

**1993 REVIEW**

**WATER QUALITY STANDARDS FOR SALINITY  
COLORADO RIVER SYSTEM**

*FINAL REPORT*

**October 1993**

Prepared by  
Colorado River Basin Salinity Control Forum

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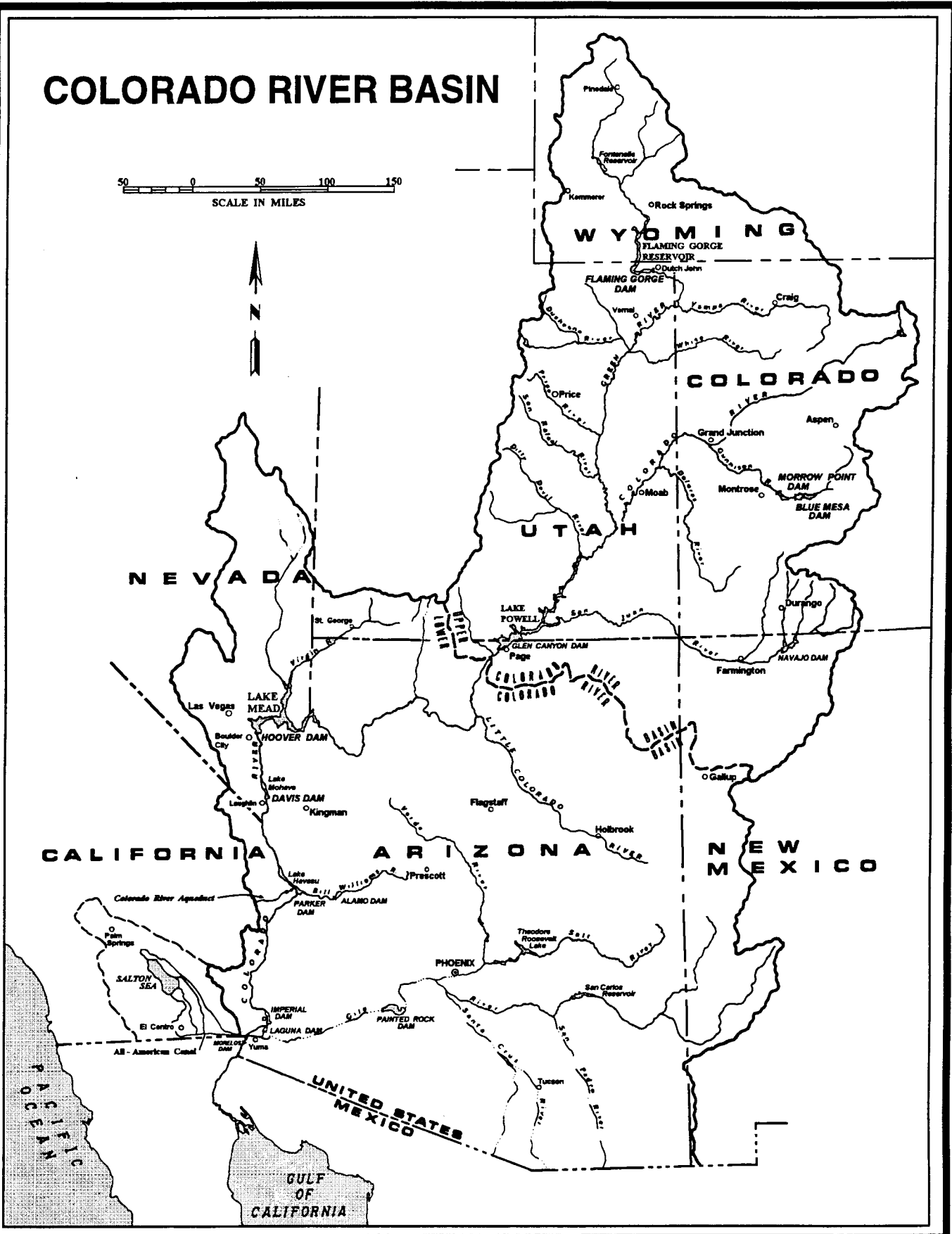
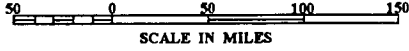
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# COLORADO RIVER BASIN



## **TRANSMITTAL LETTERS**

The Federal Water Pollution Control Act requires that at least once every three years the Colorado River Basin states review water quality standards relating to the salinity of the waters of the Colorado River. The states collectively initiated this review under the auspices of the Colorado River Basin Salinity Control Forum, prepared a preliminary report; and after holding public meetings, the Forum prepared a final report.

Upon the Forum's adoption of the final report, it is transmitted by letter to the governors of the individual states for their independent action. The following governors in each of the seven Colorado River Basin states will receive this report:

Honorable Fife Symington  
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Honorable Bruce King  
Governor of New Mexico  
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Honorable Pete Wilson  
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Honorable Mike Leavitt  
Governor of Utah  
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Honorable Roy Romer  
Governor of Colorado  
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Honorable Mike Sullivan  
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Honorable Robert Miller  
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## SUMMARY

Section 303 of the Clean Water Act requires that water quality standards be reviewed from time to time, but at least once during each three-year period. Accordingly, the seven-state Colorado River Basin Salinity Control Forum (Forum) has reviewed the existing state-adopted and Environmental Protection Agency (EPA) approved water quality standards for salinity consisting of numeric criteria and a plan of implementation for salinity control for the Colorado River System. Changes in hydrologic conditions and water use within the Colorado River Basin have been evaluated, and this Review presents the recommended revisions to the plan of implementation which are to be submitted to each of the Basin states for consideration at a public hearing prior to adoption. This final report replaces the earlier version dated June 1993 and constitutes the Forum's recommendation.

The Forum recommends no change in the numeric salinity criteria at the three lower main stem stations. The numeric criteria at these stations will remain:

<u>Station</u>	<u>Salinity in mg/L*</u>
Below Hoover Dam	723
Below Parker Dam	747
Imperial Dam	879

\*Flow-weighted average annual salinity.

The plan of implementation as set forth in the 1993 Review is designed to meet the objective of maintaining the salinity concentrations at or below the numeric criteria while the Basin states continue to develop their compact-apportioned waters. The plan is based on the use of the long-term mean water supply of 15 million acre-feet annually. The Forum recommends that the plan of implementation described in this report be carried out. The plan of implementation includes:

1. Completion of the Bureau of Reclamation, Bureau of Land Management, and the Department of Agriculture salinity control units shown in the following table, to the extent that each unit remains viable and appropriately cost-effective. The plan's current remaining federal construction costs for the Bureau of Reclamation and the Department of Agriculture activities are approximately \$483 million.
2. Imposition of effluent limitations, principally under the National Pollutant Discharge Elimination System (NPDES) permit program on industrial and municipal discharges by implementation of the Forum-recommended "Policy for Implementation of Colorado River Salinity Standards Through the NPDES Permit Program."
3. Implementation of the Forum-recommended "Policy for Use of Brackish and/or Saline Waters for Industrial Purposes."
4. Implementation of the Forum-recommended "Policy for Implementation of the Colorado River Salinity Standards Through the NPDES Permit Program for Intercepted Ground Water."
5. Implementation of the Forum-recommended "Policy for Implementation of the Colorado River Salinity Standards Through the NPDES Permit Program for Fish Hatcheries."
6. Implementation of nonpoint source management plans developed by the states and approved by EPA.

**Salinity Control Plan of Implementation  
Federal Programs**

<u>Unit</u>	<u>Begin Implemen- tation</u>	<u>Projected Date Complete</u>	<u>Tons/yr Removed Jan 1993</u>	<u>Projected Salt Removed (Tons/yr) Project Completion</u>
Meeker Dome (USBR)	Complete	1983	48,000	48,000
Grand Valley Stage One (USBR)	Complete	1984	21,900	21,900
Las Vegas Wash Pittman (USBR)	Complete	1985	3,800	3,800
Grand Valley (USDA)	1979	2010	56,600	163,000
Uinta Basin (USDA)	1980	2010	55,500	106,800
Nonpoint Sources (BLM)	1983	2015	2,800	41,000
Well Plugging (BLM)	1984	2015	8,000	14,000
Grand Valley Stage Two (USBR)	1985	1998	25,600	115,600
Paradox Valley (USBR)	1988	2001	0	180,000
Big Sandy River (USDA)	1988	2003	12,500	52,900
Lower Gunnison (USDA)	1989	2016	24,700	280,500
McElmo Creek (USDA)	1990	2009	2,300	38,000
Lower Gunnison Winter Water	1991	1994	0	74,000
Dolores Project (USBR)	1991	1995	0	23,000
Moapa Valley (USDA)	1994	2006	0	18,700
Lower Gunnison - Laterals (USBR)	1994	2007	0	60,000
*Uinta Basin I (USBR)		2004	0	25,500
*San Juan - Hammond (USBR)		2007	0	28,000
*Price-San Rafael (USBR/USDA)		2021	0	161,000
<b>TOTAL</b>			<b>261,700</b>	<b>1,455,700</b>

\*Units that have been investigated, and are in the Salinity Control Plan of Implementation, but require congressional authorization. The "Begin Implementation" date will be determined upon authorization and funding.

A - Units under consideration and/or investigation, not currently in the plan - additional information is needed:

Glenwood Springs Desalinization (USBR/private)~	San Juan Hogback (USDA)
Sinbad Valley (USBR/BLM)	San Juan Hogback (USBR)~
Lower Virgin River (USBR)~	

~ Units needing congressional authorization.

B - Examples of units investigated, but currently not being given further consideration:

Dirty Devil River (USBR)	Mancos Valley (USDA)
Palo Verde Irrigation District (USBR/USDA)	Lower Gunnison Stage I Balance (USBR)
Grand Valley II Balance (USBR)	Lower Gunnison North Fork (USBR)
San Juan - Hammond Portion (USDA)	Virgin Valley (USDA)
La Verkin Springs (USBR)	Las Vegas Wash - excluding Pittman (USBR)
Saline water use and disposal	

The plan of implementation is designed to control enough salt to maintain the numeric criteria under a long-term mean water supply of 15 million acre-feet per year. It is recognized that the river system is subject to highly variable flows. Consequently, salinity will vary from year to year and may temporarily exceed the adopted numeric criteria in some years and remain well below the criteria in others. The federal regulation provides for such temporary increases above the numeric criteria.

Should water development projects be completed before control measures are identified or brought on line, temporary increases above the numeric criteria could result. However, these increases will be deemed in conformance with the standards if appropriate salinity control measures are included in the plan.

Increases above the criteria as a result of below normal annual river flows and/or low reservoir storage conditions will also be considered in conformance with the standards, provided that when river flows return to normal and satisfactory reservoir conditions prevail, concentrations will be at or below the criteria level.

Current salinity concentrations at the three criteria stations are:

<b>Station</b>	<b>Numeric Criteria in mg/L*</b>	<b>1991 Salinity Concentration in mg/L*</b>	<b>Adjusted Salinity Concentration in mg/L**</b>
Below Hoover Dam	723	634	720
Below Parker Dam	747	635	747
Imperial Dam	879	753	864

\*Flow-weighted average annual salinity. Observed 1991 salinity levels were low due to unusually high runoff in earlier years and storage of that water in reservoirs.

\*\*Adjusted to reflect salinity that would have occurred with a long-term mean water supply.

Based on the available data, the Forum concludes that the measured salinity will not exceed the numeric criteria during the next three years. With the implementation of the plan, the Forum also concludes that the adjusted salinity concentrations will not exceed the numeric criteria during the next three years. The plan of implementation adopted herein by the Forum provides for the control of about 1,375,000 tons per year (tons/yr) of salt by the year 2015, and the total plan as identified herein will remove about 1,455,700 tons/yr.

The Forum has reviewed the impact of the program on projected salinities and finds that in the year 2015, the plan will control salinity levels so that, with long-term mean water supply conditions, salinity levels will be below the numeric criteria at the three stations. The salinity standards provide protection from long-term increases in economic damage to downstream users.

Because of the long lead time required to conduct salinity studies; complete environmental and feasibility reports; and authorize, implement, and achieve full salinity reduction effects at the lower main stem stations, continued funding is necessary for the

recommended plan of implementation for salinity control to proceed as set forth in this Review. Non-federal funds are available to cost-share with federal appropriations, and Basin irrigators stand ready to cost-share in the USDA onfarm program.



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## CHAPTER 1 - INTRODUCTION

### PURPOSE OF REPORT

This report, the 1993 Review, Water Quality Standards for Salinity, Colorado River System (1993 Review) is in response to Section 303(c) of the Clean Water Act of 1977 (Public Law 92-500 as amended by Public Law [P.L.] 95-217 and P.L. 100-4) referred to in this report as the Clean Water Act. This report is the sixth Review prepared by the Forum. Section 303(c)(1) of the Clean Water Act requires that:

*The governor of a state or the state water pollution control agency of such state shall from time to time (but at least once each three-year period beginning with the date of enactment of the Federal Water Pollution Control Act Amendments of 1972) hold public hearings for the purpose of reviewing applicable water quality standards and, as appropriate, modifying and adopting standards. Results of such review shall be made available to the Administrator.*

This Review is written as a complete document, but contains information only for the 1990-1993 period. Background information regarding historical actions relative to the adoption of salinity standards is contained in the June 1975 standards report<sup>1</sup>. The 1978, 1981, 1984, 1987 and 1990 Reviews contain information pertaining to the 1975-1978 period, 1978-1981 period, 1981-1984 period, 1984-1987 period, and 1987-1990 period, respectively.

This report, prepared by the seven-state Colorado River Basin Salinity Control Forum (Forum) is a review of the water quality standards including numeric criteria and plan of implementation previously developed and adopted by the Forum. This Review includes the modifications to the 1990 Review and the October 1990 Supplement that have become necessary as a result of changed conditions and the availability of better information.

### HISTORY AND BACKGROUND

In the 1960s and early 1970s, the seven Colorado River Basin states<sup>2</sup> and representatives of the Federal Government discussed the problem of increasing salinity levels in the lower reaches of the Colorado River. In 1972, the Federal Government enacted the Clean Water Act which mandated efforts to maintain water quality standards in the United States. At the same time, Mexico and the United States were discussing increasing salinity levels in Colorado River water being delivered to Mexico. In 1974, with Basin states' support, the Congress enacted the Colorado River Basin Salinity Control Act (P.L. 93-320). Title I of that Act addresses the United States' commitment to Mexico.

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<sup>1</sup>Water Quality Standards for Salinity, Including Numeric Criteria and Plan of Implementation for Salinity Control, Colorado River System.

<sup>2</sup>The seven Colorado River Basin states (Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming) shall be referred to as the "Basin states."

Title II created a salinity control program for water quality in the United States. Primary responsibility for the federal program was given to the Secretary of the Interior, with the Bureau of Reclamation (Reclamation) being instructed to build and investigate several salinity control units. The Secretary of Agriculture was instructed to support the effort within existing authorities (see page 4-1 regarding the specific authorizations set forth in P.L. 93-320).

In 1984, the Colorado River Basin Salinity Control Act was amended. These amendments (P.L. 98-569) directed the Secretary of the Interior and the Secretary of Agriculture to give preference to the salinity control units with the least cost per unit of salinity reduction. The Lower Gunnison Basin Unit, Colorado, and the McElmo Creek Unit (as a part of the Dolores Project), Colorado, were both authorized. The Crystal Geysers Unit, Utah, authorized in 1974, was de-authorized.

A major provision of the amendment was the authorization of a voluntary onfarm salinity control program administered by the Department of Agriculture. As part of this program, the Secretary of Agriculture may allow for the voluntary replacement of incidental fish and wildlife values foregone as salinity reduction practices are implemented.

The Forum is composed of representatives from each of the seven Basin states appointed by the governors of the respective states. The Forum was established for the purpose of interstate cooperation and to provide the states with the information necessary to comply with the Environmental Protection Agency's (EPA) regulation, 40 CFR, Part 120, entitled Water Quality Standards, Colorado River System: Salinity Control Policy and Standards Procedures and Section 303(a) and (b) of the Clean Water Act. A copy of the regulation is included in Appendix A.

The 1975 standards report includes a detailed discussion of the legislation and events leading to the establishment of basin-wide salinity standards with numeric criteria for the lower main stem of the Colorado River. The standards were adopted by all of the Basin states and subsequently approved by the EPA. The 1978, 1981, 1984, 1987 and 1990 reports reviewed the numeric criteria included in the 1975 report and concluded that no change was warranted. However, the plan of implementation in each report was updated to reflect changes in the salinity control program since 1975.

The plan of implementation, as set forth in this and earlier Forum Reviews, includes effluent limitations for industrial point source discharges with the objective of no-salt return whenever practicable. On February 28, 1977, the Forum adopted the "Policy for Implementation of Colorado River Salinity Standards Through the NPDES Permit Program." This policy provides guidance for the regulation of municipal and industrial point source discharges. On September 11, 1980, the Forum adopted a policy to encourage the use of brackish and/or saline waters for industrial purposes where it is environmentally sound and economically feasible. A third policy dealing with intercepted ground water was adopted by the Forum on October 20, 1982. On October 28, 1988, the Forum adopted a fourth policy which addresses discharges from fish hatcheries. All of the Forum policies are included in Appendix B.

Nothing in this report shall be construed to alter, amend, repeal, interpret, modify, or be in conflict with the provisions of the Boulder Canyon Project Act (45 Stat. 1057), the Boulder

Canyon Project Adjustment Act (54 Stat. 774), the Colorado River Basin Project Act (82 Stat. 885), the Colorado River Compact, the Upper Colorado River Basin Compact, or the Treaty with the United Mexican States (Treaty Series 994).

This Review is consistent with the EPA-approved 1975 standards and the 1978, 1981, 1984, 1987 and 1990 Reviews and deals only with the portion of the Colorado River Basin above Imperial Dam. As used in this Review, the lower main stem of the Colorado River System is defined as that portion of the main river from Hoover Dam to Imperial Dam.

Below Imperial Dam, salinity is controlled to meet the terms of the agreement with Mexico found in Minute No. 242 of the International Boundary and Water Commission (IBWC), entitled "Permanent and Definitive Solution to the International Problem of the Salinity of the Colorado River." This agreement states that measures will be taken to assure that the waters delivered to Mexico upstream from Morelos Dam will have an average annual salinity concentration of no more than  $115 \pm 30$  parts per million (ppm) total dissolved solids (TDS) greater than the average annual salinity concentration of Colorado River water arriving at Imperial Dam. Title I of the Colorado River Basin Salinity Control Act, P.L. 93-320, is the legislation which implements the provisions of Minute No. 242. The Minute and Title I of P.L. 93-320 constitute a federal numeric criterion and plan of implementation for the river below Imperial Dam.

### PROGRAM FUNDING

The success of the federal/state cooperative Colorado River Basin salinity control program is contingent upon sufficient funding to allow the plan of implementation to proceed as scheduled.

In fiscal years 1991, 1992 and 1993, the Colorado River Basin states urged Congress to provide Reclamation, the Bureau of Land Management (BLM), and the Department of Agriculture (USDA) with adequate funds to implement the authorized salinity control program. Table 1.1 is a summary of the Forum's funding recommendations and the federal appropriations for Fiscal Years 1991, 1992 and 1993.

**Table 1.1  
Summary of Program Funding  
(by Federal Fiscal Years)**

AGENCY	1991		1992		1993	
	Forum Recommendation	Appropriation	Forum Recommendation	Appropriation	Forum Recommendation	Appropriation
Bureau of Reclamation	27,050,000	24,984,000	40,194,000	34,566,000	36,897,000	33,817,000
Bureau of Land Management	1,540,000	873,000	3,454,000	873,000	7,302,000	866,000
Department of Agriculture	17,500,000	14,783,000	22,000,000	14,783,000	18,500,000	13,783,000

## CHAPTER 2 - SALINITY OF THE RIVER

### OVERVIEW

The Colorado River drains 244,000 square miles of the western United States and a small portion of northern Mexico. Its waters serve some 2.5 million people within the United States' portion of the basin and through export provides full or supplemental water supply to another 18.0 million people outside the basin. The regional economy is based on irrigated agriculture, livestock grazing, mining, forestry, manufacturing, oil and gas production and tourism. About 2.5 million acres are irrigated within the basin and hundreds of thousands of acres are irrigated by waters exported from the basin. The Colorado River also serves about 1.7 million people and 500,000 irrigated acres in Mexico.

Salinity<sup>1</sup> has long been recognized as one of the major problems of the river. The Colorado, like most western rivers, increases in salinity from its headwaters to its mouth, carrying an average salt load of 9 million tons annually past Hoover Dam, the uppermost location at which numeric criteria have been established. In addition to total salt load (tons/yr), this report also examines salinity in terms of concentration as expressed in milligrams per liter (mg/L).

The salts in the Colorado River system are indigenous and pervasive. Many of the sediments of the basin were deposited in marine environments which were saline. Salts deposited with the sedimentary rocks are easily eroded, dissolved, and transported into the river system. The salinity control program is designed to prevent a portion of this abundant salt supply from moving into the river system.

The EPA (1971) analyzed the salt loading and for convenience divided it into two categories: naturally occurring and human-caused. They concluded that about half of the salinity concentration measured at Hoover Dam is from natural causes. Natural causes include salt contribution from saline springs, ground water discharge into the river system (excluding irrigation return flows), erosion and dissolution of sediments, and the concentrating effects of evaporation and transpiration. The natural causes category also includes salt contributions from nonpoint (excluding irrigated agriculture) or unidentified sources or from the vast, sparsely populated regions of the drainage, much of which is administered by the BLM or other government agencies. Human activities in these vast regions influence the rate of natural salt movement from the rocks and soils to the river system. Human activities which influence the "natural" contribution include livestock grazing, wildlife management, logging, mining, oil exploration, road building, recreation and others.

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<sup>1</sup>For this report, the terms "salinity" and "total dissolved solids" (TDS) are used interchangeably.

Of the land within the Colorado River Basin, about 75 percent is owned and administered by the Federal Government or held in trust for Indian tribes. By far the greatest portion of the naturally occurring salt load originates on these federally owned and administered lands.

Human-caused increases in salinity concentration, as identified by EPA, result from a number of human activities. EPA estimated that out-of-basin exports account for about 3 percent of increased salinity concentrations, irrigation accounts for about 37 percent, reservoir evaporation and phreatophyte use accounts for about 12 percent, and municipal and industrial uses account for about 1 percent. Much of the irrigated agriculture contribution is from federally developed irrigation projects.

The salinity control activities include a water quality monitoring and analysis component that provides information on a basin-wide basis for program evaluation. The monitoring and analysis component provides an essential database for future studies, supports state and regional planning activities, and provides an objective basis in evaluating the effectiveness of salinity control measures.

Evaluations of the salinity of the Colorado River have been made by Reclamation, the U.S. Geological Survey (USGS) and the Bureau of Land Management (BLM). They were published by the agencies during the period of this Review (1990-1993). In order to evaluate changes in salinity, water quality and streamflow data are obtained on a daily, weekly, monthly, or quarterly basis at various points on streams throughout the basin by the USGS in cooperation with the states and other federal agencies. Average annual salinity concentrations and salt loads are determined on a flow-weighted basis using the most accurate data available<sup>2</sup>. Gaging stations in the basin which are of significance to this report, and for which streamflow and water quality records are available, are shown on Figure 2.1.

Data collection at these stations include: streamflow, specific conductance, and periodic sampling for dissolved solids concentration. In addition to those stations shown in Figure 2.1, the USGS maintains monitoring stations whose data can, in part, be used to analyze the effectiveness of the salinity control program.

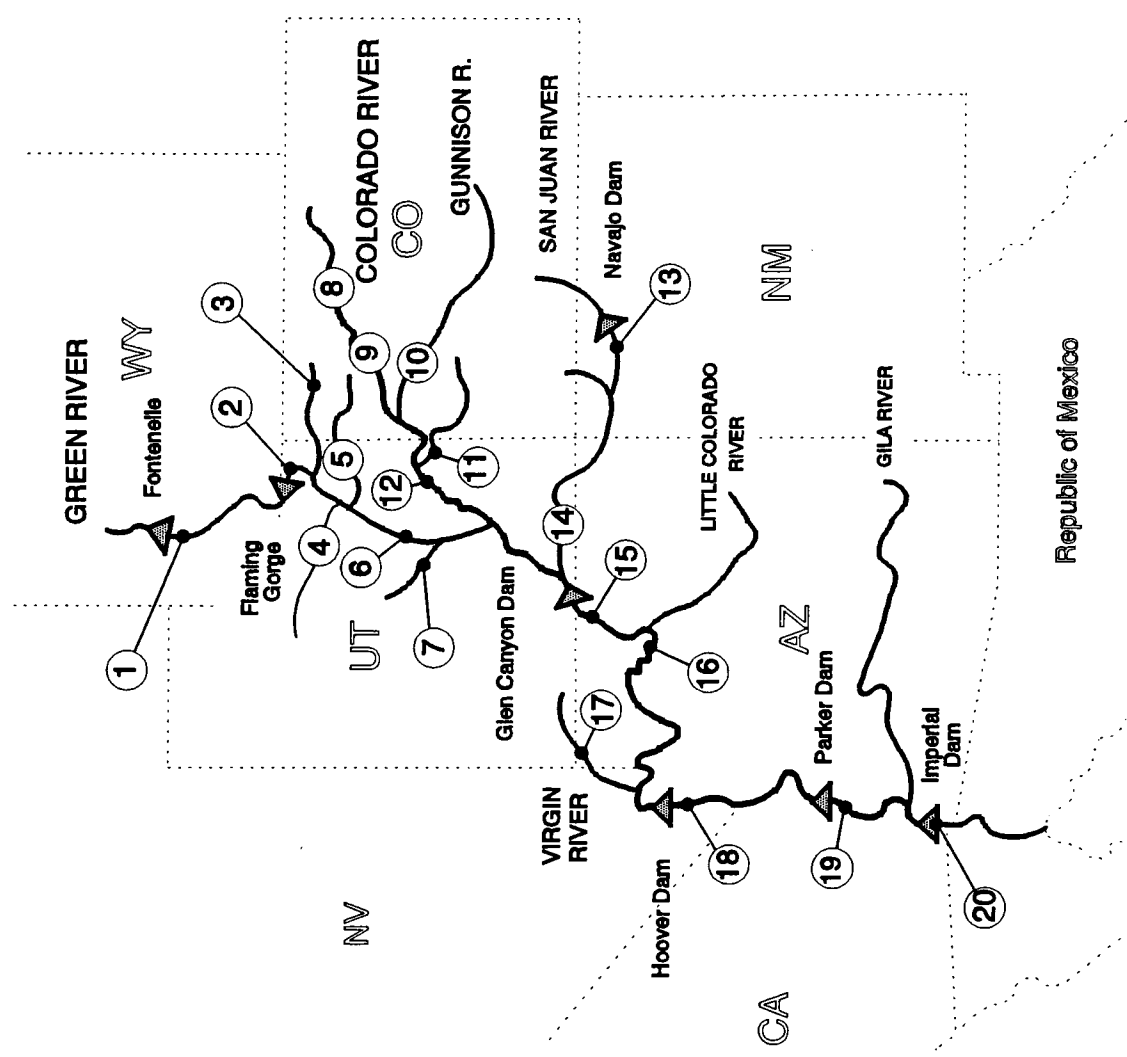
Some of the Basin states also maintain monitoring networks. As an example, the Utah Division of Water Quality maintains approximately 25 stations in the Utah portion of the Colorado River Basin. Water from these sites is sampled bimonthly and analyzed for chemical constituents, nutrients, 5-day biochemical oxygen demand, suspended solids, dissolved solids,

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<sup>2</sup>To compute the flow-weighted average annual salinity concentration, the average flow of the river in acre-feet per day at a measuring point and the average concentration of salts in the water in mg/L are determined on a daily basis. Concentration of salt may be measured directly by chemical analysis of dissolved constituents (TDS) or indirectly as specific conductance and correlated to TDS. Daily flows are multiplied by daily salinity concentrations and then summed to produce an annual mass number. The annual mass number is then divided by the total flow for the year at the measuring point (sum of the daily average flows) to yield the flow-weighted average annual salinity for the station.



Figure 2.1  
 Map of Colorado River Quality of Water Monitoring Stations



- 1 Green River near Green River
- 2 Green River near Greendale
- 3 Yampa River near Maybell
- 4 Duchesne River near Randlett
- 5 White River near Watson
- 6 Green River at Green River
- 7 San Rafael River near Green River
- 8 Colorado River near Greenwood Springs
- 9 Colorado River near Cameo
- 10 Gunnison River near Grand Junction
- 11 Dolores River near Cisco
- 12 Colorado River near Archuleta
- 13 San Juan River near Bluff
- 14 Colorado River at Lee's Ferry
- 15 Colorado River near Grand Canyon
- 16 Virgin River at Littlefield
- 17 Colorado River below Hoover Dam
- 18 Colorado River below Parker Dam
- 19 Colorado River at Imperial Dam
- 20 Colorado River at Imperial Dam

and coliform. In addition, continuous recordings of temperature and specific conductance are taken at seven stations in Utah.

The Forum adopted a system of baseline salinity values for certain key monitoring points in 1980. Since that time salinity changes at these baseline stations have been separately reported and commented upon in subsequent triennial reviews. The Forum has not found the concept of baseline values to be especially helpful in guiding salinity control efforts, and as of this 1993 Review, will not be relying on the notion of baseline values to assess or plan the program.

### **OBSERVED SALINITY CONCENTRATIONS**

Salinity concentrations of the river have fluctuated significantly over the period of record, (1941-1991; Figure 2.2). Salinity concentrations generally decrease in periods of high flows and increase in periods of low flows. Figure 2.2 shows the inverse relationship between the mean annual flow and the salinity of the Colorado River at Imperial Dam.

Salinity concentrations at Imperial Dam decreased steadily from 1972-1979, increased in 1981-1982, and decreased significantly from 1983-1986. The period 1983 through 1986 was a period of above-normal runoff. Each of the four years had an estimated natural flow at Lee Ferry in excess of 20.0 million acre-feet (maf), with the four year average of 22.6 maf. Only one other period has had 20 maf of natural flow for two or more consecutive years (1920-1921), and only one period (1920-1923) had an estimated average natural flow exceeding 20.0 maf (20.4 maf). During 1983-1986, the annual (calendar year) flow to Mexico exceeded scheduled deliveries by a cumulative total of 45.7 maf.

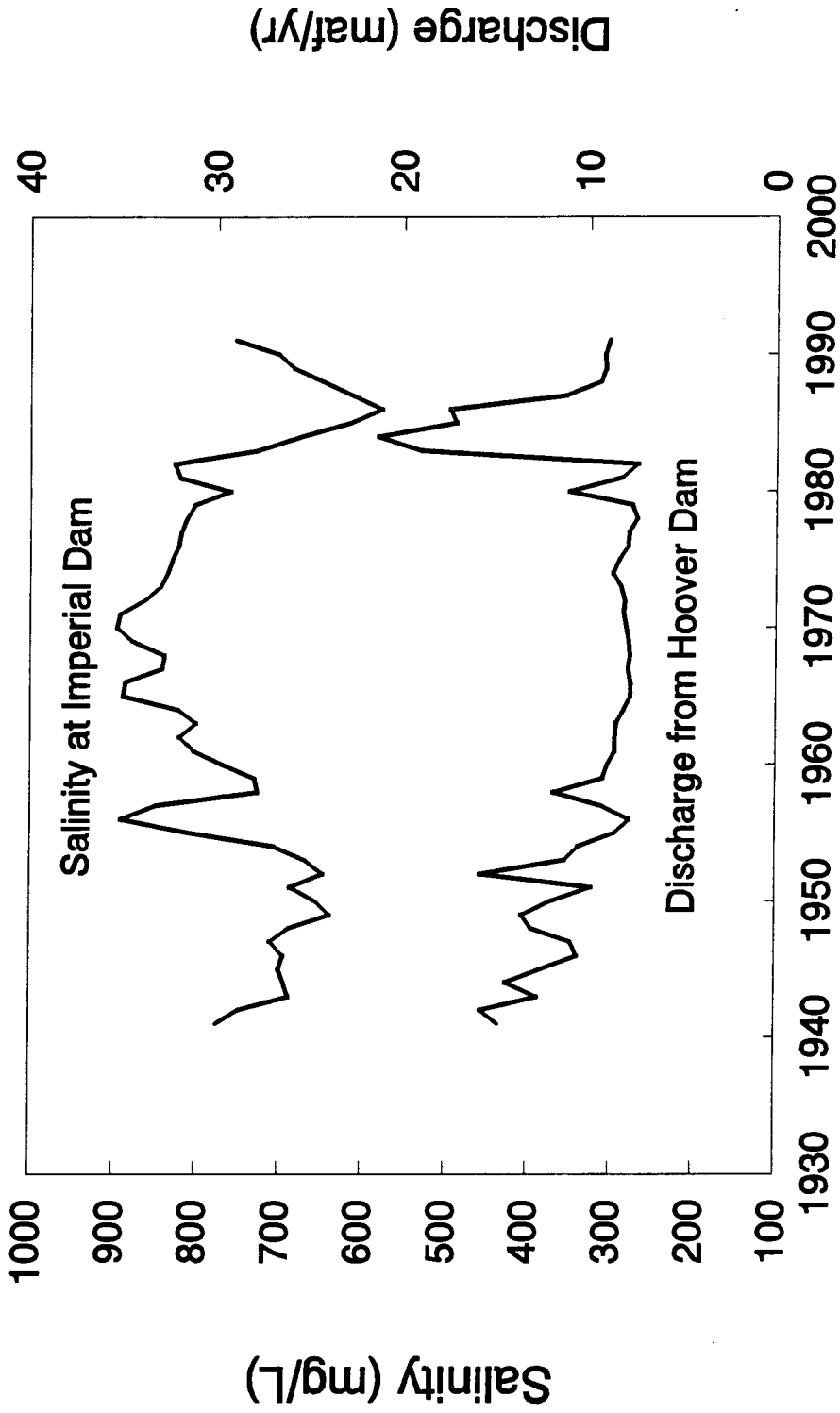
The record high flows during the period 1983-1986 produced a reduction in salinity concentrations in the lower main stem of approximately 250 mg/L at Imperial Dam. Table 2.1 (page 2-6) shows the flow-weighted average annual salinity concentrations from 1972 to 1992 at Imperial Dam and also below Hoover and Parker Dams. With river flows below normal from 1987 to 1992, salinity concentrations increased. Initially, because of the large volume of lower salinity water in the reservoirs, the rate of increase was attenuated. However, as of 1992, the reservoirs had been drawn down and most of the lower salinity storage water had already been released.

### **WATER USE AND ASSOCIATED IMPACTS OF SALINITY**

The Colorado River, from its headwaters in the Rocky Mountains to its mouth in the Gulf of California, is utilized for a variety of purposes. A portion of the flow is transported out of the Colorado River Basin for use in adjacent river basins. In the Colorado River Basin, irrigation, municipal and industrial, powerplant cooling, fish and wildlife, and recreation are the major uses of the river water.

Colorado River water users in the Lower Basin have suffered significant economic impacts due to long-term continued use of water with elevated salinity levels. Figure 2.3 on

**Figure 2.2**  
**Salinity at Imperial Dam**



Note: Salinity at Imperial Dam is greatly influenced by the volume of water released from Hoover Dam, the last major storage reservoir on the Colorado River. All salinities are flow-weighted annual values.

**Table 2.1**  
**Observed Flow-weighted Average Annual Salinity Concentrations**  
**at the Numeric Criteria Stations**

(Total Dissolved Solids in mg/L)<sup>1/</sup>

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Calendar Year	Below Hoover Dam	Below Parker Dam	At Imperial Dam
1972 <sup>2/</sup>	723	747	879
1973	675	709	843
1974	681	702	834
1975	680	702	829
1976	674	690	822
1977	665	687	819
1978	678	688	812
1979	688	701	802
1980	691	711	760
1981	681	716	821
1982	680	713	826
1983	658	678	727
1984	597	611	675
1985	556	561	615
1986	517	535	577
1987	519	538	612
1988	529	540	648
1989	564	559	683
1990	587	600	702
1991	634	635	753
1992	657 <sup>2/</sup>	688 <sup>3/</sup>	781 <sup>3/</sup>

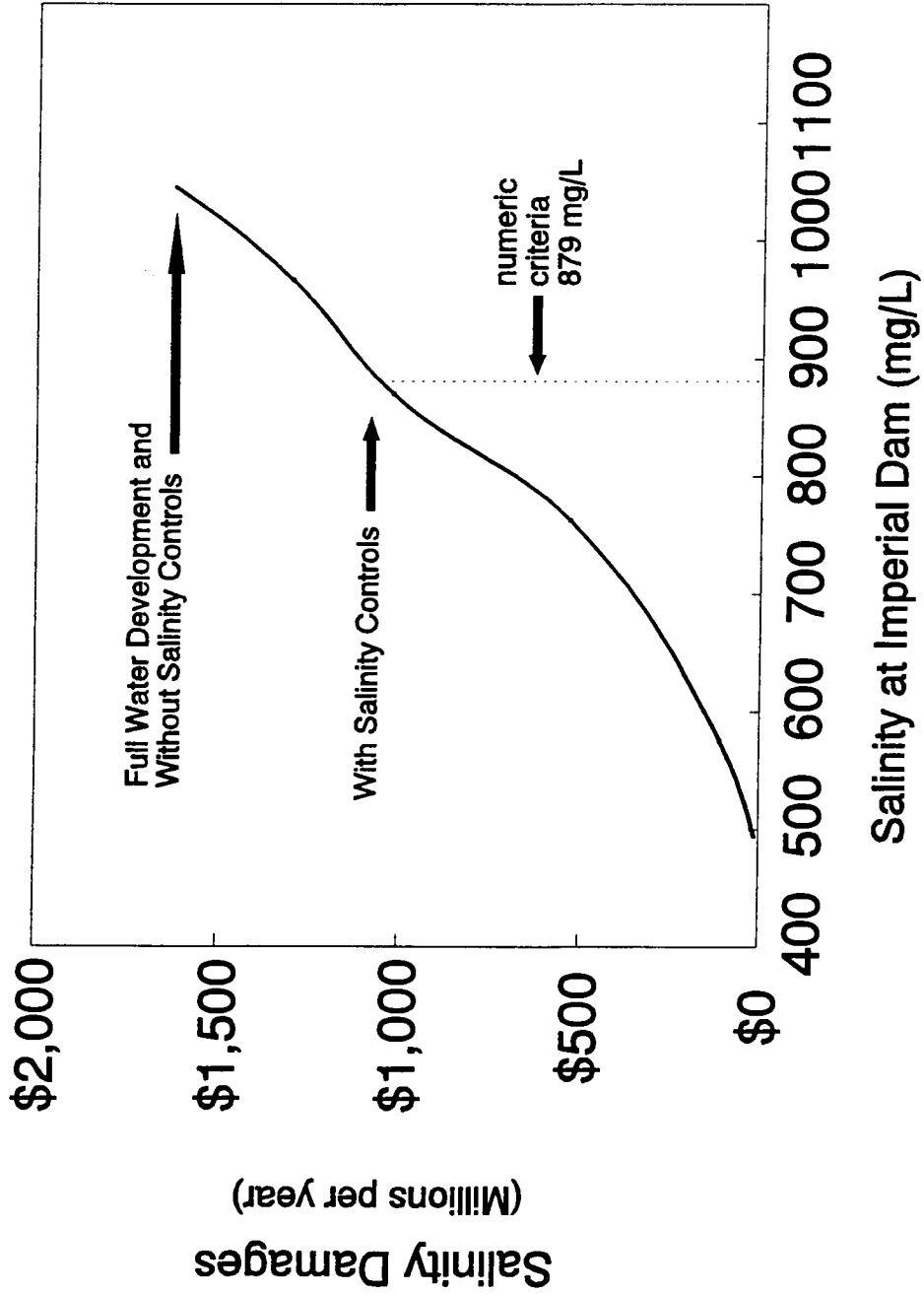
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<sup>1/</sup>Determined by the USGS from data collected by Reclamation and the U.S. Geological Survey and published in Quality of Water, Colorado River Basin, Progress Report No. 16, 1993.

