2011 Review

Water Quality Standards for Salinity
Colorado River System

October 2011

Colorado River Basin Salinity Control Forum

2011 Review

WATER QUALITY STANDARDS FOR SALINITY
COLORADO RIVER SYSTEM

October 2011

Prepared by

Colorado River Basin Salinity Control Forum

COLORADO RIVER BASIN SALINITY CONTROL FORUM

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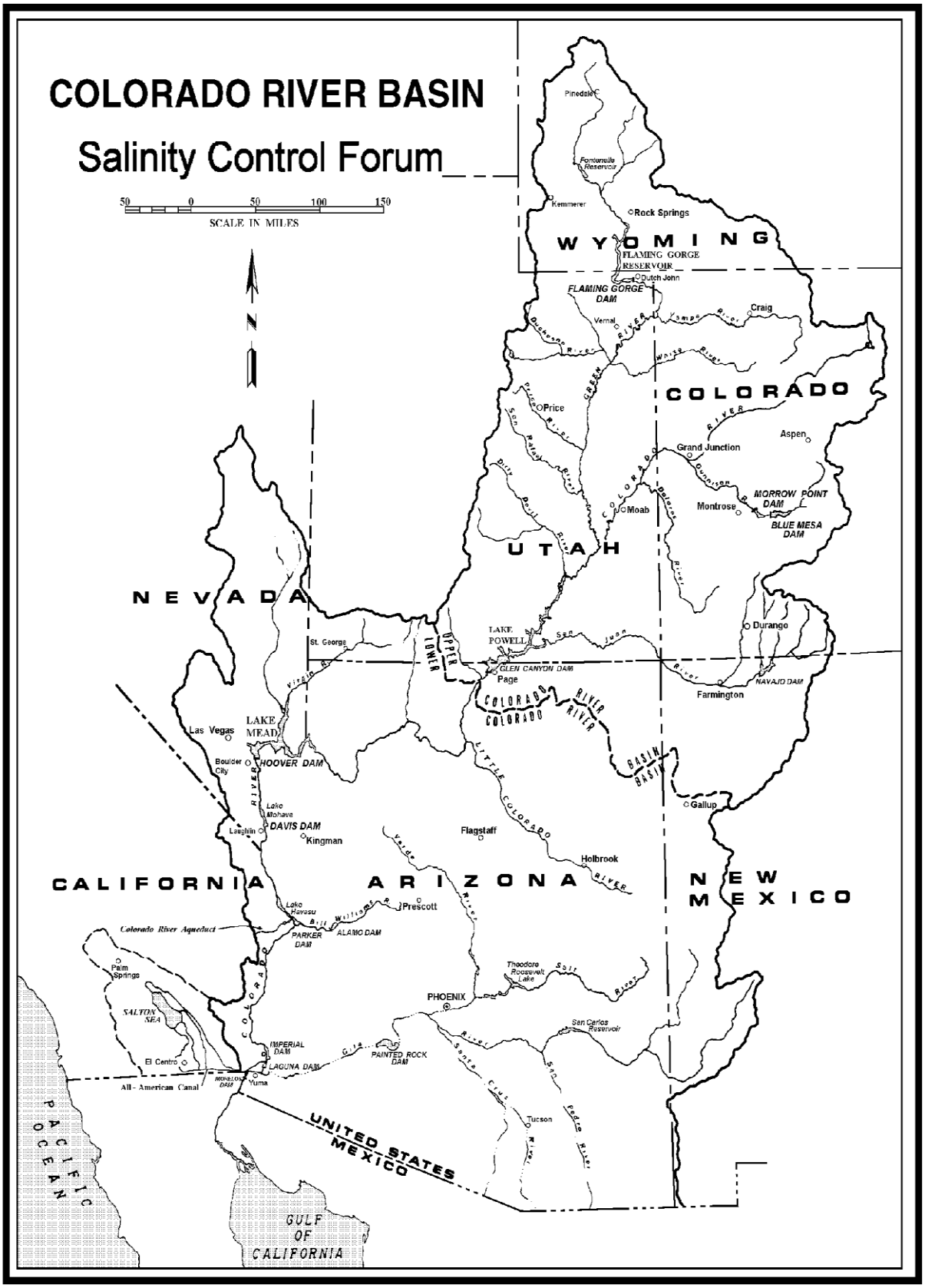
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Salinity Control Forum
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SCALE IN MILES
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Dutch John
FLAMING GORGE DAM
Vernal
Craig
Duchesne River
Yampa River
White River
GREEN RIVER
Price
Price River
San Rafael River
Aspen
Grand Junction
Gunnison River
COLORADO RIVER
MORROW POINT DAM
Montrose
BLUE MESA DAM
Moab
Dolores River
Durango
LAKE POWELL
San Juan River
GLEN CANYON DAM
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Farmington
NAVAJO DAM
St. Georges
Virgin River
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LOWER
LAKE MEAD
Las Vegas
Boulder City
HOOVER DAM
Lake Mohave
DAVIS DAM
Laughlin
Kingman
Flagstaff
Little Colorado River
Gallup
Holbrook
Lake Havasu
Bill Williams River
Prescott
Colorado River Aqueduct
PARKER DAM
ALAMO DAM
Palm Springs
SALTON SEA
Theodore Roosevelt Lake
Salt River
PHOENIX
San Carlos Reservoir
IMPERIAL DAM
El Centro
LAGUNA DAM
PAINTED ROCK DAM
Gila River
Santa Cruz River
San Pedro River
All-American Canal
NORTON DAM
Yuma
Tucson
UNITED STATES
MEXICO
PACIFIC OCEAN
GULF OF CALIFORNIA

TRANSMITTAL LETTERS

The Federal Water Pollution Control Act requires that at least once every three years the 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 Forum, prepared a proposed Review and, after holding public meetings, prepared this final Review.

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

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Honorable Brian Sandoval
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SUMMARY

This Review is a review of the water quality standards for salinity for the Colorado River. 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 has reviewed the existing state-adopted and EPA approved water quality standards for salinity consisting of numeric criteria and a Plan of Implementation. During the period of the 2008 Review, the Colorado River Basin Salinity Control Act was amended to include the Basin States Program. The salinity model continues to be improved in order to provide the best salinity projections for this Review. Upon adoption by the Forum, this Review will be submitted to each of the Basin States for consideration as each state proceeds with its three-year water quality review process.

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

Station	Salinity in mg/L[1]
Below Hoover Dam	723
Below Parker Dam	747
At Imperial Dam	879

The Plan of Implementation is intended to maintain the salinity concentrations at or below the numeric criteria while the Basin States continue to develop their compact-apportioned waters. Reclamation's computer model runs indicate there is little probability of the numeric criteria being exceeded in the next three years. The Act requires the implementation of salinity control programs to reduce the salinity of the Colorado River. Reducing the salinity of the Colorado River reduces economic damages. The Plan of Implementation included in this Review, while insuring the numeric criteria will not be exceeded during the review period, also recognizes additional salinity control further reduces economic damages in the Lower Basin, as well as providing additional benefits in the Upper Basin.

The Forum's Plan of Implementation includes:

1. Construction of salinity control measures by Reclamation, USDA, the Basin States Program and BLM to the extent that those measures remain viable and appropriately cost-effective.

2. Application of the Forum-adopted policies by each of the states (the text of the policies are included in Appendix A of this Review).

