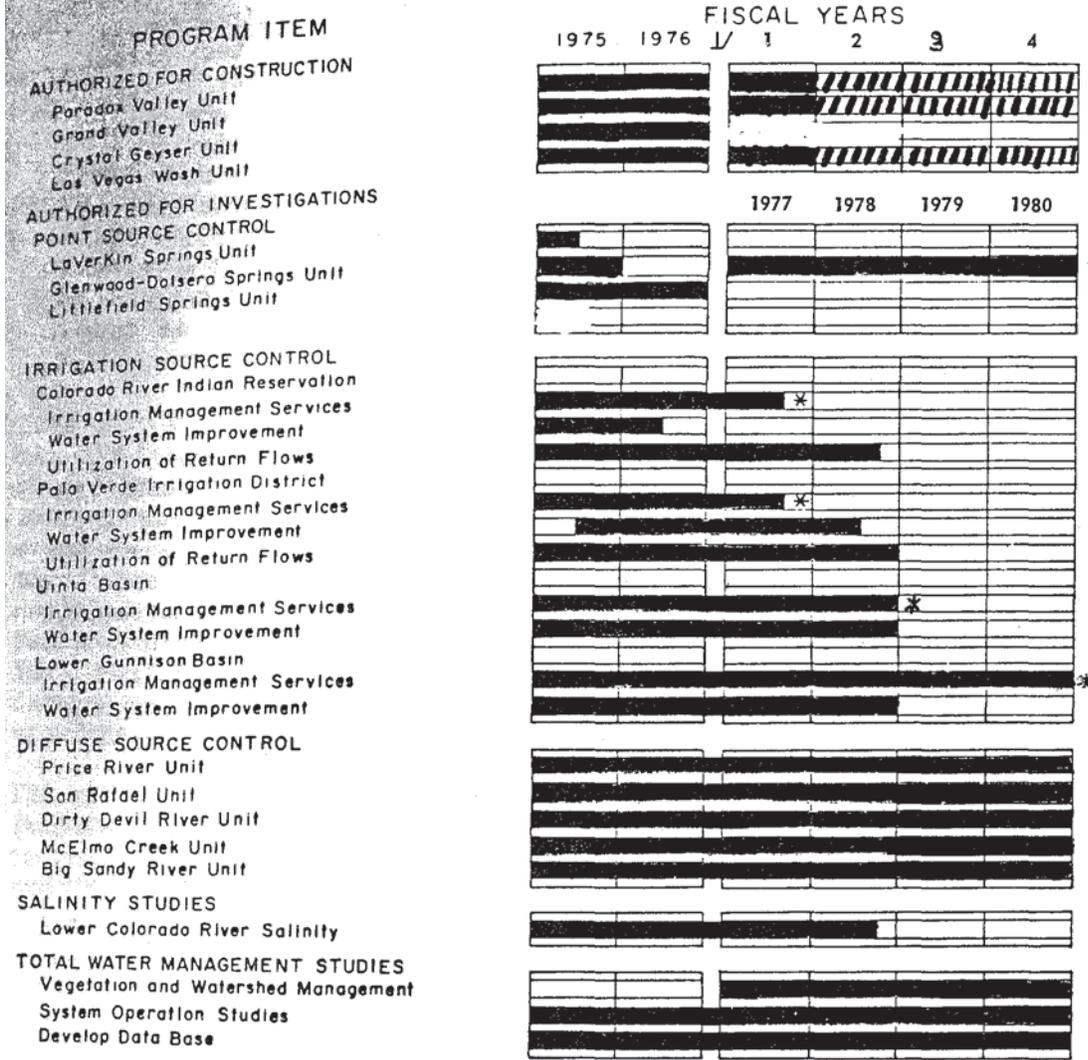
5. Costs and Schedule

The Authorized expenditure for construction of the four initial salinity control units authorized under P.L. 93-320 is \$125,100,000 based on 1973 prices. In recognition of Federal responsibility for the Colorado River as an interstate stream, international comity with Mexico, and policy embodied in the Federal Water Pollution Control Act Amendments of 1972, the authorizing legislation provides that 75 percent of the unit's total costs will be nonreimbursable. The remaining 25 percent of the unit's total costs will be allocated between the Upper Colorado River Basin Fund established by the Colorado River Storage Project Act P.L. 84-485 (70 Stat. 107) and The Lower Colorado River Basin Development Fund established by the Colorado River Basin Project Act P.L. 90-537 (82 Stat. 895). For further details, see appendix E.

Cost allocations for other control units under CRWQIP have not been identified and studies are underway to determine equitable, cost-sharing arrangements.