<sup>2/</sup>Values for 1972 are the numeric criteria.

<sup>3/</sup>Provisional records.

**Figure 2.3**  
**Salinity Damage Curve**



Source: Quality of Water, Colorado River System, Progress Report No. 16, 1993.

page 2-7 indicates salinity damages resulting from long-term continued use at various levels of salinity. With current salinity concentrations, these damages are estimated to be over \$750 million per year. If the proposed plan of implementation for salinity control, as set forth in this Review, is not implemented, these damages could double by the year 2015.

Agricultural water users suffer economic damage as a result of using highly saline waters through reduced crop yields, added labor costs for irrigation management, and added drainage requirements. The urban user incurs additional costs due to more frequent replacement of plumbing and water using appliances, use of water softeners and the purchase of bottled water. Industrial users and water treatment and waste water utilities incur reductions in the useful life of system facilities and equipment from increased levels of salinity.

A significant impact in the Lower Basin is that imposed by local and regional water quality standards and management programs, to protect ground water supplies. Regulatory agencies have placed restrictions on reuse or recharge of waters that exceed specified salinity levels. If the river's salinity continues to increase, these regulatory actions would result in additional expensive treatment of water prior to reuse or disposal of such waters. If disposal options are selected, additional costly alternative sources of water must be developed or imported to meet the demands previously met or that could be met by water reuse.

The goal of Colorado River salinity control is to maintain the flow-weighted average annual salinity at or below the numeric criteria of the salinity standards. The effort is not, however, intended to counteract the salinity fluctuations that are a result of the highly variable flows caused by climatic conditions, precipitation, and snowmelt. Therefore, to evaluate the effectiveness of the salinity control program, water quality data were adjusted to reflect long-term mean water supply.

For Progress Report 16, Reclamation evaluated whether current salinity control efforts are sufficient to meet the numeric criteria of the salinity standards under the current level of development in the basin. The study found the numeric criteria will not be exceeded at any of the three stations under the "present" or existing (1991) level of development and salinity control. Table 2.2 shows a comparison of the numeric criteria to the adjusted flow-weighted average annual salinity for existing conditions at the three Lower Basin monitoring stations. Observed salinity concentration at each of these three stations is much lower than the adjusted values, due to the unusually wet hydrology during the mid 1980's and the storage of this water in the main stem reservoir system.

Salinity concentrations caused by natural fluctuations of flows in the basin differ from the salinity that would be observed if the long-term mean water supply condition were to occur. The water quality standards allow for the variation which is due to natural fluctuation in the hydrologic conditions.

**Table 2.2—Comparison of Salinity Levels to the Numeric Criteria for the Existing (1991) Level of Development and Salinity Control**

Station	Numeric Criteria (mg/L)	Adjusted Salinity (mg/L)	Observed Salinity (mg/L)
Colorado River below Hoover Dam	723	720	634
Colorado River below Parker Dam	747	747	635
Colorado River at Imperial Dam	879	864	753

\* Reflects salinity that would occur from long-term mean water supply as computed by CRSS. Observed 1991 salinity levels were lower due to unusually high runoff in earlier years and storage of that water in the reservoir system.

## PROJECTIONS

### Future Water Depletions

One of the significant factors affecting salinity concentrations is water use. Estimates of projected water use through the year 2015 for each of the seven states were developed jointly by the states and Reclamation.

Table 2.3 presents a summary of estimated water depletions in the Upper Colorado River Basin, and from the main stem of the Lower Colorado River.

**Table 2.3  
Summary of Projected Water Depletions in the  
Colorado River Basin<sup>1, 2/</sup>**

(1,000 acre-feet)

	1995	2000	2005	2010	2015
Upper Basin <sup>3/</sup>	3,776	3,945	4,094	4,280	4,390
Lower Basin <sup>4/</sup>	7,500	7,500	7,500	7,500	7,500
Total	11,276	11,445	11,594	11,780	11,890

<sup>1/</sup>Source: Table prepared from primary depletion projections utilized by Reclamation for CRSS salinity runs.

<sup>2/</sup>Does not include deliveries to Mexico.

<sup>3/</sup>Depletions at point of use. Does not include Colorado River Storage Project reservoir evaporations estimated by Reclamation to average 520,000 acre-feet per year under full development.

<sup>4/</sup>Lower main stem only. Diversions from the main stem less returns. Does not include main stem reservoir evaporation and stream losses.

## Salinity Concentrations

Salt-routing studies were conducted for the 1993 Review using the Colorado River Simulation System (CRSS) developed by Reclamation.<sup>3</sup> The CRSS is a package of computer programs and databases developed by Reclamation as a tool for use by water resource managers dealing with water-related issues and problems in the Colorado River Basin. The central feature of the CRSS is a computer program which simulates the flow of water and salt through the system and the operation of the major reservoirs including hydroelectric power plants. Two studies were conducted to provide estimates of future flow-weighted average annual salinity concentrations for each year of the study period at Hoover, Parker and Imperial Dams in the Lower Basin. The first study used the future water depletion projections described earlier, the average of 78 historic hydrologies which approximate the average annual long-term water supply of 15 maf, and the salt load reduction currently in place.

The second study used the same future water depletions and long-term water supply, except that it included the salt load reduction from the salinity control units which constitutes the Forum's recommended plan of implementation. The purpose of the first study was to determine the future salinity levels and salt load tonnage requirements needed to maintain salinity levels at or below the numeric criteria through the year 2015. Based on the salt load reduction requirements determined by the first study, the implementation plan was developed. The second study was to validate the plan's ability to meet the objective.

Using the 78 years of historic hydrology in the CRSS data bank, Reclamation determined the mean salinity levels for each year of the study period through the year 2015. The results of the two studies are presented in Figures 2.4, through 2.6. In addition, Reclamation also projected the minimum and maximum salinity values in the year 2015. Table 2.4 presents those values.

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<sup>3</sup>Detailed information on CRSS is presented in the following Bureau of Reclamation reports: Colorado River Simulation System, An Executive Summary (October 1981); Colorado River Simulation System, Users Manual (June 1982); and Colorado River Simulation System, System Overview (1984).



Figure 2.4

# PROJECTED SALINITY CONCENTRATIONS

BELOW HOOVER DAM

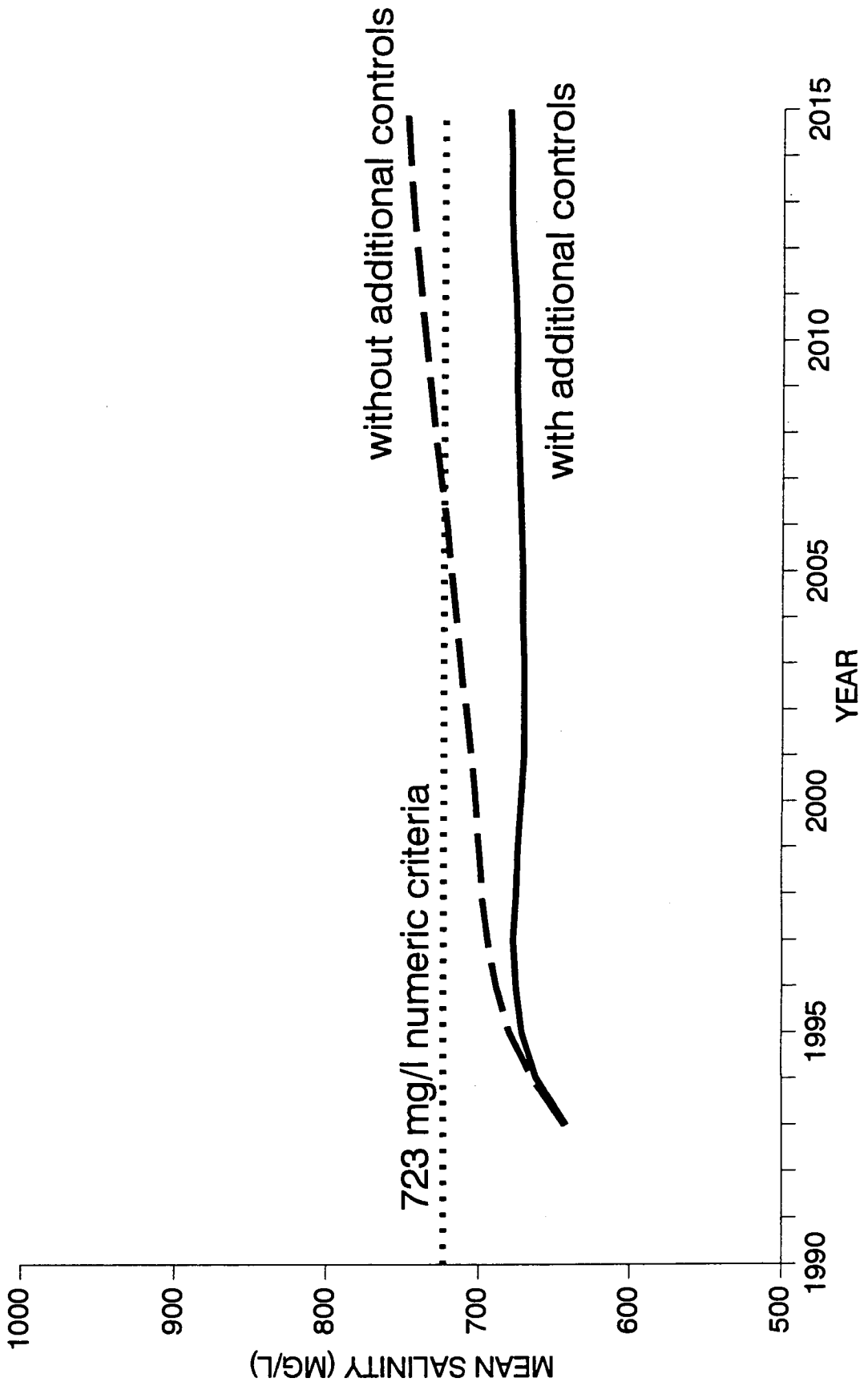


Figure 2.5

# PROJECTED SALINITY CONCENTRATIONS

BELOW PARKER DAM

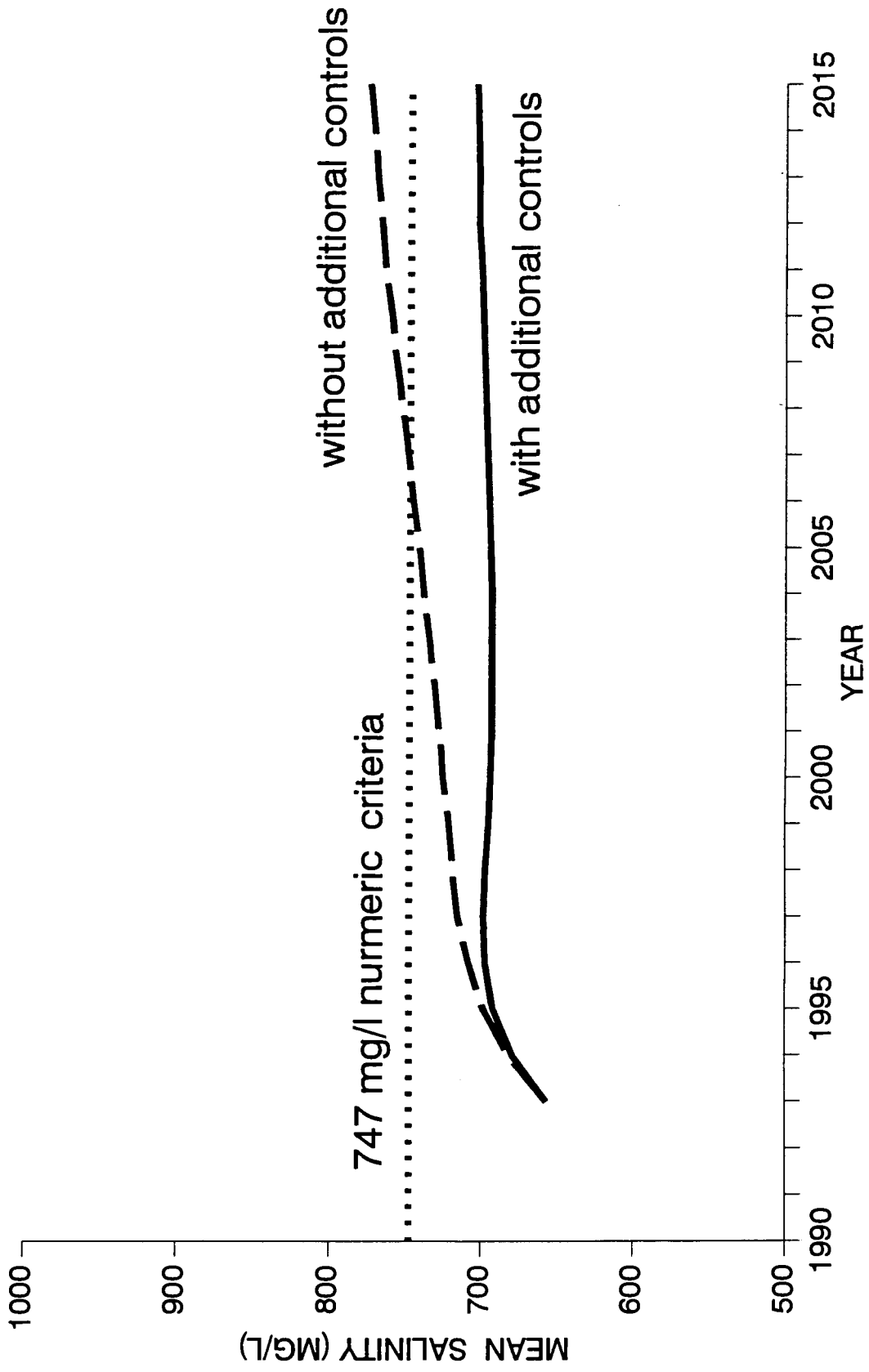
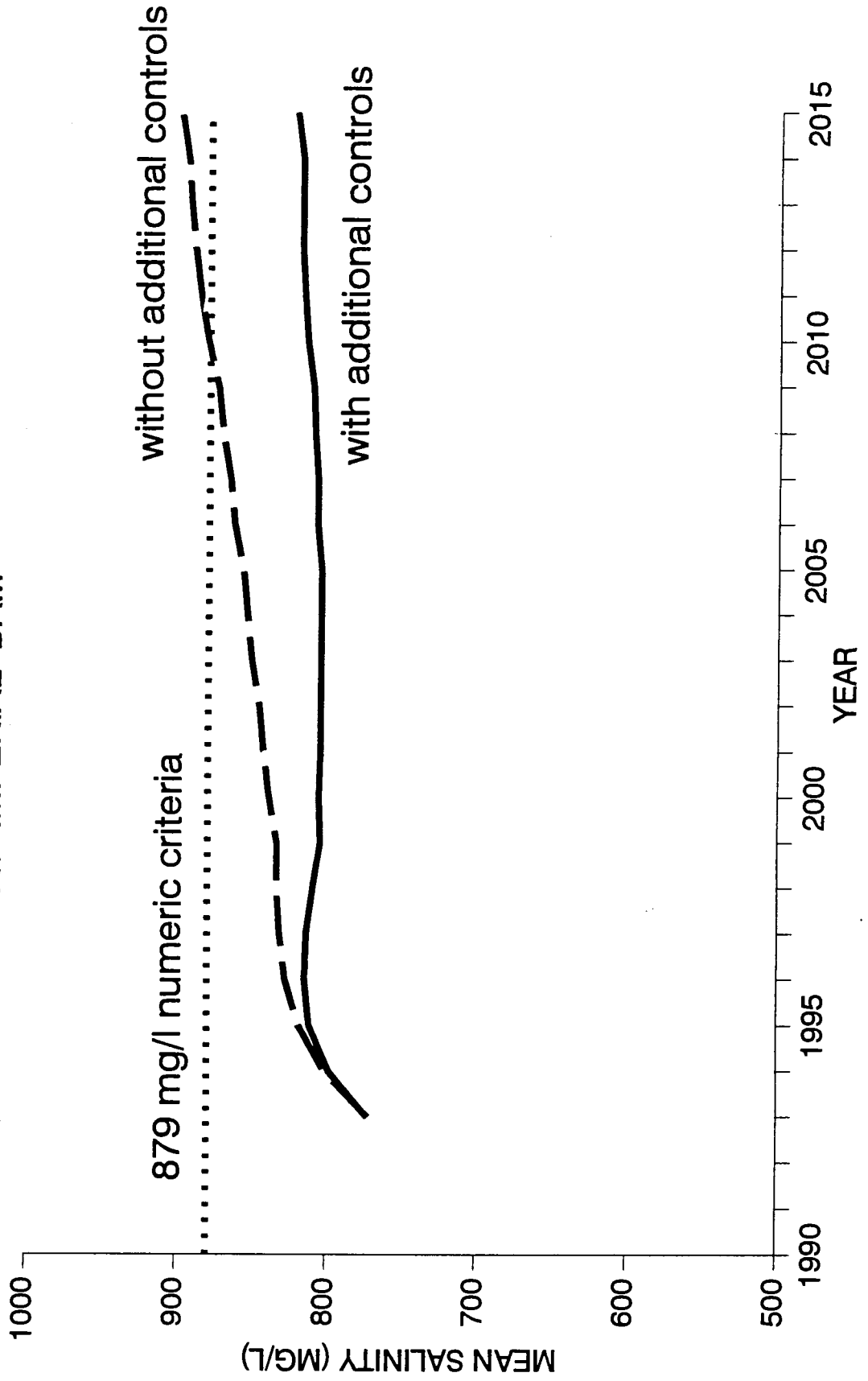


Figure 2.6

# PROJECTED SALINITY CONCENTRATIONS

AT IMPERIAL DAM



**Table 2.4  
Colorado River Salinity Projections, 2015**

<b>Station</b>	<b>Numeric Criteria (mg/L)</b>	<b>Mean Salinity (mg/L)</b>	<b>Minimum Salinity (mg/L)</b>	<b>Maximum Salinity (mg/L)</b>
Colorado River below Hoover Dam	723	680	536	833
Colorado River below Parker Dam	747	704	549	869
Colorado River at Imperial Dam	879	822	625	1023

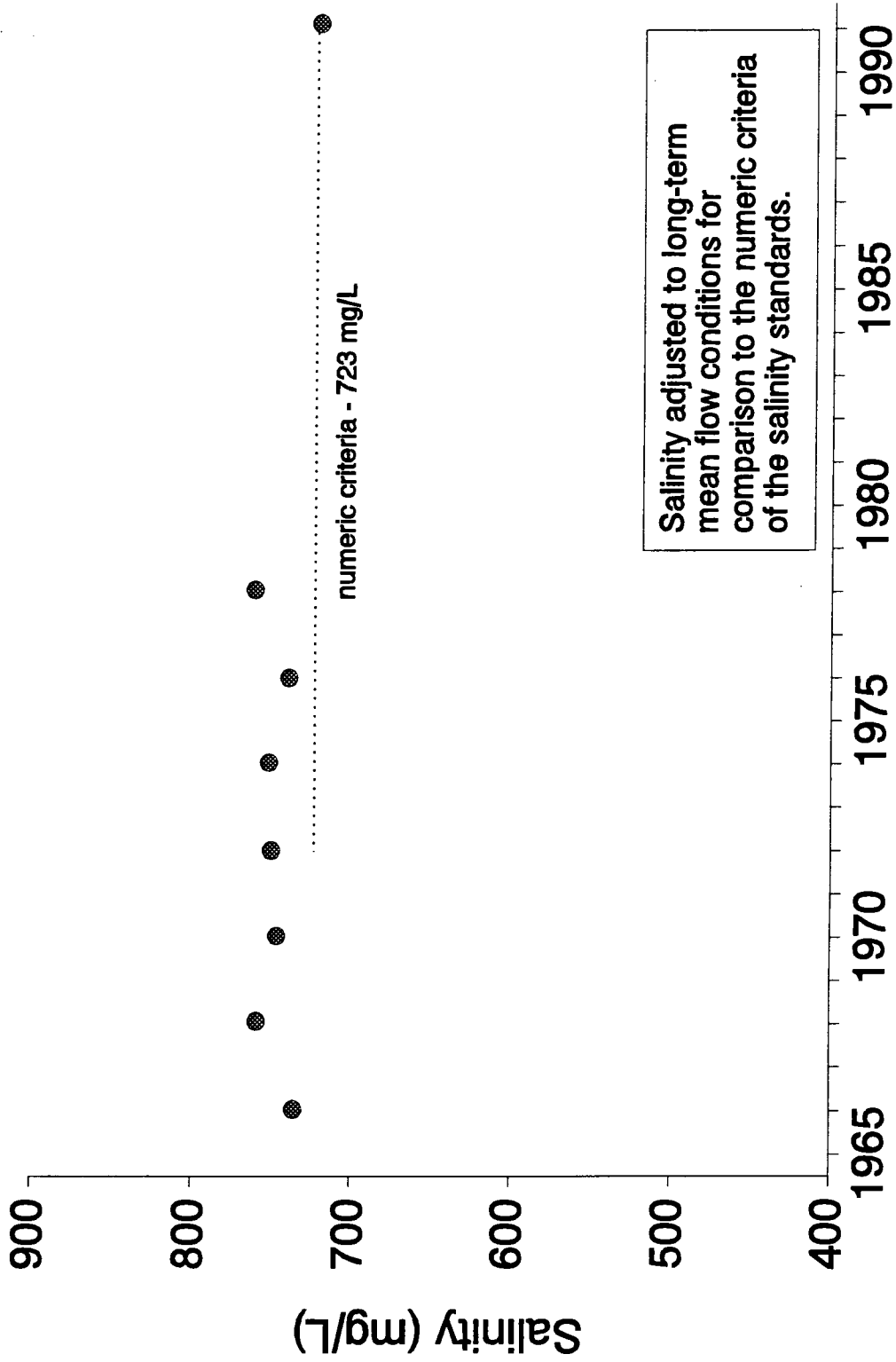
Future salinity concentrations will depend not only upon human activities but upon natural phenomena, such as runoff conditions, natural evapotranspiration, and precipitation, dissolution and mixing within the major storage reservoirs. Even with a full salinity control effort that would offset human impacts since 1972, the actual salinities at the criteria stations (and elsewhere in the basin) will continue to fluctuate with hydrologic conditions in the future.

Figures 2.7, 2.8 and 2.9 summarize the results from past Reclamation progress reports<sup>4</sup>, comparing the adjusted salinity (to reflect long-term mean water supply) to the numeric criteria at the three water quality stations through time. The figures show that at times in the past, adjusted salinities have been above the numeric criteria. The most recent analysis shows that this condition has improved. The salinity program has been able to maintain salinity at or below the numeric criteria. Those results show the salinity control program has been able to meet its objective of maintaining the numeric criteria by offsetting the effects of water development since 1972.

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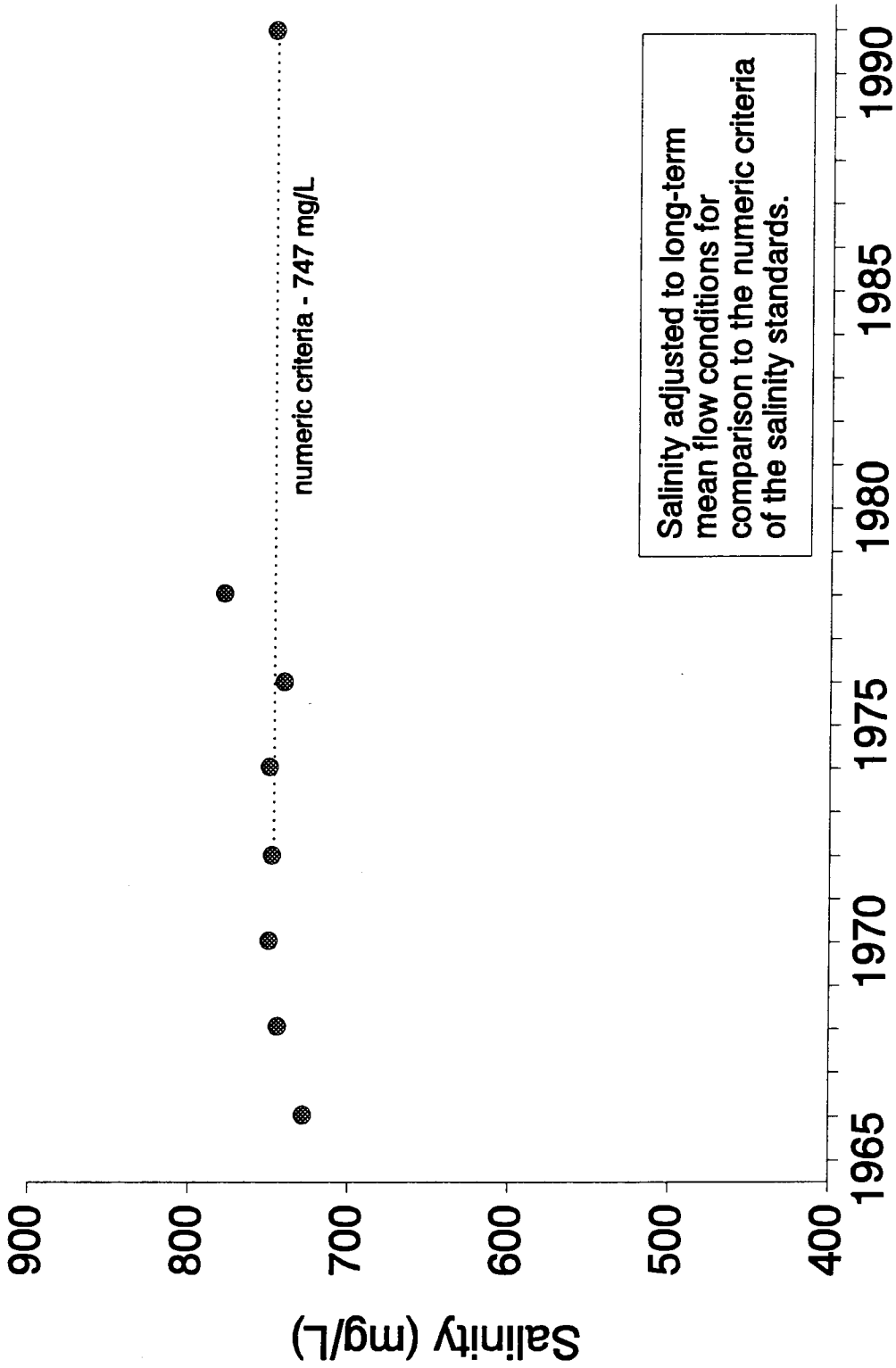
<sup>4</sup>Quality of Water, Colorado River Basin, Progress Report, No. 1 through 16.

**Figure 2.7**  
**Adjusted Salinity below Hoover Dam**



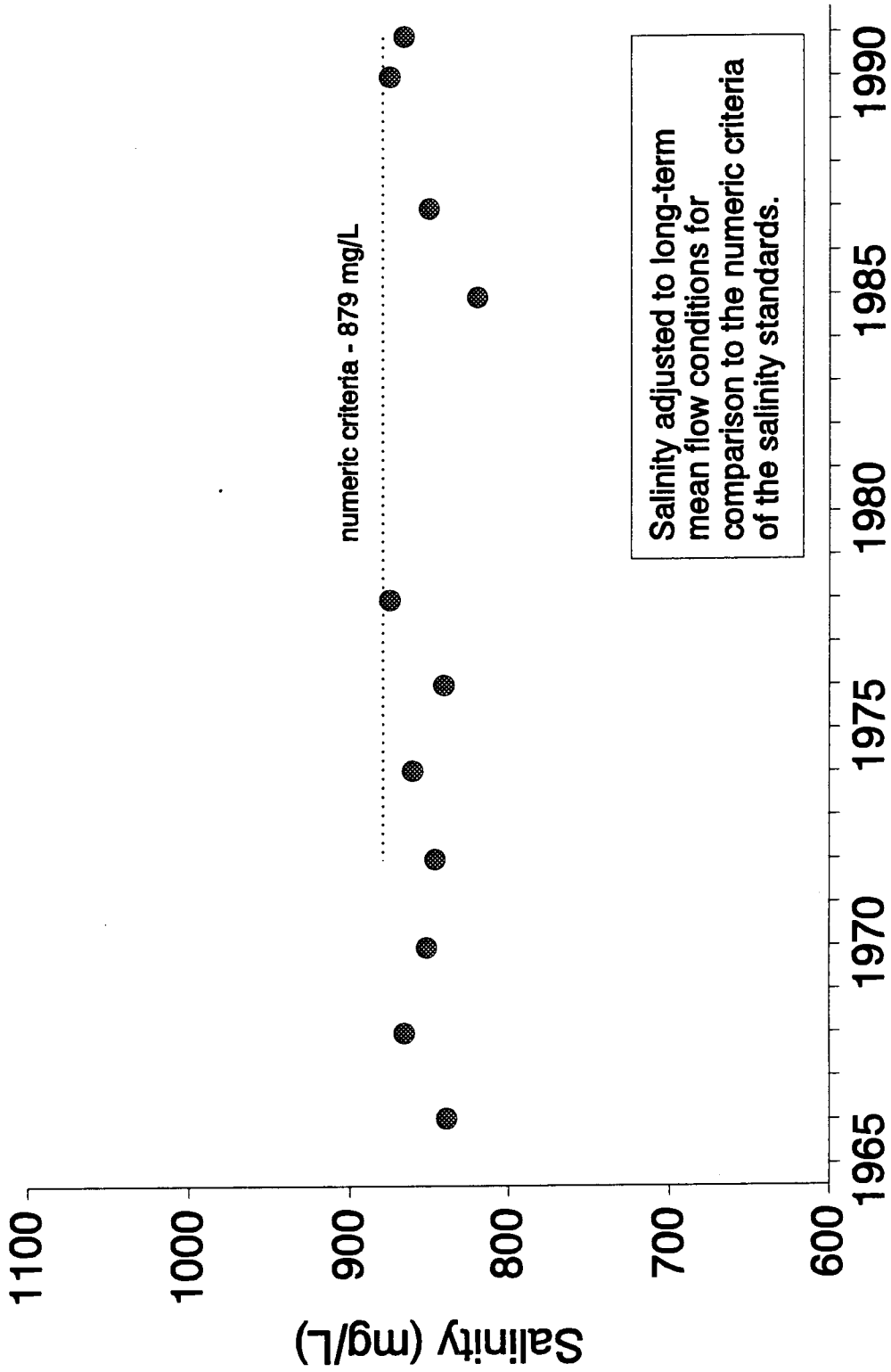
Note: Adjusted salinity values were not reported during 1980-90 period.

**Figure 2.8**  
**Adjusted Salinity below Parker Dam**



Note: Adjusted salinity values were not reported during 1980-90 period.

**Figure 2.9**  
**Adjusted Salinity at Imperial Dam**



Note: Adjusted salinity values were not reported during 1979-83 period.

# CHAPTER 3 - WATER QUALITY STANDARDS FOR SALINITY

## OVERVIEW OF STANDARDS

On December 18, 1974, the EPA promulgated a regulation (40 CFR 120; see Appendix A) which set forth a basin-wide salinity control policy for the Colorado River Basin. This regulation also established a standards procedure, and required the Colorado River Basin states to adopt and submit to the EPA water quality standards for salinity, including numeric criteria and a plan of implementation, consistent with the policy stated in the regulation. The Basin states, acting through the Forum, initially responded to this regulation by developing and submitting to the EPA a report entitled Water Quality Standards for Salinity Including Numeric Criteria and Plan of Implementation for Salinity Control - Colorado River System dated June 1975. Since the states' initial adoption, the water quality standards have been reviewed every three years (1978, 1981, 1984, 1987 and 1990) as required by Section 303(c)(1) of the Clean Water Act. This document was prepared in conjunction with the sixth triennial review conducted by the Forum as required by that law.

In 1975 the Forum proposed, the states adopted and the EPA approved water quality standards, including numeric criteria and a plan of implementation to control salinity increases. The Forum selected three lower Colorado River main stem stations as being appropriate points in the Colorado River system at which numeric criteria should be established as required by the 1974 regulation; these stations are below Hoover Dam, below Parker Dam and at Imperial Dam. The plan of implementation, developed in 1975 by the Forum and participating federal agencies, was designed to ensure compliance with the water quality standards for salinity. During each triennial review, the plan of implementation has been updated to ensure continuing compliance.

The standards require that a plan be developed that will maintain the flow-weighted average annual salinity at or below the 1972 levels while the Basin states continue to develop their compact-apportioned water supply. The plan of implementation was not established to reduce the salinity of the river below levels that were caused by natural variations in river flows or human activities prior to 1972, but to offset the effects of water resource development in the Colorado River Basin after 1972.

The Colorado River water quality standards for salinity and the approach taken by the Basin states in complying are unique. During the course of each triennial review, the Forum projects the Basin states' use of compact-apportioned waters and the resulting changes in salinity. The salinity projections are based on the use of the long-term mean water supply of 15 maf/yr. The plan of implementation is revised as necessary to ensure that the numeric criteria will be maintained.

The regulation specifically stated that salinity control was to be implemented while the Basin states continue to develop their compact-apportioned water. Historically, the Forum designed the plan of implementation to maintain the numeric criteria for a period of 15-20 years (e.g., the 1990 Review contained a plan of implementation through the year 2010). In this triennial review, the Forum not only looked at the amount of salt that needs to be removed by



the year 2015, but also determined the salt removal necessary when there is full development of the compact-apportioned waters of the Colorado River. In order to comply with the numeric criteria, the Forum has determined that at full development of the compact-apportioned waters, 1.8 million tons of salt annually must be removed or prevented from entering the system. The plan of implementation (described in Chapters 4 and 5) includes projects that have the potential for meeting the goal of removing the required tonnage.

## NUMERIC CRITERIA FOR SALINITY

### Federal Regulation

The federal regulation promulgated (see Appendix A) by the EPA required the adoption of numeric criteria by the states. The criteria are:

Below Hoover Dam	723 mg/L
Below Parker Dam	747 mg/L
At Imperial Dam	879 mg/L

The observed flow-weighted average annual salinity for the year 1972 was determined by Reclamation from daily flow and salinity data collected by the U.S. Geological Survey and Reclamation.

There is no inference that 1972 was chosen as the basis for establishing the numeric criteria because that year represented a typical or average year. Further, the plan of implementation is designed to offset the effects of human activity under long-term mean water supply conditions of 15 maf/yr. The Forum's basis for selecting these stations is because of their proximity to key diversion facilities on the lower Colorado River. The State of Nevada diverts Colorado River main stem water from Lake Mead for use in the Las Vegas area, and its return flows move into the Lake and are part of the water supply available below Hoover Dam. The Metropolitan Water District of Southern California and the Central Arizona Project divert water from Lake Havasu, impounded behind Parker Dam, for many millions of users. The large agricultural areas in the Imperial and Coachella Valleys in California and the Yuma area in Arizona and California are served by diversions made at the Imperial Dam. All lower Basin water users suffer adverse impacts of high salinity to some degree.

The criteria were not established to protect human health or fish and wildlife values. The salinity levels that are anticipated in the future, even without salinity control efforts, have not been shown to have adverse effects on human health or wildlife. Thus, this program is different than most other water quality standards programs.

The Forum, responding to the requirements of Section 303(c) of the Clean Water Act, has conducted the review contained in this report. The Forum concludes that the numeric criteria need not be revised and should continue to be used.