3. Implementation of non-point source management plans developed by the states and approved by EPA.

The Colorado River Basin Salinity Control Program is a unique cooperative watershed effort between several federal agencies and seven states designated to meet national, international and state

[1]Flow-weighted average annual salinity

water quality objectives. The Forum participates with federal, state, local agencies and private participants to ensure the Plan of Implementation is implemented. The Forum also urges Congress to appropriate the funds needed for implementation and recommends legislative changes when necessary.

The water quality standards involve both a Plan of Implementation and numeric criteria. With the Plan of Implementation as proposed in this Review in place, the probability of exceeding the numeric criteria is low based on Reclamation computer model simulations. The analysis indicates the probability of exceedance of the numeric criteria with the Plan of Implementation in place in the next three years at the Hoover Dam, Parker Dam and Imperial Dam stations is 1 percent or less and, with the Plan in place, probabilities stay below 5 percent through the 20-year evaluation period. This low probability of exceedance opportunity was an important factor in the Forum's decision to adopt the Plan of Implementation accompanying this Review.

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LIST OF ABBREVIATIONS

208 Plan	Section 208 of the Clean Water Act amendments of 1972 and 1977 requiring integrated area-wide plans and programs for dealing with water pollution problems
Basin	Colorado River Basin
Basin Funds	Lower Colorado River Basin Development Fund and Upper Colorado River Basin Fund
Basin States	Arizona, California, Colorado, Nevada, New Mexico, Utah, Wyoming
BSP	Basin States Program
Basinwide Program	Basinwide Salinity Control Program
BLM	United States Bureau of Land Management
Clean Water Act	P.L. 92-500
Congress	United States Congress
CRSS	Colorado River Simulation System
EQIP	Environmental Quality Incentives Program
EPA	United States Environmental Protection Agency
Forum	Colorado River Basin Salinity Control Forum
maf	million acre-feet
mgd	million gallons per day
mg/L	milligrams per liter
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
Program	Colorado River Basin Salinity Control Program
Reclamation	United States Bureau of Reclamation
Review	2011 Review, *Water Quality Standards for Salinity, Colorado River System*
TDS	Total dissolved solids
The Act	The Colorado River Basin Salinity Control Act (P.L. 93-320) (1974), as amended by P.L. 98-569 (1984), P.L. 104-20 (1995), P.L. 104-127 (1996), P.L. 106-459 (2000), P.L. 107-171 (2002) and P.L. 110-246 (2008)
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture

PURPOSE OF THE REVIEW

This 2011 Review, *Water Quality Standards for Salinity, Colorado River System*, (Review) is prepared and submitted in response to Section 303(c) of Public Law (P.L.) 92-500 (Clean Water Act) by the seven-state Colorado River Basin Salinity Control Forum (Forum) on behalf of the governors of their respective states. This Review of the water quality standards includes the numeric criteria and the Plan of Implementation developed and adopted by the Forum. This is the twelfth Triennial Review conducted 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 consistent with the United States Environmental Protection Agency (EPA) approved 1975 standards and deals only with that portion of the Colorado River Basin (Basin) above Imperial Dam. This Review focuses on the 2011 to 2014 period and evaluates the appropriateness of the standards. Background information and activities regarding historical actions relative to the development and adoption of salinity standards is contained in the Forum report, *Water Quality Standards for Salinity, Including Numeric Criteria and Plan of Implementation for Salinity Control, Colorado River System*, Colorado River Basin Salinity Control Forum, June 1975.

Below Imperial Dam, salinity is controlled as a federal responsibility to meet the terms of the agreement with Mexico contained within Minute No. 242 of the International Boundary and Water Commission entitled "Permanent and Definitive Solution to the International Problem of the Salinity of the Colorado River." Minute No. 242 requires that measures be taken to assure that Colorado River water delivered to Mexico upstream from Morelos Dam will have an average annual salinity concentration of no more than 115 ± 30 parts per million TDS higher than the average annual flow-weighted salinity concentration of the Colorado River water arriving at Imperial Dam.

Nothing in this Review 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 Colorado River Storage Project Act (70 Stat. 105), the Upper Colorado River Basin Compact, or the Treaty with the United Mexican States (Treaty Series 994).

HISTORY AND BACKGROUND

The Basin is 242,000 square miles[2] (approximately 155 million acres) of the western United States and a small portion of northern Mexico. Its waters serve some 7.5 million people within the United States' portion of the Basin, and through export provides full or supplemental water supply to another 25.4 million people outside the Basin. The regional economy is based on irrigated agriculture, livestock grazing, mining, forestry, manufacturing, oil and gas production, recreation and tourism. The Colorado River provides irrigation water to about 4 million acres within the United States. Hydroelectric power facilities along the Colorado River and its tributaries generate approximately 12 billion kilowatt hours annually which is used both inside and outside of the Basin. The Colorado River also serves about 3 million people and 500,000 irrigated acres in Mexico.

Salinity-caused impacts have long been a major concern in the United States and Mexico. The salinity in the river increases as it flows downstream. The Colorado River has carried an average salt load of approximately 9 million tons annually past Hoover Dam, the uppermost location at which numeric criteria have been established.

The salts in the Colorado River system are naturally occurring and pervasive. Many of the saline sediments of the Basin were deposited in prehistoric marine environments. Salts contained within the sedimentary rocks are easily eroded, dissolved, and transported into the river system.

In the 1960s and early 1970s, the seven Basin States and representatives of the federal government discussed the problem of salinity concentrations increasing in the lower reaches of the Colorado River. In a 1971 study[3], EPA analyzed salt loading in the Basin and divided it into two categories, naturally occurring and human-caused. EPA concluded that about half (47 percent) of the salinity concentration measured in water arriving at Hoover Dam is from natural causes, including salt contributions from saline springs, groundwater 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 included salt contributions from non-point (excluding irrigated agriculture) or unidentified sources or from the vast, sparsely populated regions of the drainage, much of which are administered by the United States Bureau of Land Management (BLM) or other governmental agencies. Of the land within the Basin, about 75 percent is owned and administered by the federal government or held in trust for Indian tribes. The greatest portion of the naturally occurring salt load originates on these federally owned and administered lands. Human activities can influence the rate of natural salt movement from rock formations and soils to the river system and include livestock grazing, wildlife management, logging, mining, oil exploration, road building, recreation and urbanization.

Approximately 53 percent of the salinity concentration in the water arriving at Hoover Dam, as identified by EPA, results from various human activities. EPA estimated that out-of-Basin exports account for about 3 percent of the salt concentration at Hoover Dam, with irrigation accounting for 37 percent, reservoir evaporation and phreatophyte use accounting for about 12 percent, and about 1 percent attributed to municipal and industrial uses. Much of the salt load contribution from irrigated

[2]Colorado River System, Consumptive Uses and Losses Report, 1996-2000, Bureau of Reclamation

[3]The Mineral Quality Problem in the Colorado River, Summary Report, Environmental Protection Agency, Regions VIII and IX, 65pp., 1971

agriculture is from federally developed irrigation projects. In 1972, the federal government enacted the Clean Water Act that mandated efforts to maintain water quality standards in the United States. At the same time, Mexico and the United States were discussing the increasing salinity of the Colorado River water being delivered to Mexico.

The Basin States established the Forum in 1973. The Forum is composed of representatives from each of the seven Basin States appointed by the governors of the respective states. The Forum was created for interstate cooperation and to provide the states with the information necessary to comply with Section 303(a) and (b) of the Clean Water Act.