Initial construction of the four control units specified under Title II of P.L. 93-320 is scheduled after completion of 1976 Advance Planning Studies. Approximately 10 years will be required to complete all four units with the Grand Valley Unit requiring the longest construction time. Figure I-2 shows the proposed construction times and investigation schedules for the more advanced units and studies under the total program. This schedule is coordinated with other Federal agencies.

INVESTIGATION SCHEDULE
COLORADO RIVER WATER QUALITY IMPROVEMENT PROGRAM



1/ Transition Quarter changing Fiscal Year from beginning July 1, to beginning October 1

||||| under construction

* WATER USER ORGANIZATIONS TAKE OVER PROGRAM OPERATION

Figure I-2

For control of irrigation sources, emphasis is placed on three programs: (1) Onfarm Irrigation Systems and Management Improvement, (2) scheduling irrigation through an Irrigation Management Services (IMS) program, and (3) improved conveyance systems through a Water System Improvement (WSI) program. Therefore, the investigation schedule shown in figure I-2 will ultimately reflect Onfarm Irrigation Systems and Management Improvement and investigations of total watershed area under Irrigation Source Control, and investigations of the irrigated areas under Diffuse Source Control. Investigations and planning activities for salinity control will continue through 1981 at a total expenditure of about \$18 million by the Bureau of Reclamation and about \$2 million by the Soil Conservation Service.

6. Future Water Resources Development and Water Quality

The overall salinity problem cannot be divorced from planned future development of the Basin's water resources and the resulting water demands that are expected to exceed the river's dependable natural supply by about 1990-95. Thus, the overriding issue of the Colorado River Basin involves the interrelationship between future water depletions and deteriorating water quality. Moreover, the rapid onset of the energy crisis is expected to result in accelerated consumption of Colorado River water to support oil shale development, electric power generation, and coal development and conversion. Subsequent energy development in the basin will directly affect water quality and emphasizes the need for an effective and comprehensive salinity control program.

Salinity control adds another dimension to River Basin planning and resources development and must be viewed in broad context with other programs such as weather modification, geothermal resources, vegetation management, water conservation, and desalting.

The long-term 1941-1972 historic average annual salinity concentration of the Colorado River at its headwaters is less than 50 mg/l. At Imperial Dam, the last major diversion point in the United States, the concentration is 762 mg/l. Modifying this historic condition to reflect all upstream existing projects assumed to be in operation for the full period 1941-1972 would again show a concentration of less than 50 mg/l at headwaters and a value of 847 mg/l at Imperial Dam. Values for selected locations in the river are shown in the following tabulation:

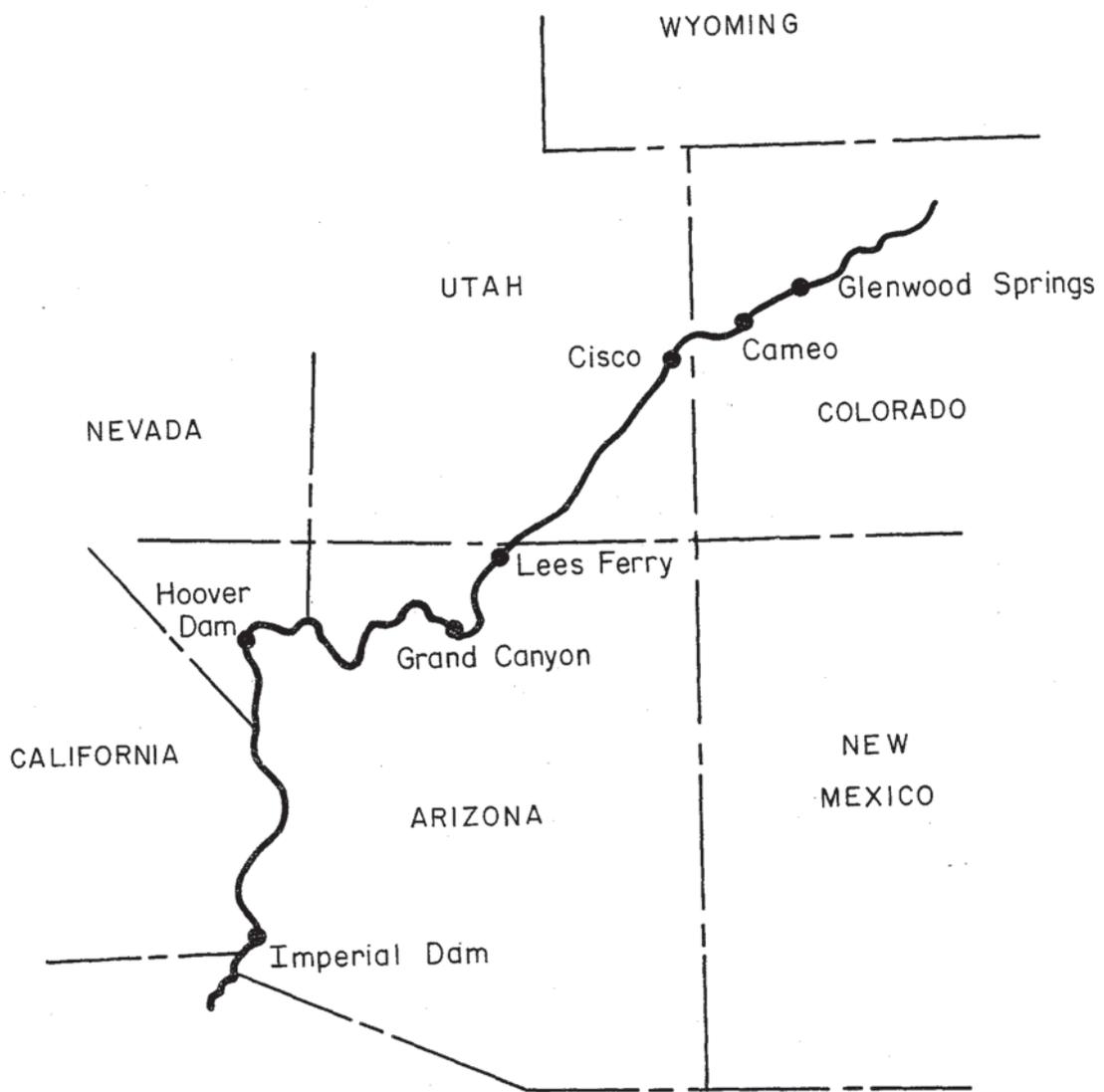
HISTORIC AND PRESENT MODIFIED QUALITY OF WATER
 Colorado River - Average Values 1941-1972