## **Temporary Increases**

The plan of implementation as set forth in this Review is designed to remove or control enough salt from the river system to maintain salinity levels at or below the 1972 levels as far as it may be determined that development and/or human activity have impacted the salinity levels. The program is not, however, intended to offset the salinity fluctuations that are a result of the highly variable annual flows (natural variations in the hydrologic cycle). The plan of implementation for this Review is based on the use of the long-term mean water supply, as were the 1975 Report and all subsequent Reviews.

It should be recognized that the river system is subject to highly variable annual flow. The frequency, duration, and availability of carryover storage greatly affect the salinity of the lower main stem. Therefore, it is probable that salinity levels will exceed the numeric criteria in some years and be well below the criteria in others. Given the above assumptions, the flow-weighted average annual salinity will be maintained at all times at or below 1972 levels.

Periodic increases in salinity above the criteria as a result of reservoir conditions or periods of below long-term average annual river flow will also be in compliance with the standards. With satisfactory reservoir conditions, and when river flows return to at or above the long-term average annual flow, concentrations are expected to be at or below the numeric criteria.

As shown in Figure 2.2 of Chapter 2 (page 2-5), the flow-weighted average annual salinity concentrations can fluctuate greatly. Recent analyses have shown that the impact of natural variations in the hydrologic cycle can have a significant impact on salinity. These natural variations in runoff can cause a fluctuation in average annual salinity concentrations of about 450 mg/L TDS at Imperial Dam. The plan of implementation, as set forth in this Review, will, by the year 2015, prevent a salinity concentration increase of approximately 140 mg/L at Imperial Dam.

The federal regulations provide for temporary increases above the 1972 levels if control measures are included in the plan. Should water development projects be completed before control measures are identified or brought on line, temporary increases above the numeric criteria could result. However, these increases will be deemed in conformance with the standards if appropriate salinity control measures are included in the plan.

## **PLAN OF IMPLEMENTATION**

The plan of implementation has been reviewed and modified as a result of this Review. The changes that have been made in the plan of implementation since the last triennial review are described more fully in Chapters 4 and 5. The plan of implementation is designed to maintain the salinity concentration of the river at or below the numeric criteria, principally by reducing the salt contribution to the river from existing sources and minimizing future increases in salt load caused by human activities. The control measures are selected on the basis of cost-

effectiveness, technical feasibility, social and political acceptability and environmental considerations. The plan of implementation consists of:

1. Completion of Reclamation, BLM and USDA salinity control measures shown in Table 4.1 to the extent that each unit remains viable and appropriately cost effective.
2. Imposition of effluent limitations, principally under the National Pollutant Discharge Elimination System (NPDES) permit program provided for in Section 402 of the Clean Water Act of 1977, on industrial and municipal discharges, based on the Forum's 1977 "Policy for Implementation of Colorado River Salinity Standards Through the NPDES Permit Program" (Appendix B).
3. Implementation of the Forum-recommended "Policy for Use of Brackish and/or Saline Waters for Industrial Purposes" (Appendix B).
4. Implementation of the Forum-recommended "Policy for Implementation of the Colorado River Salinity Standards Through the NPDES Permit Program for Intercepted Ground Water" (Appendix B).
5. Implementation of the Forum-recommended "Policy for Implementation of the Colorado River Salinity Standards Through the NPDES Permit Program for Fish Hatcheries" (Appendix B).
6. Implementation of nonpoint source management plans developed by the states and approved by EPA.

Item 1 of the plan of implementation listed above is to be implemented by federal agencies in conjunction with state, local and private participants. The Forum works jointly with federal agencies on developing the units and measures to be implemented. The Forum also urges Congress to appropriate needed funds and to amend legislative authorization when necessary. Items 2 through 6 above are primarily implemented by each of the Basin states. The federal efforts that are a part of this plan of implementation and supported by the states are described in Chapter 4. The states' efforts are described in Chapter 5.

The Forum believes it should assess whether implementation of the salinity control program maintains salinity at some interim point at or below the numeric criteria as provided for in the standards. For this report, the Forum has decided to look ahead about 20 years to the year 2015. If the plan is implemented, the projected salinities, in the year 2015, at the three criteria stations (below Hoover, below Parker and at Imperial Dams) will be 43, 49 and 62 mg/L, respectively.

There are advantages to keeping the salinity levels below the numeric criteria. The Colorado River salinity effort was created, in part, to prevent additional economic damages caused by continuous and persistent long-term salinity levels. With the estimated projected

salinity levels below the numeric criteria in the year 2015, there will be an additional reduction in economic damages to the water users.

The Forum recognizes that although the salinity levels may be below the criteria level, based on the assumption of a long term mean water supply, that natural variations in water supply may result in annual salinity values that temporarily exceed, the criteria level. However, by design the Forum's proposed plan greatly reduces the chance that the criteria, in any one year or sequence of years will exceed the criteria.

The Forum has also begun to look at the plan of implementation under full water development. Unlike previous Reviews, the 1993 Review presents a plan of implementation that addresses the salt removal needed far into the future (well past 2015). This is, in part, possible because planning has progressed to a point where additional salinity control units have been identified, analyzed, and can now be considered. It should be noted that the plan adopted in this report does not remove all of the tons needed at full development. In the decades ahead, and in future triennial reviews, there is ample time for consideration of the additional efforts which should be added to the plan to offset the impact of full utilization of compact-apportioned waters.

## **CHAPTER 4 - PLAN OF IMPLEMENTATION-FEDERAL PROGRAMS**

### **INTRODUCTION**

Title II of P.L. 93-320 directed the Secretary of the Interior to expedite the investigation, planning and implementation of the salinity control program. The program objective is to treat salinity as a basin-wide problem in order to maintain salinity concentrations at or below 1972 levels in the lower main stem of the river while the Basin states continued to develop their compact-apportioned waters. Specifically, the Act authorized the construction, operation and maintenance of four salinity control projects (Paradox Valley, Grand Valley, Las Vegas Wash and Crystal Geysers units) and the expeditious completion of planning reports for 12 other projects. It also required cost-sharing by non-federal entities. The Secretary of the Interior, Secretary of Agriculture and Administrator of the EPA were directed to cooperate and coordinate their activities to meet the program objectives.

P.L. 98-569, signed into law on October 30, 1984, amends P.L. 93-320. This law amended the original salinity control program by authorizing construction of additional units by Reclamation and de-authorizing Crystal Geysers because of poor cost effectiveness. The Secretary of Agriculture was directed to establish a major voluntary onfarm cooperative salinity control program. The authorizing legislation provides for cost-sharing and technical assistance to participants for planning and installing needed salinity reduction practices, including voluntary replacement of incidental fish and wildlife values foregone. Participants pay at least 30 percent of the costs to install salinity reduction and wildlife habitat practices. P.L. 98-569 also directed that the Bureau of Land Management (BLM) develop a comprehensive program for minimizing salt contributions from the 48 million acres of Basin lands which it administers.

### **RECOMMENDED PLAN**

#### **Salinity Control Plan of Implementation**

The involved federal agencies, working in close cooperation with the Forum, have identified potentially cost-effective, viable salinity control units and efforts that will be implemented over the next two to three decades. The collective efforts of Reclamation, the USDA, and the BLM are identified and summarized in Table 4.1. The location of the salinity control units are illustrated in Figure 4.1. Table 4.1, and the states' efforts identified in Chapter 5, are collectively the plan of implementation adopted by the Forum in this 1993 Review.

The Federal portion of the plan (Table 4.1) would remove 1,375,400 tons of salt by the year 2015; when the units and efforts identified in the federal portion of the plan are fully implemented, 1,455,700 tons of salt would be removed. It should be recognized that over time, some of the salinity control units now in the implementation plan might not remove all of the projected salt or the costs may increase, and other units and/or salinity control measures will have to be substituted in order to maintain the numeric criteria while the Basin states continue to develop their compact-apportioned waters.

**Table 4.1**  
**Salinity Control Plan of Implementation**  
**Federal Programs**

<u>Unit</u>	<u>Begin Implemen- tation</u>	<u>Projected Date Complete</u>	<u>Tons/yr Removed Jan 1993</u>	<u>Projected Salt Removed (Tons/yr) by 2015</u>	<u>Projected Total Salt Removed (Tons/yr) Project Completion</u>	<u>Cost Effective- ness (\$/ton)</u>
Meeker Dome (USBR)	Complete	1983	48,000	48,000	48,000	14
Grand Valley Stage One (USBR)	Complete	1984	21,900	21,900	21,900	121
Las Vegas Wash Pittman (USBR)	Complete	1985	3,800	3,800	3,800	24
Grand Valley (USDA)	1979	2010	56,600	163,000	163,000	27
Uinta Basin (USDA)	1980	2010	55,500	106,800	106,800	80
Nonpoint Sources (BLM)	1983	2015	2,800	41,000	41,000	30
Well Plugging (BLM)	1984	2015	8,000	14,000	14,000	20
Grand Valley Stage Two (USBR)	1985	1998	25,600	115,600	115,600	113
Paradox Valley (USBR)	1988	2001	0	180,000	180,000	49
Big Sandy River (USDA)	1988	2003	12,500	52,900	52,900	27
Lower Gunnison (USDA)	1989	2016	24,700	277,950	280,500	70
McElmo Creek (USDA)	1990	2009	2,300	38,000	38,000	83
Lower Gunnison Winter Water (USBR)	1991	1994	0	74,000	74,000	38
Dolores Project (USBR)	1991	1995	0	23,000	23,000	84
Moapa Valley (USDA)	1994	2006	0	18,700	18,700	38
Lower Gunnison - Laterals (USBR)	1994	2007	0	60,000	60,000	60
*Uinta Basin I (USBR)		2004	0	25,500	25,500	88
*San Juan - Hammond (USBR)		2007	0	28,000	28,000	37
*Price-San Rafael (USBR/USDA)		2021	0	83,250	161,000	39
<b>TOTAL</b>			<b>261,700</b>	<b>1,375,400</b>	<b>1,455,700</b>	

\*Units that have been investigated, and are in the Salinity Control Plan of Implementation, but require congressional authorization. The "Begin implementation" date will be determined upon authorization and funding.

A - Units under consideration and/or investigation, not currently in the plan - additional information is needed:

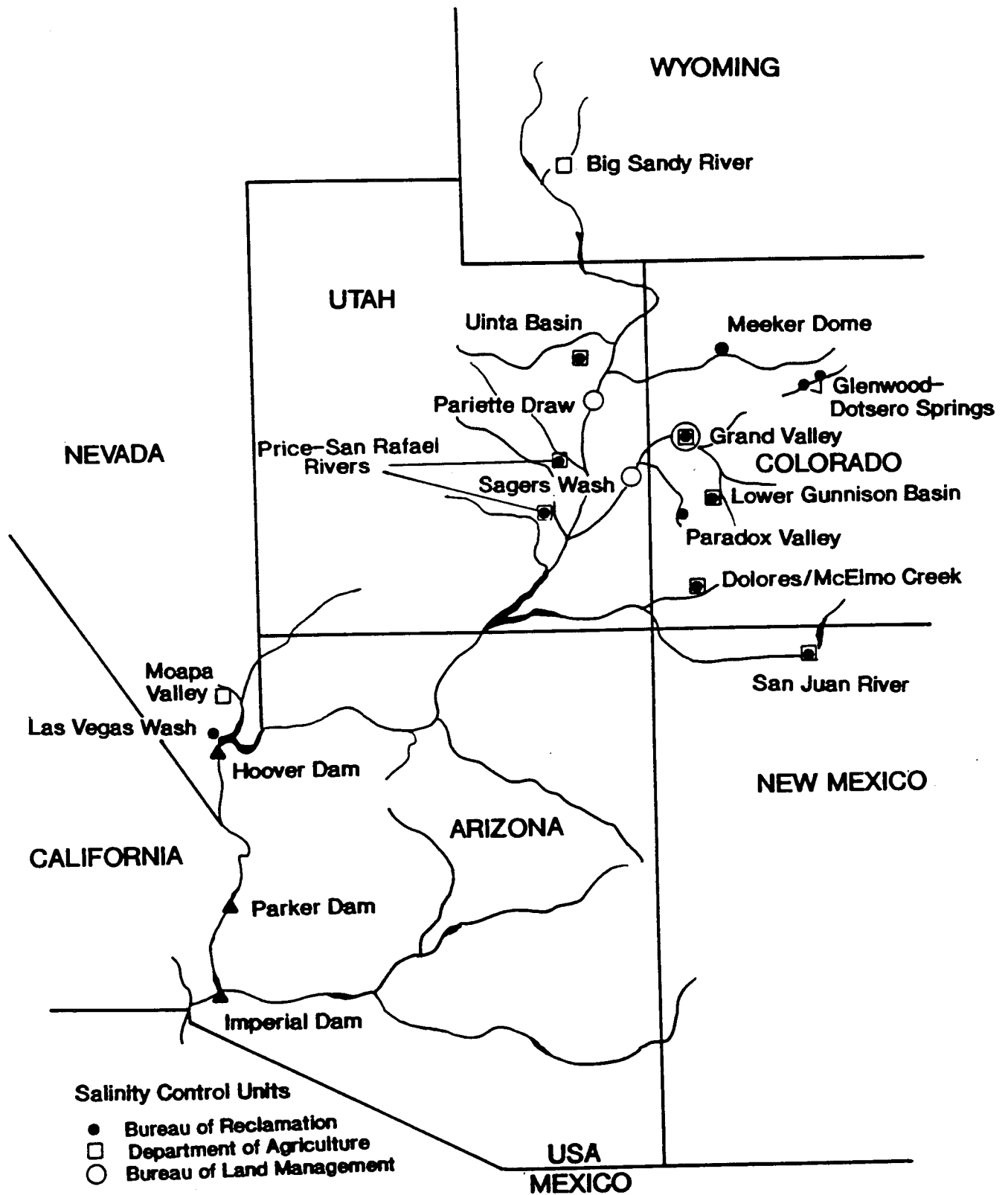
Glenwood Springs Desalinization (USBR/private)~ San Juan Hogback (USDA)  
 Sinbad Valley (USBR/BLM) San Juan Hogback (USBR)~  
 Lower Virgin River (USBR)~

~ Units needing congressional authorization.

3 - Examples of units investigated, but currently not being given further consideration:

Dirty Devil River (USBR) Mancos Valley (USDA)  
 Palo Verde Irrigation District (USBR/USDA) Lower Gunnison Stage I Balance (USBR)  
 Grand Valley II Balance (USBR) Lower Gunnison North Fork (USBR)  
 San Juan - Hammond Portion (USDA) Virgin Valley (USDA)  
 La Verkin Springs (USBR) Las Vegas Wash - excluding Pittman (USBR)  
 Saline water use and disposal

Figure 4.1  
Colorado River Basin Salinity Control Units



## **Reclamation/USDA Units Included in the Plan**

The following paragraphs briefly describe the units which constitute the recommended implementation plan. Detailed information on each unit can be found in the following reports:

Quality of Water - Colorado River Basin, Progress Report No. 16, 1993, U.S. Department of the Interior

1991 Joint Evaluation of the Salinity Control Program in the Colorado River Basin, January 1992, Bureau of Reclamation, Bureau of Land Management and U.S. Department of Agriculture, Soil Conservation Service

Monitoring and Evaluation Report - for each of the salinity control units currently being implemented by the USDA Colorado River Salinity Control Program

### ***Units Completed***

Three Reclamation units (Meeker Dome, a portion of Las Vegas Wash and Grand Valley Stage I) are completed. These units are preventing 73,700 tons of salt per year from reaching the Colorado River.

### ***Units Being Implemented***

Paradox Valley (Reclamation): Local ground water comes into contact with the top of a natural salt formation where it becomes nearly saturated with sodium chloride and surfaces in the Dolores River channel in Paradox Valley, Colorado. The river picks up over 205,000 tons of salt annually from this saline ground water source as it passes through the valley.

The salinity control program involves pumping the saline ground water, thereby lowering the water table and reducing saline inflows to the Dolores River. The pumped brine is injected into a deep well in the Paradox Valley. About 180,000 tons of salt would be removed annually by this unit.

The injection test well, the brine pipeline, the surface treatment building and the injection building have been completed. System testing and shakedown are underway and are scheduled to be completed in about two years.

Grand Valley (Reclamation and USDA): The area within the Grand Valley Unit in western Mesa County, Colorado, contributes 580,000 tons of salt annually to the Colorado River. Most of the salts are leached from the soil and underlying Mancos Formation by ground water that is recharged by deep percolation from canal and lateral leakage and onfarm application.

The Reclamation program in the Grand Valley is being implemented in two stages. Stage I, encompassing about 10 percent of the unit area, consisted of concrete lining 6.8 miles



of the Government Highline Canal (GHC), consolidating 34 miles of open laterals into 29 miles of pipe laterals and installing an automated moss and debris removal structure. Salt load reduction in Stage I from the canal and lateral improvements is estimated to be 21,900 tons per year (tons/yr). This work was completed in April 1983. To test the effects of Stage I improvements on ground water flows and quality, a hydrologically isolated subbasin within the Stage I area, the Reed Wash, was instrumented to monitor surface and ground-water inflow and outflow. This subbasin was used in the planning and design of Stage II.

Stage II construction began on the west end of the GHC system in the fall of 1986 and was essentially completed in 1991. Improvements to this reach reduced salt reaching the river by 25,600 tons/yr. Work on Stage II is continuing in the middle reach of the GHC system canal lining with replacement laterals. Construction in the more populated east end of the GHC required Reclamation to prepare an environmental assessment to evaluate the impacts of alternative methods of canal lining. In response to landowner concerns, Reclamation developed a plan which minimizes the need for right-of-way acquisition without increasing the project costs significantly. Construction of east end improvements started in 1992.

The 1977 Definite Plan Report and Environmental Impact Statement for the Grand Valley Unit were supplemented to add improvements to the privately owned Price and Stubb Ditches. Construction of these Stage II facilities started in 1991 under cooperative agreements with the Palisade Irrigation District and the Mesa County Irrigation District. Reclamation is continuing with planning and studies of other proposed components of Stage II.

USDA published the plan for the Grand Valley onfarm program in 1977 and in 1980 prepared a supplement to include improvements to lateral systems. The plan identifies a salt load reduction goal of 163,000 tons. The USDA program includes the installation of onfarm salinity reduction practices and lining or piping certain off-farm lateral systems which are needed to support the onfarm improvements. Implementation was initiated in 1979 under existing USDA authorities and in 1987 funding became available under the USDA Colorado River Salinity Control (CRSC) program.

As of September 30, 1992, a total of 3,264 annual Agricultural Conservation Program (ACP)/long-term agreements and CRSC contracts have been signed with participants. In addition, 180 farmers are ready to implement salinity reduction and wildlife habitat measures and have submitted applications for salinity control contracts. Because of insufficient USDA funds, salinity control contracts can be prepared and signed with only a limited number of these applicants. Farmers have installed 426 miles of pipelines and ditch lining. Major improvements have been made on 19,000 acres of surface irrigation systems including over 4,400 acres of land leveling. In addition, 38 sprinkler systems and 37 drip systems have been installed. The total USDA annual salt load reduction as of September 30, 1992, is 56,600 tons.

Uinta Basin (Reclamation and USDA): The area covered by the Uinta Basin Unit in northeastern Utah contributed about 450,000 tons of salt annually to the Colorado River System. Return flows from 204,000 acres of irrigated land account for most of the salt contribution.

Reclamation Phase I studies showed the only viable off-farm alternative in the study area is canal lining and identified about 56 miles of the total 240 miles of canals and laterals in the Uinta Basin that could be cost-effectively lined. Implementation of the Reclamation portion of this unit would reduce the salt load to the Colorado River by an estimated 21,000 to 30,000 tons/yr.

The final planning report/environmental impact statement (EIS) on the unit was filed with the EPA and released to the public in 1987. Congressional authorization of the Uinta Basin Unit is needed before implementation can proceed.

USDA published the Uinta Basin Salinity plan in 1970 and in 1987 prepared a supplement to include lateral systems. In 1991 the Uinta Basin Unit was expanded to include treatment on adjacent irrigated land. The plan identifies a salt load reduction goal of 106,800 tons. The USDA program includes the installation of onfarm salinity reduction practices and lining or piping lateral systems. The major emphasis is conversion of inefficient surface irrigation to sprinkler systems. Implementation was initiated in 1980 under existing USDA authorities, and in 1987 funding became available from the Colorado River salinity control program.

As of September 30, 1992, a total of 1,370 annual ACP/long-term agreements and CRSC contracts have been signed with farmers. Also 138 farmers, who are ready to implement salinity reduction and wildlife habitat measures, have submitted applications for salinity control contracts. However, contracts can be prepared and signed with only a limited number of these farmers because of inadequate USDA funding. Over 605 miles of underground pipelines and concrete lined ditches have been installed and 2,200 acres of land leveled. Over 1040 sprinkler systems have been installed on 67,000 acres and approximately 220 surface systems have been improved on 13,000 acres. Irrigation water management is being applied on 59,000 acres. The total salt load reduction achieved through 1992 is 55,500 tons/yr.

Lower Gunnison Basin (Reclamation and USDA): The Lower Gunnison Basin Unit is located in west-central Colorado. An estimated 360,000 tons of salt are contributed annually to the Colorado River.

Construction of the winter water portion of the unit is designed to eliminate ditch seepage during the non-irrigation season by providing a piped delivery system for livestock water. This component is proceeding ahead of schedule and under budget.

Studies on ways to reduce the cost of a canal and lateral lining program through cooperative construction agreements, cost sharing, and redesign of the delivery system to reduce canal and lateral lengths have been completed. This portion of the unit is scheduled to begin after the winter water improvements are completed.

The Lower Gunnison Basin USDA plan was prepared in 1981 and identified a salt load reduction goal of 280,500 tons. The USDA program includes the application of onfarm salinity reduction practices on 169,000 irrigated acres and improving off-farm irrigation laterals. Implementation was initiated in 1988.

As of September 30, 1992, 149 salinity contracts have been signed with participants. In addition 457 farmers have submitted applications for salinity control contracts, but contracts can be prepared and signed with only a limited number of these farmers because of inadequate USDA salinity control program funds. Farmers have installed over 48 miles of pipelines and concrete lined ditches. Six sprinkler systems have been installed, 706 acres of land leveled and 43 surface systems improved. A salt load reduction of 24,700 tons/yr has been accomplished.

*Big Sandy River (USDA)*: The Big Sandy River Unit is located in southwestern Wyoming. Below Big Sandy Reservoir water is diverted to irrigate lands in the Eden Project. Irrigation seepage into shallow aquifers near the Big Sandy River is the source of saline seeps. These seeps and springs below the Eden Project contribute about 116,000 tons of salt, and tributaries contribute about 48,000 tons of salt annually to the Green River.

The USDA Big Sandy River Unit plan was published in 1988. The USDA salinity control program consists of converting 15,700 acres of onfarm surface irrigation to low-pressure sprinkler systems. When fully implemented, the onfarm program will reduce the salt loading by 52,900 tons/yr.

As of September 30, 1992, 47 salinity contracts have been signed with participants. Also 19 farmers have submitted applications for salinity control contracts, but inadequate USDA funds allow the preparation and signature of contracts with only a limited number of these farmers. Thirty-five sprinkler systems have been installed on 3,200 acres, 3 surface systems have been improved on 56 acres and 14 miles of pipeline have been installed. The annual salt reduction from these practices is estimated at 12,500 tons/yr.

*Dolores Project/McElmo Creek (Reclamation and USDA)*: Irrigation and other nonpoint sources in the McElmo Creek area of southwestern Colorado result in an estimated salt load of 119,000 tons/yr to the Colorado River.

Salinity control as an added feature of the Dolores Project, already under construction by Reclamation, was authorized by the 1984 amendment to the Salinity Control Act. Reclamation modified the design of Towaoc Canal to allow abandonment and consolidation of certain ditches and is in the process of lining other ditches and installing piped laterals to reduce salt loading from ditch seepage. These improvements, scheduled for completion in 1994, are described in the 1989 Supplement to the Final Environmental Statement for the Dolores Project.

The McElmo Creek Unit, as described in the Soil Conservation Services's (SCS) 1989 Environmental Impact Statement, will remove 38,000 tons/yr of salt from the Colorado River. The plan will provide for the installation of sprinkler irrigation systems on 19,700 acres, including 268 miles of pipeline, and surface improvements to another 1,800 acres.

As of September 30, 1992, a total of 91 contracts have been signed with participants. In addition 336 farmers have submitted applications for salinity control contracts. These farmers are ready to implement salinity reduction measures, but only a limited number of contracts can be prepared and signed because of inadequate funding. Since the program was initiated, 29

miles of pipelines and 49 sprinkler systems on 950 acres have been installed. The salt load reduction accomplished to date is 2,300 tons/yr.

**Moapa Valley (USDA):** This unit is located in southeastern Nevada and includes 19,500 acres of irrigated land in the Meadow and Moapa Valleys along the Muddy River, immediately upstream from Lake Mead. This unit includes installation of a 46-mile underground piped delivery system and onfarm salinity control practices. By reducing seepage and excess deep percolation, the annual salt load is expected to be reduced by 18,700 tons. The final Plan/EIS was issued in January 1993, and a Record of Decision was published in the Federal Register on February 26, 1993. In 1989, the Nevada State Legislature appropriated \$500,000 for implementation, contingent upon matching funds from Clark County and the Muddy Valley Irrigation Company.

**San Juan River-Hammond (Reclamation and USDA):** San Juan River Unit drainage contributes approximately one million tons of salt annually to the Colorado River Basin. In the Hammond area, Reclamation has completed a draft planning report/EIS. The recommended plan proposes to line all unlined sections of the Hammond Project Irrigation system. The estimated salt load reduction would be 28,000 tons/yr. SCS completed an investigation in 1992 to explore the potential for a USDA program in the San Juan River Basin in the Hammond area. Investigations indicated that a USDA onfarm program is not cost-effective in this area.

**Price-San Rafael Rivers (Reclamation and USDA):** An estimated 430,000 tons of salt annually reaches the Colorado River from these two river basins. The Price and San Rafael rivers, tributaries of the Green River, Utah are 120 miles southeast of Salt Lake City.

SCS and Reclamation prepared a draft joint plan and EIS for the Price-San Rafael Rivers Unit. Reclamation will install salinity control features in the irrigation distribution system and USDA will assist individuals and groups with applying onfarm salinity reduction practices.

The draft planning report/EIS has been completed, and the final planning report/EIS is scheduled for completion in 1993. Under the preferred plan, salt loading to the Colorado River System would be reduced by an estimated 161,000 tons/yr.

#### ***Units Under Consideration But Not Currently in the Plan***

**San Juan - Hogback (Reclamation and USDA):** In 1992 investigations were initiated in the San Juan River Basin west of the Hogback to determine if a salinity control project is cost effective in this area. The study area lies within the boundaries of the Navajo Indian Nation.

**Lower Virgin River (Reclamation):** In April 1992, Reclamation began a cooperative study with the Las Vegas Valley Water District of a water supply and salinity control project on the Lower Virgin River in Nevada. The water would be desalted for use in Las Vegas Valley. The plan is to divert water from the Virgin River, desalt the diverted water, and pipe it to the Las Vegas Valley. A Preliminary Findings Report was completed in April 1993.

*Glenwood Springs Desalination (Reclamation)*: One of the partners in the cogeneration/desalting proposal for Glenwood Springs has withdrawn from the project because of difficulties locating an acceptable site for electrical generation. A manufacturer of thermal and membrane desalination equipment is now a partner in the project. The plan is to convert the project from a cogeneration/desalting unit to a pure desalination facility. Studies are underway by the proponents on the feasibility of the proposal.

*Sinbad Valley (BLM and Reclamation)*. Sinbad Valley is in western Colorado, south of the town of Gateway. Seeps entering Salt Creek, which drains Sinbad Valley, have been identified as point sources of saline ground water contributing an estimated 5,000 to 8,000 tons/yr of salts to the Colorado River system.

The BLM initiated a feasibility study of the interception and disposal of these saline waters during fiscal year 1982 and prepared a report on Sinbad Valley in April 1983. This report identified six alternatives and recommended that lead responsibility and funding be assumed by Reclamation.

Before final selection can be made, additional information is needed. The additional information includes: discharge and conductivity measurements to define salt loads of high flows, on-site evaporation data to further refine the sizing of evaporation ponds for an evaporation alternative, and data on the abandoned wildcat well, No. 1, Sinbad Unit, to assess the suitability for deep well injection of the collected brines. In addition to the technical issues, questions relating to water rights and compatibility of the project with existing land uses must be resolved prior to proceeding.

### ***Units Investigated But No Longer Being Considered***

A number of salinity control measures have been investigated but they are no longer being considered because the cost effectiveness was extremely poor. These units include: Dirty Devil River, Utah; La Verkin Springs, Utah; Palo Verde Irrigation District, California; and Grand Valley Stage II Balance, Colorado. A description of these units can be found in Quality of Water, Colorado River Basin, Progress Report No. 16, 1993.

## **Bureau of Land Management**

### ***Overview***

The BLM is moving forward with the implementation of actions which will minimize point and nonpoint salt discharges to the Colorado River. Resource Management Plans are being implemented through activity plans. These plans (usually comprehensive Watershed Management Plans) prescribe management activities, treatments and/or structural projects for salinity control, with consideration for other resource values. To ensure technical consistency and comparability, all watersheds are being ranked by federal/state interagency teams to establish

relative salinity control priorities. Watershed rankings have been completed for Colorado and Utah, are underway in Wyoming, and are planned in Arizona, Nevada and New Mexico.

As the agency responsible for leasing all federally-owned mineral resources, opportunities occur for BLM and cooperating agencies to reduce saline water discharge from oil and gas operations. Production water disposal requirements are outlined in "Notice to Lessees and Operators of Federal and Indian Oil and Gas Operations". BLM has worked closely with the New Mexico Oil Conservation Division to plug several orphan wells having no clear owner, and BLM anticipates many more wells can be plugged under this industry-funded program.

BLM's approach to controlling salinity is to manage for proper land use to ensure healthy ecological systems and processes. Proper objectives for rangeland, recreation, energy and minerals management have the greatest potential for reducing salinity from public lands.

### ***BLM Units Included in the Plan***

***BLM Units Completed:*** Control of point sources (either flowing wells or springs) by the BLM at various locations has reduced approximately 8,000 tons/yr of salt discharge, and nonpoint source salinity control measures have been completed which control 2,800 tons/yr.

***BLM Units Being Implemented:*** Flowing wells and springs continue to be controlled at various locations. It is estimated that another 6,000 tons of salt reduction can be accomplished at known point sources.

Implementation of salinity control activities is underway in Colorado at Milk/Alkali, Exclosure, and Baking Powder Basins. The Montrose District plans to revise its plans for salinity control at Spring Creek Basin and Disappointment Valley. BLM and Reclamation have developed a draft Interagency Agreement for work in the Grand Valley. Lower Wolf Creek and Milk/Alkali are being maintained, and monitoring is underway at Lower Wolf, Elephant Skin Wash and Milk/Alkali.

Utah's comprehensive planning for salinity control is completed at Sagers Wash and is underway in the Vernal District portion of the Red Creek Basin. Implementation is underway at Sagers Wash and Castle Peak-Pariette.

Monitoring at two climatological and 82 watershed sites is proceeding to support more salinity control activities in the Richfield and Cedar City Districts, and the Vernal District's Castle Peak Project. BLM is also engaged in a cooperative monitoring effort with Reclamation at Sagers Wash, Utah.

The draft Muddy Creek-Ordersville watershed plan and EIS (BLM/SCS) is scheduled for completion in 1993 and will establish implementation dates for this 1,700 tons/yr salt removal effort (of which 1,390 tons/yr is BLM). The USDA portion would be funded under P.L. 566.

In the Wyoming portion of the Red Creek Basin, implementation of previous planning continues, with a goal of 500 tons/yr salt removed. Combined, all of the BLM units for nonpoint source salinity control (units underway and/or identified as potential) will prevent 41,000 tons of salt from entering the river system.

***BLM Units Under Consideration But Not Currently in the Plan:*** Investigations of salinity control opportunities are underway in Nevada's Caliente Resource Area, the Bullrush Draw (Kaibab Creek), Clayhole and Hurricane Wash areas of Arizona, and in Colorado's Powder Wash, Vermillion Creek, Evacuation Creek Basins and two areas of the Uncompahgre. Comprehensive planning is underway for Exclosure and Baking Powder Basins.

In New Mexico's San Juan Basin, BLM has continued to identify oil and gas wells which need to be plugged. In the Aneth area, the USGS, through an Interagency Agreement with BLM, will determine the sources of salt loading, so that control strategies might be developed. On BLM roads and right-of-ways, maintenance and corrective measures have been taken to minimize sediment transport from saline soil areas.

The Round Valley, Utah, project would remove 350 tons/yr of salt. Preliminary engineering studies have been conducted on a potential site for a large sediment control structure. Alvey Wash, in the Escalante River Basin, is undergoing comprehensive planning. The Birch Creek, Blind Trail, Factory Butte, and Last Chance areas in Utah's Richfield District have been assessed for potential salinity control projects.

Three more wells in the Rock Springs District are under consideration for plugging (280 tons/year of salt). Salinity controls are being implemented at the Muddy Creek site in Wyoming.

### **Fish and Wildlife Service (FWS)**

The authorities set forth in the Endangered Species Act, Fish and Wildlife Coordination Act, Clean Water Act, National Environmental Policy Act and the Migratory Bird Treaty Act, provide for FWS participation in the Colorado River salinity control program. It is mainly through these legislative authorities that the FWS works toward meeting its objective of providing the federal leadership to conserve, protect, and enhance fish and wildlife and their habitat for the continuing benefit to the public.

There is a biological diversity of fish and wildlife resources and a great number of unique species in the Colorado River Basin. This river system has one of the largest lists of threatened and endangered fish and wildlife species in the United States as well as significant other resources, including migratory birds and waterfowl, non-migratory birds, big game, plus the wetlands, riparian lands, and other habitats that support these wildlife.

In general, FWS activities consist of evaluating proposed salinity control projects of Reclamation, USDA and the BLM, and preparing related Fish and Wildlife Coordination Act reports, Planning Aid Memorandums, biological opinions, and commenting on Draft

Environmental Impact Statements and biological assessments. The Salt Lake City Field Office provides the overall program coordination for the Service.

FWS participation in the planning process for the salinity control program is provided through a variety of planning/working/coordinating interactions with Reclamation, SCS, EPA, BLM, the Forum, state agencies, Indian tribes and the general public. Lists of threatened and endangered species that may occur in the salinity control project areas are provided by the FWS. Biological opinions are formulated by the FWS for projects where threatened or endangered species may be affected.

Controversy has arisen over the anticipated effects of salinity control measures on wetlands. Replacing the loss of irrigation-induced wetlands may result in conflicts between the primary objective of salinity control, protection of water quality, and other regulatory programs requiring the replacement of wetland values lost.

Much of the salt load is attributed to seepage from leaking irrigation water distribution systems and deep percolation from inefficient onfarm irrigation. This seepage and deep percolation also provides the source of water for many of the irrigation-induced wetlands in the salinity project areas. As seepage and deep percolation are reduced, some of the irrigation-induced wetlands will be unavoidably lost.

The implementation of USDA salinity control projects has made apparent the conflict between legislation authorizing the USDA salinity control program and wetland protection and mitigation requirements of NEPA, Executive Order 11990 and USDA policy. P.L. 98-569 directs USDA to implement a voluntary, not mandatory, program to replace incidental fish and wildlife values foregone. Voluntary programs to date have not fully replaced anticipated fish and wildlife values foregone in USDA projects that are being implemented. This conflict has resulted in disputes between the states and USDA on one hand and FWS and EPA on the other. Resolution of this dispute must be reached in order for the USDA salinity control projects to achieve full salt reduction goals. Communication and cooperation among FWS, USDA, EPA, Reclamation and the states is necessary in order to accomplish satisfactory progress.

### Geological Survey

The Geological Survey's Water Resources Division provides and analyzes hydrologic information to assess the Nation's water resources. Programs are developed with cooperation and financial support from state, local and other federal agencies. The programs provide hydrologic and geochemical information for evaluation of surface and ground water systems as well as for management and policy decisions.

To provide information required by the federal, state and local agencies to address Colorado River water quantity and quality issues, the Water Resources Division operates and maintains a network of about 520 stream gaging stations and 140 water quality stations in the Colorado River Basin. Streamflow and water-quality information from these stations provide input to the hydrologic database for Reclamation's Colorado River Simulation System. In



addition to collecting hydrologic data, the Water Resources Division conducts specific studies on surface water, ground water and water quality.

### **Environmental Protection Agency**

The major EPA programs relating to Colorado River salinity control are: (1) water quality management planning; (2) water quality standards; (3) National Pollutant Discharge Elimination System (NPDES) permits; (4) review of NEPA documents; (5) nonpoint source control under Section 319 of the Water Quality Act of 1987; (6) wetlands protection; and (7) the Underground Injection Control (UIC) Program. For the most part, these programs are either implemented by the states under federal statute (such as the water quality standards program) or delegated to the states by EPA (such as the NPDES program). EPA maintains oversight responsibilities for the assumed and delegated programs, and has responsibility for reviewing and approving water quality standards, including salinity. EPA continues to encourage the Basin states to develop and implement the basin-wide and state salinity control strategies.

Section 303 of the Clean Water Act (the Act) requires states to adopt water quality standards, pursuant to their own laws, that are consistent with the applicable requirements of the Act. The Forum, through its Work Group, has been re-affirming the numeric criteria for salinity and developing a new basin-wide plan of implementation for salinity control for the seven Basin states every three years to satisfy the triennial review requirements of the Act. Following adoption of the standards by each state, it is the responsibility of the EPA regional administrators to approve or disapprove the standards based on consistency with the Act's requirements.