EPA promulgated a regulation in December 1974 which set forth a basinwide salinity control policy for the Basin. The regulation specifically stated that salinity control was to be implemented while the Basin States continue to develop their compact-apportioned water. This regulation also established a standards procedure and required the Basin States to adopt and submit for approval to EPA water quality standards for salinity, including numeric criteria and a Plan of Implementation, consistent with the policy stated in the regulation.

In 1975, the Forum proposed, the states adopted, and EPA approved water quality standards which included numeric criteria and a Plan of Implementation to control salinity increases in the Colorado River. The plan was designed to maintain the flow-weighted average annual salinity concentrations at or below the 1972 levels while the Basin States continued to develop their compact-apportioned water supply. Average annual salinity concentrations and salt loads were determined on a flow-weighted basis. The flow-weighted average annual salinity concentration is determined by dividing the flow-weighted average annual salt load passing a measuring station by the total annual volume of water passing the same point during a calendar year. The flow-weighted average annual salt load is calculated by first multiplying the daily salinity concentration values by the daily flow rates. These values are then summed over a calendar year. The total annual volume of water is calculated by calculating the sum of the daily flow rate.

The Forum selected three numeric criteria stations on the main stem of the lower Colorado River as being appropriate points to measure the salinity concentrations of the river. These stations are located at the following points: 1) below Hoover Dam, 2) below Parker Dam, and 3) at Imperial Dam.

The Colorado River Basin Salinity Control Act (P.L. 93-320) (1974) (Act), established the Colorado River Basin Salinity Control Program (Program) under Title II to address the concerns raised by EPA. P.L. 93-320 has been amended several times since its original enactment. P.L. 98-569 (1984) authorized the United States Department of Agriculture's (USDA) on-farm program. P.L. 104-20 (1995) created the United States Bureau of Reclamation's (Reclamation) Basinwide Salinity Control Program (Basinwide Program). The Federal Agriculture Improvement and Reform Act (P.L. 104-127) (1996) (1996 Farm Bill) authorized up-front cost sharing by the Basin States and modified the USDA authorities, including the use of the Environmental Quality Incentives Program (EQIP). P.L. 106-459 (2000) increased the appropriation ceiling. The Farm Security and Rural Investment Act (P.L. 107-171) (2002) continued the authorization of EQIP. The Food, Conservation, and Energy Act of 2008 (P.L. 110-246) (2008 Farm Bill) created the Basin States Program (BSP).

UNDERSTANDING THE SALINITY OF THE COLORADO RIVER

As with most large rivers, the natural flow of the Colorado River increases from its headwaters to its terminus. Today, however, the flow of the Colorado River decreases below Hoover Dam as it is decreased by diversions. Imperial Dam is the last major diversion point for uses in the United States. In normal years, only 1.5 maf is scheduled to pass Imperial Dam for deliveries to Mexico.

In general, the salinity concentration of the water in the Colorado River increases from the headwaters to the terminus. Much of the salt is picked up in the Upper Basin and some of the tributary streams average higher concentrations of salt.

Reclamation has developed a map of the Basin reflecting the relative flows and the corresponding salinity concentrations of the water across the Basin in the calendar year 2009. This map is provided for general illustrative purposes as Figure 1. The average flow of the Colorado River and its important tributaries are indicated by the width of the line and the salinity concentrations are illustrated by colors coded to ranges in TDS.

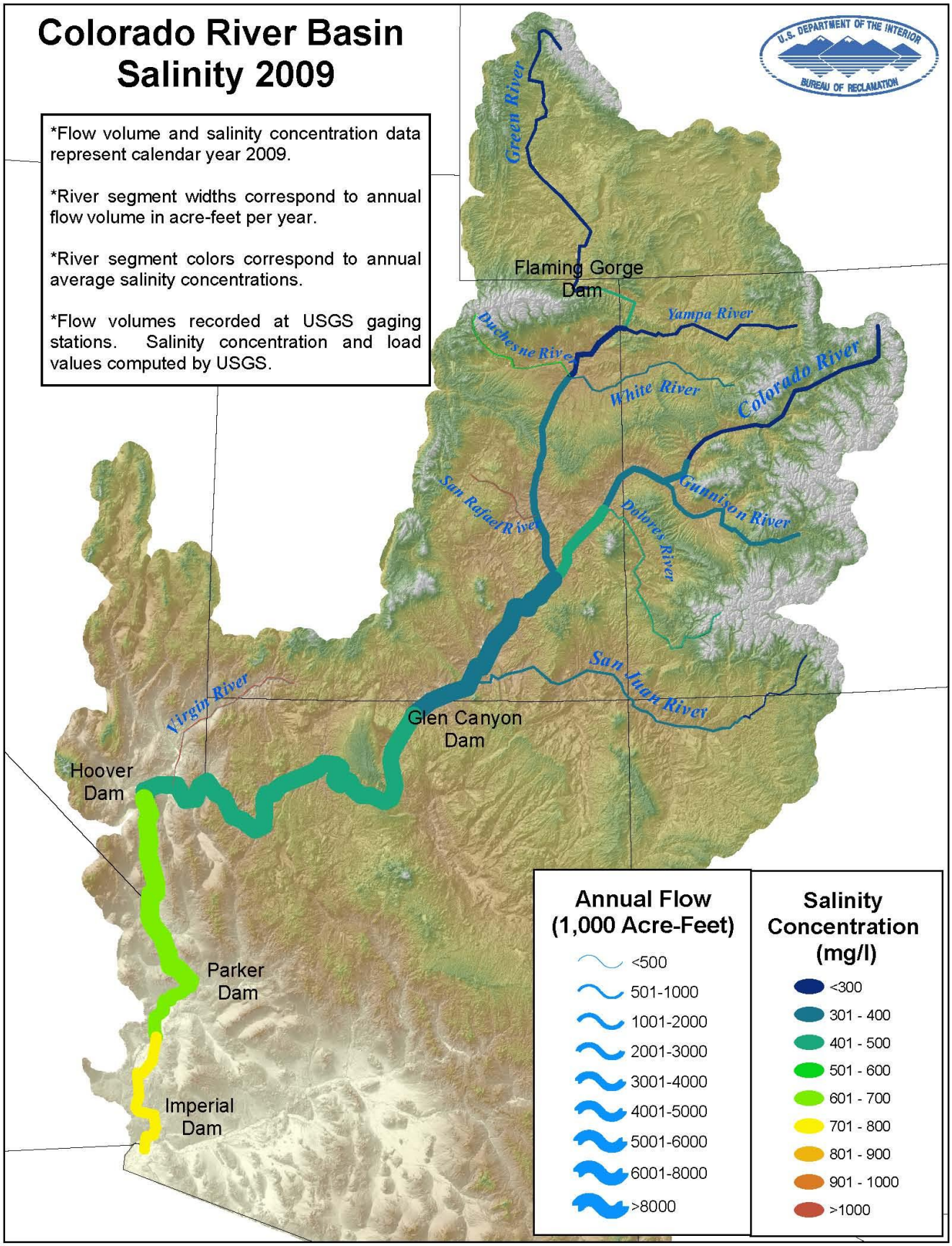

Figure 1 – 2009 (Calendar Year) Generalized Flow and Salinity Concentrations Across the Colorado River Basin

In general, over the last thirty years the salinity concentrations have decreased at all three of the numeric criteria stations (see Figure 2 and Table 1). In 1970, the concentrations of all three stations were at or above the concentrations which were later adopted as the numeric criteria for those stations. Now the concentrations are well below the numeric criteria. Salinity concentrations are based on TDS as the sum of constituents whenever possible. The sum of constituents is defined to include calcium, magnesium, sodium, chloride, sulfate, a measure of the carbonate equivalent of alkalinity and, if measured, silica and potassium. If a sum of constituents could not be computed, TDS as residue on evaporation (at 180 degrees Celsius) is substituted. In this Review, the terms "salinity," "TDS" and "concentration" in mg/L are used interchangeably.