<u>Location (see figure I-3)</u>	<u>Concentration (mg/l)</u>	
	<u>Historic</u>	<u>Modified conditions</u>
Glenwood Springs, Colorado	270	301
Cameo, Colorado	405	439
Cisco, Utah	612	659
Lees Ferry, Arizona	558	607
Grand Canyon, Arizona	618	667
Hoover Dam, Arizona-Nevada	693	749
Imperial Dam, Arizona-California	762	847

It should be emphasized that when time intervals are reduced to a monthly basis, wide fluctuations can be expected. Under historic conditions at Imperial Dam, the salinity concentration for January 1957 was 1,000 mg/l and for December 1967, it was 992 mg/l. Six other months in the period 1941-1970 have had average concentrations above 960 mg/l. Moreover, under present conditions of depletion, the mean monthly concentration of 1,000 mg/l at Imperial Dam would have been exceeded in 40 months during the period 1941-70. Such monthly salinity values have greater significance than long-term means in relation to impacts on land and crops, water quality standards, and water treatment.

The salinity in the Colorado River has been the object of long-standing concern and study. Studies by various agencies converge to one simple fact - salinity will increase with continued use and development of the available water supply unless comprehensive, basinwide water quality management planning is implemented and supported by the installation of effective control measures. Projected estimates by various entities are presented in table I-1. These estimates assume that no measures are undertaken to control salinity.

It is significant that the results of studies by the various agencies all predicted that proposed developments will cause a considerable increase in the future salinity of the river. Even under current salinity conditions, many irrigators are resorting to special practices in using the water to grow salt-sensitive crops. Some areas have adverse drainage conditions which would be magnified if higher salinity water were used. Municipal and industrial users are faced with considerable expense due to water quality. Allowing the salinity of the river to increase will result in additional economic impacts.



Historic Quality of Water Sampling Sites
Colorado River System

Figure I-3

Table I-1

PROJECTED CONCENTRATIONS OF TOTAL DISSOLVED SOLIDS
(mg/l) at Imperial Dam
(Average annual values)

Source	Year		
	1980	1990	2000
EPA	1060	1110	1165
CRBC	1070	1200	1340
WRC	1260	1275	1290
USBR	923-938	1118-1174	1154-1214
C14	955	1080	1210

EPA: Environmental Protection Agency, 1972

CRBC: Colorado River Board of California, 1970

WRC: Water Resources Council (Lower Colorado Region Comprehensive Framework Study), 1971

USBR: Bureau of Reclamation, 1977 (range shown for 0 and 2 tons per acre pickup of salts from new lands)

C14: Committee of Fourteen, 1974

The differences in the values reported by the various agencies arise from assumptions made regarding completion dates for water development projects, estimates of the amount of salt loading or concentration effects produced by these projects, the period of analysis used, and estimates of the time involved for the effects to emerge at Imperial Dam.

B. Overview of the Colorado River Water Quality Improvement Program

1. Sources of Salinity

In any river system, salinity concentrations arise from a salt loading effect and a salt concentrating effect. The salt loading may be regarded as the pickup of salt due to mineral weathering