EPA-drafted NPDES permits for federal and Indian facilities in the Colorado River Basin must incorporate the requirements set forth in the Forum's policies.

EPA reviews NEPA documents for both salinity and non-salinity control projects of other agencies. Through review of non-salinity projects, EPA urges the identification of potential salinity impacts and encourages discussion of mitigation of adverse impacts as required by the Council on Environmental Quality regulations for implementing NEPA (40 CFR Parts 1500-1508). For example, EPA will comment on potential salinity impacts, when appropriate, when reviewing EIS's for grazing and land management, recreational developments, mining and water development projects. In addition, EPA encourages the development of mitigation measures for adverse impacts to satisfy state and Forum policies for salinity control and through Clean Water Act Section 401 certifications for activities subject to federal permitting actions. The Forum policy encouraging the use of water with higher total dissolved solids for industrial purposes is being supported primarily through NEPA review responsibilities.

The basis for wetland protection and mitigation is established in the regulations for compliance with NEPA, Executive Order 11990, and USDA policy. However, preserving irrigation-induced wetlands and reducing salt loading to the Colorado River may present conflicts between authorizing legislation and other regulatory programs. A portion of the salt load in the Colorado River system is attributed to seepage and deep percolation from leaking irrigation canals and laterals, and poor onfarm irrigation systems and water management. Some of these

inefficient irrigation systems and practices are the source of water for many of the wetlands associated with salinity control units. As seepage from irrigation systems is reduced and irrigation efficiencies improved, some portion of these irrigation-induced wetlands may be impacted or lost. The concept of replacing irrigation-induced wetlands and the need to reduce the salt load in the Colorado River presents difficult choices between environmental values of improved water quality and wetland preservation. Landowners are volunteering to implement wildlife habitat practices, including wetland replacement, as was contemplated by the Act. The rate at which such replacement is occurring has been a matter of concern to the EPA. EPA utilizes NEPA review and other types of coordination with state and federal agencies as the means to participate in wetland assessment, monitoring, replacement and reporting activities.

Section 319 funds have been appropriated since Fiscal Year 1990 for the states to implement nonpoint source water pollution control programs. EPA encourages the states to assure that salinity is addressed in updates to their nonpoint source assessment report and management plans. EPA also encourages the states to consider salinity control benefits as they make decisions on Section 319 funding for their priority watersheds.

# CHAPTER 5 - PLAN OF IMPLEMENTATION - STATE PROGRAMS

## OVERVIEW

Important components of the plan of implementation for salinity control are the Basin states' activities associated with the control of total dissolved solids through the National Pollutant Discharge Elimination System (NPDES) Permit program and the water quality management plans. Each of the states has adopted all of the Forum policies presented in Appendix B. A listing of the NPDES permits in force within the Colorado River Basin are presented in Appendix C. During the period of this review, the status of implementation of the NPDES permits and the water quality management plans in each of the states is as follows.

## ARIZONA

### NPDES Permits

Authority for issuing NPDES permits has not been delegated to the state and still resides in the Region IX office of EPA. Arizona is currently operating under an "interim" plan in which the state prepares the permit, solicits public comments and involvement, and forwards the final draft to EPA for approval and issuance.

Arizona, in drafting NPDES permits for industries throughout the Colorado River Basin within the state above Imperial Dam, follows the Forum's policy regarding salinity control. Reuse of treated wastewater is encouraged as a general principle.

Presently there are 48 discharges in Arizona that are subject to the NPDES program and drain into the Colorado River above Imperial Dam. There are:

Municipal/Quasi-Public (Including Federal/Indian Reservation Facilities)	44
Industrial	4

One industrial facility is under a Clean Water Act, Section 308 Order, for discharging without a NPDES permit.

The Department of Environmental Quality annually reviews monitoring reports of facilities potentially discharging under NPDES permits. No permitted facility is discharging more than one ton per day or 350 tons/yr of TDS; and in most cases discharges are to ephemeral tributaries which are remote from the main stream of the Colorado River.

## **Water Quality Management Planning**

The Northern Arizona Council of Governments (NACOG) is the designated area-wide water quality planning agency for the Colorado River and its tributaries in the northeast and north central parts of the state, while the Western Arizona Council of Governments has similar responsibilities for Mohave, La Paz and Yuma Counties. The NACOG area-wide 208 Plan is in the update process which will be completed in 1993.

## **Other Activities**

In 1986, the Arizona State Legislature adopted the State Environmental Quality Act (H.B. 2518). The Act established a new Department of Environmental Quality on July 1, 1987. The water quality staff of the Department is developing programs to protect the quality of both surface and ground water, including point source and nonpoint source management, permitting, and pesticides management. The State Nonpoint Source Water Quality Assessment and Management Plan reports have been approved by EPA and demonstration projects are being evaluated. The State Nonpoint Source Management Plan provides for consistency reviews in accordance with Section 319(k) of the federal Clean Water Act. Consistency reviews provide an effective mechanism for states to ensure proposed projects and programs contribute to improved water quality management. Categories of projects and programs related to salinity control include irrigation systems, salinity control projects impoundments, diversion and rangeland management.

## **CALIFORNIA**

### **NPDES Permits**

The California Regional Water Quality Control Board, Colorado River Basin Region, issues the NPDES permits for navigable waters and waste discharge requirements for land discharges within the Colorado River drainage portion of the state. In issuing and reissuing waste discharge requirements, the Regional Water Quality Control Board complies with all Forum policies. In addition, the Regional Board has included in the discharge permit requirements for land discharges a prohibition of brine backwash from water softeners into evapo-percolation ponds which overlie ground waters which are in hydraulic continuity with the Colorado River system. Industrial discharges are to be confined in impervious evaporation basins.

### **Water Quality Management Planning**

The Water Quality Control Plan for the Colorado River Basin was adopted by the California Regional Water Quality Control Board in May 1991. Following public hearings, the updated plan was adopted by the Regional Water Quality Control Board and approved by the State Water Resources Control Board in August 1991. The revised plan became effective upon

approval of the State Board. The salinity control component of the water quality plan is consistent with the Forum's plan of implementation for salinity control. The Regional Water Quality Control Board is working with the Forum and local entities to ensure that implementation of the water quality plan is achieved.

### **Other Activities**

State Water Resources Control Board policy 75-58 established priorities for the use of poor quality waters for cooling of inland power plants and has been in effect since 1975. The State Water Resources Control Board has included salinity control in the Colorado River among its top priority items.

## **COLORADO**

### **NPDES Permits**

Administration of the NPDES permit program was delegated to the State of Colorado, Water Quality Control Commission (WQCC), by the EPA in May, 1978. The Commission's regulation for implementation of the Colorado River Salinity Standards reflect all of the Forum policies adopted to date. All existing, new or reissued permits require compliance with this regulation.

Currently (March 1, 1993), there are 289 NPDES permits in the Colorado River Basin portion of the state, of which 148 are domestic or municipal and 143 are industrial facilities. Of this total, there are 8 major industrial permits and 26 major municipal permits.

Colorado is continuing to insure that the Forum's policies are implemented through the WQCC regulations. Monitoring is in place for all permits in the basin. Industrial and municipal permittees who cannot meet the Forum's policies of no salt return or the 400 mg/L incremental increase are required to conduct studies to demonstrate that meeting these standards is not practicable.

### **Water Quality Management Planning**

In the Colorado River Basin of Colorado there are four water quality planning regions. Opportunities for salinity control were identified in the management plans for all areas of the Colorado River Basin within Colorado. Critical salt yielding areas were assessed by the USDA, Colorado Soil Conservation Board and local soil conservation districts. All updated 208 plans continue to contain lists of the NPDES permits within each area and stream classifications.

Region 9 covers primarily the San Juan Basin portion of Colorado. Salinity projects in this area include McElmo Creek and portions of the Dolores Project. The Region 10 plan covers primarily the Gunnison and Dolores River Basins. Salinity projects in this region include

the Lower Gunnison and Paradox Valley units. Region 11 includes the Colorado main stem below Dotsero, and the lower reaches of the White and Yampa Rivers. The salinity control projects in this region are Grand Valley, Glenwood-Dotsero and Meeker Dome. Region 12 is comprised primarily of the high mountain headwaters of the Colorado River and produces little salt loading to the river system. The updated Water Quality Management Plan for this region has been certified by the state and submitted to EPA for approval. The regional plan directs salinity control efforts towards control of point sources and local control of nonpoint sources in the form of urban runoff restrictions.

Colorado is endeavoring to fully implement the Section 208 plans as funding allows. To aid in this effort, when possible Colorado will utilize Section 319 funding available to it under the Clean Water Act.

### **Nonpoint Source Program**

Pursuant to Section 319 of the amended (1987) Clean Water Act, Colorado developed a "Nonpoint Source Assessment Report" which identified stream segments impacted by nonpoint source pollution and categories of nonpoint source pollutants which added significant pollution to those stream segments. The report also recognized the impacts caused by salinity from nonpoint sources on several stream segments and principally attributed the elevated salinity levels in those segments to agricultural activities (i.e. irrigation and soil erosion due to grazing). It further recognized the significance of the salinity control efforts which have been made pursuant to the Colorado River Basin Salinity Control Act of 1974. The assessment report also recognized the need for development of best management practices (BMPs), to control nonpoint source pollution and a handbook of BMPs was completed in May 1989.

The "Colorado Nonpoint Source Management Program" was completed by the State and approved by EPA in May 1989. The program is intended to provide an implementation strategy for the future treatment of water quality problems identified in the Assessment Report. The program sets forth the roles and responsibilities of the various subcommittees; which include representatives from local, state, federal and private organizations, that are responsible for implementing the nonpoint source program in Colorado. The program includes:

1. A description of each committee's membership and tasks it undertakes;
2. A priority system for reviewing, ranking and recommending nonpoint source control projects, to establish their eligibility to receive state and federal monies set aside for such projects; and
3. A description of the management program and BMP's utilized by each subcommittee (agriculture and silviculture, urban and construction runoff, mining impacts and hydrologic modifications).

Several nonpoint source control projects, for both statewide management and individual nonpoint source control, which will reduce salinity in the Colorado River Basin have been

approved by the subcommittees for implementation. Other projects are contemplated and will be implemented as project plans are developed and funding becomes available. The most recent annual report on Section 319 activities was prepared in October 1992.

### **Other Activities**

Colorado has continued its support of the basin-wide approach to salinity control through its participation in the Colorado River Basin Salinity Control Forum and associated activities. The State of Colorado has put significant work into the Grand Valley Salinity Control Unit coordination efforts since installation of facilities began in 1979.

The Colorado Soil Conservation Board, with support from other state agencies, is continuing its work with the SCS, ASCS and local soil conservation districts to direct, as appropriate, available federal soil conservation funding programs towards improvement of onfarm irrigation practice. The salinity control benefits of improved practices are one of the reasons for this effort. The Board also took the lead in a recent effort with the BLM to identify and rate watersheds for salinity potential on rangelands.

A proposal for a federal-private desalinization project at Glenwood Springs has been submitted by a private contractor. The proposal calls for desalting saline water from the Glenwood Springs in a privately financed and operated facility, with the salinity program only paying for the tons of salt actually removed. Legislation authorizing and funding the unit will be required and will be introduced before Congress when site-specific environmental work is completed.

## **NEVADA**

### **NPDES Permits**

EPA has delegated the Nevada Division of Environmental Protection (NDEP) authority to issue NPDES Permits. Basic Management Industries (BMI) has eliminated industrial wastewater discharges to Las Vegas Wash. BMI now pipes wastewater to lined ponds where it evaporates. Two of the companies have been issued permits which allow discharge of cooling water to Las Vegas Wash with a limit of no more than 75 mg/L TDS greater than the water supply. Another Basic Management company has been issued a permit which allows discharge of surface stormwater runoff.

In the past, the Nevada Power Company (Company) discharged brackish cooling water from both the Clark and Sunrise Power Plants into Las Vegas Wash. Permits now prohibit such discharges and the Company treats and recycles water for further cooling before final disposition into lined evaporation ponds. The new recycling process has reduced the cooling water requirement by about 75 percent.

The City of Las Vegas and Clark County Sanitation District (CCSD) were issued new discharge permits in January 1992. The City and County permits allow a flow of up to 66 and 90 million gallons per day (MGD), respectively, through January 1997. Changes from the previous permits include Waste Load Allocations (WLA) for total phosphorus and total ammonia, whole effluent toxicity testing, chlorine residual limits, and an ambient monitoring program in Las Vegas Wash and Las Vegas Bay. The WLA for total phosphorus will apply from March through October and ammonia from April through September. The WLA do not apply to other periods of the year.

The City of Henderson was issued an NPDES permit in September 1992 to seasonally discharge up to 9.5 MGD to Las Vegas Wash from November through February. The Board of County Commissioners has approved an amendment to the Clark County 208 Plan which allows the City of Henderson to discharge up to 10 MGD on a year-round basis in addition to the seasonal 9.5 MGD discharge. In order for Henderson to discharge to Las Vegas Wash in the WLA period, new NPDES permits reflecting adjustments to the WLA will be required for each entity. Henderson will continue to use rapid infiltration basins and subsequent re-use. Henderson has an extensive re-use system, which NDEP encourages, including parks, cemeteries, a golf course and a green belt along the Boulder Highway.

The CCSD plans to make direct discharge of part of Laughlin's wastewater effluent into the Colorado River and to make reuse of the remainder on local golf courses. The CCSD estimates that by the year 2000, 7,000 af/y of treated effluent in Laughlin, a rapidly growing resort area located adjacent to the Colorado River, will ultimately be available, 2,000 af/y will be reused, and 5,000 af/y will be returned to the Colorado River for credit. An NPDES permit has been issued. The quality of the waters affected by this permit will be closely monitored and all necessary programs to protect water quality standards will be implemented.

Nevada is continuing to apply the policies adopted by the Forum.

### **Water Quality Management Planning**

A Section 208 Water Quality Management Plan for Clark County was approved by the Board of County Commissioners in December 1979 and approved by EPA in October 1981. The plan has been amended on several occasions to address changing water quality needs due to growth in urban and rural areas of the County. The most recent comprehensive rural area amendment was approved in November 1988. The most recent comprehensive update for the Las Vegas Valley was approved by the Board of County Commissioners in June 1990 and approved by EPA in January 1993.

The 1990 urban area amendment updated Las Vegas Valley water quality management practices with respect to wastewater treatment, effluent reuse, water conservation, flood control, stormwater permitting, and the Las Vegas Wash. It also evaluated the primary and secondary environmental impacts resulting from the updated strategies and discussed appropriate mitigation measures. The 1990 amendment incorporated a previous 1989 amendment that updated population projections and wastewater flow projections for the designated planning area in Clark



County through the year 2010. Other 1990 amendments incorporated facilities plans for the City of Henderson, the City of Mesquite and the unincorporated area of Laughlin.

On January 4, 1993, the Board of County Commissioners approved a 208 amendment to permit year-round discharge of treated effluent to the Las Vegas Wash by the City of Henderson. A request has been submitted to the NDEP to reallocate wasteloads to the Las Vegas Wash to permit year-round discharge by the City of Henderson Water Reclamation Facility. Currently, wasteloads are allocated to the CCSD and the City of Las Vegas wastewater treatment facilities. Affected local entities have also requested that the State reevaluate Total Maximum Daily Loads (TMDLs) for discharge of ammonia and phosphorous to the Las Vegas Wash. Clark County has requested that the Nevada Division of Environmental Protection use designated Section 604(b) funds for the water quality modeling in the Las Vegas Wash that is needed to evaluate requested changes to TMDLs.

Expansions of the CCSD and City of Las Vegas wastewater treatment facilities are underway in accordance with approved 201 facilities plans. Industrial pre-treatment permits are being required by the CCSD for reverse osmosis treatment of shallow ground water and on-site treated gray water to be used by the Mirage/Treasure Island development in its landscaping and decorative water features. This represents a new beneficial use of shallow saline ground water that is pumped for dewatering around building foundations. Local government entities within urban Clark County are also participants in the NPDES Stormwater Permit Technical Committee to identify and implement measures to meet State stormwater permitting requirements. Future 208 amendments are expected to address gray water issues and shallow ground water issues, to update population projections, and to incorporate BMPs identified in the stormwater permit for the Las Vegas area entities.

### **Facilities Plans**

The City of Henderson began construction of a ten MGD treatment plant in January of 1993. Upon completion of this plant, the City will have the capability to treat 19.5 MGD of wastewater. The City has been granted a permit to discharge secondary effluent to the Las Vegas Wash during the winter months. Effluent disposal will be accomplished by a combination of subsurface disposal via rapid infiltration basins, irrigation on golf courses, a highway median, other public areas, and by discharge to the Las Vegas Wash during the winter months. Infiltrated effluent will eventually reach the Las Vegas Wash as a subsurface flow. At some time in the future the City may have to discharge to the Las Vegas Wash year round, in which case, nutrient removal will be required during the summer months.

The CCSD is constructing a project which will increase the District's advanced secondary treatment capacity to 65.6 MGD. This should be sufficient capacity for projected wastewater flows through the year 2000. The advanced secondary treatment plant will provide nitrification to reduce ammonia to required levels. Effluent from the advanced secondary treatment plant will be pumped to the AWT plant for additional treatment which includes the removal of phosphorus.

The capacity of the City of Las Vegas' treatment plant is 66 MGD. The treatment plant provides secondary treatment and phosphorus removal. Nitrification facilities, to reduce the concentration of ammonia, are under construction. The treatment plant treats the flows of both the Cities of Las Vegas and North Las Vegas.

### **Other Activities**

A program has been developed by CCSD, Las Vegas, and North Las Vegas to coordinate, investigate, and encourage the implementation of management practices resulting in reduction of wastewater salinity. The principal emphasis of this program will be directed toward salinity control to meet the requirements of the NPDES permits issued to Clark County, the City of Las Vegas, and Henderson.

## **NEW MEXICO**

### **NPDES Permits**

Authority for issuing permits has not been delegated to the state. Currently, the program is being administered by EPA, Region VI, except for facilities located on the Navajo Indian Reservation which are administered by Region IX. EPA is following Forum policy in the administration of the permit program. All new or renewed discharge permits contain language requiring the permittee to adhere to Forum policy regarding salt discharges.

In the Colorado River Basin within the state, the following permits have been issued:

- A. Industrial permits: electric power generation (3), coal mines (8), uranium mines (3), sand and gravel operations (3), small domestic sewage treatment plants (4), small process water treatment facility (1), drinking water treatment plant (1), and an underground storage tank clean-up program (1).
- B. Municipal discharge permits: major sewage treatment plants (3) minor sewage treatment plants (2), and federal/Indian wastewater facilities (10).

### **Water Quality Management Planning**

Major elements of the State of New Mexico Water Quality Management Plan (Plan) that are applicable to the Colorado River Basin are sediment control, silviculture and irrigated agriculture. The New Mexico Water Quality Control Commission is responsible for the Plan's adoption in New Mexico. The initial Plan was adopted in two parts in October 1978 and May 1979. The most recent update to the Plan was adopted in 1991. The Plan recognizes the importance of working cooperatively with the Forum.

The Plan covers the entire state except for that portion of the Navajo Reservation lying therein. Planning within the reservation is the responsibility of the Navajo Tribe. Much of the Colorado River Basin in New Mexico is within the reservation.

The Plan encourages the voluntary use of BMPs to control or reduce nonpoint source pollution. The Plan designates the San Juan River Basin in New Mexico as one of the four priority basins for implementation of BMP's for sediment control.

The 1984 Plan included designated management agencies responsible for implementation of the nonpoint source control programs set forth therein. The agencies designated for portions of New Mexico lying within the Colorado River Basin are:

- New Mexico Forestry Division for silviculture;
- New Mexico State Highway Department, New Mexico State Park and Recreation Division, and Jicarilla Apache Tribe for rural road construction and maintenance;
- New Mexico State Land Office and U.S. Bureau of Land Management for sediment control;
- U.S. Forest Service for sediment control, rural road construction and maintenance, and silviculture, and;
- U.S. Bureau of Indian Affairs for sediment control, rural road construction and maintenance, silviculture, and irrigated agriculture.

Another management strategy used to control nonpoint source pollution was developed by the state under Section 319 of the 1987 Amendment to the federal Clean Water Act. This section required each state to develop an assessment of its nonpoint source impacted waters and a management plan for controlling pollution from nonpoint sources. Both the assessment and the management program have been approved by EPA. The goal of the management plan is to develop and implement a program which will reduce human-induced pollutants from nonpoint sources entering surface and ground waters. The New Mexico Nonpoint Source Pollution Management Program has been in effect now for three years. The state is making steady progress in identifying, controlling and abating existing nonpoint source pollution problems and in preventing additional nonpoint source concerns. Several state and federal land management agencies such as the U.S. Forest Service, BLM and the State Land Office are participating in nonpoint source activities.

### **Other Activities**

The State of New Mexico, through the Colorado River Basin Salinity Control Advisory Council and the New Mexico Water Quality Control Commission, supports the Colorado River Basin salinity control program and is taking all reasonable actions to ensure its implementation.

State actions include: (1) support of federal legislation including appropriations to implement the program, (2) inclusion of salinity control measures in the Section 208 plans, (3) dissemination of information on salinity sources and control measures to the water users and the public in the Colorado River Basin area of the state, (4) consultation with industries on potential salinity reduction measures, (5) implementation of Forum policy through existing legal and institutional mechanisms, e.g. NPDES permits, (6) allocation of state financial and manpower resources to several salinity research efforts, (7) providing matching funds to support the USGS water quality data collection program in the Colorado River Basin portion of the state, and (8) maintaining a continuous water quality planning program whereby new or additional salinity control measures can be addressed. A decrease in state funding for items (6) and (7) above has caused a reduction in those programs since 1986.

## UTAH

### NPDES Permits

The Division of Water Quality administers the discharge permit program. The State has the responsibility for issuance and compliance for all new permits and permit renewal applications received since July 7, 1987.

A total of 68 discharge permits are in effect for industrial facilities in the Utah portion of the Colorado River Basin. Most of the permits are for facilities with no discharge or discharge of intercepted ground water from mining operations in accordance with Forum policy. Coastal States Energy-Skyline Mine is reducing their TDS discharge concentration by using limestone instead of gypsum for coal mine rock dusting.

There are 28 municipal treatment facilities in the Colorado River Basin of Utah. Currently, 12 wastewater treatment facilities provide total containment.

### Water Quality Management Planning

Water quality management plans for the Uinta Basin, Southeastern Utah, and Wayne County are certified by the State and conditionally approved by EPA.

### Other Activities

Utah's Nonpoint Source Management Plan was approved by EPA in December 1989. The plan contains Utah's strategy for the control of nonpoint source pollution in the state. A major element in the plan is the need to define rangeland areas in the Colorado River drainage which are yielding sediment and salinity to the system. In a joint effort, the Utah Department of Agriculture, the Utah Department of Health, the Utah Division of Water Resources, Reclamation, BLM, SCS and the USGS completed the task of delineating these areas in 1992. This project identified watershed projects which may be implemented for salinity control on a

cost-effective basis. Where possible, Utah is utilizing federal 319 funds to implement projects identified in the Nonpoint Source Management Plan which will reduce salinity in the Colorado River Basin.

Utah operates a low interest loan program which provides funding for soil and water conservation and water quality improvement practices for farms. Utah has committed a substantial amount of funding through this program to irrigation improvement projects which provide salinity reduction from onfarm sources. This program operates under the guidance of the Soil Conservation Commission and local soil conservation districts.

## WYOMING

### NPDES Permits

The Wyoming Department of Environmental Quality, Water Quality Division, administers the NPDES Program. The Forum's "Policy for Implementation of Colorado River Salinity Standards Through the NPDES Permit Program" is utilized to evaluate industrial and municipal discharges. There is only one significant industrial source of salinity in the Green River Basin. The Utah Power's Naughton Plant discharges approximately 20 tons of salt per day to a tributary of the Green River. This permit was issued on the basis that it was not "practicable" to implement the Forum policy of no discharge of salt from industrial sources. This decision was based upon a comparison of the costs of removing salt and downstream benefits associated with eliminating the discharge. The current permit expires October 31, 1997, and will be reevaluated for consistency with Forum policy at that time.

A total of 48 NPDES permits are currently active in the Wyoming portion of the Colorado River Basin. Except for the previously discussed permit, all of these discharges are very small. Fifteen municipal discharge permits serving a total population of 41,000 have been issued. Of this total, 32,000 are in Rock Springs and Green River. The incremental increase in total dissolved solids concentration is 420 mg/L and 400 mg/L, respectively, for Rock Springs and Green River. Of the 13 other municipal discharges, most are in compliance; however, a few exceed the 400 mg/L incremental increase in salinity by a few milligrams per liter. It is not economically feasible to implement a comprehensive municipal salinity control program for these very small salt loads. There are 4 other domestic discharges in the basin. These are all small facilities that do not exceed the 400 mg/L incremental increase. Twenty-nine other industrial dischargers also operate in the basin; all are in compliance with Forum policy.

### Water Quality Management Planning

The Water Quality Management Planning and Nonpoint Source Implementation Programs in Wyoming are under the direction of the Water Quality Division of the Department of Environmental Quality. The Clean Water Report for Southwestern Wyoming addressed water quality in Lincoln, Uinta and Sweetwater Counties. This report was adopted at the local level, certified by the Governor and conditionally approved by the EPA on October 9, 1980. The

Governor's certification recognized a salinity control program for the Green River Basin as a major water quality priority. The state strongly supports the current USDA efforts in the Big Sandy River Unit.

The Statewide Water Quality Management Plan establishes an institutional framework under which planning and implementation activities can proceed in Wyoming. Implementation of much of the program depends on the availability of funds and the acceptance of responsibilities by the designated management agencies. The Wyoming Statewide Water Quality Management Plan is amended regularly through adoption of the triennial review and its supplemental report.

The Wyoming Nonpoint Source Management Plan was partially approved by EPA in September 1989. The Plan calls for a cooperative, voluntary approach in the implementation of BMP's targeted at water quality improvements. As with the Statewide Water Quality Management Plan, implementation hinges upon acceptance of responsibilities by designated management agencies and upon the availability of funding under Section 319.

### **EDUCATION AND PUBLIC INVOLVEMENT**

The Colorado River Basin salinity control problem is basin wide, with implications which range over the entire 244,000 square mile basin drainage area. The basin's immense size highlights the need for effective public education and public involvement programs due to the physical and cultural diversities which exist across the seven states. Implementation of measures to control complex problems such as salinity, requires awareness, concern and involvement, along with recognition that a problem many miles away may have direct impacts. The states individually and in concert as the Forum have and will continue to work with concerned agencies, both state and federal, to increase the public understanding of the salinity problem and its control.

Since irrigation is the principal human-induced source of salinity, a major thrust of the public education/public involvement effort focuses on educating irrigators as to the sources, impacts and methods of controlling salinity, specifically the means to improve irrigation practices so as to reduce the input of salts into the river system. The goal of this effort is to encourage desirable changes in water application technology and management practices. The Basin states work within the framework of ongoing efforts (Water Quality Management Programs, SCS and Cooperative Extension Service) to achieve this goal, and assistance from the Executive Director of the Forum is routinely provided. The plan formulation phase of Reclamation, USDA and BLM salinity control projects provides an excellent opportunity for public education with regard to Colorado River salinity and the means for its control.

Meetings of the Colorado River Basin Salinity Control Forum are open and the public is welcome to attend. All input, whether oral or written, is considered and acted on as appropriate by Forum consensus. The Forum also provides for public involvement in the water quality standards review process in that public meetings are held to receive comments on the

salinity standards during each triennial review. As a result of such public input, appropriate changes are made.

As each of the Basin states proceeds with its adoption process, one or more state-wide, public hearings are held. In addition, there is widespread announcement of the Forum and state hearings, and copies of the Review and associated state standards are mailed to interested agencies, groups and individuals.

Forum members participate with their water quality planning agencies in matters related to salinity and salinity control and will continue to do so as the need arises.

## FORUM ACTIVITIES

The Forum meets about twice a year, or as needed, to discuss the salinity control program, the efforts of the federal agencies and the states, and the need for additional policy and/or action by the Forum. During the last triennial review effort, the Forum met on May 22, 1990, in Albuquerque, New Mexico, and adopted the preliminary report for 1990. The Forum then held public meetings during the summer, and after receiving comments, prepared a supplemental report dated October 1990.

During this reporting period, the Forum also met on October 24, 1990, in San Diego, California; May 15, 1991, in Salt Lake City, Utah; November 8, 1991, in Yuma, Arizona; May 4, 1992, in Cheyenne, Wyoming; and November 18, 1992, in Newport Beach, California. In all, since the creation of the Forum in November of 1973, the Forum has held 48 meetings. Several years ago the Forum published a compilation of all of the minutes of the Forum meetings from 1973 through 1985. More recently, the Forum also published a compilation of minutes of Forum meetings from 1986 through 1991. The Forum held its 48th meeting on April 28, 1993, in Grand Junction, Colorado, and authorized final preparation of this report for publication.

A Work Group, created by the Forum, holds meetings on a more frequent basis to review technical information which is generated by the federal agencies. Membership on the Work Group is composed of technical representatives from each of the seven Basin states. Federal agency representatives, however, attend meetings of the Work Group and informally exchange information, ideas and viewpoints. The Work Group coordinates the efforts of the seven Basin states and reports back to the Forum any actions which the Work Group believes the Forum should consider.

Positions have been taken on many issues, such as the need for appropriation of funds by the Congress. Federal agencies have also prepared numerous reports in the three-year period. The Forum has compiled a library of many reports relating to Colorado River salinity. The Work Group and the Forum have had opportunity to review and comment on these reports in draft form. Notable among the reports prepared since the last triennial review effort are the 1990 Joint Evaluation of Salinity Control Programs, the 1991 Joint Evaluation of Salinity Control Programs, and also the 1992 Joint Evaluation of Salinity Control Programs in the

Colorado River Basin. These three reports evaluate progress and set forth the salinity control efforts needed to meet the numeric criteria.

The Forum and the Work Group have, over the last three years, assisted the Colorado River Basin Salinity Control Advisory Council in the preparation of three annual reports. The Forum also prepared and issued two annual reports: (1) the 1991 Annual Progress Report, Water Quality Standards for Salinity, Colorado River System, August 1992, and (2) the 1992 Annual Progress Report, Water Quality Standards for Salinity, Colorado River System, March 1993. As of this review, the practice of preparing annual reports has been discontinued.



## **CHAPTER 6 - MEANS OF MAKING PLAN OPERATIONAL**

### **LEGISLATION NEEDED TO CARRY OUT PROGRAMS**

There is immediate need for legislation to modify the Colorado River Basin Salinity Control Act as established by P.L. 93-320 and later modified in 1984 by P.L. 98-569. Reclamation has advised the Basin states that starting in Fiscal Year 1996, the ceiling for Reclamation expenditures established by the original enactment of the Salinity Control Act in 1974 will need to be raised if Reclamation is to spend additional funds on the program. The Forum recommends that this needed legislation be advanced by the Department of the Interior (Interior) to Congress and anticipates that Interior will act in 1993. The Forum is prepared to actively support Interior's advancement of this needed legislation to Congress.

In addition, Reclamation has identified a cost-effective salinity control unit in the Uinta Basin. Planning reports have been completed, and the request for authorization of this unit has been held by the Administration for a period of time. The Forum believes that the Administration should, without further delay, advance to Congress a request for the needed authorization of the Uinta unit.

Discussions between Reclamation and the Office of the Inspector General may result in recommendations being transmitted to Congress to provide authority for planning and implementation of additional salinity control units by Reclamation. This is similar to the procedure by which additional USDA units may be initiated, in which the basin-wide USDA program is authorized and the initiation of individual salinity control units is delegated to the secretary. The Forum believes such legislation would lead to a more efficient procedure for Reclamation to identify cost-effective units, or portions thereof, and to proceed with their construction.

The current plan of implementation includes efforts by Reclamation in the Hammond area of New Mexico. In addition, Reclamation has completed studies with respect to the Price-San Rafael unit, and USDA's portion of that unit is dependent upon the construction of Reclamation's portion of that unit. Therefore, the Forum recommends that Interior proceed with acquiring congressional authority to construct these units, and all other units that need congressional authorization, as identified in the plan of implementation set forth with respect to the federal efforts in Table 4.1.

The USDA's program was authorized in 1984. This program provides for USDA to investigate additional salinity control areas. Upon completion of reports which find salinity control in new areas to be cost effective and environmentally acceptable, and after advising the Congress of its findings, the USDA can initiate efforts in these newly investigated areas. The Forum finds that, at this point in time, there is no need for congressional modifications to the authorized USDA program.

The work anticipated by BLM in the current plan of implementation is already authorized under existing authorities. Ongoing studies may identify an expanded role for BLM. With time, it may be necessary to seek legislative authority for specific BLM activities.

The Basin states each year urge Congress to appropriate the funds necessary to implement the federal portion of the plan of implementation. The Basin states intend to continue to aggressively urge Senators and Representatives from the Basin states, and those in key positions on the appropriation committees and subcommittees, to provide the funds necessary for the effective implementation of the program.

## **FINANCING SALINITY CONTROL ACTIVITIES**

In enacting P.L. 93-320, Congress recognized the federal responsibility for the Colorado River as an interstate stream and adopted a cost-sharing formula which provides that 75 percent of the costs of the four Department of the Interior salinity control projects authorized by Title II of the Act are nonreimbursable. The remaining 25 percent of the costs are to be repaid from the Upper and Lower Basin funds over a 50-year period without interest. The maximum allocation to the Upper Basin fund is not to exceed 15 percent of the total costs to be repaid from the two funds with the remainder to be repaid by the Lower Basin fund.

The 1984 amendments to P.L. 93-320 changed the cost-sharing formula. For the Department of the Interior program, the non-reimbursable portion was reduced to 70 percent, with the remaining 30 percent to come from Upper and Lower Basin funds in the same proportionate share as under P.L. 93-320. However, the Upper Basin fund would repay its share over 50 years with interest, and the Lower Basin fund would reimburse its share of the annual expenditure during the year that costs are incurred.

The voluntary onfarm salinity control program of USDA requires a minimum 30 percent cost-share from the local participants unless the Secretary of Agriculture finds that such cost-sharing requirements would result in a failure to proceed with the needed onfarm measures. In addition, the Federal Government receives a 30 percent reimbursement from the Basin funds in the manner in which reimbursements are made for Interior programs. Thus, the local participants' contribution plus the reimbursement from the Basin funds ensure that nonfederal contributions to the USDA salinity control program will always exceed 50 percent of the total construction costs. Costs of operation and maintenance of USDA salinity control units, including those for voluntary replacement of fish and wildlife values foregone, are the responsibility of the program participants.

P.L. 98-569 also provides that Reclamation is authorized to reimburse the costs of operation and maintenance expenses in excess of those that would have occurred for the thorough and timely operation and maintenance of the unimproved system. The Act also allows for the Federal Government to pay for replacement costs of the facilities and the costs of operation and maintenance of works to replace impacted fish and wildlife values.

Revenues accruing to the Lower Basin fund for the salinity control program are derived from a 2-1/2 mill levy on hydropower generation in the Lower Basin. The plan of implementation presented in this Review incorporates a construction schedule that, when implemented, would have a total estimated cost of \$483 million. Under this plan, the required salinity reduction can be made throughout the planning period (2015), and the Lower Basin fund

will be adequate to meet its obligation of repayment if the annual inflation rate does not exceed 6.4 percent.

Two potential sources of funding to assist salinity control efforts exist under the Clean Water Act. Through Fiscal Year 1993, Congressional appropriations for Section 319 nonpoint source control funds are nearly \$190 million. Section 319 funds are available for implementing state-adopted EPA-approved nonpoint source management programs. Also, the states have the opportunity to designate up to 20 percent of their wastewater treatment construction grant funds under Section 201(g)(1)(B) for implementing nonpoint source management programs.

## **RESPONSIBILITY FOR ACCOMPLISHING SALINITY CONTROL MEASURES**

The plan of implementation recognizes that the Forum, participating federal agencies and the Basin states each have specific responsibilities for furthering the salinity control program. The elements of the plan of implementation are premised on full implementation of all salinity control measures discussed in Chapters 4 and 5.

The Forum will provide overall coordination and a continuing review of salinity changes and program effectiveness. At least every three years the Forum, will consider existing depletions and salt concentrations and, when needed and feasible, recommend revisions in the schedule for implementing salinity control measures and/or modifications of the numeric criteria. The review will include both federal and non-federal programs. This Review is transmitted to the EPA and to state water resources and pollution control agencies and will be made available to others interested in the salinity control program.

Appropriate federal agencies will complete planning reports and seek authorization and funding for salinity control projects in accordance with Title II of P.L. 93-320 and P.L. 98-569. The Basin states will lend their support in seeking needed authorization and funding.

## **STANDARDS REVIEW PROCEDURES**

Prior to state action on the review of the numeric criteria and plan of implementation, public review and discussion will be sought through public meetings. The Forum will hold two regional meetings in the basin to describe the basin-wide nature of the salinity problem and the control program and to solicit views from interested agencies, groups and individuals.

In accordance with provisions of the Clean Water Act, each of the Basin states will consider the Forum's Review. No change has been made in the numeric criteria since their adoption in 1975 by the Basin states and approval by EPA. The Basin states again find the numeric criteria to be appropriate. Adoption will be accomplished according to the required procedures of each state and the Water Quality Standards Regulation (40 CFR Part 131).