During extreme drought which began about 2000, the concentrations of salts measured at Hoover and Parker Dams numeric criteria stations increased sharply. Those concentrations have been decreasing over the last few years. These trends can be observed in Figure 2. Relief from extreme drought conditions in recent years might be a factor with respect to these decreases. The concentration of salts measured at the Imperial numeric criteria station has exhibited no trend since 2006, remaining relatively unchanged.

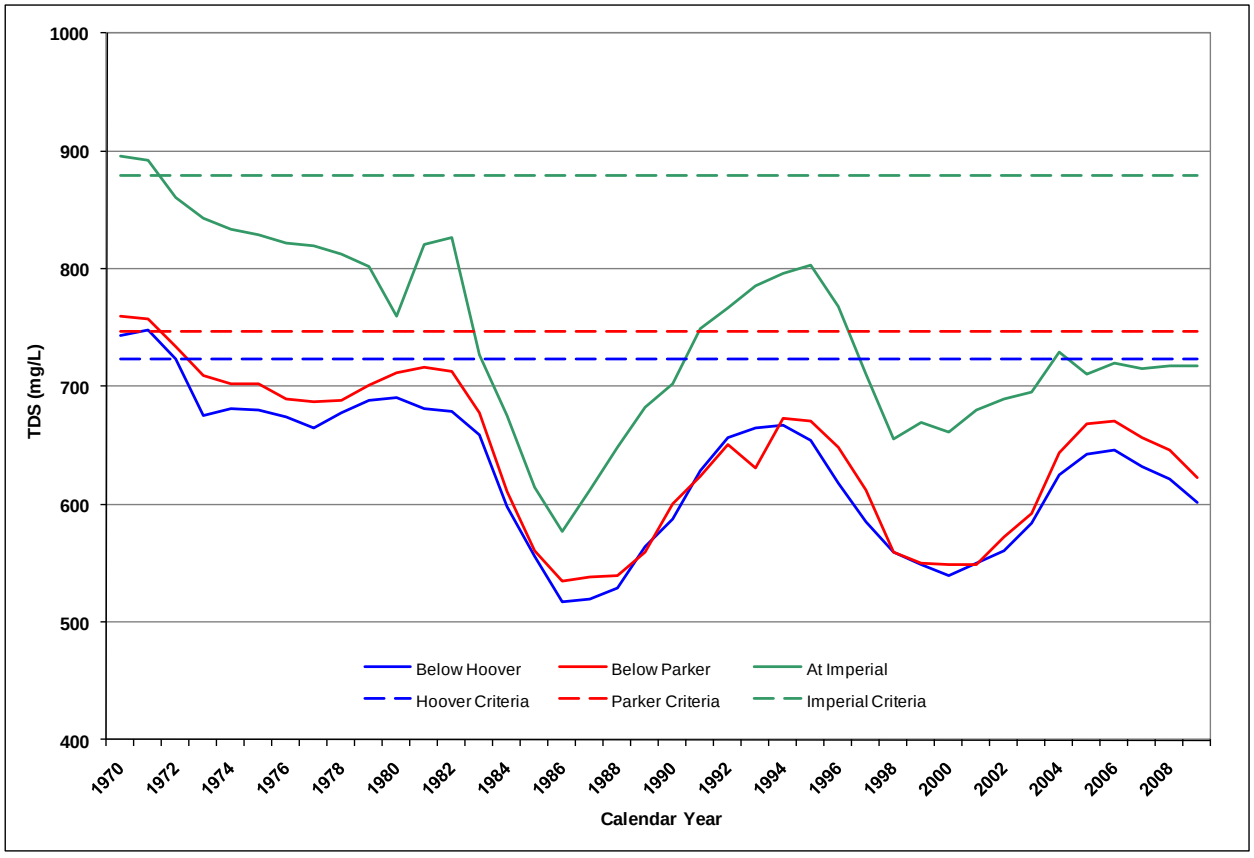

Figure 2 – Salt Concentrations at Numeric Criteria Stations

Table 1
Observed Flow-Weighted Average Salinity
at the Numeric Criteria Stations
(Total Dissolved Solids in mg/L)[4]

Calendar Year (Numeric Criteria)	Below Hoover Dam (723 mg/L)	Below Parker Dam (747 mg/L)	At Imperial Dam (879 mg/L)
1970	743	760	896
1971	748	758	892
1972	724	734	861
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	712	760
1981	681	716	821
1982	679	713	827
1983	659	678	727
1984	598	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	629	624	749
1992	657	651	767
1993	665	631	785
1994	667	673	796
1995	654	671	803
1996	618	648	768
1997	585	612	710
1998	559	559	655
1999	549	550	670
2000	539	549	661
2001	550	549	680
2002	561	572	689
2003	584	592	695
2004	625	644	729
2005	643	668	710
2006	646	671	720
2007	632	657	715
2008	622	646	717
2009 provisional	602	623	717

[4] Determined by the USGS from data collected by Reclamation and USGS.

PROVISION FOR REVIEWING AND REVISING THE STANDARD

The Colorado River water quality standards for salinity and the approach taken by the Basin States in complying with the standards are unique. The salinity concentrations that are projected in the future have not been shown to have adverse effects on human health or wildlife. Thus, the Program is different from most other water quality standard compliance programs. The standards adopted by the Forum and the Basin States and approved by EPA consist of the numeric criteria and the Plan of Implementation. The numeric criteria portion of the water quality standards are established to protect against increases in economic damages to infrastructure and crop production. The Plan of Implementation is designed to maintain the flow-weighted average annual salinity at or below the numeric criteria while the Basin States continue to develop their compact-apportioned water supply through projects and programs to meet water supply needs.

The Program is a basinwide coordinated effort among federal, state and local agencies and participants to control salt loading. 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 every three 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 Plan of Implementation is not intended to offset the salinity fluctuations that are a result of the Colorado River's highly variable annual flows (natural variations in the hydrologic cycle). 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 concentration of as much as 350 mg/L TDS at Imperial Dam. Recognizing the variability of the Colorado River, the plan for maintaining the criteria is developed using a long-term mean water supply of 15 maf. When the Colorado River flows are at or above the long-term mean and reservoirs are full, concentrations are expected and have been observed to be below the numeric criteria. Conversely, when flows are dramatically below the long-term mean and reservoirs are depleted, salinities may increase above the numeric criteria.

Considerable knowledge has been gained through a wide range of research and technical studies since the Forum took this position. Procedures for reducing the volume of saline irrigation return flows have been developed. Reclamation, Natural Resources Conservation Service (NRCS) and the Basin States are funding salinity control measures with irrigation districts, canal companies and individual farmers to accomplish salt loading reductions to the Colorado River system by improving off-farm and on-farm water delivery systems and water management practices. Additionally, BLM is investigating and implementing measures for reducing salt load contributions from the vast areas of public lands within the Basin managed by the agency.

NUMERIC CRITERIA

As discussed earlier in this Review, EPA promulgated a regulation that set forth a basinwide salinity control policy for the Basin. This policy required that the flow-weighted average annual salinity in the lower main stem of the Colorado River be maintained at or below the 1972 levels. Three stations: 1) below Hoover Dam, (2) below Parker Dam, and (3) at Imperial Dam are the points in the lower main stem of the Colorado River where the flow-weighted average annual salinity is measured. The basis for selecting these stations is their proximity to key diversion facilities on the lower Colorado River. Nevada diverts main stem water from Lake Mead for use in the Las Vegas area. The Metropolitan Water District of Southern California and the Central Arizona Project divert water from Lake Havasu, impounded behind Parker Dam, for millions of water users in southern California and central Arizona, respectively. The large agricultural areas in the Imperial and Coachella Valleys in California and the Yuma area in Arizona are served by diversions at Imperial Dam.

The numeric criteria for each of those stations as established in 1972 are as follows:

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

The federal regulations provide for temporary increases above the numeric criteria levels if sufficient control measures are included in the Plan of Implementation. Should additional water development projects take place beyond those anticipated to occur before control measures are 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. During the next three years, or the period of this Review, no increases above the 1972 levels are anticipated.

Since the numeric criteria were adopted in 1974, shifts in water use patterns have occurred in the Lower Basin. While agriculture still remains the predominant user, there has been a shift within this sector from growing mostly low value, salt tolerant crops to growing higher value, less salt tolerant crops. Changing markets, increasing land values, escalating production costs, and competition for water supplies drives agricultural producers to higher value crops per unit of land area. Continued control of salinity levels allows the trend to plant and harvest higher value crops to continue. These higher value crops tend to be less salt tolerant overall or are particularly susceptible to some of the salt constituents such as sodium or boron. Because of this shift, the need for water conservation and efficiency within the agricultural sector continues to put an emphasis on reducing salinity. Because of the economic benefit to the Basin, the Forum believes there is justification to maintain salinity levels below the numeric criteria and remove additional salt from the Colorado River, thus saving several hundred million dollars in annual damages.

The Forum believes the Review is the appropriate setting to recommend any changes to the numeric criteria. Based on the ongoing progress toward accomplishing all measures identified in the Plan of Implementation as described in this Review and recognizing the numeric criteria are threshold limits, the Forum finds the current numeric criteria are adequate for the next three years and recommends no changes at this time.

PLAN OF IMPLEMENTATION

General

A purpose of the Plan of Implementation is to offset the salinity effects of future water resource development that will occur in the Basin. The Plan of Implementation is not intended to address the fluctuations in Colorado River salinity resulting from natural variations in river flows.

Figure 3 was created based on Reclamation's long-term planning model, the Colorado River Simulation System (CRSS). One hundred and three different flow scenarios were evaluated and the probability of exceeding the numeric criteria in any year was calculated by dividing the number of scenarios that exceeded the criteria in any year by 103. Probabilities are shown over the review period (2011-2030) and include the current year (2011) and the year of the next Review (2014).

This figure shows the calculated probability of exceeding the numeric criteria if the only salinity control measures completed are those that are now in process. Out year construction of salinity control measures that might be contemplated by the Plan of Implementation were not included in the analysis that led to the creation of Figure 3.

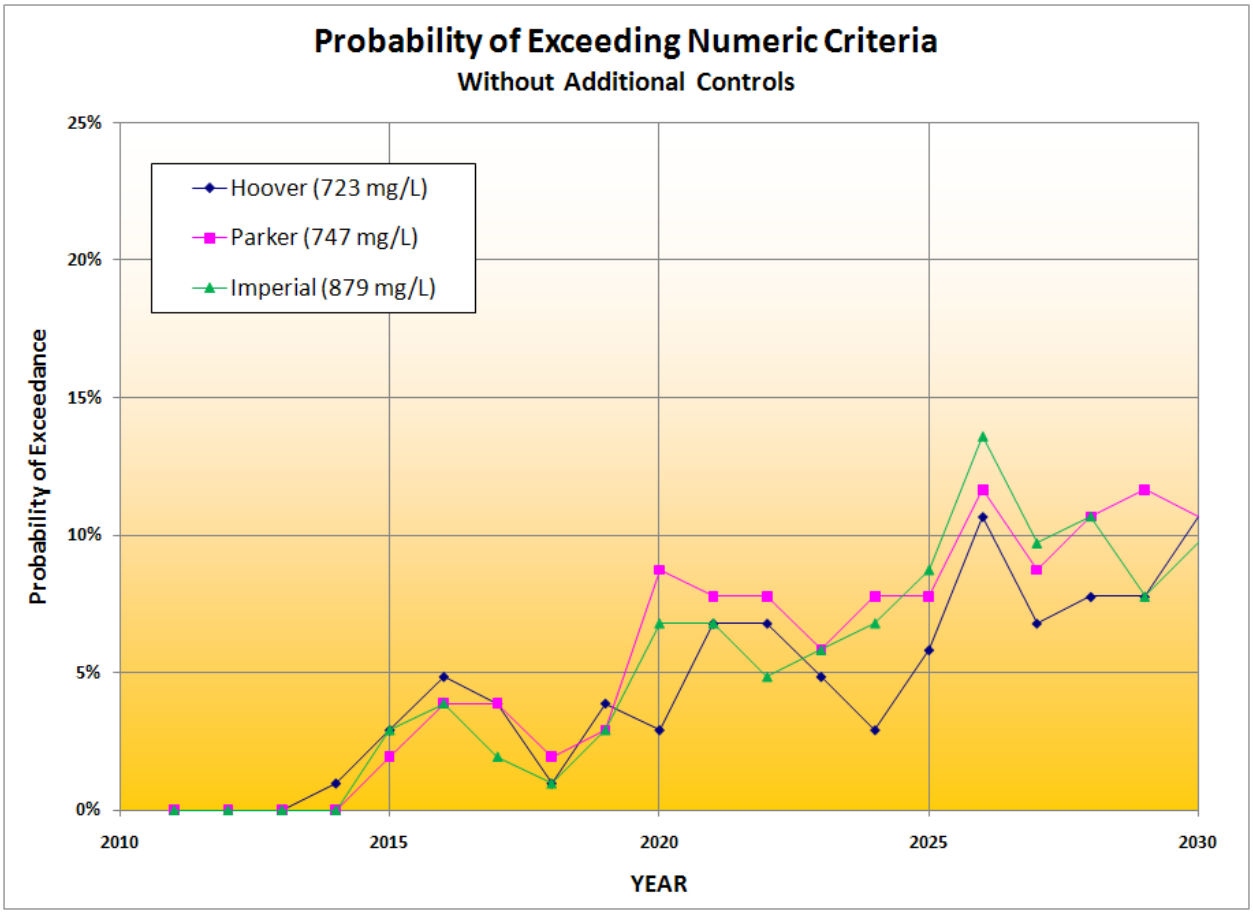

Figure 3

The Plan of Implementation is designed to keep the flow-weighted average annual salinity concentrations at or below the 1972 numeric criteria levels while the Basin States continue to develop their compact-apportioned water supply. The Plan of Implementation is based on maintaining the numeric criteria under a long-term mean water supply of 15 maf per year as represented by the natural flow database. The Plan of Implementation is based on the need to control annually an additional 644,000 tons of salt by the year 2030. Based on present and projected conditions, there is no probability that the numeric criteria will be exceeded given mean water supply any time in the next 20 years. However, recognizing the variability in the flow of the Colorado River, during periods of reduced flow there is an increasing probability of approaching or exceeding the numeric criteria by 10 percent near the end of the review period.