## **CHAPTER 7 - PROVISION FOR REVIEWING AND REVISING STANDARDS**

The Forum, in its statement of "Principles and Assumptions for Development of Colorado River Salinity Standards and Implementation Plan," approved by the Forum on September 20, 1974, stated under Principle 7:

*The plan of implementation shall be reviewed and modified as appropriate from time to time, but at least once each 3 years. At the same time, the (numeric) standards, as required by Section 303(c) (1) of P.L. 92-500 shall be reviewed for the purpose of modifying and adopting standards consistent with the plan so that the Basin states may continue to develop their compact-apportioned waters while providing the best practicable water quality in the Colorado River Basin.*

The Forum took this position because the Colorado River Basin is a large and complex area with many problems. A wide range of research, technical studies and actions are underway and much knowledge is yet to be gained. Procedures for reducing the volume of saline irrigation return flows have been developed and the USDA is aggressively implementing, within available funding, a voluntary cost-sharing program with individual farmers, irrigation districts and canal companies to improve onfarm water management practices and local water delivery systems.

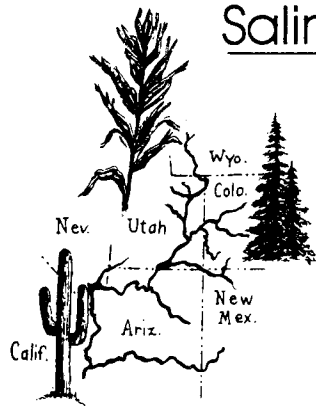
The Forum's Work Group keeps current with salinity control efforts and suggests revisions as appropriate. The Work Group operates under a schedule which enables the states to take action on any potential revision by the required revision date.

## **APPENDIX A**

**Forum letter to EPA Regional Administrators,  
Regions VIII and IX, dated February 26, 1990,  
and  
EPA Regulation 40 CFR, Part 120**

# Colorado River Basin

## Salinity Control Forum



February 26, 1990

Daniel W. McGovern  
Regional Administrator  
EPA Region IX  
215 Fremont Street  
San Francisco, CA 94105

James Scherer  
Regional Administrator  
EPA Region VIII  
999 18th Street  
Denver Place, Suite 500  
Denver, CO 80202-2405

Dear Messrs. McGovern and Scherer:

The Colorado River Basin States have submitted to you the 1987 Review of Water Quality Standards for Salinity, Colorado River. In approving the Review as submitted to you by California, Nevada, and Wyoming, you commented in your approval letters (enclosed) that for the 1990 Review, the States and the Forum should address certain aspects of the water quality standards and the associated plan of implementation.

The requests in those approval letters have led to significant discussions between the Forum and your staff. A great deal of uncertainty initially prevailed as to precisely what EPA was requesting from the states within the approval letters. After lengthy discussions, it was agreed that the Forum would restate in writing precisely what the States believe the standards were, as initially adopted in the mid 1970s by the States and approved by EPA. We also contend that the standards have been unchanged and continue as the standards for Colorado River salinity today.

While some documentation exists of earlier discussions held between the states and EPA pursuant to requirements of the Clean Water Act, the first formal Forum document concerning standards was Water Quality Standards for Salinity, Including Numeric Criteria and Plan of Implementation for Salinity Control, Colorado River System, prepared by the Colorado River Basin Salinity Control Forum, June 1975. The document submitted by each State was approved by EPA and has been the basis for the triennial reviews since 1975.

### GOVERNORS

Rose Mofford, AZ  
George Deukmejian, CA  
Roy Romer, CO  
Robert Miller, NV  
Garrey Carruthers, NM  
Norman H. Bangert, UT  
Mike Sullivan, WY

### FORUM MEMBERS

#### Arizona

Hanna Cortner  
C. Laurence Linser  
Ronald L. Miller

#### California

Myron B. Holburt  
Walter G. Pettit  
Richard E. Angelos

#### Colorado

David W. Robbins  
J. William McDonald

#### Nevada

Jack L. Stonehocker  
Lewis H. Dodgion  
Roland D. Westergard

#### New Mexico

Stephen E. Reynolds

#### Utah

D. Larry Anderson  
Jay B. Pitkin

#### Wyoming

Gordon W. Fassett  
William L. Garland  
Don S. Budd

### EXECUTIVE DIRECTOR

Jack A. Barnett

Perhaps the best way to clearly state the standards, which have not changed since the 1975 submittal, is to quote directly from the EPA-approved 1975 report of the Forum. In the report, it is noted that EPA, pursuant to requirements of Section 303 of Public Law 92-500, adopted regulations in the Federal Register on December 18, 1974, concerning the establishing of the Colorado River salinity control policy and standard procedure. The 1975 report then (on page 54) states:

*. . . the numeric criteria for the Colorado River System are to be established at levels corresponding to the flow-weighted average concentrations in the lower main stem during calendar year 1972.*

The report then goes on to state that numeric criteria are to be established at three key stations: below Hoover Dam, below Parker Dam, and at Imperial Dam. The report then states:

*The flow-weighted average annual salinity for the year 1972 was used. These values were determined by the Bureau of Reclamation from daily flow and salinity data collected by the U. S. Geological Survey and the Bureau of Reclamation. They are as follows:*

<i>Below Hoover Dam</i>	<i>723 mg/l</i>
<i>Below Parker Dam</i>	<i>747 mg/l</i>
<i>Imperial Dam</i>	<i>879 mg/l</i>

It may be helpful to state what is meant by the term "flow-weighted average annual salinity" and to further state how that flow-weighted average annual salinity was calculated in 1972 and how it is calculated today. The term was first used formally by EPA in the December 18, 1974, Federal Register and was carried forward by the States to the 1975 standards. The average daily flow of the river past each of these three measuring points is determined, and the average concentration of salts in the water in milligrams per liter (mg/l) (daily salinity) is also determined each day at each of these three measuring points.

For each day, the average daily flow is multiplied by the daily salinity concentration, resulting in a flow/salinity mass number. For all 365 days of the year, the daily mass numbers are added together, resulting in an annual mass number. The sum of average daily flow (in cfs) of the river past the gage for the entire year is also calculated. The total mass number is then divided by the sum of each average daily flow for the year, and the resulting product is the flow-weighted average annual salinity for the calendar year at that station.

It may be helpful to note that 1972 was picked as the year upon which to base the standards. There are no inferences that anyone felt that 1972 represented a typical or average year. The States

concur with the EPA regulation published in December of 1974 which stated in part:

*The flow-weighted average annual salinity in the lower main stem of the Colorado River System is to be maintained at or below the average value found during 1972.*

There are two other aspects of the water quality standards on the Colorado River which should be noted. First, controlling the salinity of the Colorado River is significantly different than dealing with man-induced, unnatural pollutants in other river systems. The Colorado River is naturally heavily laden with salts. The standards require that a program be developed that will maintain the flow-weighted average annual salinity at or below the 1972 levels while the Basin States continue to develop their compact-apportioned water supply. The program was not established to reduce the salinity of the river below levels that were caused by natural sources and man's efforts prior to 1972, but to counteract the effects of development of water resources in the Colorado River Basin after 1972.

The flow in the river system will fluctuate with the amount of precipitation that the river basin receives from year to year. The salinity concentrations also are strongly influenced by the volume of the flow in the river. Therefore, there will be variations from the numeric criteria brought about by fluctuations in the river flow unrelated to man's activities. This was made abundantly clear in several documents; a July 1, 1977, letter from Douglas M. Costle, the Administrator of EPA, to the Environmental Defense Fund clearly states this understanding.

The Salinity Control Program that has been adopted by the States, agencies of the Federal Government, and approved by EPA is intended to remove enough salt from the river system to maintain salinity levels at or below the 1972 levels as far as it may be determined that development and/or man's activities has impacted the salinity levels. The program is not, however, intended to counteract the salinity fluctuations that are a result of the highly variable flows. The 1975 report of the Forum which was sent to EPA clearly acknowledges this. On page 56 the report states:

*It should be recognized that the river system is subject to highly variable annual flow. The frequency, duration and availability of carryover storage greatly affect the salinity of the lower main stem and, therefore, it is probable that salinity levels will exceed the numeric criteria in some years and be well below the criteria in others. However, under the above assumptions, the average salinity will be maintained at or below 1972 levels.*



Quoting from page 57 of the report, we find:

*Periodic increases above the criteria as a result of reservoir conditions or periods of below long-time average annual river flow also will be in conformance with the regulation. With satisfactory reservoir conditions and when river flows return to the long-time average annual flow or above, concentrations are expected to be at or below the criteria level.*

The phrase quoted above, "long-time average annual flow," means an average of 15 million acre-feet per year. The 15 million acre-feet per year is the long-term virgin flow measured at Lee Ferry for the period of record when the standards were adopted.

The second aspect of the standards adopted in 1975 is that they provide for one additional deviation from the 1972 levels. This deviation has been termed a "temporary increase" and it should not be confused with the natural variations discussed in the previous paragraphs. On page 56 of the 1975 Review we quote:

*The federal regulations provide for temporary increases above the 1972 levels if control measures are included in the plan. Should water development projects be completed before control measures are identified or brought on line, temporary increases above the criteria could result and these increases will be in conformance with the regulation. With completion of control projects, those now in the plan or those to be added subsequently, salinity would return to or below the criteria level.*

The standards include the numeric criteria established by the Basin States in 1975 pursuant to formal regulations set forth by EPA were approved by EPA, and the standards and the numeric criteria have not changed. Since 1975, the numeric criteria have not been exceeded.

In connection with each of the triennial reviews, the Forum has identified what is believed to be the most feasible and cost-effective plan for the construction of salinity control units or the implementation of salinity control strategies so that the numeric criteria will not be exceeded. The analysis also includes a determination as to the year in which each of the elements of the salinity control plan must be built and/or implemented in order to prevent the numeric criteria from being exceeded. From time to time the Bureau of Reclamation, the Department of Agriculture, and the Forum have developed jointly agreed upon implementation plans to ensure that future water quality standards can be met. Following the adoption by the Forum, the plans are made a part of the triennial review and are formally published in the Forum's triennial review document.

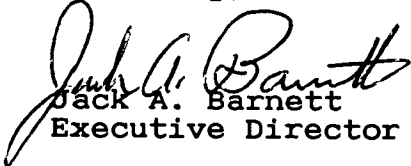
Messieurs McGovern & Scherer  
February 26, 1990  
Page 5

The most recent plan of implementation as adopted by the Basin States is described in the 1987 triennial review within Chapter IV. That chapter adequately describes the overall program, which includes major efforts of the Bureau of Reclamation and the Department of Agriculture as well as contributing efforts from other federal agencies such as the Bureau of Land Management, the Fish and Wildlife Service, the Geological Survey and your own agency. The States cost share in expenditures authorized for the Bureau of Reclamation and the Department of Agriculture. Chapter V describes additional efforts to be undertaken by the States as a part of the salinity control plan of implementation.

For your convenience in reviewing the current plan, we have enclosed page 25 from the 1987 Review. It contains a table indicating the Department of Agriculture and Bureau of Reclamation units which are to be constructed to remove 1,177,300 tons of salt. The table indicates the time of construction anticipated for each of the various units, with some projects already having been completed, some projects currently under construction, and the most-remote project being completed by the year 2008.

We trust that this letter fully describes the water quality standards for the Colorado River with respect to salinity. It is our intention that the plan to be adopted in the 1990 Review will, as did the plan in the 1987 Review, remove enough salts from the river system to ensure compliance with the water quality standards, as set forth in this letter, in all of the years through the period of projected salinities to 2010. As the program moves ahead and we approach the turn of the century, the Forum will address the need for a salinity control program which looks beyond the year 2010. We believe this letter fully answers issues raised in the letters to California, Nevada, and Wyoming and further answers issues raised by the your staff in subsequent expanded conversations concerning the standards. Should you have additional questions, we would welcome your inquiry.

Sincerely,

  
Jack A. Barnett  
Executive Director

hsm  
enclosures

cc: Robert E. Layton, Jr.

4 JAN 1989

Mr. W. Don Maughan  
Chairman  
State Water Resources Control Board  
P.O. Box 100  
Sacramento, CA 95801

Dear Mr. Maughan:

The U.S. Environmental Protection Agency, Region 9, has reviewed California's triennial review of water quality standards for salinity in the Colorado River System as contained in the State Water Resources Control Board Resolution No. 88-27 adopted March 17, 1988. This resolution incorporates the Colorado River Basin Salinity Control Forum 1987 review entitled "Water Quality Standards for Salinity - Colorado River System, May 1987" and supplement thereto dated August 1987. Based upon EPA's review, it is my pleasure to inform you of EPA's approval of California's reaffirmation of water quality standards for salinity pursuant to Section 303(c) of the Clean Water Act and its implementing regulations (40 CFR Part 131, November 8, 1983).

This action is based upon my determination that these water quality standards are consistent with the protection of the public health and welfare, the protection of water quality and the intent and purposes of the Clean Water Act. The plan of implementation for salinity control included in the Forum report and submitted by California, indicates a commitment by each of the seven basin States to maintain the criteria and protect designated uses throughout the Basin. This commitment is essential to EPA's approval of the water quality standards for salinity.

It appears that the current plan of implementation is adequate for at least the next three years. However, EPA would like to see the plan of implementation increase the probability of compliance with the salinity standards in the longer term. We ask the State to work with the Forum during the next triennial review of the salinity standards to address our concerns regarding the frequency of compliance in more detail. We will cooperate with California, the other Basin States, and the involved Federal agencies during the triennial review process. We plan to discuss these concerns in more detail at the Forum meeting scheduled in March.

I commend the State of California and the Colorado River Basin Salinity Control Forum for their cooperation in working with EPA to update this basinwide plan to control salinity. Since salinity is a basinwide problem, EPA will exercise its authority under Section 303(c) of the Act to reassess the State's approach to salinity control if a basinwide approach is not maintained.

This Agency continues to support the Basin States' concept that salinity is a basinwide problem and recognizes the State's commitment to implement salinity control measures. It is further recognized that, without implementation of State and local salinity control measures, the criteria for the salinity standards could be seriously jeopardized. EPA, in its administration of the Clean Water Act, intends to ensure that all Colorado River Basin States aggressively develop and implement programs for salinity control.

The plan of implementation submitted as a part of California's water quality standards for salinity contains Federal projects authorized by the Colorado River Basin Salinity Control Act. EPA's support for this plan does not constitute a commitment by the Federal Government to fund these projects or their equivalents.

In future review efforts, EPA will continue to support adoption of vigorous implementation of the basinwide salinity control program. EPA looks forward to working with you and your staff toward our mutual goal of protecting and enhancing the quality of California's waters.

Sincerely,

Daniel W. McGovern  
Regional Administrator



20 JAN 1989

Mr. Melvin Close, Jr.  
Chairman  
Nevada State Environmental Commission  
Capitol Complex, Room 221  
201 South Fall Street  
Carson City, NV 89710

Dear Mr. Close:

The U.S. Environmental Protection Agency, Region 9, has reviewed Nevada's triennial review of water quality standards for salinity in the Colorado River System as approved by the State Environmental Commission on May 24, 1988. This approval was transmitted to us by Wendell McCurry's letter of November 21, 1988 and incorporates the Colorado River Basin Salinity Control Forum 1987 review entitled "Water Quality Standards for Salinity - Colorado River System, May 1987" and supplement thereto dated August 1987. Based upon EPA's review, it is my pleasure to inform you of EPA's approval of Nevada's reaffirmation of water quality standards for salinity pursuant to Section 303(c) of the Clean Water Act and its implementing regulations (40 CFR Part 131, November 8, 1983).

This action is based upon my determination that these water quality standards are consistent with the protection of the public health and welfare, the protection of water quality and the intent and purposes of the Clean Water Act. The plan of implementation for salinity control included in the Forum report and submitted by Nevada, indicates a commitment by each of the seven basin States to maintain the criteria and protect designated uses throughout the Basin. This commitment is essential to EPA's approval of the water quality standards for salinity.

It appears that the current plan of implementation is adequate for at least the next three years. However, EPA would like to see the plan of implementation increase the probability of compliance with the salinity standards in the longer term. We ask the State to work with the Forum during the next triennial review of the salinity standards to address our concerns regarding the frequency of compliance in more detail. We will cooperate with Nevada, the other Basin States, and the involved Federal agencies during the triennial review process. We plan to discuss these concerns in more detail at the Forum meeting scheduled in March.

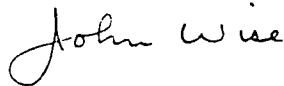
I commend the State of Nevada and the Colorado River Basin Salinity Control Forum for their cooperation in working with EPA to update this basinwide plan to control salinity. Since salinity is a basinwide problem, EPA will exercise its authority under Section 303(c) of the Act to reassess the State's approach to salinity control if a basinwide approach is not maintained.

This Agency continues to support the Basin States' concept that salinity is a basinwide problem and recognizes the State's commitment to implement salinity control measures. It is further recognized that, without implementation of State and local salinity control measures, the criteria for the salinity standards could be seriously jeopardized. EPA, in its administration of the Clean Water Act, intends to ensure that all Colorado River Basin States aggressively develop and implement programs for salinity control.

The plan of implementation submitted as a part of Nevada's water quality standards for salinity contains Federal projects authorized by the Colorado River Basin Salinity Control Act. EPA's support for this plan does not constitute a commitment by the Federal Government to fund these projects or their equivalents.

In future review efforts, EPA will continue to support adoption of vigorous implementation of the basinwide salinity control program. EPA looks forward to working with you and your staff toward our mutual goal of protecting and enhancing the quality of Nevada's waters.

Sincerely,



for Daniel W. McGovern  
Regional Administrator



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

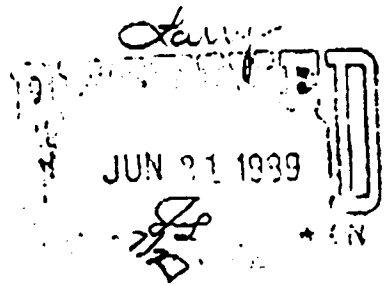
REGION VIII

999 18th STREET - SUITE 500

DENVER, COLORADO 80202-2405

JUN 15 1989

JUN 15 1989



Ref: 8WM-SP

Honorable Mike Sullivan  
Governor of Wyoming  
State Capitol  
Cheyenne, Wyoming 82002

RE: Wyoming Statewide Water  
Quality Management Plan

Dear Governor Sullivan:

The U.S. Environmental Protection Agency, Region VIII, has reviewed your certification of an amendment to the Wyoming Statewide Water Quality Management (WQM) Plan entitled Proposed Report and Supplement, 1987 Review Water Quality Standards for Salinity Colorado River System. The 1987 Review was published by the Colorado River Basin Salinity Control Forum (Forum). Based upon EPA's review, it is my pleasure to inform you of EPA's approval of the amendment pursuant to Section 208 of the Clean Water Act (the Act) and its implementing regulations (40 CFR Part 130, January 11, 1985.)

No changes in the downstream salinity numeric criteria are proposed. However, the plan of implementation for salinity control included in the 1987 Review and submitted by Wyoming is revised. It indicates a commitment by each of the seven Basin States to maintain the criteria and protect designated uses throughout the Basin. This commitment is essential to EPA's continued approval of the water quality standards for salinity.

It appears that the plan of implementation is adequate for at least the next three years. However, EPA would like to see the plan of implementation increase the probability of compliance with the salinity standards in the longer term. Our concerns and opportunities for addressing the concerns were discussed in detail with the Forum at its October 1988 and May 1989 meetings. We ask the State to work with the Forum during the next triennial review of the salinity standards to address our concerns regarding the frequency of compliance in more detail. I believe that our concerns on frequency of compliance are important and must be resolved by the end of the next triennial review. In addition, we will cooperate with Wyoming, the other Basin States, and the involved Federal agencies during the triennial review process pursuant to Section 303(c) of the Act. We suggest that Chapter VI of the Wyoming Water Quality Standards "Rules and

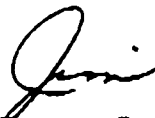
Regulations" be amended to provide an appropriate linkage between the salinity standards regulations and the WQM Plan/Amendments.

I commend the State of Wyoming and the other states of the Forum for their cooperation in working with EPA to update the Basinwide plan to control salinity. This Agency continues to support the Basin states' concept that salinity is a basinwide problem and recognizes the state's commitment to implement salinity control measures. It is further recognized that, without implementation of state and local salinity control measures, the criteria for the salinity standards could be seriously jeopardized.

The plan of implementation submitted contains Federal projects authorized by the Colorado River Basin Salinity Control Act. EPA's support for this plan does not constitute a commitment by the Federal Government to fund these projects or their equivalents.

In future review efforts, EPA will continue to support adoption of vigorous implementation of the Basinwide salinity control program. EPA looks forward to working with you and your staff toward our mutual goal of protecting and enhancing the quality of Wyoming's waters.

Sincerely,



James J. Scherer  
Regional Administrator

cc: Alan Edwards, Interim Director, Wyoming DEQ  
Larry Robinson, Wyoming DEQ  
Jack Barnett, Colorado River Basin  
Salinity Control Forum



Table 3  
Recommended Salinity Control Plan  
Implementation Schedule

	<u>Begin Implemen- tation</u>	<u>Projected Date Complete</u>	<u>Tons/yr Removed Jan 1987</u>	<u>Projected Salt Removed Tons/yr</u>
Meeker Dome (USBR)	Complete	1983	48,000	
Grand Valley Stage One (USBR)	Complete	1984	21,900	
BIM well plugging & nonpoint	Complete	1986	7,600	
Las Vegas Wash Pittman (USBR)	Complete	1985	7,000	
Grand Valley (USDA)	1979	2000	33,600	196,400
Paradox Valley (USBR)	1980	1990		180,000
Uinta Basin (USDA)	1980	2003	22,700	75,500
Grand Valley Stage Two (USBR)	1985	2003		113,100
Las Vegas Wash Whitney (USBR)	1986	1988		1,000
Big Sandy River (USDA)	1989	1996		52,900
Dolores Project (McElmo, USBR)	1989	1994		24,500
Lower Gunnison Win Wtr (USBR)	1989	1991		74,000
Lower Gunnison 1 (USDA)	1989	2006		82,100
Moapa Valley (USDA)	1990	1993		19,500
Lower Gunnison 2, Mont. (USDA)	1991	2008		81,700
Lower Gunnison 2, Delta (USDA)	1991	2004		104,700
McElmo Creek (USDA)	1990	1999		38,000
Lower Gunnison 3, (USDA)	1992	1995		12,000
Uinta Basin I (USBR)	1993	2000		25,500
<u>1/</u> Price-San Rafael (Coordinated)	1992	1998		52,300
Lower Virgin River (USBR)	1992	1994		44,100
			140,800	1,177,300 <u>2/</u>

Others under consideration, not included in the plan.

San Juan River (USBR)  
Sinbad Valley (USBR)  
Mancos Valley (USDA)  
Lower Gunnison Stage I Balance (USBR)  
Lower Gunnison North Fork (USBR)  
Grand Valley II Balance (USBR)  
Las Vegas Wash Balance (USBR)  
Virgin Valley (USDA)

1/ Not included in USDA implementation plan.

2/ Reduction to maintain the numeric criteria through 2010.

Title 40—Protection of Environment

CHAPTER I—ENVIRONMENTAL  
PROTECTION AGENCY

[FRL 298-6]

PART 120—WATER QUALITY  
STANDARDS

Colorado River System; Salinity Control  
Policy and Standards Procedures

The purpose of this notice is to amend 40 CFR Part 120 to set forth a salinity control policy and procedures and requirements for establishing water quality standards for salinity and a plan of implementation for salinity control in the Colorado River System which lies within the States of Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming pursuant to section 303 of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1313). A notice proposing such policy and standards procedures was issued on June 10, 1974 (39 FR 20703, 39 FR 24517).

High salinity (total dissolved solids) is recognized as a significant water quality problem causing adverse impacts on water uses. Salinity concentrations are affected by two basic processes: (a) Salt loading—the addition of mineral salts from various natural and man-made sources, and (b) salt concentrating—the loss of water from the system through stream depletion.

Studies to date have demonstrated that the high salinity of stream systems can be alleviated. Although further study may be required to determine the economic and technical feasibility of controlling specific sources, sufficient information is available to develop a salinity control program.

Salinity standards for the Colorado River System would be useful in the formulation of an effective salinity control program. In developing these standards, the seven States must cooperate with one another and the Federal Government to support and implement the conclusions and recommendations adopted April 27, 1972, by the reconvened 7th Session of the Conference in the Matter of Pollution of the Interstate Waters of the Colorado River and its Tributaries.

Public hearings on the proposed regulation were held in Las Vegas, Nevada, on August 19, 1974, and in Denver, Colorado, on August 21, 1974. Public comments were provided at the hearings and also by letter during the review period. A summary of major comments and Environmental Protection Agency response follows:

(1) The Colorado River Basin Salinity Control Forum stated that it did not object to the proposed regulation, and believed that it satisfied the requirements of section 303(b)(2) of P.L. 92-500 until October 18, 1975. The Forum reported that the seven Colorado River Basin States were actively working on the development of water quality standards and a plan of implementation for salinity control.

(2) The Colorado River Water Conservation District inquired as to whether

the definition of the Colorado River Basin contained in Article II(f) of the Colorado River Compact of 1922 would be followed in the development of salinity standards and the salinity control plan.

The requirement for establishing water quality standards and an implementation plan apply to the Colorado River System as defined in Part 120.5(a) of this regulation. This definition is consistent with the definition of the Colorado River System contained in Article II(a) of the Compact. The regulation states that the salinity problem shall be treated as a basinwide problem. Articles II(f) and II(g) define the Basin to include the System plus areas outside the drainage area which are served by the Colorado River System. The Environmental Protection Agency (EPA) will require that the standards and implementation plan consider the impacts of basinwide uses, e.g., transmountain diversions, on salinity effects in the System, but the establishment of standards and implementation plans pursuant to this regulation will not be required for streams located outside the System.

The District also questioned the feasibility of relying on irrigation improvement programs as a means of alleviating the salinity problem.

EPA believes that adequate information is available to initiate controls for irrigated agriculture, yet at the same time acknowledges that additional work is needed to demonstrate the efficacy of certain control measures. Projects presently being supported by EPA and others should demonstrate the adequacy of various control measures including management and non-structural techniques. These measures will be considered during the development of the implementation plan.

(3) The Environmental Defense Fund (EDF) testified that it believed that EPA was not complying with the requirements of the Federal Water Pollution Control Act, as amended, chiefly because of EPA's late response to the timetable delineated in the Act for establishing standards, and also because numerical standards still have not been set for the Colorado River System. EDF called upon EPA to withdraw the proposed regulation and promptly promulgate numerical limits for salinity.

EPA believes that a move to promulgate numerical standards at this time could cause even further delays in controlling salinity due to the problems involved with obtaining interstate cooperation and public acceptance of such a promulgation.

(4) The Sierra Club raised a number of objections to the proposed regulation, principally because, in its opinion, it permits further development of the waters of the Colorado River without requiring that adequate salinity controls be on line prior to development. Specific suggestions are:

(a) Section 120.5(e)(3). Shorten the deadline for submission of the standards and implementation plan to May 30, 1975.

EPA believes that this would not allow adequate time due to the complexities of the problem, the interstate coordination needed and the time requirements for public hearings. The October 18, 1975, date is consistent with the requirements of the Federal Water Pollution Control Act, as amended, for the three year review and revision of standards. The schedule set forth by the Colorado River Basin Salinity Control Forum calls for development of draft standards and an implementation plan by February 1975 in order to allow time for public participation prior to promulgation.

(b) Section 120.5(c)(2). Delete "as expeditiously as practicable."

The date of July 1, 1983, remains the goal for accomplishment of implementation plans as stated in § 120.5(c)(2)(iii). It is the purpose of this language to accelerate progress by the States toward this goal where possible.

(c) Section 120.5(c)(2)(ii). Delete "while the basin States continue to develop their compact apportioned waters."

In recognition of the provisions of the Colorado River Compact of 1922 and until such time that the relationship between the Compact and the Federal Water Pollution Control Act, as amended, is clarified, EPA believes that development may proceed provided that measures are taken to offset the salinity increases resulting from further development.

(d) Section 120.5(c)(2)(iv). Add language to describe conditions under which temporary increases above the 1972 levels will be allowed.

EPA believes that this matter should be addressed in further detail in the formulation, review and acceptance of the implementation plan, not in the regulation.

(e) Add a new subsection on financing of control measures.

EPA believes that this, too, is an issue that should be handled as part of the implementation plan.

(f) Add a new subsection delineating requirements for evaluating control plans and restricting consideration of controls for the Blue Spring on the Little Colorado River.

EPA believes these issues should also be addressed as part of the implementation plan. It should be noted that nothing in this regulation removes the requirement for assessing environmental impacts and preparing environmental impact statements for control measures.

(g) Add a new section requiring public hearings.

EPA's public participation regulations appear at 40 CFR 105 and apply to all actions to be taken by the States and Federal Government pursuant to the Act. States have provided for public participation throughout the initial water quality standards review process. We expect the States to do so in this situation and see no need to set forth additional requirements.

(h) Add a new section stating that the implementation plan will be published in the FEDERAL REGISTER.

EPA expects there will be substantial public participation at the State and local level prior to adoption of the plan. The salinity standards are expected to be published in the FEDERAL REGISTER, but the size and complexity of the plan may militate against its publication. At the very least, the plan will be available for review at appropriate EPA and State offices. Notice of its availability will be published in the FEDERAL REGISTER, and 60 days will be allowed for public review and comment.

(i) Add a new subsection stating that EPA will promulgate standards if the States fail to do so as prescribed in this regulation.

Section 303 of the Federal Water Pollution Control Act provides for promulgation by EPA where the States fail to adopt standards requested by the Administrator, or where the Administrator determines Federal promulgation is necessary to carry out the purposes of the Act. EPA's responsibility to promulgate standards if the States fail to do so is thus expressed in the statute itself; the Agency does not believe that recitation of the statutory duty in this particular rulemaking is necessary.

(5) The American Farm Bureau Federation, California Farm Bureau Federation, Nevada Farm Bureau Federation, and the New Mexico Farm and Livestock Bureau believe that standards should not be set until further evaluation of the problems and opportunities for control are completed.

EPA believes that adequate information is available for setting standards and formulating controls, and while it recognizes that additional work is needed on specific aspects of solutions, it believes that further delay without any action is not appropriate.

Records of the hearings and comments received by letter during the review period are available for public inspection at the regional offices of the Environmental Protection Agency at 1860 Lincoln Street in Denver, Colorado, at 100 California Street in San Francisco, California, at 1600 Patterson Street in Dallas, Texas, and at the Environmental Protection Agency Freedom of Information Center at 401 M Street SW in Washington, D.C.

This regulation sets forth a policy of maintaining salinity concentrations in the lower main stem of the Colorado River at or below 1972 average levels and requires the Colorado River System States to promulgate water quality standards and a plan for meeting the standards. The first step will be the establishment of procedures within 30 days of the effective date of these regulations which will lead to adoption on or before October 18, 1975, of water quality standards for salinity including numeric criteria and an implementation plan for salinity control.

Except as provided in this regulation, the interstate and intrastate standards previously adopted by the States of Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming and approved by the Environmental Protection

Agency are the effective water quality standards under section 303 of the Act for interstate and intrastate waters within those States. Where the regulations set forth below are inconsistent with the referenced state standards, these regulations will supersede such standards to the extent of the inconsistency.

In consideration of the foregoing, 40 CFR Part 120 is amended as follows:

1. Section 120.5 is added to read as set forth below:

**§ 120.5 Colorado River System Salinity Standards and Implementation Plan.**

(a) "Colorado River System" means that portion of the Colorado River and its tributaries within the United States of America.

(b) It shall be the policy that the flow weighted average annual salinity in the lower main stem of the Colorado River System be maintained at or below the average value found during 1972. To carry out this policy, water quality standards for salinity and a plan of implementation for salinity control shall be developed and implemented in accordance with the principles of paragraph (c) below.

(c) The States of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming are required to adopt and submit for approval to the Environmental Protection Agency on or before October 18, 1975:

(1) Adopted water quality standards for salinity including numeric criteria consistent with the policy stated above for appropriate points in the Colorado River System; and,

(2) A plan to achieve compliance with these standards as expeditiously as practicable providing that:

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

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

(iii) The goal of the plan shall be to achieve compliance with the adopted standards by July 1, 1983. The date of compliance with the adopted standards shall take into account the necessity for Federal salinity control actions set forth in the plan. Abatement measures within the control of the States shall be implemented as soon as practicable.

(iv) Salinity levels in the lower main stem may temporarily increase above the 1972 levels if control measures to offset the increases are included in the control plan. However, compliance with 1972 levels shall be a primary consideration.

(v) The feasibility of establishing an interstate institution for salinity management shall be evaluated.

(d) The States are required to submit to the respective Environmental Protection Agency Regional Administrator established procedures for achieving (c)

(1) and (c) (2) above within 30 days of the effective date of these regulations and to submit progress reports quarterly thereafter. EPA will on a quarterly basis determine the progress being made in the development of salinity standards and the implementation plan.

**§ 120.10 [Amended]**

§ 120.10 is amended by adding to the paragraphs entitled "Arizona", "California", "Colorado", "Nevada", "New Mexico", "Utah", and "Wyoming" a salinity control policy and procedures and requirements for establishing water quality standards for salinity control in the Colorado River System.

(Sec. 303, Pub. L. 92-600, 86 Stat. 816 (33 U.S.C. 1313))

Effective date: December 18, 1974.

Dated: December 11, 1974.

## **APPENDIX B**

### **Forum Policies**

**POLICY  
FOR IMPLEMENTATION OF  
COLORADO RIVER SALINITY STANDARDS  
THROUGH THE NPDES PERMIT PROGRAM**

Prepared by  
The Colorado River Basin Salinity Control Forum

February 28, 1977

In November 1976, the United States Environmental Protection Agency Regional Administrators notified each of the seven Colorado River Basin states of the approval of the water quality standards for salinity for the Colorado River System as contained in the document entitled "Proposed Water Quality Standards for Salinity Including Numeric Criteria and Plan of Implementation for Salinity Control, Colorado River System, June 1975," and the supplement dated August 25, 1975. The salinity standards including numeric criteria and a plan of implementation provide for a flow weighted average annual numeric criteria for three stations in the lower main stem of the Colorado River: below Hoover Dam, below Parker Dam, and at Imperial Dam.

The Plan of Implementation is comprised of a number of Federal and non-Federal projects and measures to maintain the flow-weighted average annual salinity in the Lower Colorado River at or below numeric criteria at the three stations as the Upper and Lower Basin states continue to develop their compact-apportioned waters. One of the components of the Plan consists of the placing of effluent limitations, through the National Pollutant Discharge Elimination System (NPDES) permit program, on industrial and municipal discharges.

The purpose of this policy is to provide more detailed guidance in the application of salinity standards developed pursuant to Section 303 and through the NPDES permitting authority in the regulation of municipal and industrial sources. (See Section 402 of the Federal Water Pollution Control Act.) This policy is applicable to discharges that would have an impact, either direct or indirect on the lower main stem of the Colorado River System. The lower main stem is defined as that portion of the main river from Hoover Dam to Imperial Dam.

**I. Industrial Sources**

The Salinity Standards state that "the objective for discharges shall be a no-salt return policy whenever practicable." This is the policy that shall be followed in issuing NPDES discharge permits for all new industrial sources, and upon the reissuance of permits for all existing industrial sources, except as provided herein. The following

addresses those cases where no-discharge of salt may be deemed not to be practicable.

A. New Construction

1. New construction is defined as any facility from which a discharge may occur, the construction of which is commenced after October 18, 1975. (Date of submittal of water quality standards as required by 40 CFR 120, December 11, 1974.) Appendix A provides guidance on new construction determination.
  - a. The permitting authority may permit the discharge of salt upon a satisfactory demonstration by the permittee that it is not practicable to prevent the discharge of all salt from proposed new construction.
  - b. The demonstration by the applicant must include information on the following factors relating to the potential discharge:
    - (1) Description of the proposed new construction.
    - (2) Description of the quantity and salinity of the water supply.
    - (3) Description of water rights, including diversions and consumptive use quantities.
    - (4) Alternative plans that could reduce or eliminate salt discharge. Alternative plans shall include:
      - (a) Description of alternative water supplies, including provisions of water reuse, if any.
      - (b) Description of quantity and quality of proposed discharge.
      - (c) Description of how salts removed from discharges shall be disposed of to prevent such salts from entering surface waters or groundwater aquifers.
      - (d) Costs of alternative plans in dollars per ton of salt removed.

- (5) Of the alternatives, a statement as to the one plan for reduction of salt discharge that the applicant recommends be adopted.
  - (6) Such other information pertinent to demonstration of non-practicability as the permitting authority may deem necessary.
- c. In determining what permit conditions shall be required, the permit issuing authority shall consider, but not be limited to the following:
- (1) The practicability of achieving no discharge of salt.
  - (2) Where no discharge is determined not to be practicable:
    - (a) The impact of the total proposed salt discharge of each alternative on the lower main stem in terms of both tons per year and concentration.
    - (b) Costs per ton of salt removed from the discharge for each plan alternative.
    - (c) Capability of minimizing salinity discharge.
  - (3) With regard to both points, one and two above, the compatibility of state water laws with either the complete elimination of a salt discharge or any plan for minimizing a salt discharge.
  - (4) The no-salt discharge requirement may be waived in those cases where the salt load reaching the main stem of the Colorado River is less than one ton per day or 350 tons per year, whichever is less. Evaluation will be made on a case-by-case basis.

## B. Existing Facilities

1. The permitting authority may permit the discharge of salt upon a satisfactory demonstration by the permittee that it is not practicable to prevent the discharge of all salt from an existing facility.



2. The demonstration by the applicant must include, in addition to that required under Section I,A,1,b; the following factors relating to the potential discharge:
  - a. Existing tonnage of salt discharged and volume of effluent.
  - b. Cost of modifying existing industrial plant to provide for no salt discharge.
  - c. Cost of salt minimization.
3. In determining what permit conditions shall be required, the permit issuing authority shall consider the items presented under I,A,1,c (2), and in addition; the annual costs of plant modification in terms of dollars per ton of salt removed for:
  - a. No salt return.
  - b. Minimizing salt return.
4. The no-salt discharge requirement may be waived in those cases where the salt load reaching the main stem of the Colorado River is less than one ton per day or 350 tons per year, whichever is less. Evaluation will be made on a case-by-case basis.