The Plan of Implementation is composed of many actions contemplated by the federal government and many of its agencies, and by each of the seven Basin States and many of their agencies. The plan includes projects that remove the required salt tonnage. This will principally be accomplished by reducing the salt contributions to the Colorado River from existing sources and minimizing future increases in salt load caused by human activities. For this Review, the Plan of Implementation can be briefly summarized as follows:

1. Implementation of salinity control measures by Reclamation, NRCS, the BSP and BLM to the extent that those measures remain viable and appropriately cost-effective.

2. Application of the Forum adopted policies by each of the states (the text of the policies are included in Appendix A, and a list of National Pollutant Discharge Elimination System (NPDES) permits issued pursuant to these policies are found in Appendices B and C of this Review).

3. Implementation of non-point source management plans developed by the states and approved by EPA (see State Water Quality Management Plans section of this Review).

The Forum participates with federal, state and local agencies and private participants to ensure the Plan of Implementation is implemented. The Forum also urges Congress to appropriate the funds needed for implementation and recommends legislative changes when necessary.

To evaluate the effectiveness of the Plan of Implementation, the probability of exceeding the numeric criteria with the Plan of Implementation in place was calculated. Figure 4 provides the results of that calculation. Comparing Figure 4 with Figure 3, it can be seen that the probability of exceeding the numeric criteria is greatly reduced by the implementation of the plan. For example, the figure shows the probability of exceeding the numeric criteria in any year remains fairly constant over the review period with minimal increases. In fact the probabilities for the first three years of this Review are less than 1 percent and stay below 5 percent for the full review period.

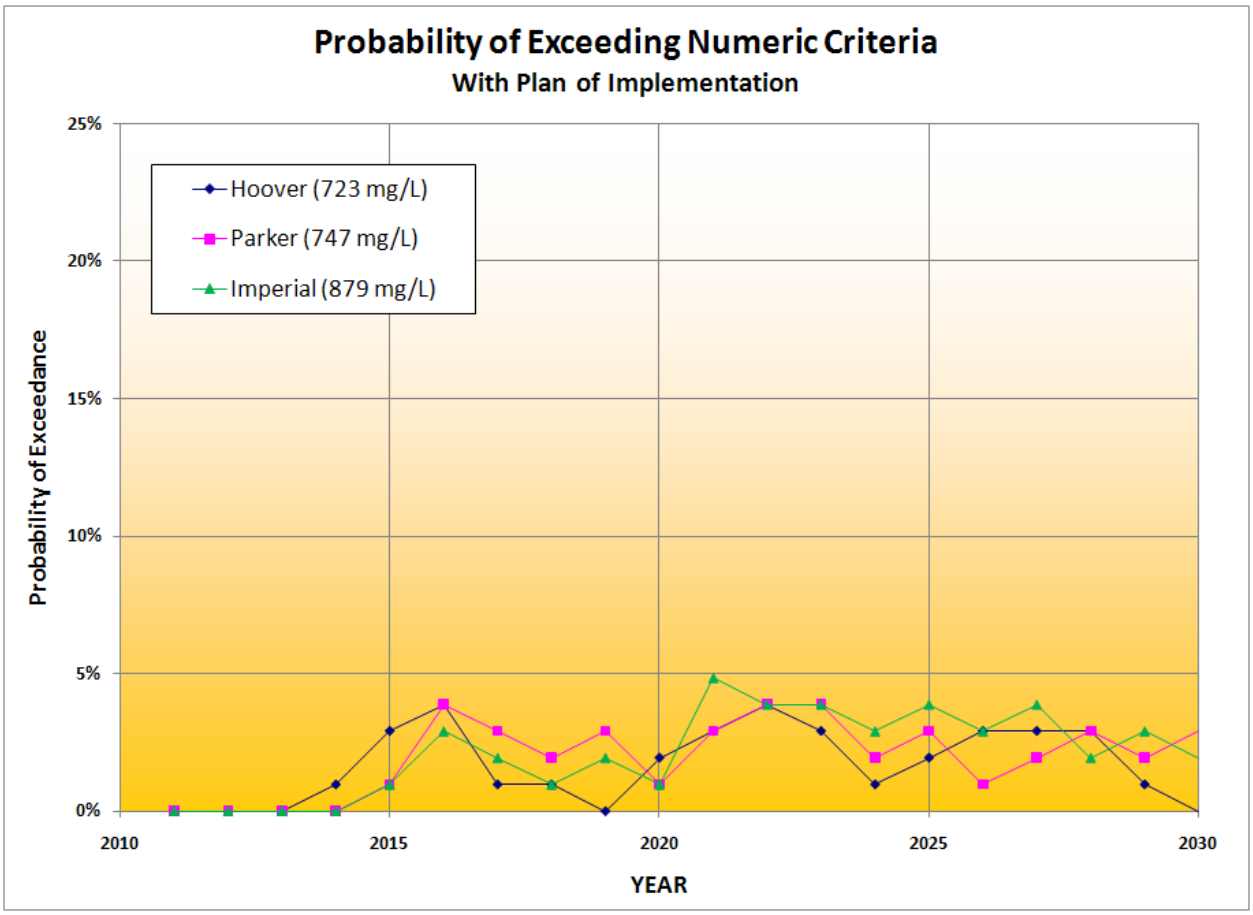

Figure 4

Constructed Measures

Congress enacted Public Law 93-320 in June of 1974 with the Forum's support. Title I of the Public Law addressed the United States' commitment to Mexico and provided the means for the United States to comply with the provisions of Minute No. 242. Title II of the Public Law created a water quality program for addressing salinity in the Colorado River in the United States above Imperial Dam. Primary responsibility for Title II was given to the Secretary of the Interior, with Reclamation being instructed to investigate and build several salinity control units. The Secretary of Agriculture was also instructed to support the effort within existing authorities.

Public Law 93-320 was amended in 1984 by P.L. 98-569 to authorize two additional units for construction by Reclamation and directed BLM to implement a comprehensive program to minimize salt loading in the Basin. The amendments 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. Public Law 93-320 was also amended to establish a voluntary on-farm salinity control program to be implemented by USDA and provided for voluntary replacement of incidental fish and wildlife values foregone on account of the on-farm measures. Many cost-effective salt-load reducing activities have been accomplished since that authorization.

Reclamation

The Act was amended by P.L. 104-20 to authorize the Basinwide Program. The Basinwide Program uses a competitive process that has greatly increased the federal cost effectiveness of salinity control. Reclamation may implement a variety of effective salinity control measures, but most projects concentrate on improving the efficiency of off-farm irrigation delivery systems. Reclamation solicits applications through a Funding Opportunity Announcement (FOA) for projects that will reduce the salinity of the Colorado River. Reclamation evaluates and ranks each application and awards grants to the highest ranking applications. Cost effectiveness is the prime criteria in the evaluation. The timing of the FOA is based on the need and the amount of federal appropriation Reclamation receives to implement its portion of the Program. P.L. 106-459 increased the authorization ceiling for Reclamation's salinity control program.

USDA NRCS

The NRCS program generally concentrates on improving on-farm systems. NRCS salinity activities fall mainly under the authorities of EQIP. EQIP was initially authorized under the 1996 Farm Bill and reauthorized by the 2008 Farm Bill. While the 2008 Farm Bill is set to expire in late 2012, this Review assumes that, as in the past, some comparable authorization will be available for NRCS to continue its salinity control activities.

NRCS accepts applications under EQIP and evaluates, ranks and selects those applications that best meet the goals of the salinity control program. Based on the application, NRCS provides technical and financial assistance to the producers. NRCS also offers financial assistance for voluntary replacement of fish and wildlife values forgone.

Basin States Program

The Act requires cost share on federal appropriations expended by both Reclamation and NRCS for salinity control in the Basin. The Act further authorizes that the Lower Colorado River Basin Development Fund and the Upper Colorado River Basin Fund (Basin Funds) be used to provide the required cost sharing. The moneys for the Basin Funds come from a levy assessed on power revenues on the Colorado River. Public Law 110-246 amended the Act and created the BSP through which all moneys from the Basin Funds used for cost sharing in Reclamation and NRCS salinity control programs are administered by Reclamation in consultation with the Colorado River Basin Salinity Control Advisory Council. The required cost share on the original salinity control units of Paradox, Grand Valley, and Las Vegas Wash is 25 percent of the project cost. The required cost share on the original units of McElmo Creek and Lower Gunnison, the Basinwide Program, and the NRCS EQIP is 30 percent of the project costs.

For cost share dollars generated by the federal expenditures under the Basinwide Program, Reclamation expends the required cost share moneys together with appropriated funds in the Basinwide Program using the FOA process. BSP moneys generated by federal appropriations expended in EQIP are managed by Reclamation to administer the BSP and to enter into the following agreements: 1) NRCS for technical assistance, 2) other federal agencies for studies and research, 3) the states of Colorado, Utah, and Wyoming to fund approved salinity control activities and projects, and 4) other entities for approved salinity control activities and salinity control projects. Cost share funds received by the states allow the states to enter into contracts with other local entities to achieve

salinity control. Each of the state agencies have the same goal of providing salinity control in the most cost-effective manner. The cost share aspects of the Basin States Program have proven very useful as a means of achieving additional cost effective salinity control.

BLM

The goal of the BLM program is to reduce the mobilization of salts to the Colorado River from BLM administered public lands. Salt reduction is achieved by controlling both point and non-point sources of salt contributions; however, the majority of salt derived from public lands is of non-point-source origin. Salt loading from non-point sources is mainly reduced by minimizing soil erosion. BLM uses mainly appropriated funds to achieve salinity control goals.

Accomplishments and Future Control

The Plan of Implementation recognizes that the Forum, participating federal agencies, and the Basin States each have specific responsibilities for furthering the Program. The Forum, in conjunction with the Colorado River Basin Salinity Control Advisory Council, will continue to provide overall coordination and a continuing review of salinity changes, program effectiveness, and the need to make further program changes and improvements.

To date, it is estimated that the Program has reduced the salt loading in the Colorado River by approximately 1,206,000 tons per year. Table 2 gives a brief summary of the measures that have been implemented to date, the areas where those measures have occurred and the tons of salt controlled per year associated with each area.

Table 2
Measures in Place

	Tons/Year		Tons/Year
Agricultural Measures	**932,000**	**Other Measures**	**274,000**
Big Sandy	68,000	Paradox Valley Unit	113,000
Grand Valley	271,000	Meeker Dome	48,000
Green River	0	Las Vegas Wash	4,000
Lower Gunnison	167,000	Ashley Valley WWTP	9,000
Mancos	4,000	Nonpoint Sources	85,000
Manila	13,000	Well-Plugging	15,000
McElmo	50,000		
Muddy Creek	0		
Price-San Rafael	126,000		
Silt	4,000		
Uinta	179,000		
Non-project areas	50,000		
TOTAL			**1,206,000**

The Plan of Implementation included in this Review anticipates the continuation of the Program through the period of the Review. As shown in Table 3, it is anticipated that an additional 644,000 tons per year will be removed by the Plan of Implementation, resulting in a total of 1,850,000 tons per year reduction by 2030. The Plan of Implementation also assumes that the reductions occurring at

the Paradox Valley Unit, as it may be modified in the future, will continue through the review period. The table identifies the tons to be controlled by each of the four funding sources.

Table 3
Plan of Implementation

Funding Source		Tons/Year
RECLAMATION (Basinwide Program)		258,000
USDA NRCS (EQIP)		186,000
BLM		10,000
BASIN STATES PROGRAM (Cost Share)		190,000
Basinwide Program	110,000	
EQIP Related	80,000	
TOTAL		**644,000**

The Plan of Implementation includes measures similar to those used in past Plans of Implementation. This Plan of Implementation mainly focuses on the improvement of agricultural practices in the Upper Colorado River Basin. These improvements include both on-farm and off-farm activities. Table 4 summarizes the areas in which these improvements will most likely occur. The majority of the salt reduction will occur in historically established salinity project areas, but some will occur in areas that are outside those historic areas and have not been included in previous Plans of Implementation. Table 4 provides the areas and an estimate of the potential salt reductions for both on-farm and off-farm that could occur in those areas. The potential additional controllable salt remaining in all of the identified areas is estimated to be 1,362,000 tons per year, and thus the potential available tons exceed the 644,000 tons required by the Plan of Implementation.

Table 4
Potential Areas of Future Implementation

	Tons/Year	Tons/Year
Projects Areas		1,182,000
Big Sandy	39,000	
Grand Valley	234,000	
Green River	14,000	
Lower Gunnison	585,000	
Mancos	20,000	
Manila	22,000	
McElmo	39,000	
Muddy Creek	13,000	
Price-San Rafael	90,000	
Silt	18,000	
Uinta	108,000	
Non-project Areas		20,000
Saline Groundwater Sources		150,000
Nonpoint Sources		10,000
TOTAL		**1,362,000**

Forum Policies and NPDES Permits

An important component of the Plan of Implementation for salinity control is the Basin States' activities associated with the control of salt discharge to the Colorado River through Forum policies and NPDES permits. In 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 of saline water. The Forum approved needed changes to its NPDES policy on October 30, 2002. In 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 groundwater was adopted by the Forum in 1982. In 1988, the Forum adopted a fourth policy which addresses the salinity of water discharges from fish hatcheries. These policies are found in Appendix A of this report.

Each of the states has adopted the Forum policies presented in Appendix A. A listing of NPDES permits in force within the Basin is presented in Appendix B. Some NPDES permits are issued by EPA for federal facilities and on Indian reservations. NPDES permits are issued by EPA for New Mexico. Salinity discharge requirements for these permits are reviewed and added where needed during the permit re-issuance process. The Forum policies also apply to these EPA permits and hence, this EPA effort is a part of the Plan of Implementation. The permits issued by EPA can be found in Appendix C of this report. During the period of this Review, the status of implementation of NPDES permits and water quality management plans in each of the states is as follows:

State Water Quality Management Plans

Arizona

Scope

The Colorado River enters Arizona, and the Lower Basin, near Page, travels through the Grand Canyon before turning southward at Lake Mead (Hoover Dam) and flowing to the Gulf of California. There are four major drainages entering the river as it passes through Arizona: 1) the Little Colorado River which drains east-central Arizona, crosses the Navajo Reservation before emptying into the Colorado River approximately 50 miles south of the Utah border; 2) the Virgin River which cuts across the northwest corner of Arizona from Utah before entering Lake Mead; 3) the Bill Williams River, formed by the Big Sandy and the Santa Maria Rivers at Alamo Lake, which empties into the Colorado River above Parker Dam, and lastly 4) the Gila River, which drains central and southern Arizona and joins the Colorado River near Yuma, below Imperial Dam. Because this latter reach enters the river below Imperial Dam, facilities discharges to the Gila River or tributaries do not require conformance with the Forum policies.