## II. Municipal Discharges

The basic policy is that a reasonable increase in salinity shall be established for municipal discharges to any portion of the Colorado River stream system that has an impact on the lower main stem. The incremental increase in salinity shall be 400 mg/l or less, which is considered to be a reasonable incremental increase above the flow weighted average salinity of the intake water supply.

- A. The permitting authority may permit a discharge in excess of the 400 mg/l incremental increase at the time of issuance or reissuance of a NPDES discharge permit, upon satisfactory demonstration by the permittee that it is not practicable to attain the 400 mg/l limit.
- B. Demonstration by the applicant must include information on the following factors relating to the potential discharge:
  1. Description of the municipal entity and facilities.
  2. Description of the quantity and salinity of intake water sources.

3. Description of significant salt sources of the municipal wastewater collection system, and identification of entities responsible for each source, if available.
  4. Description of water rights, including diversions and consumptive use quantities.
  5. Description of the wastewater discharge, covering location, receiving waters, quantity, salt load, and salinity.
  6. Alternative plans for minimizing salt contribution from the municipal discharge. Alternative plans should include:
    - a. Description of system salt sources and alternative means of control.
    - b. Cost of alternative plans in dollars per ton, of salt removed from discharge.
  7. Such other information pertinent to demonstration of non-practicability as the permitting authority may deem necessary.
- C. In determining what permit conditions shall be required, the permit issuing authority shall consider the following criteria including, but not limited to:
1. The practicability of achieving the 400 mg/l incremental increase.
  2. Where the 400 mg/l incremental increase is not determined to be practicable:
    - a. The impact of the proposed salt input of each alternative on the lower main stem in terms of tons per year and concentration.
    - b. Costs per ton of salt removed from discharge of each alternative plan.
    - c. Capability of minimizing the salt discharge.
- D. If, in the opinion of the permitting authority, the data base for the municipal waste discharger is inadequate, the permit will contain the requirement that the municipal waste discharger monitor the water supply and the wastewater discharge for salinity. Such monitoring program shall be completed within 2 years and the discharger shall then present the information as specified above.

- E. Requirements for establishing incremental increases may be waived in those cases where the incremental salt load reaching the main stem of the Colorado River is less than one ton per day or 350 tons per year, whichever is less. Evaluation will be made on a case-by-case basis.
- F. All new and reissued NPDES permits for all municipalities shall require monitoring of the salinity of the intake water supply and the wastewater treatment plant effluent in accordance with the following guidelines:

<u>Treatment Plant Design Capacity</u>	<u>Monitoring Frequency</u>	<u>Type of Sample</u>
<1.0 MGD*	Quarterly	Discrete
1.0 - 5.0 MGD	Monthly	Composite
>5.0 - 50.0 MGD	Weekly	Composite
50.0 MGD	Daily	Composite

1. Analysis for salinity may be either as total dissolved solids (TDS) or be electrical conductivity where a satisfactory correlation with TDS has been established. The correlation should be based on a minimum of five different samples.
2. Monitoring of the intake water supply may be at a reduced frequency where the salinity of the water supply is relatively uniform.

## APPENDIX A

### Guidance on New Construction Determination

For purposes of determining a new construction, a source should be considered new if by October 18, 1975, there has not been:

- I. Significant site preparation work such as major clearing or excavation; and/or
- II. Placement, assembly or installation of unique facilities or equipment at the premises where such facilities or equipment will be used; and/or
- III. Any contractual obligation to purchase unique facilities or equipment. Facilities and equipment shall include only the major items listed below, provided that the value of such items represents a substantial commitment to construct the facility:
  - A. structures; or
  - B. structural materials; or
  - C. machinery; or
  - D. process equipment; or
  - E. construction equipment.
- IV. Contractual obligation with a firm to design, engineer, and erect a completed facility (i.e., a turnkey plant).

**POLICY  
FOR USE OF  
BRACKISH AND/OR SALINE WATERS  
FOR INDUSTRIAL PURPOSES**

Adopted by  
The Colorado River Basin Salinity Control Forum

September 11, 1980

The states of the Colorado River Basin, the federal Executive Department, and the Congress have all adopted as a policy that the salinity in 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 waters. In order to achieve this policy, all steps which are practical and within the framework of the administration of states' water rights must be taken to reduce the salt load of the river. One such step was the adoption in 1975 by the Forum of a policy regarding effluent limitations for industrial discharges with the objective of "no-salt return" wherever practicable. Another step was the Forum's adoption in 1977 of the "Policy for Implementation of Colorado River Salinity Standards through the NPDES Permit Program." These policies are part of the basinwide plan of implementation for salinity control which has been adopted by the seven Basin states.

The Forum finds that the objective of maintaining 1972 salinity levels would be served by the exercise of all feasible measures including, wherever practicable, the use of brackish and/or saline waters for industrial purposes.

The summary and page 32 of the Forum's 1978 Revision of the Water Quality Standards for Salinity state: "The plan also contemplates the use of saline water for industrial purposes whenever practicable,..." In order to implement this concept and thereby further extend the Forum's basic salinity policies, the Colorado River Basin states support the Water and Power Resources Service (WPRS) appraisal study of saline water collection, pretreatment and potential industrial use.

The Colorado River Basin contains large energy resources which are in the early stages of development. The WPRS study should investigate the technical and financial feasibility of serving a significant portion of the water requirements of the energy industry and any other industries by the use of Basin brackish and/or saline waters. The Forum recommends that:

- I. The Colorado River Basin states, working with federal agencies, identify, locate and quantify such brackish and/or saline water sources.
- II. Information on the availability of these waters be made available to all potential users.
- III. Each state encourage and promote the use of such brackish and/or saline waters, except where it would not be environmentally sound or economically feasible, or would significantly increase consumptive use of Colorado River System water in the state above that which would otherwise occur.
- IV. The WPRS, with the assistance of the states, encourages and promotes the use of brackish return flows from federal irrigation projects in lieu of fresh water sources, except where it would not be environmentally sound or economically feasible, or would significantly increase consumptive use of Colorado River System water.
- V. The WPRS considers a federal contribution to the costs of industrial use of brackish and/or saline water, where cost-effective, as a joint private-government salinity control measure. Such activities shall not delay the implementation of the salinity control projects identified in Title II of P.L. 93-320.

**POLICY  
FOR IMPLEMENTATION OF  
COLORADO RIVER SALINITY STANDARDS  
THROUGH THE NPDES PERMIT PROGRAM  
FOR INTERCEPTED GROUND WATER**

Adopted by  
The Colorado River Basin Salinity Control Forum

October 20, 1982

The States of the Colorado River Basin in 1977 agreed to the "Policy for Implementation of Colorado River Salinity Standards through the NPDES Permit Program" with the objective for industrial discharge being "no-salt return" whenever practicable. That policy required the submittal of information by the applicant on alternatives, water rights, quantity, quality, and costs to eliminate or minimize the salt discharge. The information is for use by the NPDES permit-issuing agency in evaluating the practicability of achieving "no-salt" discharge.

There are mines and wells in the Basin which discharge intercepted ground waters. The factors involved in those situations differ somewhat from those encountered in other industrial discharges. Continued development will undoubtedly result in additional instances in which permit conditions must deal with intercepted ground water.

The discharge of intercepted ground water needs to be evaluated in a manner consistent with the overall objective of "no-salt return" whenever practical. The following provides more detailed guidance for those situations where ground waters are intercepted with resultant changes in ground-water flow regime.

- I. The "no-salt" discharge requirement may be waived at the option of the permitting authority in those cases where the discharged salt load reaching the main stem of the Colorado River is less than one ton per day or 350 tons per year whichever is less. Evaluation will be made on a case-by-case basis.
- II. Consideration should be given to the possibility that the ground water, if not intercepted, normally would reach the Colorado River System in a reasonable time frame. An industry desiring such consideration must provide detailed information

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\*The term "intercepted ground water" means all ground water encountered during mining or other industrial operations.

including a description of the topography, geology, and hydrology. Such information must include direction and rate of ground-water flow; chemical quality and quantity of ground water; and the location, quality, and quantity of surface streams and springs that might be affected. If the information adequately demonstrates that the ground water to be intercepted normally would reach the river system in a reasonable time frame and would contain approximately the same or greater salt load than if intercepted, and if no significant localized problems would be created, then the permitting agency may waive the "no-salt" discharge requirement.

III. In those situations where the discharge does not meet the criteria in I or II above, the applicant will be required to submit the following information for consideration:

- A. Description of the topography, geology, and hydrology. Such information must include the location of the development, direction and rate of ground-water flow, chemical quality and quantity of ground water, and relevant data on surface streams and springs that are or might be affected. This information should be provided for the conditions with and without the project.
- B. Alternative plans that could substantially reduce or eliminate salt discharge. Alternative plans must include:
  - 1. Description of water rights, including beneficial uses, diversions, and consumptive use quantities.
  - 2. Description of alternative water supplies, including provisions for water reuse, if any.
  - 3. Description of quantity and quality of proposed discharge.
  - 4. Description of how salts removed from discharges shall be disposed of to prevent their entering surface waters or ground-water aquifers.
  - 5. Technical feasibility of the alternatives.
  - 6. Total construction, operation, and maintenance costs; and costs in dollars per ton of salt removed from the discharge.
  - 7. Closure plans to ensure termination of any proposed discharge at the end of the economic life of the project.



8. A statement as to the one alternative plan for reduction of salt discharge that the applicant recommends be adopted, including an evaluation of the technical, economic, and legal practicability of achieving no discharge of salt.
  9. Such information as the permitting authority may deem necessary.
- IV. In determining whether a "no-salt" discharge is practicable, the permit-issuing authority shall consider, but not be limited to, the water rights and the technical, economic, and legal practicability of achieving no discharge of salt.
- V. Where "no-salt" discharge is determined not to be practicable the permitting authority shall, in determining permit conditions, consider:
- A. The impact of the total proposed salt discharge of each alternative on the lower main stem in terms of both tons per year and concentration.
  - B. Costs per ton of salt removed from the discharge for each plan alternative.
  - C. The compatibility of state water laws with each alternative.
  - D. Capability of minimizing salinity discharge.
  - E. The localized impact of the discharge.
  - F. Minimization of salt discharges and the preservation of fresh water by using intercepted ground water for industrial processes, dust control, etc. whenever it is economically feasible and environmentally sound.

**POLICY  
FOR IMPLEMENTATION OF  
COLORADO RIVER SALINITY STANDARDS  
THROUGH THE NPDES PERMIT PROGRAM  
FOR FISH HATCHERIES**

Adopted by  
The Colorado River Basin Salinity Control Forum

October 28, 1988

The states of the Colorado River Basin in 1977 adopted the "Policy for Implementation of Colorado River Salinity Standards through the NPDES Permit Program." The objective was for "no-salt return" whenever practicable for industrial discharges and an incremental increase in salinity over the supply water for municipal discharges. The Forum addressed the issue of intercepted ground water under the 1977 policy, and adopted a specific policy dealing with that type of discharge.

A specific water use and associated discharge which has not been here-to-fore considered is discharges from fish hatcheries. This policy is limited exclusively to discharges from fish hatcheries within the Colorado River Basin. The discharges from fish hatcheries need to be addressed in a manner consistent with the 1977 and 1980 Forum policies.

The basic policy for discharges from fish hatcheries shall permit an incremental increase in salinity of 100 mg/l or less above the flow weighted average salinity of the intake supply water. The 100 mg/l incremental increase may be waived if the discharged salt load reaching the Colorado River system is less than one ton per day, or 350 tons per year, whichever is less. Evaluation is to be made on a case-by-case basis.

- I. The permitting authority may permit a discharge in excess of the 100 mg/l incremental increase at the time of issuance or reissuance of a NPDES discharge permit. Upon satisfactory demonstration by the permittee that it is not practicable to attain the 100 mg/l limit.
- II. Demonstration by the applicant must include information on the following factors relating to the potential discharge:
  - A. Description of the fish hatchery and facilities.
  - B. Description of the quantity and salinity of intake water sources.
  - C. Description of salt sources in the hatchery.

- D. Description of water rights, including diversions and consumptive use quantities.
  - E. Description of the discharge, covering location, receiving waters, quantity salt load, and salinity.
  - F. Alternative plans for minimizing salt discharge from the hatchery. Alternative plans should include:
    - 1. Description of alternative means of salt control.
    - 2. Cost of alternative plans in dollars per ton, of salt removed from discharge.
  - G. Such other information pertinent to demonstration of non-practicability as the permitting authority may deem necessary.
- III. In determining what permit conditions shall be required, the permit-issuing authority shall consider the following criteria including, but not limited to:
- A. The practicability of achieving the 100 mg/l incremental increase.
  - B. Where the 100 mg/l incremental increase is not determined to be practicable:
    - 1. The impact of the proposed salt input of each alternative on the lower main stem in terms of tons per year and concentration.
    - 2. Costs per ton of salt removed from discharge of each alternative plan.
    - 3. Capability of minimizing the salt discharge.
- IV. If, in the opinion of the permitting authority, the database for the hatchery is inadequate, the permit will contain the requirement that the discharger monitor the water supply and the discharge for salinity. Such monitoring program shall be completed within two years and the discharger shall then present the information as specified above.
- V. All new and reissued NPDES permits for all hatcheries shall require monitoring of the salinity of the intake water supply and the effluent at the time of peak fish population.
- A. Analysis for salinity may be either as total dissolved solids (TDS) or be electrical conductivity where a satisfactory correlation with TDS has been established. The correlation should be based on a minimum of five different samples.

## APPENDIX C

### List of NPDES Permits

LEGEND

**NPDES PERMITS  
EXPLANATION CODES**

**COLORADO RIVER BASIN SALINITY CONTROL FORUM**

NPDES permits are reviewed under two different criterium under Forum policy; these being municipal and industrial. In order for a permittee to be in compliance under the municipal criterium, the increase in concentration between inflow and outflow can not be greater than 400 mg/L. Forum industrial criterium requires that no industrial user discharges more than 1.00 ton/day. Under Forum policy there can be granted exceptions to these limitations by the states. The following gives an explanation of the current status of the NPDES permits. Because at any given time many of the approximate 600 permits identified in this list are being reviewed, reissued, and/or terminated, and new discharge permits are being filed, this list must be considered as being subject to frequent change.

MUNICIPAL

INDUSTRIAL

(M)	Municipal user in compliance with Forum policy.	(I)	Industrial user in compliance with Forum policy.
(M-1)	Permit has expired or been revoked. No discharge.	(I-1)	Permit has expired or been revoked. No discharge.
(M-2)	Permittee is not currently discharging.	(I-2)	Permittee is not currently discharging.
(M-3)	Measurement of TDS is not currently required, but the state and/or EPA plans to require measurements of both inflow and outflow when the permit is reissued.	(I-3)	Measurement of TDS is not currently required, but the state and/or EPA plans to require measurements of both volume and concentration of outflow when the permit is reissued.
(M-4)	Measurements of inflow are not consistent with Forum policy;	(I-4)	Either concentration or volume of outflow are not currently being made as stipulated, thus the permit is in violation of Forum policy. It is not known if the permit is in excess of the <1.00 ton/day requirement.
(M-4A)	Therefore, it is not known whether or not this municipal user is in compliance.		
(M-4B)	However, since outflow concentration is less than 500 mg/L it is presumed that this permit is not in violation of the <400 mg/L increase.	(I-5)	This permit is in violation of Forum policy in that they are discharging >1.00 ton/day of salts.
(M-5)	This permit is in violation of Forum policy in that there is an increase in concentration of >400 mg/L over the source waters.	(I-5A)	No provision has been made allowing this violation of Forum policy.
(M-5A)	The state is currently working to bring them into compliance.	(I-5B)	Though discharge is >1.00 ton/day, in keeping with Forum policy the discharger has demonstrated the salt reduction is not practicable and the requirement has been waived.
(M-6)	This permit is under the supervision of EPA and they report <400 ppm incremental increase in TDS.	(I-5C)	The use of water under this permit is for thermal energy. Only heat is extracted and thus the salt and water which are discharged into the river would have done so naturally. They are covered by the Forum's policy on intercepted ground waters.
(M-7)	Insufficient data to know the status of this permit.	(I-5D)	This permit is for a fish hatchery. The use of the water is a one-time pass through, and <1.00 ton/day of salt is being discharged.
		(I-5E)	This permit is for the interception and passage of ground waters and thus is excepted under the Forum's policy on ground-water interception.
		(I-6)	This permit is under the supervision of EPA and they report a discharge of <1.00 ton/day of salt.
		(I-7)	Insufficient data to know the current status of this permit.

\* Permit issued to a federal agency or an Indian tribe and the responsibility of EPA.

**NPDES PERMITS**  
**COLORADO RIVER BASIN SALINITY CONTROL FORUM**  
**DECEMBER 31, 1991**

NPDES #	REACH	NAME	CONCENTRATION MG/L	FLOW RATE MGD	SALT LOAD TONS/DAY	EXPLANATION CODE
AZ0000078	930	AZ PUBLIC SERVICE CO YUCCA POWER	0	0.000	0.00	I-2
AZ0110124	801	BIA DENNE HOTS0 BOARDING SCHOOL	0	0.000	0.00	M-1*
AZ0110159	900	BIA DILCON SCHOOL	0	0.000	0.00	M-2*
AZ0110167	900	BIA HUNTERS POINT SCHOOL	—	0.014	0.00	M-6*
AZ0110213	900	BIA LOW MOUNTAIN SCHOOL	—	0.014	0.00	M-6*
AZ0110507	801	BIA LUKACHUKAI	0	0.000	0.00	M-1*
AZ0110043	801	BIA NAZLINI BOARDING SCHOOL	—	0.013	0.00	M-3*
AZ0110175	900	BIA PINE SPRINGS SCHOOL	0	0.045	0.00	M-2*
AZ0110132	900	BIA ROCKY RIDGE	0	0.000	0.00	M-1*
AZ0110183	900	BIA SEBA DALKAI	0	0.000	0.00	M-2*
AZ0110094	801	BIA TEEC NOS POS SCHOOL	—	0.080	0.00	M-6*
AZ0110191	900	BIA TOYEI SCHOOL	0	0.000	0.00	M-2*
AZ0110116	700	BIA UPPER KAIBITO	0	0.000	0.00	M-1*
AZ0021610	900	CAMERON TRADING POST	2500	0.010	0.10	I
AZ0021822	801	CHINLE PUBLIC SCHOOL	0	0.000	0.00	M-1*
AZ0021024	920	CITIZENS UTILITIES	1366	0.118	0.67	M-4A
AZ0021415	940	COLORADO RIVER WTJV	360	0.454	0.68	M-4A
AZ0022462	940	COLORADO RIVER INDIAN TRIBE WTP	—	—	0.00	M-3*
AZ0022268	930	CYPRUS BAGDAD COPPER DIV	0	0.000	0.00	I-2
AZ0022144	900	ENERGY FUELS NUCLEAR HACK CANYON	0	0.000	0.00	I-2
AZ0022322	900	ENERGY FUELS NUCLEAR KANAB	0	0.000	0.00	I-2
AZ0022454	900	FAIRFIELD SUNRISE VILLAGE	0	0.000	0.00	I-2
AZ0020427	900	FLAGSTAFF, CITY OF	344	4.662	6.69	M-4B
AZ0022152	900	GRAND CANYON NAT. PK.	—	—	0.00	I-7
AZ0022527	940	HEADGATE ROCK DAM	—	—	0.00	I-3*
AZ0020257	900	HOLBROOK, TOWN OF	835	0.367	1.28	M-4A
AZ0022098	940	LE PERA SCHOOL - PARKER SCHOOL DIST #27	30	0.028	0.00	M-4A
AZ0020265	801	NTUA CHINLE	617	0.168	0.43	M-4A
AZ0020281	801	NTUA KAYENTA	887	0.090	0.33	M-4A
AZ0021920	801	NTUA MANY FARMS	552	0.047	0.11	M-4A
AZ0020290	900	NTUA TUBA CITY	359	0.200	0.30	M-4B
AZ0021555	900	NTUA WINDOW ROCK	730	0.888	2.71	M-4A
AZ0022284	940	PARKER, TOWN OF	—	—	0.00	M-7
AZ0022179	900	PEABODY COAL CO.	0	0.000	0.00	I-2
AZ0020125	900	SNOWFLAKE, TOWN OF	—	—	0.00	M-7
AZ0000132	920	U.S.F.W. WILLOW	36	8.400	1.26	I-5A
AZ0110302	900	US FOREST SERVICE APPACHE	0	0.000	0.00	I-2
AZ0110426	900	US NAT'L PARK SER. GRAND CANYON	460	0.080	0.15	I
AZ0110249	920	WATER & POWER RES SERV DAVIS	710	0.027	0.08	I
AZ0020648	940	WHITEWING AGRICULTURE	—	—	0.00	I-7
AZ0020346	900	WILLIAMS, CITY OF	—	0.141	0.00	M-3
AZ0021512	900	WINSLOW, CITY OF	0	0.000	0.00	M-2
CA0104205	920	NEEDLES, CITY OF	1231	0.960	4.93	M
C00039993	801	AIRCO CARBON DIOXIDE	1400	8.290	48.39	I-5
COG500141	100	ALPINE ROCK CO.	—	0.000	0.00	I-2
C00036609	—	AMERICAN SHIELD COAL MINE	—	0.000	0.00	I-2
C00040444	220	AMOCO PRODUCTION-HOTCHKISS RANCH	—	—	—	—
C00026468	801	AMORELLI, JOE & CHERYL-LIGHTNER CRK	1410	0.002	0.04	M-5A
C00039683	510	ANDRIKOPOULOS, A. G.	—	0.000	0.00	I-2
C00033090	801	ANIMAS AGGREGATES, INC.	—	—	—	—
C00041858	220	ANTELOPE HILLS HOMEOWNERS ASSN	642	0.009	0.02	M
C00031364	100	ASPEN BASALT KOA CAMPGROUND	—	—	—	—
C00026387	100	ASPEN CONSOLIDATED SAN DIST	582	1.668	4.01	M
C00022721	100	ASPEN VILLAGE	475	0.027	0.05	M
C00040665	190	ATLAS PRECIOUS METALS, INC-CART	—	—	—	—
C00037117	—	AXIAL BASIN RANCH COMPANY	—	—	—	—
C00021491	100	BASALT SANITATION DISTRICT	397	0.236	0.39	M
C00039063	100	BATTLEMENT MESA, INC.	596	0.207	0.50	M

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CO0038989	100	BATTLEMENT MESA, INC. WTP		0.000	0.00	I-2
CO0039276	801	BAYFIELD SAN DIST-GEM VILLAGE	433	0.013	0.02	M
CO0020273	801	BAYFIELD SANITARY DISTRICT	204	0.195	0.16	M
COG850015	220	BEAR COAL COMPANY, INC.-BEAR MINE		0.000	0.00	I-2
CO0042111		BEAR, REUDI	1980	0.320	2.64	I-5C
CO0023663		BENSON, dba COUNTRY MEADOWS MHP	348	0.008	0.01	M
CO0000051		BHP PETROLEUM (AMERIGAS)/GEODYNE	1835	0.910	6.96	I
CO0031445	801	BINCKES, dba FIVE BRANCHES CAMPGRND	233	0.007	0.01	M
COG640020	100	BLUE RIVER WTR DIST-PEAK 7 WPT	86	0.002	0.00	I
COG500150	300	BOUNDS & SONS, INC.-BOUNDS PIT		0.000	0.00	I-2
CO0036072	100	BRAMWELL, ERMA (WENDALL)		.	.	M-1
CO0031887	100	BRECKENRIDGE SAN DIST-QUANDRY		.	.	
CO0029611	100	BRECKENRIDGE SAN DIST-SKIERS EDGE		.	.	
CO0027197	100	BRECKENRIDGE SAN DIST-VALLEY OF BLU		.	.	
CO0021539	100	BRECKENRIDGE SANITATION DISTRICT	280	1.101	1.31	M
CO0031020	100	BRECKENRIDGE WTP		.	.	
CO0041637	801	BUFFALO BOY MINE DEVELOPMENT		.	.	
COG500096	801	BURNETT CONSTRUCTION COMPANY		0.000	0.00	I-2
CO0026981	220	CAMP BIRD MINE (CHIPETA)	1205	1.420	7.15	I-5B
CO0026751	100	CARBONDALE SANITATION DISTRICT	303	0.261	0.32	M
CO0033634	100	CARBONDALE, TOWN OF WTP		0.000	0.00	I-2
CO0041513	220	CASIAS-LOVATO SUBDIVISION	1283	0.018	0.10	M-5
CO0033961	510	CATHEDRAL BLUFFS SHALE OIL CO.	1546	0.139	0.89	I
CO0031984	220	CEDAREGE, TOWN OF	313	0.167	0.22	M
COG640015	220	CEDAREGE, TOWN OF - WTP	77	0.012	0.00	I
CO0038474	300	CLEAR CREEK DEVELOPMENT SEMI-WORKS		.	.	
CO0033260	300	CLIFTON SANITATION DISTRICT #1	912	0.057	0.22	M
CO0033791	300	CLIFTON SANITATION DISTRICT #2	623	0.586	1.52	M
CO0000248	100	CLIMAX MOLYBDENUM-CLIMAX MINE	1107	7.980	36.80	I-5B
CO0032522		CLIMAX MOLYBDENUM-HENDERSON MINE		.	.	
CO0035394	190	CLIMAX MOLYBDENUM-MT. EMMONS MINE	1383	0.340	1.94	I-5B
CO0041076		COCA-COLA BOTTLING COMPANY	486	0.088	0.18	I
CO0021563	300	COLLBRAN, TOWN OF		.	.	
CO0040487	100	COLLBRAN, TOWN OF WWTP	721	0.117	0.37	M
CO0040771	100	COLO DEPT CORRECTIONS-RIFLE CENTER		.	.	M-7
COG070039	100	COLO DEPT HIGHWAYS-DEBEQUE		0.000	0.00	I-2
CO0030872	100	COLO DEPT HIGHWAYS-WILMOR LAKE REST		.	.	M-1
CO0000329	100	COLO DIV WILDLIFE-CRYSTAL RIVER	374	5.980	9.31	I-5D
CO0000281	801	COLO DIV WILDLIFE-DURANGO HATCHERY	304	2.160	2.75	I-5D
CO0000353	100	COLO DIV WILDLIFE-FINGER ROCK	231	2.410	2.32	I-5D
CO0000272	190	COLO DIV WILDLIFE-PITKIN TROUT	141	10.200	6.03	I-5D
CO0026352	100	COLO DIV WILDLIFE-RIFLE FALLS	401	20.800	34.80	I-5D
CO0000299	190	COLO DIV WILDLIFE-ROARING JUDY	217	20.270	18.34	I-5D
CO0000043	220	COLO UTE ELEC ASSN-JIM BULLOCK		0.000	0.00	I-2
COG850017	500	COLO-WYO COAL CO.	2305	0.071	0.68	I
CO0042765		COLORADO MINING & SMELTING		0.000	0.00	I-2
CO0027154	500	COLORADO YAMPA COAL COMPANY	2932	1.340	16.40	I-5B
COG850013	500	COLORADO YAMPA COAL COMPANY	824	0.062	0.21	I
CO0038440		CONRAD, JOHN - CONRAD JOINT VENTURE	349	0.001	0.00	M
CO0033537	300	COORS PORCELAIN CO-GRAND JUNCTION	304	0.038	0.05	I
CO0021598	100	COPPER MOUNTAIN SANITATION DISTRICT	250	0.260	0.29	M
CO0032344	100	CORN CONSTRUCTION COMPANY		.	.	
CO0039411	300	CORN CONSTRUCTION COMPANY		.	.	
CO0039420	300	CORN CONSTRUCTION COMPANY		.	.	
CO0039471	300	CORN CONSTRUCTION COMPANY		.	.	
COG500003	300	CORN CONSTRUCTION COMPANY		0.000	0.00	I-2
COG500155	300	CORN CONSTRUCTION COMPANY		0.000	0.00	I-2
COG500156	300	CORN CONSTRUCTION COMPANY		0.000	0.00	I-2
COG500157	300	CORN CONSTRUCTION COMPANY		.	.	
COG500158	300	CORN CONSTRUCTION COMPANY		0.000	0.00	I-2
COG500159	300	CORN CONSTRUCTION COMPANY		0.000	0.00	I-2

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COG500160	300	CORN CONSTRUCTION COMPANY		0.000	0.00	I-2
C00027545	801	CORTEZ SANITATION DIST-SOUTHWEST	830	0.131	0.45	M
C00020125	801	CORTEZ SANITATION DISTRICT-NORTH	953	0.232	0.92	M
C00027880	801	CORTEZ SANITATION DISTRICT-SOUTH	590	0.460	1.13	M
C00036251	310	COTTER CORP-JD-7 & JD-9 MINES	1850	0.017	0.13	I
C00035777	100	COTTONWOOD SPRINGS MHP, LTD	2681	0.045	0.51	M-5A
C00040037	500	CRAIG, CITY OF WWTP	606	0.899	2.29	M
C00037729	220	CRAWFORD SEWER TREATMENT PLANT	375	0.010	0.02	M
C00031836	190	CRESTED BUTTE SOUTH METRO DISTRICT	467	0.028	0.05	M
C00020443	190	CRESTED BUTTE, TOWN OF	179	0.263	0.20	M
C00038563	801	CUMBERLAND MINES, LTD				
C00034142	500	CYPRUS EMPIRE ENERGY CORP-WISE HILL	1034	0.001	0.00	I-5B
C00033685	220	CYPRUS ORCHARD VALLEY COAL	439	0.020	0.03	I
C00023418	100	DEBEQUE, TOWN OF	1010	0.035	0.16	M-5A
COG500136	220	DELTA SAND & GRAVEL CO - PIT #1	1740	1.500	10.90	I-5B
COG500136		DELTA SAND & GRAVEL-PIT NO. 1				
C00020036	220	DELTA, CITY OF				
C00039641	220	DELTA, CITY OF	1619	1.402	9.47	M
C00032735	200	DELTA-MONTROSE VOCATIONAL-TECH				
COG640006	100	DILLON, CITY OF WTP				
C00039802	310	DOLORES CANYON MINES				
C00020001	801	DOLORES, TOWN OF				
C00040509	801	DOLORES, TOWN OF	432	0.158	0.28	M-4B
C00036960	300	DORCHESTER COAL COMPANY				
C00033901	190	DOS RIOS DIV OF GUNNISON COUNTY				
C00023434	310	DOVE CREEK SANITATION DISTRICT	654	0.030	0.08	M-5A
C00041181		DURANGO SCHOOL DISTRICT 9R		0.000	0.00	I-2
C00031658	801	DURANGO SKI CORP				
C00036226	801	DURANGO WEST METROPOLITAN DISTRICT	507	0.063	0.13	M
C00024082	801	DURANGO, CITY OF	362	1.917	2.88	M
C00021059	100	EAGLE SANITATION DISTRICT	733	0.100	0.29	M
C00039501	100	EAGLE, TOWN OF WTP		0.000	0.00	I-2
C00040720	190	EAST RIVER REGIONAL SAN DIST-WWTP	178	0.060	0.07	M
COG850019	100	EASTSIDE COAL CO., INC.		0.000	0.00	I-2
C00040266	801	EDGEMONT RANCH WW RECLAM FACILITY	468	0.005	0.01	M
C00039691	801	EDMUNDS dba CASCADE VILLAGE DEV	771	0.012	0.04	M
COG500106	300	ELAM CONSTRUCTION-19 ROAD PIT		0.000	0.00	I-2
COG500107	300	ELAM CONSTRUCTION-29 ROAD		0.000	0.00	I-2
COG500108	300	ELAM CONSTRUCTION-BOUNDS		0.000	0.00	I-2
COG500130	300	ELAM CONSTRUCTION-GRIFFIN PIT		0.000	0.00	I-2
C00033812	300	ELAM CONSTRUCTION-PETERSON				
C00039021	500	EMPIRE ENERGY CORP LOADOUT				
C00036048	500	ENERGY FUELS COAL, INC.				
COG850003	510	ENRON COAL COMPANY-NORTHERN #1		0.000	0.00	I-2
COG850002	510	ENRON COAL COMPANY-RIENAU #2		0.000	0.00	I-2
C00031003	500	EUZOA BIBLE CHURCH	136	0.000	0.00	M
C00038229	100	EVERIST, L.G. - LOVE GRAVEL PIT		0.000	0.00	I-2
C00037524	510	EXXON COAL RESOURCES USA, INC.				
C00038270	100	EXXON COMPANY-COLONY SHALE OIL PROJ		0.000	0.00	I-2
C00034193	300	FIBREBOARD CORPORATION	1	0.050	0.00	I
C00040240		FIDELITY TRUST BUILDING				
C00040967	190	FILOHA MEADOWS HEALTH EDUCATION	2615	0.025	0.27	I
C00031496	801	FLORIDA MESA ELEMENTARY SCHOOL				
C00028827	801	FORREST GROVES ESTATES	468	0.002	0.00	M
C00020966	100	FRASER SANITARY DISTRICT				
C00040142	100	FRASER SANITATION DISTRICT	201	0.316	0.27	M
COG500114	100	FREI, ALBERT & SONS-SILT PIT		0.000	0.00	I-2
C00020451	100	FRISCO SANITARY DISTRICT	571	0.413	0.98	M
C00037907	100	FRISCO, TOWN OF WTP	42	0.007	0.00	I
C00020257	100	FRUITA, TOWN OF	923	0.360	1.39	M
C00040916	100	GARFIELD COAL SALES, INC.				



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COG070014		GARFIELD COUNTY-UNA BRIDGE				
C00036340	500	GENERAL ELECTRIC HOLDING-CRAIG MINE				
C00000141	100	GLENWOOD HOT SPRINGS LODGE & POOL	14475	2.090	126.30	I-5C
C00020516	100	GLENWOOD SPRINGS, CITY OF	526	0.760	1.67	M
C00035386	100	GLENWOOD SPRINGS, CITY OF WTP	156	0.619	0.40	I
C00023108	801	GOLDEN WEST PARK				
C00035939	801	GOLF HOST WEST-TAMARRON RESORT				
C00020699	100	GRANBY SANITATION DISTRICT	288	0.293	0.35	M
C00033740	100	GRAND COUNTY WTR & SAN DIST - WTP		0.000	0.00	I-2
C00032964	100	GRAND COUNTY WTR & SANITATION DIST	172	0.274	0.19	M
COG500154	300	GRAND JUNCTION CONCRETE PIPE		0.000	0.00	I-2
COG500161	300	GRAND JUNCTION PIPE & SUPPLY		0.000	0.00	I-2
COG640004	220	GRAND JUNCTION WTP		0.000	0.00	I-2
C00040053	300	GRAND JUNCTION, CITY OF - PERSIGO	948	6.927	27.45	M-5A
C00037991	100	GRAND VALLEY PIT, GRAND RIVER CONST				
C00031640	801	GRANDVIEW MOTEL & PINON ACRES				
C00033502		GRANITE CONSTRUCTION COMPANY				
C00041530	220	GUNNISON, CITY OF	387	1.068	1.61	M
C00030996	100	GYPHUM SANITATION DISTRICT	678	0.166	0.45	M-5A
COG850018	500	H-G COAL CO.-HAYDEN GULCH MINE	2000	0.041	0.34	I
COG850008	500	H-G COAL CO.-HAYDEN GULCH MINE	640	0.043	0.12	I
C00029904	801	HARRELL, LYNN (LIGHTNER CREEK MHP)		0.000	0.00	M-2
C00027537	801	HARVEY, JOHN dba PONDEROSA KOA	351	0.010	0.02	M
C00020486	500	HAYDEN, TOWN OF				
C00040959	500	HAYDEN, TOWN OF	103	0.149	0.05	M
C00040452	801	HERMOSA SEWAGE LAGOONS	688	0.082	0.24	M
C00021326	801	HI-Z MINING CORP				
C00036315	300	HOLLY PLAZA DEVELOPMENT	488	0.005	0.01	M
C00032841	220	HORIZONS NURSING HOME (VOA)				M-1
C00031437	801	HORNBAKER, dba VALLECITO RESORT	497	0.042	0.10	M
C00024350	100	HOT SULPHUR SPRINGS, TOWN OF	275	0.031	0.04	M
COG640019		HOT SULPHUR SPRINGS	64	0.020	0.01	I
C00021415	220	HOTCHKISS SANITARY DISTRICT	1347	0.201	1.17	M-5A
C00034363	300	ICS INCORPORATED				M-1
C00026956	310	IDARADO MINING		0.000	0.00	I-2
C00022853	801	IGNACIO SANITARY DISTRICT	317	0.253	0.34	M
C00041220		INGLEHART, dba EL ROCKO MHP	522	0.009	0.02	M
C00033723	300	JOHNSON,P&M dba MOBILE CITY MHP	486	0.002	0.00	M
C00022748	801	JUNCTION CREEK TRAILER PARK				
C00036081	801	KAISER STEEL RESOURCES-CHIMNEY ROCK		0.000	0.00	I-2
COG850010		KAISER STEEL-COLO COAL MINE #1		0.000	0.00	I-2
COG850021		KERR COAL				I-3
C00023876	100	KEYSTONE RESORTS	484	0.008	0.02	M
C00027995	100	KEYSTONE RESORTS MGMT-SUMMIT HOUSE				
COG500118	300	KIEWIT WESTERN CO.-McGEE PIT				
COG500117		KIEWIT WESTERN CONST.-CLARK PIT		0.000	0.00	I-2
C00035319	801	KING, WILLARD dba WOLF CREEK VILLAGE		0.000	0.00	M-2
C00021636	100	KREMMLING SANITATION DISTRICT		0.000	0.00	M-2
C00020371	200	LAKE CITY AREA WTR & SAN DIST				
C00040673	200	LAKE CITY AREA WTR & SAN DIST	178	0.103	0.07	M
C00000078	300	LANDMARK PETROLEUM, INC.		0.000	0.00	I-2
C00029777	310	LAST DOLLAR HOMEOWNERS ASSN	377	0.004	0.01	M
COG500083		LATHAM, THOMAS & GINGER-DeBEQUE PIT		0.000	0.00	I-2
C00040134	100	LAZIER-SILLS JT VENTURE-CANYON CRK	526	0.004	0.01	M
C00020303	100	LAZY GLEN, INC.	410	0.028	0.05	M
C00032492	801	LEE, RICHARD O. MOBILE HOME PARK	380	0.004	0.01	M
COG850022		LOBATO, FIDEL - BLUE FLAME COAL		0.000	0.00	I-2
C00041408		LOMA LINDA SANITATION DISTRICT	503	0.024	0.05	M
C00021687	801	MANCOS, TOWN OF	383	0.076	0.12	M
C00033073		MARQUETTE MINERALS, INC.				
C00022781	510	MEEKER SANITATION DISTRICT	657	0.204	0.59	M

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C00029203	190	MERIDIAN LAKE, INC.	241	0.007	0.01	M
C00027456	510	MESA COUNTY - GATEWAY SCHOOL		0.000	0.00	M-2
COG500071	300	MESA COUNTY ROAD DEPARTMENT		0.000	0.00	I-2
C00032727	300	MESA WATER & SANITATION DISTRICT	704	0.012	0.03	M
COG850026	100	MID CONTINENT RESOURCES, INC.		0.000	0.00	I-2
C00000396	100	MID CONTINENT RESOURCES, INC.-DUTCH	1982	0.665	5.49	I-5B
C00040495	100	MID-VALLEY METROPOLITAN DISTRICT	551	0.030	0.07	M
COG500079	100	MIDDLE PARK CONCRETE-CERTIFIED REDI				
C00000035	100	MILLER ENTERPRISES - EAGLE MINE				
COG850020	220	MINREC (GRAND MESA COAL CO.)		0.000	0.00	I-2
COG850009	220	MINREC, INC.-BLUE RIBBON MINE		0.000	0.00	I-2
C00029599	100	MINREC, INC.-THOMPSON CREEK	2031	0.038	0.32	I
C00038806	100	MOBILE HOME MANAGEMENT	504	0.064	0.13	M
C00037621	500	MOFFAT COUNTY IMPROVEMENT-MAYBELL	523	0.010	0.02	M
C00000124	220	MONTROSE CONCRETE COMPANY				
C00039624	220	MONTROSE, CITY OF STP	883	1.465	5.43	M-5
C00029301	300	MONUMENT MEADOWS PROP OWNERS ASSN				
C00022969	220	MORRISON CREEK METROPOLITAN DIST	368	0.049	0.07	M
C00038776	220	MOUNTAIN COAL CO(WEST ELK COAL CO.)	759	0.067	0.21	I
C00027472	310	MOUNTAIN VILLAGE METRO DISTRICT				
C00027171	190	MT CRESTED BUTTE WTR & SAN DISTRICT	520	0.264	0.58	M
C00040703	500	MT WERNER W&S-STEAMBOAT SPRINGS WTP		0.000	0.00	I-2
C00031551	801	NARROW GAUGE MOBILE HOME PARK	610	0.006	0.02	M
C00040754	510	NATEC MINERALS, INC.		0.000	0.00	I-2
C00040410	510	NATEC MINERALS, LTD, INC. (IRI)				
COG850001	801	NATIONAL KING COAL, INC.		0.000	0.00	I-2
C00024007	310	NATURITA, TOWN OF	718	0.016	0.05	M
COG850025		NCIG FINANCIAL		0.000	0.00	I-2
C00040860	310	NEEDLES HOMEOWNERS ASSN (SECURITY)				
C00040894	100	NEW CASTLE ENERGY CORPORATION				
C00020192	100	NEW CASTLE, TOWN OF				
C00040479	100	NEW CASTLE, TOWN OF WWTP	518	0.050	0.11	M
COG500089	100	NICHOLS, BEN J. - CALDWELL PIT				
C00038601	100	NIELSON, INC. - ORTIZ GRAVEL				
C00037168	190	NORTH ELK MEADOWS WWTP	479	0.005	0.01	M
C00034096	220	NORTH FORK CONCRETE PRODUCTS				
C00031895	510	NORTH PARK MOBILE HOME PARK				
C00037354	510	NORTHERN COAL COMPANY				
C00037931	510	NORTHERN COAL COMPANY - NORTHERN				
C00039667	510	NORTHWEST PIPELINE CORPORATION				
C00032191	310	NORWOOD SANITATION DISTRICT	703	0.012	0.07	M
C00020591	310	NUCLA SANITARY DISTRICT	1627	0.276	1.71	M-5A
C00041106		OAK CREEK - TOWN OF WWTP	298	0.239	0.33	M
COG021393	500	OAK CREEK, TOWN OF				
C00040908	500	OAK CREEK, TOWN OF WTP	93	0.053	0.02	I
C00039322	220	OAK GROVE ELEMENTARY SCHOOL				
C00029947	100	OCCIDENTAL OIL SHALE - LOGAN WASH		0.000	0.00	I-2
C00020907	220	OLATHE, CITY OF	2343	0.183	1.78	M-5
C00028860	100	OURAY RANCH ASSOC. LTD		0.002	.	M-7
C00020087	220	OURAY SANITATION DISTRICT	381	0.260	0.42	M
C00033014	220	OWNERS ASSN OF ELK MEADOWS				
C00039586	801	P&G MINING COMPANY				
C00036790	801	P&G MINING COMPANY				
C00031755	801	PAGOSA AREA WTR & SAN-VISTA PLANT	515	0.292	0.62	M
C00038032	801	PAGOSA AREA WTR & SANITATION DIST	877	0.082	0.26	M-5A
C00041343		PAGOSA AREA WTR & SANITATION DIST		0.000	0.00	I-7
C00039659	801	PAGOSA PROPANE /TOVREA OIL				
C00022845	801	PAGOSA SPRINGS SANITATION DISTRICT	757	0.375	1.17	M-5
C00039764	300	PALISADE, TOWN OF - SEWAGE LAGOON	444	0.189	0.36	M
C00040100	300	PALISADE, TOWN OF - WTP	161	0.001	0.00	I
C00037583	801	PANDORO MINING COMPANY - ANGLO				

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NPDES #	REACH	NAME	CONCENTRATION MG/L	FLOW RATE MGD	SALT LOAD TONS/DAY	EXPLANATION CODE
C00027713	300	PANORAMA IMPROVEMENT DISTRICT	500	0.059	0.12	M
C00021709	220	PAONIA, TOWN OF	1351	0.318	1.82	M-5A
C00042480		PARAMOUNT COMMUNICATIONS	5734	0.250	6.03	I-5
C00037656	500	PEABODY COAL CO. - MESA GRAVEL	178	0.002	0.00	I-5B
COG070069	500	PEABODY COAL CO. - SENECA II MINE		0.000	0.00	I-2
C00000221	500	PEABODY COAL CO. - SENECA MINE	2641	0.480	5.28	I-5B
COG850007		PEERLESS RESOURCES, INC.		0.000	0.00	I-2
C00031402	801	PINE-ANIMAS SEWER MGMT CO.	480	0.028	0.16	M
C00032638	500	PITTSBURGH & MIDWAY COAL MINE	3815	0.532	24.00	I-5
C00027146	300	POWDERHORN COAL COMPANY	1662	0.210	1.46	I-5B
C00036617	300	POWDERHORN COAL COMPANY				
C00023485	300	POWDERHORN METRO DIST NO. 1	623	0.004	0.01	M
C00000523	500	PUBLIC SERVICE CO-HAYDEN PLANT	333	0.065	0.09	I
C00000027	300	PUBLIC SERVICE CO.-CAMEO STATION	297	43.550	54.00	I
COG850027	801	PUEBLO COAL		0.000	0.00	I-2
C00040878	801	PURGATORY METRO DISTRICT WWTP				
C00020176	801	PURGATORY SANITARY DISTRICT	1044	0.067	0.30	M
COG850011	220	QUINN COAL COMPANY		0.000	0.00	I-2
C00028525	100	RANCH AT ROARING FORK	716	0.035	0.10	M
C00036366	801	RANCH PROPERTY OWNERS	614	0.019	0.05	M-5A
C00026972	510	RANGELY SANITATION DISTRICT	620	0.223	0.59	M
C00000108	310	RAPHOLZ SILVER, INC. - SILVER BELL				
C00021385	100	REDCLIFF SANITARY DISTRICT	202	0.500	0.42	M
C00039551	100	REDSTONE 21-9 GEOTHERMAL WELL		0.000	0.00	I-2
C00041564		REDSTONE CORPORATION				
C00023922	100	REDSTONE WATER & SANITATION DIST	384	0.025	0.05	M
C00041335		RESOLUTION TRUST-SWAN'S NEST				
C00029793	310	RICO DEVELOPMENT CORPORATION	1224	0.700	3.55	I-5B
C00029106	220	RIDGWAY, TOWN OF	517	0.031	0.07	M
C00020117	100	RIFLE, CITY OF				
C00030970	100	RIFLE, CITY OF	912	0.044	0.17	M
C00040738	100	RIFLE, CITY OF WWTP	1152	0.525	2.51	M-5A
C00034045	510	RIO BLANCO OIL SHALE PROJECT				
C00035947	190	RIVER BEND WASTE WATER TREATMENT				
C00039209	100	ROARING FORK RESOURCES-UMETCO PIT		0.000	0.00	I-2
COG850023	500	ROCKCASTLE CO.-GRASSY CREEK COAL MN		0.000	0.00	I-2
C00032590	500	ROUTT CO. FOR PHIPPSBURG COMMUNITY	420	0.027	0.05	M
C00039705	500	ROUTT COUNTY FOR MILNER COMMUNITY	386	0.009	0.01	M
C00036277	801	SACKETT MINING CO.-SHALAKO MINE				
C00040827		SALT CREEK MINING COMPANY (MUNGER)		0.000	0.00	I-2
C00038342	100	SALT CREEK MINING COMPANY (McCLANE)		0.000	0.00	I-2
C00032573	801	SAN JUAN AREA VOC-TECH SCHOOL				
C00031461	801	SAN JUAN RIVER VILLAGE METRO DIST	310	0.020	0.01	M
C00036781	801	SHALAKO INTERNATIONAL-GREAT GUENNOL		0.000	0.00	I-2
C00036978	801	SIERRA VERDE ESTATES		0.000	0.00	M-2
C00029181	100	SILT, TOWN OF	867	0.010	0.35	M-5
C00037460	220	SILVER EAGLE CO.-MOUNTAIN TOP MINE	225	0.218	0.20	I
C00026867	220	SILVER SPRINGS TROUT FARM	504	1.125	2.36	I-5D
C00020826	100	SILVERTHORNE-DILLON JOINT SW	332	0.986	1.36	M
C00020311	801	SILVERTON, TOWN OF	357	0.219	0.32	M
C00038598	100	SKI SUNLIGHT, INC.		0.000	0.00	M-2
C00037567	100	SNOWMASS COAL CO.-UNIT TR				
C00023086	100	SNOWMASS WATER & SANITATION	215	0.638	0.57	M
C00036544	100	SNOWMASS WATER TREATMENT PLANT	96	0.008	0.00	I
C00000132	220	SOMERSET MINING CO. (KAISER COAL)		0.000	0.00	I-2
C00031810	100	SOPRIS VILLAGE JOINT VENTURE	515	0.030	0.06	M
C00022632		SOUTH BLUE RIVER SANITATION				
C00041262		SOUTH DURANGO SANITATION DISTRICT	993	0.031	0.13	M
C00037001	220	SPRING CREEK ESTATES LAGOON	601	0.003	0.01	M
CO0038075	510	STAGECOACH SANITATION, INC.		0.000	0.00	M-2
C00032280	500	STEAMBOAT HEALTH & RECREATION	750	0.005	0.02	I

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NPDES #	REACH	NAME	CONCENTRATION MG/L	FLOW RATE MGD	SALT LOAD TONS/DAY	EXPLANATION CODE
C00035556	500	STEAMBOAT LAKE SANITATION DISTRICT	190	0.078	0.06	M
C00020834	500	STEAMBOAT SPRINGS, TOWN OF	213	2.069	1.85	M
C00029955	100	SUMMIT COUNTY BOARD - SNAKE RIVER	379	0.484	0.76	M
COG850012	500	SUN COAL COMPANY, INC.- MEADOWS	307	0.010	0.01	I
C00036668	500	SUNLAND MINING CORP-APEX #2 MINE		0.000	0.00	I-2
C00027529	801	SUNNYSIDE GOLD - AMERICAN TUNNEL	1967	2.170	17.78	I-5B
C00000426	801	SUNNYSIDE GOLD - MAYFLOWER MINE	800	0.670	2.24	I-5B
C00036056	801	SUNNYSIDE GOLD - TERRY TUNNEL	801	0.450	1.50	I-5B
C00035815	100	TALBOTT ENTERPRISES, INC.	1446	0.048	0.28	M-5
C00020869	310	TELLURIDE, TOWN OF				
C00041840	310	TELLURIDE, TOWN OF	328	0.327	0.44	M
C00039527	310	TELLURIDE, TOWN OF WTP		0.000	0.00	I-2
C00039756	220	TERROR CREEK CO. - PACIFIC BASIN		0.000	0.00	I-2
COG310002		TEXACO REFINING				I-7
C00037699	100	THREE LAKES WTR & SAN-SUN VALLEY	282	0.005	0.01	M
C00037681	100	THREE LAKES WTR & SAN-WILLOW	200	0.418	0.36	M
C00041165		THREE RIVERS RESORT, INC.				
C00037672	190	TIMBERLINE MINING, INC.				
C00040550		TORO DE PLATA, INC.				
C00032115	500	TRAPPER MINING, INC.	1466	0.215	1.31	I-5B
C00000540	310	TRI-STATE GEN & TRANS-NUCLA	1325	0.160	0.89	I
C00041734		TRW EXPLOR & PROD - CACTUS VALLEY				
C00036684	500	TWENTYMILE COAL CO.	3119	0.240	0.31	I
C00041009	801	TXO PRODUCTION CORP.				
C00020648	310	UMETCO MINERALS CORP.-URAVAN				
C00000515	310	UMETCO MINERALS CORP.-URAVAN WWTP				
C00039101	220	UNCOMPAHGRE VISTA SUBDIV WWTP				
C00039918	100	UNION OIL CO. - PARACHUTE CREEK		0.000	0.00	I-2
C00038121	100	UNION OIL TEMP CAMP				
C00037532	220	UNITED BANK OF DELTA-BLUE RIDGE EST		0.000	0.00	M-2
COG500047		UNITED COMPANIES OF MESA COUNTY	4588	0.460	8.80	I
COG500004		UNITED COMPANIES OF MESA COUNTY		0.000	0.00	I-2
COG500177		UNITED COMPANIES OF MESA COUNTY	3964	0.290	4.79	I
COG500142	300	UNITED SAND & GRAVEL		0.000	0.00	I-2
COG500020	300	UNITED SAND & GRAVEL				
C00037311	100	UPPER EAGLE VALLEY - SQAWE CREEK	611	0.539	1.37	M
C00021369	100	UPPER EAGLE VALLEY - VAIL	347	1.784	2.62	M
C00024431	100	UPPER EAGLE VALLEY SAN DIST - AVON	375	1.878	2.94	M
C00037508	310	USBOR - BLUE MESA SPILLWAY	0	0.000	0.00	I-1*
C00027511	300	USBOR - COLLBRAN JOB CORPS	0	0.000	0.00	M-1*
C00021725	100	USBOR - GREEN MTN GOVERNMENT CAMP	0	0.000	0.00	M-1*
C00021741	100	USBOR - GREEN MTN POWER PLANT	0	0.000	0.00	M-1*
C00021351	220	USBOR - MORROW POINT DAM	0	0.000	0.00	M-2*
C00034398	801	USDI-NPS-MESA VERDE NAT'L PARK	0	0.000	0.00	M*
C00000086	220	USFWS - HOTCHKISS NFH		6.490	0.00	I-3*
C00022578	220	USFWS - HOTCHKISS NFH STP	0	0.000	0.00	M-3*
C00000205	300	UTE WATER CONSERVATION DISTRICT-WA		0.000	0.00	I-2
C00030465	100	VAIL ASSOCIATES, INC.				
COG500010	190	VALCO, INC. - GUNNISON CONCRETE	387	4.000	6.46	I-5
COG500134		VALCO, INC. - VADER PIT		0.000	0.00	I-2
C00041742		VALLECITO SEWER & WATER CO	415	0.009	0.02	M
C00037702	801	VISTA VERDE VILLAGE		0.000	0.00	M-2
C00042617		VOLUNTEERS OF AMERICA CARE FACILITY	447	0.025	0.05	M
C00037206	220	WALKER MINING & MILLING, INC.	200	0.030	0.03	I
C00037605		WEAVER, RBT (O.C. COAL CO)		0.000	0.00	I-2
C00024317	100	WEST GLENWOOD SPRINGS SAN DISTRICT	314	0.224	0.29	M
C00030449		WEST MONTROSE SANITATION DISTRICT	884	0.162	0.57	M-5
C00000213	310	WESTERN FUELS - NUCLA MINE	2837	0.278	3.28	I-5B
C00038024	510	WESTERN FUELS UTAH, INC.-DESERAD	4900	0.360	7.27	I-5B
COG500093	220	WESTERN GRAVEL, INC. (SCHNEIDERS)		0.000	0.00	I-2
COG500120	500	WESTERN MOBILE NORTHERN, INC.	185	0.950	0.73	I

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COG500087	300	WESTERN MOBILE NORTHERN-LOESCH PIT				
COG500119	100	WESTERN MOBILE NORTHERN-RIFLE PIT		0.000	0.00	I-2
CO0033146	220	WESTERN SLOPE CARBON				
CO0031062	500	WHITEMAN SCHOOL	168	0.003	0.00	M
COG500122	220	WHITEWATER BLDG - 29 ROAD		0.000	0.00	I-2
COG500123	220	WHITEWATER BLDG - DYKE ROAD		0.000	0.00	I-2
COG500127	220	WHITEWATER BLDG - HIGHWAY 141	1067	0.070	0.31	I
COG500062		WILLIAMS FORK COMPANY	1610	0.910	4.03	I-5
CO0026051	100	WINTER PARK WATER & SANITATION	213	0.108	0.10	M
CO0028762	220	WOODGATE SUBDIVISION HOA				
COG500067	101	WORLEY, D. (KENT, F.J. PIPELINE)		0.000	0.00	I-2
CO0030635	500	YAMPA, TOWN OF	333	0.106	0.15	M
CO0023442	100	YMCA SNOW MOUNTAIN RANCH		0.000	0.00	M-2
NM0027995	801	ARCO MATERIALS INC.		0.000	0.00	I-1
NM0000019	801	ARIZONA PUBLIC SERVICE CO. - FOUR CORNER	897	3.919	14.67	I-5B
NM0020168	801	AZTEC WASTE WATER TREATMENT PLANT	596	0.578	1.44	M-6
NM0028142	801	BLOOMFIELD SCHOOLS WWTP		0.003	0.00	I-7
NM0020770	801	BLOOMFIELD WWTP	601	0.710	1.78	M-6
NM0029538	900	CARBON COAL (CARBON #2 MINE)	0	0.000	0.00	I-1
NM0029251	801	CARBON COAL (MENTMORE MINE)	0	0.000	0.00	I-1
NM0029319	801	CENTRAL CONS. SCHOOL DIST #22	582	0.038	0.09	I-6
NM0028584	801	CONSOLIDATION COAL CO.	0	0.000	0.00	I-2
NM0000043	801	FARMINGTON ANIMAS POWER PLANT		4.674	0.00	I-4
NM0000051	801	FARMINGTON DRINKING WATER PLANT	0	0.000	0.00	I-2
NM0029572	801	FARMINGTON MUNICIPAL OPERATIONS CENTER	0	0.000	0.00	I-5E
NM0028258	801	FARMINGTON SAND AND GRAVEL		0.001	0.00	I-4
NM0020583	801	FARMINGTON WWTP	734	3.758	11.51	M-6
NM0020672	900	GALLUP WWTP	1140	2.472	11.76	M-6
NM0029025	801	HARPER VALLEY SUBD. (USDIBIA)		0.009	0.00	I-4
NM0027774	900	INDIAN HILLS MHP			0.00	I-7
NM0020630	900	NTUA CROWNPOINT WWTP	649	0.110	0.30	M-2*
NM0020613	900	NTUA NAVAJO WWTP	1041	0.120	0.52	M-4A*
NM0020621	801	NTUA SHIPROCK WWTP	682	0.621	1.77	M-6*
NM0020605	801	NTUA TOHATCHI WWTP	0	0.000	0.00	M-1*
NM0029408	900	PONDEROSA PRODUCTS, INC.	0	0.000	0.00	I-2
NM0028606	801	PUBLIC SERVICE CO OF NM - SAN JUAN	0	0.000	0.00	I-2
NM0020524	900	QUIVIRA MINING COMPANY - CHURCH ROCK	0	0.000	0.00	I-2
NM0023396	900	RAMAH WWTP	795	0.013	0.04	M-7
NM0029505	801	SAN JUAN COAL COMPANY	0	0.000	0.00	I-2
NM0028746	801	SAN JUAN COAL COMPANY (SAN JUAN MINE)	0	0.000	0.00	I-2
NM0000027	801	SAN JUAN CONCRETE COMPANY	0	0.000	0.00	I-3
NM0028550	900	UNITED NUCLEAR CORPORATION CHURCH ROCK	0	0.000	0.00	I-2
NM0020401	900	UNITED NUCLEAR CORPORATION NE CHURCH ROCK	0	0.000	0.00	I-2
NM0020869	801	USDIBIA, CRYSTAL BOARDING SCHOOL			0.00	M-7*
NM0026751	801	USDIBIA, JICARILLA WWTP			0.00	M-3*
NM0021016	801	USDIBIA, LAKE VALLEY BOARDING SCHOOL			0.00	M-7*
NM0020800	801	USDIBIA, NENAHNEZAD BOARDING SCHOOL		0.024	0.00	M-7*
NM0020991	801	USDIBIA, PUEBLO PINTADO BOARDING SCHOOL			0.00	M-7*
NM0020982	801	USDIBIA, STANDING ROCK BOARDING SCHOOL			0.00	M-7*
NM0020958	900	USDIBIA, WINGATE BOARDING SCHOOL			0.00	M-7*
NM0028193	801	UTAH INTERNATIONAL INC. - NAVAJO MINE	0	0.000	0.00	I-2
NM0029432	801	YAMPA MINING CO. (DE-NA-ZIN MINE)	0	0.000	0.00	I-2
NM0029475	801	YAMPA MINING CO. (GATEWAY MINE)	0	0.000	0.00	I-2
NV0021261	910	CLARK CO. S.D. (dewatering)	2000	2.000	16.69	I-5E
NV0021261	910	CLARK COUNTY SD #1	1267	52.900	279.69	M
NV0022080	910	HENDERSON, CITY OF	725	9.500	28.74	M
NV0000078	910	KERR - MCGEE CHEMICAL	652	0.010	0.03	I
NV0020133	910	LAS VEGAS, CITY OF	1046	38.400	167.61	M
NV0021750	910	LAS VEGAS HILTON	3000	0.120	1.50	I-5E

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NV0020192	910	NV DEPT FISH & GAME	669	3.730	10.41	I-5D
NV0020923	910	PIONEER CHLOR-ALKALI	0	0.000	0.00	I-2
NV0021954		RIVERSIDE RESORT CASINO	723	0.060	0.18	I-5E
NV0000060	910	TITANIUM METALS	657	3.900	10.69	I
UT0021091	610	ALTAMONT, CITY OF	0	0.000	0.00	M-2
UTG040012	600	AMAX COAL COMPANY	0	0.000	0.00	I
UT0000167	510	AMERICAN GILSONITE CO	2000	0.110	0.92	I-5E
UT0024112	600	AMOCO MINERALS CO - SUNNYSIDE TRIAL	0	0.000	0.00	I-1
UTG040008	600	ANDALEX - PINNACLE COAL MINE	1200	0.080	0.40	I-5E
UTG040007	600	ANDALEX WILDCAT LOADOUT	0	0.000	0.00	I-2
UT0024180	610	ASAMERA OIL - HANSEN #1	0	0.000	0.00	I-1
UT0024511	411	ASHLEY VALLEY SEWER BOARD	0	0.410	0.00	M-4A
UTG640003	411	ASHLEY VALLEY WATER & SEWER IDWTP	0	0.000	0.00	M-2
UT0023906	710	ATLAS MINERALS SNOW PROBE MINE	0	0.000	0.00	I-1
UTG040005	600	BEAVER CREEK COAL COMPANY	0	0.000	0.00	I-2
UTG040014	600	BEAVER CREEK COAL - GORDON 3 & 6	0	0.000	0.00	I-2
UTG040004	710	BEAVER CREEK COAL - GORDON CREEK	435	0.007	0.01	I
UTG040015	710	BEAVER CREEK COAL - HUNTINGTON	0	0.000	0.00	I-2
UTG040002	710	BHP - KNIGHT COAL MINE	0	0.000	0.00	I-1
UT0000124	411	BHP PETROLEUM	1400	1.200	7.01	I-5E
UT0024139	300	BIG HORN OIL, INC.	0	0.000	0.00	I-1
UT0023086	600	BLACKHAWK COAL	2400	0.015	0.15	I
UTG640019	802	BLANDING CULINARY WATER TREATMENT	0	0.000	0.00	M-2
UT0023647	600	BLAZON NO 1 MINE	0	0.000	0.00	I-1
UT0020451	510	BONANZA, CITY OF	0	0.000	0.00	M-2
UTG130014	700	BROWN TROUT FARM	0	0.000	0.00	I-2
UT0023761	600	C & W MINE # 1	0	0.000	0.00	I-2
UT0023663	710	CASTLE VALLEY SPECIAL SERVICE	0	0.000	0.00	M-2
UT0022489	700	CHAPPELL'S CHEESE COMPANY	0	0.000	0.00	I-1
UTG790004	600	CHEVRON STATION - GREEN RIVER	0	0.000	0.00	I-2
UT0022411	600	CLEAR CREEK UTILITIES, INC.	0	0.000	0.00	M-2
UTG040006	710	CO-OP MINING COMPANY	0	0.000	0.00	I-2
UT0023540	600	COASTAL STATES ENERGY CO-UTAH	1000	0.400	1.67	I-5E
UTG070036	600	COCKRELL OIL	5000	0.100	2.09	I-5A
UT0022616	700	CONSOLIDATED COAL CO-UNDERGROUND	3200	0.067	0.89	I-5
UT0022624	700	CONSOLIDATED COAL CO. - SURFACE MINE	0	0.000	0.00	I-1
UT0024040	700	CONSOLIDATED COAL - EMERY PLANT	0	0.000	0.00	I-2
UTG040016	600	CYPRES BLACKHAWK	0	0.000	0.00	I-2
UT0020095	610	DUCHESNE CITY CORP	0	0.000	0.00	M-2
UTG640014	411	DUTCH JOHN	0	0.000	0.00	M-2
UTG640012	600	E CARBON CITY - SUNNYSIDE CWTP	0	0.000	0.00	M-2
UT0000035	411	EQUITY OIL CO	1360	1.400	7.95	I-5E
UT0020052	710	FERRON, CITY OF	0	0.000	0.00	M-2
UT0023876	600	FIRST WESTERN COAL CO- ALETHA #1	0	0.000	0.00	I-1
UTG040010	600	GENWAL - (WELLINGTON)	0	0.000	0.00	I-2
UT0024368	710	GENWAL COAL CO, INC-CRANDALL	600	0.000	0.00	I-2
UT0000787	600	GREEN RIVER, CITY OF	0	0.000	0.00	M-2
UT0020958	600	GREEN RIVER, CITY OF	0	0.000	0.00	M-2
UT0022748	600	HIAWATHA	0	0.000	0.00	M-2
UT0021792	411	HOLLANDSWORTH & TRAVIS	1940	0.105	0.85	I-5E
UT0021296	710	HUNTINGTON, CITY OF	2827	0.260	3.07	M-5A
UT0024015	411	INTERMOUNTAIN CONCRETE	0	0.000	0.00	I-2
UT0024929	900	INTERSTATE ROCK PRODUCT	0	0.000	0.00	I-2
UTG040013	600	IPA—HORSE CANYON	0	0.000	0.00	I-2
UT0020401	900	KANAB CITY CORP	0	0.000	0.00	M-2
UTG070037		KERN RIVER GAS PIPELINE	600	0.000	0.00	I-2
UTG130013	700	LONESOME CEDAR TROUT FARM	0	0.000	0.00	I-2
UT0020443	411	MANILA, TOWN OF	0	0.000	0.00	M-2
UT0021768	411	McKENZIE PETROLEUM	2100	1.050	9.20	I-5E
UT0023396	300	MINERALS EVALUATION & INVEST	0	0.000	0.00	I-2

**NPDES PERMITS**  
**COLORADO RIVER BASIN SALINITY CONTROL FORUM**  
**DECEMBER 31, 1991**

NPDES #	REACH	NAME	CONCENTRATION MG/L	FLOW RATE MGD	SALT LOAD TONS/DAY	EXPLANATION CODE
UT0024945	802	MK - FERGUSON (MEXICAN HAT UMTRA)	0	0.000	0.00	I-2*
UT0024694	600	MK - FERGUSON CO (GREEN RIVER UMTRA)	0	0.000	0.00	I-1
UT0020419	300	MOAB, CITY OF	530	0.700	1.55	M
UTG079001	300	MOAB INTERIM REMEDIAL	0	0.000	0.00	I-2
UT0023108	300	MOAB READY-MIX CO	0	0.000	0.00	I-1
UTG640007	300	MOAB SALT WTP	0	0.000	0.00	I-2
UTG640015	802	MONTICELLO CITY (CULINARY WATER TREATMENT)	0	0.000	0.00	M-2
UTG070025		MOUNTAIN FUEL PIPELINE	0	0.000	0.00	I-2
UT0020133	802	MOUNTAIN STATES PETROLEUM	1000	0.030	0.13	I*
UTG640008		MYTON CITY WTP	0	0.000	0.00	M-2
UT0023001	610	NEOLA TOWN WATER & SEWER ASSOC.	0	0.000	0.00	M-2
UT0024287	610	NORTH FORK SIPHON - SUCCESSFUL BIDDER	0	0.000	0.00	I-1
UT0000094	600	PACIFIC CORP (CARBON)	1900	0.470	3.73	I-5B
UT0023426	710	PACIFIC CORP (HUNTER)	0	0.000	0.00	I
UT0023604	710	PACIFICORP (DEER CREEK)	450	1.730	3.25	I-5E
UT0023591	710	PACIFICORP (DES BEE DOVE MINE)	0	0.000	0.17	I
UTG040009	710	PACIFICORP (HUNTER COAL PREP)	0	0.000	0.00	I-2
UTG040003	710	PACIFICORP - (TRAIL MOUNTAIN)	0	0.000	0.00	I-2
UT0022896	710	PACIFICORP (WILBERG MINE)	1060	0.240	1.06	I-5E
UT0024163	510	PARAHO-UTE OIL SHALE FACILITY	0	0.000	0.00	I-1
UT0022527	610	PENNZOIL	0	0.000	0.00	I-2
UTG070036	600	PG&E RESOURCES	0	0.000	0.00	I-2
UT0023736	600	PLATEAU MINING COMPANY	837	0.100	0.35	I
UT0024341	600	PLEASANT VALLEY COAL - KINNEY #2	0	0.000	0.00	I-1
UT0024589	600	PRICE CITY WTP	0	0.000	0.00	M-2
UT0021814	600	PRICE RIVER WATER IMP DIST	1900	2.000	15.86	M-5A
UT0024635	600	PRICE RIVER WTP	0	0.000	0.00	M-2
UT0024295	710	RILDA CANYON MINE - WEST APPA	0	0.000	0.00	I-1
UT0000311	802	RIO ALGOM CORP - LISBON MINE	0	0.000	0.00	I-1
UTG130016	700	ROAD CREEK TROUT	0	0.000	0.00	I-2
UT0000230	411	S.F. PHOSPHATES LTD	0	0.000	0.00	I-2
UT0024228	510	SEEP RIDGE SHALE OIL COMPANY	0	0.000	0.00	I-2
UT0023680	600	SOLDIER CREEK COAL CO	1000	0.850	3.55	I-5E
UT0023701	710	SOLDIER CREEK COAL CO HIDDEN VALLEY	0	0.000	0.00	I-2
UT0023817	600	SOLDIER CREEK COAL COMPANY	0	0.000	0.00	I-2
UT0022918	700	SOUTHERN UTAH FUEL	830	1.400	4.85	I-5E
UT0021776	905	ST GEORGE, CITY OF	1100	5.000	22.95	M
UT0024031	600	SUNCO ENERGY DEVELOPMENT CO	0	0.000	0.00	I-2
UT0022942	600	SUNNYSIDE COAL CO	1500	1.000	6.26	I-5E
UT0024759	600	SUNNYSIDE COGENERATION ASSOCIATES	1400	0.060	0.35	I
UT0000761	300	TEXASGULF, INCORPORATED, MOAB POTASH OPERAT	0	0.000	0.00	I-2
UT0024104	510	TOSCO DEVELOPMENT CORP - SAND WASH PROJECT	0	0.000	0.00	I-2
UTG640002	610	TRIDWELL - LAPOINT WATER (IDWTP)	0	0.000	0.00	M-2
UT0023370	900	TROPIC TOWN	0	0.000	0.00	M-2
UT0024171	411	TXO PROD CORP - ASPHALT CREEK FED 1	0	0.000	0.00	I-1
UT0023841	610	TYGER CONSTRUCTION CO, INC-UPPER STILLWATER	0	0.000	0.00	I-1
UT0023931	600	UCO, INC - SCOFIELD MINE	0	0.000	0.00	I-1
UT0023990	600	UCO, INCORPORATED	0	0.000	0.00	I-1
UT0023922	300	UMETCO RIM MINE	0	0.000	0.00	I-2
UT0023914	300	UMETCO VELVET MINE	730	0.021	0.06	I
UT0023787	411	UNDERGROUND CONSTRUCT CO-TYZACK PUMPING	0	0.000	0.00	I-1
UT0023094	600	UNITED STATES FUEL CO	700	0.800	2.34	I-5E
UTG640006	700	US NATIONAL PARK (CAPITOL REEF WTP)	0	0.000	0.00	M-2
UTG640004	700	US NATIONAL PARK (GLEN CANYON WTP)	0	0.000	0.00	M-2
UT0021121	411	USBOR - DUTCH JOHN COMMUNITY	0	0.000	0.00	I-2
UT0020338	411	USBOR - FLAMING GORGE DAM	800	0.060	0.20	I
UT0024252	610	USBOR - SOLDIER CREEK DAM	0	0.000	0.00	I-1
UT0023035	610	USBOR - STILLWATER	0	0.000	0.00	I-1
UT0024023	610	USBOR UPPER STILLWATER DAM/TUN	0	0.000	0.00	I-1
UTG130001	411	USFWS - JONES HOLE NFH	250	21.600	22.53	I-5D
UTG130003	700	UTAH DIV OF WILDLIFE - J PERRY EAGON	120	12.000	6.01	I-5D

**NPDES PERMITS**  
**COLORADO RIVER BASIN SALINITY CONTROL FORUM**  
**DECEMBER 31, 1991**

NPDES #	REACH	NAME	CONCENTRATION MG/L	FLOW RATE MGD	SALT LOAD TONS/DAY	EXPLANATION CODE
UTG130007	700	UTAH DIV OF WILDLIFE - LOA	150	8.650	5.41	I-5D
UTG130012	610	UTAH DIV OF WILDLIFE - WHITEROCK	275	4.500	5.16	I-5D
UT0025003	411	V & W OIL CO	2000	0.010	0.08	I
UT0022985	600	VALLEY CAMP OF UTAH INC	500	0.180	0.38	I-5E
UTG640005	905	VIRGIN WTP	0	0.000	0.00	M-2
UT0023515	710	WESTERN STATES MINERALS CORP	0	0.000	0.00	I-1
UT0024121	610	WHITE RIVER DAM - SUCCESSFUL BIDDER	0	0.000	0.00	I-2
UT0024261	510	WHITE RIVER SHALE OIL CORP	0	0.000	0.00	I-1
UT0023868	510	ZIEGLER CHEMICAL	1600	0.028	0.19	I-5E
WY0026671	401	AMERICAN FAMILY INN	616	0.010	0.03	M
WY0033448	411	AMOCO SKULL POINT	0	0.000	0.00	I-2
WY0022128	401	B & R INC	704	0.050	0.15	M
WY0022888	500	BAGGS, TOWN OF	750	0.080	0.25	M
WY0034967	500	BENSON-MONTIN-GREER	2900	0.001	0.01	I
WY0034975	500	BENSON-MONTIN-GREER	1400	0.020	0.12	I
WY0020133	500	BIG PINEY, TOWN OF	724	0.500	1.51	M
WY0030261	401	BLACK BUTTE COAL COMPANY	0	0.000	0.00	I-2
WY0028886	401	BLACK BUTTE COAL	0	0.000	0.00	I-2
WY0030350	401	BRIDGER COAL COMPANY	0	0.000	0.00	I-2
WY0033111	411	CHEVRON SLURRY PUMP STATION	832	0.014	0.05	I
WY0032897	411	CHEVRON - CARTER CREEK GAS PLANT	0	0.000	0.00	I-2
WY0023132	411	CHURCH & DWIGHT CO INC	1500	0.006	0.04	I
WY0032727	401	COLO INTERSTATE GAS CO - TABLE	1240	0.021	0.11	M
WY0023825	401	ARCH OF WYOMING	0	0.000	0.00	I-2
WY0023124	401	DANIEL'S MOBILE HOME PARK	0	0.000	0.00	M-2
WY0021938	500	DIXON, TOWN OF	750	0.010	0.03	M
WY0023523	500	ANDOVER RESOURCE CO	50	0.500	0.10	I
WY0032701	401	EXXON CORP - LABARGE PROJ	0	0.000	0.00	I-2
WY0032689	401	EXXON CORP - LABARGE PROJ	0	0.000	0.00	I-2
WY0032450	401	EXXON	0	0.000	0.00	I-2
WY0027626	401	FMC WYOMING CORPORATION	0	0.000	0.00	I-2
WY0031763	401	FMC	0	0.000	0.00	I-2
WY0022071	411	FORT BRIDGER	588	0.250	0.61	M
WY0034771	500	FUEL RESOURCE DEVEL. CO	2000	0.260	2.17	I-5
WY0022373	411	GRANGER, TOWN OF	0	0.000	0.00	M-2
WY0020443	401	GREEN RIVER, CITY OF	870	0.500	1.82	M
WY0000027	401	GREEN RIVER/ROCK SPRINGS JOINT POWERS BD	0	0.000	0.00	I-2
WY0033553	411	HAGENSTEIN GRAVEL	0	0.000	0.00	I-2
WY0000116	411	KEMMERER, CITY OF WTP	388	0.035	0.06	I
WY0020320	411	KEMMERER, CITY OF	720	1.000	3.00	M
WY0022080	411	LA BARGE, TOWN OF	976	0.080	0.33	M
WY0030473	401	LAKE VIVA NAUGHTON MARINA	900	0.001	0.00	M
WY0020117	411	LYMAN, TOWN OF	686	0.320	0.92	M
WY0021997	401	MARBLETON	700	0.150	0.44	M
WY0035025	500	MEADOWLARK OIL CO	0	0.000	0.00	I-2
WY0030392	500	MERIDIAN OIL COMPANY	0	0.000	0.00	I-2
WY0022896	411	MOUNTAIN VIEW	546	0.150	0.34	M
WY0027359	500	NATURAL GAS PROCESSING COMPANY	0	0.000	0.00	I-2
WY0026841	411	OPAL, TOWN OF	0	0.000	0.00	M
WY0020656	401	PINEDALE, TOWN OF	100	1.000	0.42	M
WY0000051	411	PITTSBURGH AND MIDWAY COAL MINE	0	0.000	0.00	I-2
WY0024546	500	RESERVE OPERATION CORPORATION	3500	0.002	0.03	I
WY0022357	401	ROCK SPRINGS, CITY OF	760	2.000	6.34	M
WY0021806	401	SUPERIOR	0	0.000	0.00	M-2
WY0000043	401	UNION PACIFIC RR - GREEN RIVER	0	0.000	0.00	I-2
WY0020311	411	UTAH POWER & LIGHT CO (NAUGHTON)	820	5.730	19.61	I-5B
WY0000086	401	WYO. FISH AND GAME - DANIEL	300	3.000	3.76	I-5D
WY0000094	401	WYO. FISH AND GAME - BOULDER	300	2.000	2.50	I-5D



## APPENDIX D

### **Public Advice and Comment**

# APPENDIX D - PUBLIC ADVICE & COMMENT

## OVERVIEW

More than 600 copies of the preliminary report printed in June of this year were distributed by officials and interested parties in the seven Colorado River Basin states and in Washington, D.C. Public notices were disseminated and published in newspapers providing information concerning the opportunity to submit oral and written comments.

The Forum held two regional public meetings, to receive comments and suggestions on the preliminary 1993 Review dated June 1993. The meetings were held in Farmington, New Mexico, on September 14 and in Overton, Nevada, on September 15, 1993.

This appendix contains transmittal letters, statements and comments received at the public meetings; written comments received in the Forum offices by September 13, 1993; and the Forum's response.

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Colorado River Salinity Forum  
c/o Mr. Steve Miller, CWCB  
1313 Sherman Street, Room 721  
Denver, CO 80203

RE: Paradox Injection Well Salinity Program, USBOR

Dear Mr. Miller:

The injection well project, according to information available, appears to be not working as planned, and projected costs continue to rise. As a taxpayer, this bothers me. The limited information I have indicates that critical technical and scientific concerns were not addressed or even recognized from the beginning. I have little confidence that the reported proposed remedies will work. The original plan to evaporate brine in surface ponds involved straightforward engineering planning and procedures, and was amenable to accurate cost and effectiveness estimates. However, the deep well injection program wandered into many geohydrologic and geochemical unknowns at 14,000 depth. Unbelievably, the project did not include a preliminary, less expensive, test hole so that some of the unknowns could be identified and evaluated.

As I understand the problems, they involve the following:

1. The injection zone (Leadville Limestone) may not be as permeable as assumed, and thus will not accept brine at the desired rate. A test hole would have provided data on permeability.
2. The injection string of casing was cemented in place, then perforated. This is more or less standard oil field practice. However, in water wells, great care normally is taken to not seal off productive intervals with either drill mud or cement. This is critically so in zones where permeability derives from fractures or solution cavities (as in the Leadville) of large size. If normal oil field cementing practice was followed, I suspect cement would have traveled 10's of feet or more from the well and sealed all permeable zones, while perforating techniques only penetrate a few feet. Thus, the cement job may have greatly and permanently damaged the project.
3. The shallow brine, when injected and heated to 250°F/120°C (the rock temperature in the injection zone at 14,000-foot depth), will result in precipitation of the solid mineral Anhydrite ( $\text{CaSO}_4$ ), and in the formation of additional Anhydrite by reaction with the limestone. A technical paper on this site by scientists of the U. S. Geological Survey is

attached. The abstract and highlighted sections explain the chemical incompatibility of the shallow brine in the deep zone. Note that the theoretical mass of Anhydrite that could be precipitated under the planned operating conditions is about 58,000 lbs/day, which is about 320 ft.<sup>3</sup>/day! After a year (1/100th of project life), 117,000 ft.<sup>3</sup> of solid Anhydrite (10,000 tons, or 430 large dump truck loads) would precipitate out in the injection zone. The article notes some potentially useful theoretical methods to minimize precipitation, mainly by greatly diluting the injected brine with fresh water. These are theoretical methods, and may not work in the field. If they are tried and do not work, the precipitated materials will probably be at a great distance from the well, and remediation will be impossible.

4. The EPA Injection Permit (#COS5108-0647, 1986, with 1990 modification) is unusual in some respects:

(1) It does not require monitoring other than at the well head. Several geologist colleagues familiar with the area and I are concerned that the salt layer is not a certain seal or aquiclude. There are many faults in the immediate vicinity of the well, and the nature of the salt limits against the nearby Uncompahgre Uplift and LaSal intrusive is not known. If salt springs suddenly appear in the area some time during the project, will the project be curtailed and the investment lost?

(2) Little or nothing is known about the undisturbed flow system in the Leadville, which will be greatly affected by injection. The permit and the project appear to assume that the Leadville is a "Black Hole," insofar as accepting brine with no effects.

(3) The combination of allowing 5,000 psi (or more) well-head injection pressure and injection into the underlying basement granitic rocks is an open invitation to greatly escalate energy/equipment costs over the project life, and to raise the risk of uncontrolled downhole fracturing (Page 10, 5.(b)) and local earth quakes. Without monitoring wells, there is no practical way to determine if the "...confining layer..." has been hydrologically fractured.

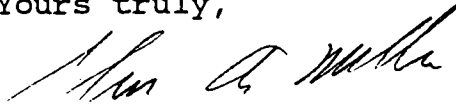
Colorado River Salinity Forum  
September 10, 1993

Page 3

(4) Finally, there is absolutely no reason to allow the project results/reports to be kept confidential (P. 16, D.). This is a bad precedent to set on an expensive publicly-funded project.

Thank you for allowing comment on the salinity program. My apologies for such a long letter, but the project is complex and has raised many complex questions. Please contact me if you have any questions on the above.

Yours truly,



Glen A. Miller  
2264 Willow Wood Road  
Grand Junction, CO 81503

GAM/an

Encl.

cc: Mr. Lee Case  
Mr. Jack Barnett

## **RESPONSE**

The Forum is aware of the difficulties that Reclamation is experiencing with the Paradox Valley Unit injection well and shares Mr. Miller's concerns. The Paradox well is currently undergoing a two year period of testing to further identify problems and possible solutions to the difficulties Mr. Miller identified. Reclamation is keeping the Forum and Work Group advised of the results of their activities.

Should the problems with the well become insurmountable or remedial cost render the unit no longer cost effective, the Forum will consider alternative salt control schemes for the unit or replace the unit with ones which are currently being investigated but not in the recommended plan.

September 7, 1993

Mr. Jay C. Groseclose, P.E., Deputy Chief  
New Mexico Interstate Stream Commission  
P. O. Box #25102  
Santa Fe, New Mexico

87504-5102

Re: Colorado River Basin Salinity Control Forum

Dear Mr. Groseclose:

This is in response to our recent conversation. It is requested that you advise the Forum of the concerns expressed in this letter. Current schedules preclude our attendance at the upcoming meeting on September 14, 1993.

National Pollution Discharge Elimination (NPDES) Permits are subject to the stream standards of the New Mexico Water Quality Control Commission. In order to meet those requirements, the treatment processes can increase the salinity in the discharge.

There appears to be a need to provide an avenue that addresses municipal discharges so that the 400 mg/l limit increase be with respect to the affect of the municipal customers so that the sampling point would be at the influent of the treatment plant or to make a provision for the 400 mg/l allowance to be increased to allow for any increases due to treatment requirements in response to steam discharge quality requirements.

The implementation of this remedy is proposed so that the expense needed to provide the study in the Forum's Policy of Implementation is not incurred and can be used for capital improvements.

D-6

September 7, 1993

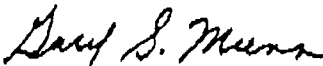
Page 2

Re: Colorado River Basin Salinity Control Forum

The available alternatives with respect to municipal point discharges is expected to result in having to go to a very costly alternative of zero flow discharge to address a salinity contribution that is more than one ton per day, but is minor relative to the non-point contributions.

The City of Gallup's NPDES permit for discharge to the Rio Puerco of the West will be renegotiated in 1994, so any consideration the Forum could give this issue will be appreciated.

Sincerely,

  
Gary S. Munn, P.E.  
Chief Engineer  
Utilities Division

GSM/rmc

xc: Glenn Saums  
Program Manager  
Surface Water Section, NMED  
File (1)





BRUCE KING  
GOVERNOR

State of New Mexico

ENVIRONMENT DEPARTMENT

JUDITH M. ESPINOSA  
SECRETARY

RON CURRY  
DEPUTY SECRETARY

MEMORANDUM

TO Jay Groseclose, P. E., Deputy Chief, NM Interstate Stream Commission

FROM Glenn Saums, Program Manager, Point Source Regulation Section

DATE September 13, 1993

SUBJECT City of Gallup Wastewater Treatment Plant Discharge to the Rio Puerco, NM0020672, Colorado River Basin Salinity Control Forum

Quarterly toxicity monitoring of the effluent from the wastewater treatment plant is required by the City of Gallup's National Pollutant Discharge Elimination System (NPDES) permit, NM0020672, for the discharge into the Rio Puerco, a tributary to the Colorado River Basin. The NPDES permit requires the City to submit an approvable plan for conducting a "Toxicity Reduction Evaluation" (TRE) to determine the cause and to remedy the conditions resulting in the toxicity.

Results of the biomonitoring tests for effluent toxicity to two species, *Daphnia pulex* and *Pimephales promelas* (fathead minnow), as reported by the City of Gallup on the NPDES permit's Discharge Monitoring Reports, indicate the most recent test failure was in August, 1992, for the fathead minnow. There have been no further test failures for either species to date. The City of Gallup samples for the toxicity test at least once monthly over a two day span, and the contract laboratory currently used is Camp Dresser & McKee, (CDM) in Denver, Colorado.

Prior to the August, 1992 toxicity test failure, the previous series of failures were in January and February, 1992, for the fathead minnow, in March, 1992, for both species, in April 1992 one test failure for *Daphnia* and one test failure for the fathead minnow on different collection dates, both tests in May 1992 for both species, and in June 1992 for the fathead minnow. A summary of toxicity test results from second quarter, 1990, to the present, is available from my staff.



Harold Runnels Building • 1190 St. Francis Drive • P.O. Box 26110 • Santa Fe, New Mexico 87502  
(505) 827-2830 FAX (505) 827-2836

Jay Grosscloss, P. E., Deputy Chief, NM Interstate Stream Comm.  
September 13, 1993  
Page 2

In a letter to the US Environmental Protection Agency from the City of Gallup's Ronald D. French, Biomonitoring Program Director, dated October 1, 1992, regarding the results of the TRB, Camp Dresser & McKee and the City state they 'have identified ammonia as the causative agent for effluent toxicity at the City's wastewater treatment facility.' The letter also indicates the three options that the City and CDM will evaluate further are: biological nitrification, land based treatment, and constructed aquatic treatment systems.

If I can provide further information, please call me at 827-2827.

## **RESPONSE**

The City of Gallup did express concern with the Forum's policy relating to the National Pollutant Discharge Elimination System (NPDES) permit program. Specifically, the City's concern is with the incremental increase of 400 mg/L TDS for municipal discharges and is requesting a provision for increases in the incremental increases.

The Forum policy (Appendix B) includes such a provision: "The permitting authority may permit a discharge in excess of the 400 mg/L incremental increase at the time of issuance or reissuance of a NPDES discharge permit, upon satisfactory demonstration by the permittee that it is not practicable to attain the 400 mg/L limit."

The Forum believes that it has already provided a reasonable mechanism to address the 400 mg/L incremental increase. The New Mexico Environment Department is the proper entity to address the City of Gallup's concerns.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VIII

999 18th STREET - SUITE 500  
DENVER, COLORADO 80202-2466

JUL 26 1993

Ref: 8WM-WQ

File # 4700

C. Laurence Linser, Chairman  
Colorado River Basin Salinity Control Forum  
Arizona Department of Water Resources  
15 South 15th Avenue  
Phoenix, AZ 85007

Dear Mr. Linser:

We have several concerns and recommendations to express to you regarding the 1993 Review of the Water Quality Standards for Salinity, Colorado River System (1993 Review) dated June 1993. We provided comments on the April 16, 1993 draft document and provided other correspondence and communications regarding EPA concerns that should be addressed in the 1993 Review. Our recommendations, in large part, relate to the need to provide more information on how the plan of implementation will meet the numeric criteria for total dissolved solids over the long term.

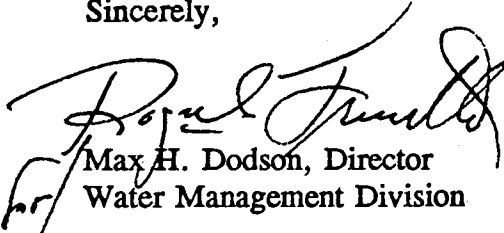
We commended the Forum's Work Group for the April 16 draft Review which began to give some indication of the magnitude, frequency and duration of future flow-weighted average annual salinity levels that would be projected to exceed the numeric criteria. However, we are disappointed to note that in general the substance of our comments on the April 16 draft were not addressed in the June version. Furthermore, in some instances where we asked for clarification and/or additional information on specific figures, tables, and text, that particular portion of the document was removed. Most notably, this included information that gave some indication of the magnitude, frequency, and duration that salinity levels are projected to exceed the numeric criteria.

By justifying the adequacy of the proposed plan of implementation on the basis of salinity adjusted to long-term (multi-year) mean flow conditions, the annual variability of salinity is concealed. By simplifying the discussion and by using long-term mean flow values rather than flow-weighted average annual salinity values, we believe that the 1993 Review gives the clear, but misleading, impression that the proposed plan of implementation provides more control than what is needed to meet the numeric criteria in 2015. This portrayal of the salinity program could convey to Congress and the public the message that current funding levels for the salinity program should be reduced.

Jack Barnett's Memorandum 93-41 suggests that a Colorado River Simulation System (CRSS) run may be needed. EPA previously requested CRSS runs to validate the proposed plan of implementation. We continue to believe that a series of CRSS runs is needed to provide the basis for the kind of analysis EPA has been requesting as well as for the Forum to support its salinity control program. As we have discussed with the Forum in the past, we believe that the States are in the best position to make the decisions on what level of salinity control is acceptable, provided that sufficient information is available for making the decisions.

We have recently had the opportunity to discuss these concerns with Ernie Weber of the Forum Work Group. As a result, we are optimistic that a coordinated effort with the Forum and the Forum Work Group will result in our concerns being sufficiently addressed as part of the 1993 Review.

Sincerely,



Max H. Dodson, Director  
Water Management Division

cc: Jack Barnett, CRBSCF  
Ernie Weber, CRBSCF Work Group

## RESPONSE

The Environmental Protection Agency (EPA) has worked closely with the Forum and the Forum's Work Group in the preparation of the 1993 Review. EPA representatives have attended several meetings of the Forum and the Work Group when the 1993 Review was discussed, and EPA has given comment and participated in an open exchange of ideas. EPA submitted its recommendations and concerns on the 1993 Review to the Forum's Chairman. Subsequent to the receipt of their letter, the Forum's Executive Director met with representatives of EPA Region 8 in Denver to discuss requests being made by EPA and to confirm proposed revisions to the 1993 Review. EPA requested (1) that Reclamation make an additional CRSS run to validate that the proposed plan of implementation will meet the objective of maintaining the numeric criteria, as well as determining the maximum and minimum salinities that could be anticipated in 2015, (2) that the preliminary 1993 Review be reprinted as a final report including the comments received on the preliminary review and the Forum's responses to those comments, and (3) clarification of the economic impact of high salinity levels in the river system.

The Forum requested Reclamation to make an additional CRSS run to validate the effectiveness of the recommended plan of implementation. The results of that run and the earlier CRSS projection of salinity without further implementation of the plan are included in this final report. The text of the report has been modified to reflect the information gained by the second CRSS run and to better state the economic impacts of salinity in the river. Finally, the comments and responses were included in this appendix (Appendix D) and printed together with the revised preliminary report as a single final report in direct response to EPA's request.

**ADDITIONAL STATEMENTS**  
(not requiring response)

A number of agencies submitted statements that, for the most part, were supportive of the report and made recommendations for change. Copies of those statements follow.



INTERNATIONAL BOUNDARY AND WATER COMMISSION  
UNITED STATES AND MEXICO

AUG 4 1993

OFFICE OF THE COMMISSIONER  
UNITED STATES SECTION

Mr. Jack A. Barnett  
Executive Director  
Colorado River Basin  
Salinity Control Forum  
106 West 500 South, Suite 101  
Bountiful, Utah 84010

SUBJECT: Forum Progress Reports-Publication of 1993 Review

Dear Mr. Barnett:

Thank you for your memorandum 93-49 of July 21, 1993, providing the United States Section of the International Boundary and Water Commission (USIBWC), with the 1993 review report on the Water Quality Standards for Salinity, Colorado River System. We have reviewed the report which proposes a plan to implement salinity control for the Colorado River System for the next three years and to maintain the salinity concentrations at or below the numeric criteria while the seven Colorado River basin states continue to develop their compact apportioned waters.

We understand from the 1993 report which was prepared by the Colorado River Basin Salinity Control Forum (Forum) that, based on the available data, the measured salinity will not exceed the numeric criteria during the next three years. These salinity standards are 723 mg/l below Hoover Dam, 747 mg/l below Parker Dam and 879 mg/l at Imperial Dam.

It is also our understanding that the plan of implementation is designed to reduce the salt contribution to the river from existing sources and to minimize future increases in salt load caused by human activities which will be beneficial to the requirements under IBWC Minute No. 242, "Permanent and Definitive Solution to the International Problem of the Salinity of the Colorado River," dated August 30, 1973.

As you are aware, by virtue of the Treaty of February 3, 1944, for "Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande" (TS 994; 59 Stat. 1219), and agreements concluded thereunder that the United States Government meets the obligations incurred in those agreements. The 1944 Treaty provides a guaranteed annual quantity of 1,850,234 thousand cubic meters (1.5 million acre-feet) of the Colorado river waters to be delivered to Mexico with stipulation that delivered waters to Morelos Dam have an annual average salinity of no more than  $115 \pm 30$  parts per million over the annual average salinity of the Colorado River at Imperial Dam.

D-15



The proposed plan should be beneficial in salinity limits and it appears to be adequate for the salinity problem in the basin.

We do appreciate the opportunity to review the 1993 report. Thank you again for your consideration.

Sincerely,

A handwritten signature in cursive script that reads "Conrad G. Keyes, Jr.".

Conrad G. Keyes, Jr.  
Principal Engineer, Planning



# United States Department of the Interior



## BUREAU OF LAND MANAGEMENT

Service Center

Denver Federal Center, Building 50

P.O. Box 25047

Denver, Colorado 80225-0047

IN REPLY  
REFER TO:

7240 (SC-210)

AUG 5 1993

Mr. Jack Barnett  
Executive Director  
Colorado River Basin Salinity Control Forum  
106 West 500 South, Suite 101  
Bountiful, Utah 84010

Dear Mr. Barnett:

The Bureau of Land Management (BLM) supports the findings of the 1993 Review: Water Quality Standards for Salinity, Colorado River System. We concur with the Forum's decision to not revise established standards for salinity for the Colorado River System.

BLM will continue its salinity partnership with the Basin States, the Bureau of Reclamation, and the United States Department of Agriculture to reduce salt yield from public lands. Our approach to controlling salinity will be to manage public lands in a manner which will support healthy ecological systems and processes.

Our participation in the 1993 Review has helped BLM to better understand the Basin States' analysis of hydrologic and water use changes that occurred between 1990 and 1993. We look forward to working with the Forum to carry out the Plan of Implementation.

If you have any questions, please call Eric Janes at (303) 236-0147.

Sincerely,

FOR Service Center Director

## COLORADO RIVER BOARD OF CALIFORNIA

770 FAIRMONT AVENUE, SUITE 100  
GLENDALE, CA 91203-1035  
318) 543-4676  
(818) 543-4685 FAX



August 13, 1993

Mr. Jack A. Barnett  
Executive Director  
Colorado River Basin Salinity  
Control Forum  
106 West 500 South, Suite 101  
Bountiful, UT 84010

Dear Mr. Barnett:

The salinity of the Colorado River is of concern to the sixteen million people in California who rely on the River to provide a full or supplemental water supply to meet their domestic, municipal, and industrial water needs and to those who rely on the River to irrigate about 900,000 acres of cropland. Salinity is a pollutant that causes economic damages. Among the states, California suffers by far the greatest economic damages resulting from elevated salinity concentrations. Without timely implementation of the proposed salinity control measures, California water users will suffer significant increases in adverse economic effects.

The Board's staff has reviewed the proposed 1993 Review - Water Quality Standards for Salinity - Colorado River System. The Forum is to be commended for its efforts in looking at the plan of implementation beyond a twenty-year time period, which has been the practice in prior reviews, and in its efforts to identify the required annual tonnage of salt reduction needed during that time period.

The Board concurs in the Forum's findings and fully supports the recommendations set forth in the 1993 Review. The Board urges that there be strict adherence to the implementation schedule.

Sincerely,

A handwritten signature in cursive script that reads "Gerald R. Zimmerman".

Gerald R. Zimmerman  
Executive Director



# United States Department of the Interior

AUG 19 1993  
TAKE  
PRIDE IN  
AMERICA

IN REPLY REFER TO:

D-5003

BUREAU OF RECLAMATION  
DENVER OFFICE  
P.O. Box 25007  
Building 67, Denver Federal Center  
Denver, Colorado 80225-0007

AUG 17 1993

Mr. Jack Barnett  
Executive Director, FORUM  
106 West 500 South, Suite 101  
Bountiful, UT 84010

Subject: 1993 Review, Water Quality Standards for Salinity  
(Salinity)

Dear Mr. Barnett:

Thank you for the opportunity to review the 1993 Review, Water Quality Standards for Salinity, Colorado River System, June 1993. As you know, the Bureau of Reclamation (Reclamation) is responsible for coordinating salinity control activities within the Department of the Interior, the Department of Agriculture, and other Federal and State agencies. In that capacity, Reclamation has cooperated with the Colorado River Salinity Control Forum (Forum) in providing various data and analyses found in the 1993 review.

Reclamation believes that the Forum's basinwide approach to controlling salt loading is the most logical and workable means of maintaining salinity levels in the lower Colorado River Basin at or below the established numeric criteria while water resources development continues throughout the basin.

Reclamation is responsible for the following elements of the plan of implementation found in the 1993 plan of implementation:

#### UNITS COMPLETED

1. Meeker Dome
2. Las Vegas Wash - Pittman Bypass
3. Grand Valley, Stage I

#### UNITS BEING IMPLEMENTED

1. Paradox Valley
2. Grand Valley, Stage II
3. Lower Gunnison Basin
4. Dolores Project/McElmo Creek

#### PLANNING COMPLETED, BUT NOT AUTHORIZED

1. Uinta Basin
2. San Juan - Hammond
3. Price - San Rafael

The combined Reclamation/Bureau of Land Management/Department of Agriculture, 1993 implementation plan projects that 1.7 million tons will need to be removed annually by 2040. Reclamation believes that the long-term projections of salinity levels are reasonable. Reclamation's evaluation supports the Forum's conclusion that salinity levels at the three downstream stations will not exceed the numeric criteria during the next 3 years.

Reclamation appreciates having had the opportunity to work with the Forum in this endeavor and looks forward to continuing in this capacity in the future.

Sincerely,



**J. William McDonald**  
Assistant Commissioner  
Resources Management

FOR



# IMPERIAL IRRIGATION DISTRICT

OPERATING HEADQUARTERS • P. O. BOX 937 • IMPERIAL, CALIFORNIA 92251

GM

August 17, 1993

Mr. Jack A. Barnett, Executive Director  
Colorado River Basin Salinity  
Control Forum  
106 West 500 South, Suite 101  
Bountiful, Utah 84010

Dear Mr. Barnett:

The Imperial Irrigation District staff has reviewed the recommendations set forth in the 1993 Review, Water Quality Standards for Salinity, Colorado River System, prepared by the Colorado River Basin Salinity Control Forum. As one of the major beneficiaries of Colorado River salinity control, we concur with the recommendation for no change in the numeric Colorado River salinity standards at this time. We also concur with the recommended updated schedule of implementation of salinity control measures to maintain the standards.

The salinity control projects defined in the plan of implementation have been deemed cost effective and are necessary to maintain the numeric criteria for salinity for the Colorado River. The plan must be in accordance with the schedule set forth in the report. Failure to do so will result in future increased cost and the need for additional salinity control measures.

We appreciate the opportunity to review and comment on the report.

Yours truly,

CHARLES L. SHREVES  
General Manager

SALINITY

cc: Mr. Jerry Zimmerman, CRB



# PALO VERDE IRRIGATION DISTRICT

180 WEST 14TH AVENUE – BLYTHE, CALIFORNIA 92225

TELEPHONE (619) 922-3144

August 23, 1993

**Mr. Jack A. Barnett, Executive Director**  
Colorado River Basin Salinity Control Forum  
106 West 500 South, Suite 101  
Bountiful, Utah 84010

Dear Mr. Barnett:

The Palo Verde Irrigation District concurs with the findings and recommendations contained in the 1993 Review, Water Quality Standards for Salinity, Colorado River system which was prepared by the Colorado River Basin Salinity Control Forum. The District appreciates having the opportunity to review and comment on the report and would like to commend the Forum for its efforts to control river water salinity.

Very truly yours,

GERALD M. DAVISSON  
Manager

GMD/dm

cc: Mr. Gerald R. Zimmerman  
Executive Director  
Colorado River Board of California



ESTABLISHED IN 1918 AS A PUBLIC AGENCY

AUG 26 1993

# COACHELLA VALLEY WATER DISTRICT

POST OFFICE BOX 1058 • COACHELLA, CALIFORNIA 92236 • TELEPHONE (619) 398-2651

**DIRECTORS**

TELLIS CODEKAS, PRESIDENT  
RAYMOND R. RUMMONDS, VICE PRESIDENT  
JOHN W. McFADDEN  
DOROTHY M. DE LAY  
THEODORE J. FISH

**OFFICERS**

THOMAS E. LEVY, GENERAL MANAGER-CHIEF ENGINEER  
BERNARDINE SUTTON, SECRETARY  
OWEN McCOOK, ASSISTANT GENERAL MANAGER  
REDWINE AND SHERRILL, ATTORNEYS

August 23, 1993

Mr. Jack A. Barnett, Executive Director  
Colorado River Basin Salinity Control Forum  
105 West 500 South, Suite 101  
Bountiful, Utah 94010

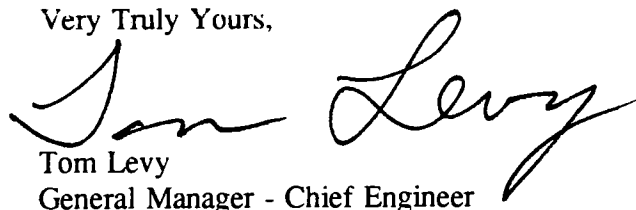
Dear Mr. Barnett:

At the invitation of California's Forum members, the Coachella Valley Water District has reviewed the 1993 Review, Water Quality Standards for Salinity, Colorado River System, prepared by the Colorado River Basin Salinity Control Forum, and we concur and fully support the recommendations set forth in the report.

Coachella Valley Water District receives its share of Colorado River water from the last diversion point in the United States and, consequently, is severely impacted by the River's salinity. It is imperative that the schedule of implementation of salinity control measures, as recommended by the Forum, be maintained. Any delay in implementation will result in additional damages from salinity and could result in future increased costs.

The district extends thanks to the Forum for the opportunity to review and comment on the report.

Very Truly Yours,



Tom Levy  
General Manager - Chief Engineer

cc: Gerald R. Zimmerman  
Executive Director  
Colorado River Board of California

TV

TRUE CONSERVATION  
USE WATER WISELY





# San Diego County Water Authority

A Public Agency

3211 Fifth Avenue • San Diego, California 92103-5718  
(619) 297-3218 FAX (619) 297-0511

AUG 27 1993

August 24, 1993

Mr. Jack A. Barnett, Executive Director  
Colorado River Basin Salinity  
Control Forum  
106 West 500 South, Suite 101  
Bountiful, Utah 84010

Dear Mr. Barnett:

Over 90 percent of San Diego County's water needs are met by imported water, with much of it coming from the Colorado River. The San Diego County Water Authority and its member agencies anticipate using this imported water more efficiently in the future through an aggressive water reclamation program. However, excessive salinity in the imported water discourages further development and use of reclaimed water. Consequently, the Water Authority is extremely concerned with the salinity of the Colorado River.

The Water Authority has reviewed the 1993 Review, Water Quality Standards for Salinity, Colorado River System and concurs with its recommendations. We urge that the recommended salinity control plan be implemented as set forth in the report so that the program can be carried out at minimal cost while assuring that the criteria will be maintained.

The Authority appreciates the opportunity to comment on the 1993 Review.

Sincerely,

*Lester A. Snow*  
FOR Lester A. Snow  
General Manager

cc: Mr. Gerald R. Zimmerman  
Executive Director  
Colorado River Board of California

PMM:aba

### MEMBER AGENCIES

- CITIES**
- Del Mar • Escondido • National City
  - Oceanside • Poway • San Diego

- COUNTY**
- San Diego (ex officio)

- IRRIGATION DISTRICTS**
- Santa Fe • South Bay

- WATER DISTRICTS**
- Helix • Otay
  - San Dieguito

D-24

- COUNTY WATER DISTRICT**
- Vallecitos

- PUBLIC UTILITY DISTRICT**
- Fallbrook

- FEDERAL AGENCY**
- Pendleton Military Reservation

- MUNICIPAL WATER DISTRICTS**
- Buena Colorado
  - Carlsbad
  - Olivenhain
  - Padre Dam
  - Rainbow
  - Ramona
  - Rincon del Diablo
  - Valley Center
  - Yuima

Mr. C. Laurence Linser  
Chairman, Colorado River Basin  
Salinity Control Forum  
15 South 15th Avenue  
Phoenix, Arizona 85007

27 AUG 1993

Dear Mr. Linser:

The USDA National Salinity Control Coordinating Committee (NSCCC) has reviewed the 1993 Review, Water Quality Standards for Salinity, Colorado River System. The Colorado River Basin Salinity Control Forum (FORUM) has done a good job in assessing salinity conditions in the Colorado River and developing the salinity standards. The FORUM is to be commended for the manner in which they have encouraged cooperation between the various federal agencies and the States in preparation of the report. The NSCCC is pleased with the responsiveness of the FORUM to comments from USDA on the report.

The NSCCC fully concurs in the plan of implementation as defined in the 1993 Review and is committed to achieving the objectives of the salinity control program in the most cost effective manner. Of the seven USDA salinity control units in the plan, five of the units have been under way for some time, implementation is just beginning in the sixth unit, and planning is essentially completed for the seventh unit. We are pleased to report that voluntary participation in the salinity control program by farmers and other land users has been exceptional.

The NSCCC feels that the goals and objectives as stated in the 1993 Review are practical and achievable. Based upon the salt load accomplishments to date and the number of pending applications for participation in the program, it is felt that progress will continue at a steady pace. We are especially supportive of the Forum's basin wide plan of implementation with strong state leadership.

Sincerely,



PETER M. TIDD  
Chairperson, National Salinity  
Control Coordinating Committee

cc:

Jack Barnett, Executive Director, CRSC Forum, Bountiful, Utah  
Ernie Weber, Chairperson, CRSC Forum Workgroup, Glendale,  
California





# CLIFTON WATER DISTRICT

P. O. Box 100, 137 Third Street

Clifton, Colorado 81520

Phones

Water Office 434-7328

Treatment Plant 434-5571

Quality Control Laboratory 434-7624

#### Board of Directors

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William M. Ela, Vice President  
George E. Wheeler, Secretary  
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Dickie D. Lewis, Director

#### Staff

Raymond J. Schuster, Manager  
Shirley Weaver, Office Manager  
Carey Blount, Plant Superintendent  
Dale Tooker, Assistant Manager

SEP 03 1993

September 1, 1993

Mr. Jack A. Barnett, Executive Director  
Colorado River Basin Salinity Control Forum  
106 West 500 South, Suite 101  
Bountiful, UT 84010

Re: Regional Public Meetings for Review of Water  
Quality Standards

Dear Mr. Barnett:

The Directors or staff of the Clifton Water District will be unable to attend either of the regional public meetings to comment on the water quality standards and related matters as contained in the Colorado River Basin Salinity Control Forum's 1993 review. The Clifton Water District serves an estimated population of 23,500 with water from the Colorado River in Mesa County, Colorado. The District is very much in favor of the proposed desalinization plant on the Colorado River in the Glenwood Springs area. We estimate that a desalinization plant in the Glenwood Springs area would reduce the salinity in the Colorado River and the Grand Valley by about seven percent. This reduction in salinity would be of great benefit to our customers and reduce our treatment and maintenance costs.

Please do not hesitate to contact us if you should require additional information about our concerns of the salinity in the Colorado River.

Sincerely,

Raymond J. Schuster  
Manager

cc E. L. Jencsok

D-26

Safe drinking water is our business - Conserving water is everyone's business.



**MWD**  
METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Office of the General Manager

September 7, 1993

Mr. Jack A. Barnett  
Executive Director  
Colorado River Basin Salinity  
Control Forum  
106 West 500 South, Suite 101  
Bountiful, Utah 84010

Dear Mr. Barnett:

1993 Review, Water Quality Standards  
for Salinity, Colorado River System

We have reviewed the report "1993 Review, Water Quality Standards for Salinity, Colorado River System" prepared by the Colorado River Basin Salinity Control Forum (Forum). Metropolitan supports the report's conclusion that the Colorado River numeric criteria need not be revised and its revision of the plan of implementation to maintain the salinity concentrations at or below the numeric criteria. We urge the adoption of the 1993 review by each of the Colorado River Basin states. Metropolitan appreciated the opportunity to review the Forum's 1993 report.

Very truly yours,

Duane L. Georgeson  
Assistant General Manager

JPM:vb

cc: Mr. Gerald R. Zimmerman  
Executive Director  
Colorado River Board of California  
770 Fairmont Avenue, Suite 100  
Glendale, California 91203-1035

# COLORADO RIVER WATER CONSERVATION DISTRICT

September 15, 1993

Mr. Jack A Barnett, Executive Director  
Colorado Basin Salinity Control Forum  
106 West 550 South, Suite 101  
Bountiful, Utah 84010

Dear Mr. Barnett:

This letter is in response to your invitation to comment of the Colorado River Basin Salinity Control Forum's 1993 Review in anticipation of public meetings.

The Colorado River Water Conservation District believes removal of excess salts from the Colorado River is in the best interest of the environment of the river and the substantial population reliant upon the river as a source of irrigation and/or drinking water.

Enclosed is a copy of a letter recently sent to the Glenwood Springs City Council stating the River District's support of a local desalinization facility to address this issue. A desalinization facility, such as that proposed by Aqua-Chem or a similar facility, at or near Glenwood Springs, could have a significant positive impact on the TDS levels in the Colorado River. Accordingly, inclusion of the Aqua-Chem, or similar proposal, is quite appropriate in the 1993 Review document for water quality planning, budgetary planning and guidance purposes.

Sincerely,



David H. Merritt,  
Senior Water Resources Engineer

enclosure