NPDES Permitting

The Water Quality Division of the Arizona Department of Environmental Quality administers the Arizona Pollutant Discharge Elimination System (AZPDES) program on non-Indian country lands. All major permits for municipal and industrial discharges, with direct river discharges, are written in conformance with the associated Forum policies. The agency continues to evaluate and revise other discharge permits as information becomes available.

Currently there are 32 active, individual Arizona discharge permit holders in the non-tribal portion of the River system. Of these, 3 are for industrial discharges related to mining and fueling stations. There are 24 permits associated with discharges from municipal and domestic wastewater and/or water treatment facilities. These facilities serve a total population of approximately 115,000 people. A specific listing of the individual permits and the status of compliance with Forum policy is contained in Appendix B.

Of the 21 federally recognized tribes in Arizona, 7 tribes have lands within the drainage of the Basin and 3 tribes currently hold a total of 19 NPDES permits. Six of these permits are issued and administered by EPA Region 9 in San Francisco. The balance are issued and administered by the Navajo Nation. Of the 19 permits on tribal lands, twelve permits are for community wastewater treatment facilities and five are for domestic wastewater discharges from boarding schools. There are two other permits issued to non-tribal entities with facilities located on tribal lands. One is a mining operation, the other a trading post.

Water Quality Assessments and TMDLs

In general, water quality in the Arizona portion of the Basin is good to very good. There are currently only 9 stream segments in the Basin that are listed in the state's 2006/2008 Section 303(d) report as impaired (2 – Bill Williams, 5 – Colorado River Mainstem, 2 – Little Colorado River). No waters are currently listed for salinity related impacts. The primary causes of impairment (a water body may be impaired for more than one pollutant) are sediment (4), selenium (4), pathogens (2) and trace metals (2), including mercury. Complete assessment information can be found on the agency's website at: http://www.azdeq.gov/environ/water/assessment/assess.html

Watershed Planning

Some of these water quality issues are being addressed through locally-led watershed management efforts funded through Arizona's 319 grant program. The Arizona Department of Environmental Quality Water Quality Improvement Grant Program utilizes comprehensive watershed-based plans, which contain EPA's required nine elements, to help focus funding to those areas and projects that have the greatest chance for improving water quality. These plans contain implementation strategies for many of the impaired waters, as well as Best Management Practices to address existing and potential issues in the watershed.

California

NPDES Permitting

The California Regional Water Quality Control Board, Colorado River Basin Region (Regional Board), issues NPDES permits for navigable waters and Waste Discharge Requirements for land discharges within the Colorado River drainage portion of the state. The only NPDES permit issued by the Regional Board is R7-2007-0037 which is for the United States Bureau of Reclamation Parker Dam and Power Plant Drinking Water Facility. The permit was updated on June 26, 2007, and will expire on June 26, 2012. In issuing and reissuing waste discharge requirements, the Regional Board complies with all Forum policies. In addition, the Regional Board has included in the discharge permit requirements for land discharges a prohibition against brine backwash from water softeners

into evapo-percolation ponds which overlie groundwaters 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 Regional Board in November 1993. Following public hearings, the updated plan was adopted by the Regional Board and approved by the State Water Resources Control Board in February 1994. The revised plan became effective upon approval of the Office of Administrative Law in August 1994. The salinity control component of the Water Quality Control Plan is consistent with the Forum's Plan of Implementation for salinity control. The Regional Board is working with local entities and the Colorado River Board of California to ensure that implementation of the water quality plan is achieved.

In March 2008, the Regional Board completed the 2007 Triennial Review of the Water Quality Control Plan. The purpose of this Review is to reaffirm and/or revise water quality objectives and beneficial uses for ground and surface waters, and evaluate the adequacy of the Basin Plan for protecting water quality. Several projects that require Basin Plan amendments are underway and include TMDLs for the Salton Sea, New River, Alamo River, Coachella Valley Stormwater Channel, and the Palo Verde Outfall Drain. Recently adopted amendments include a Silt TMDL for the Imperial Valley Drains and a Trash TMDL for the New River.

Other Activities

State Water Resources Control Board Policy on the Use and Disposal of Inland Waters Used for Powerplant Cooling, Resolution No. 75-58 establishes 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

Scope

Colorado's portion of the Colorado River Basin is comprised of six major drainages: 1) the main stem of the Colorado River from the continental divide to the Utah border, 2) the Roaring Fork River Basin, 3) the Yampa/White River Basin which flows to the Green River in Utah, 4) the Gunnison River Basin, 5) the Dolores River which flows to the main stem in Utah, and 6) the San Juan Basin which flows into New Mexico and then to the main stem in Utah.

NPDES Permitting

The Colorado Department of Public Health and Environment, Water Quality Control Division, administers the NPDES permitting program in the Colorado River Basin, with the exception that EPA issues permits for point source discharges on the Southern Ute and Ute Mountain Ute Reservations as well as for federally owned lands such as National Parks. This would include permits for discharges to groundwater that would contribute salinity to the Colorado River system through a hydrologic connection to surface waters. Permits for industrial and municipal discharges are written in conformance with the associated Forum policies. Colorado continues to issue

stormwater permits to construction of oil and gas development sites and related infrastructure (e.g. roads) of one or more acres of disturbance, even though the Energy Policy Act had exempted this activity from the requirement to obtain a permit at the federal level.

Currently there are more than 350 active discharge permits in the Colorado portion of the Colorado River Basin. A specific listing of the individual permits and compliance status is contained in Appendix B.

Water Quality Assessments and TMDLs

The waters in Colorado's portion of the Colorado River Basin, particularly at higher elevation, are generally of good quality. There are 63 stream segments in the Colorado River Basin in Colorado (24 – Gunnison, 33 – main stem and tributaries of the Colorado River, and 6 – San Juan) which are included on the 2010 303d List of Impaired Waters. Of these, a significant majority in the lower ends of these basins are impaired for selenium. Water quality impairments in the mountainous portions of these basins are due to high concentrations of metals, primarily caused by the remnants of historic mining activities. No waters are currently listed for salinity related impacts.

The lower portions of each of these basins are underlain by bedrock deposits of the cretaceous period, most notably Mancos Shale and Dakota Sandstone. The Mancos Shale is a marine deposit and, as such, contains significant amounts of readily soluble constituent materials, including selenium. Groundwater which leaches to the relatively impermeable shale deposits tends to dissolve selenium and, as it flows atop the bedrock strata towards surface drainages, carries elevated levels of dissolved selenium with it. Various anthropogenic activities like sand and gravel extraction, agricultural and urban landscape irrigation accelerate the mobilization and transport of selenium from shale and shale derived soil to surface water.

Watershed Planning - Colorado River Basin Selenium/Salinity NPS Activities

Recent activities in the Basin have ranged from planning to implementation projects for selenium and salinity reduction. The Lower Gunnison and Grand Valley Watershed Plan update has been tracking the Selenium Management Plan as required by the Final Gunnison Basin Biological Opinion, December 2009. A working draft of the watershed plan will be available in July 2011. A Middle Colorado watershed group has formed and received preliminary Nonpoint Source (NPS) section 319 funding to develop a watershed plan for the area from Glenwood Canyon to DeBeque Canyon, a watershed with selenium impaired segments. The Water Quality Control Division has also completed the state's first selenium TMDLs for 12 segments in the Gunnison River Basin. The Water Quality Control Division will begin monitoring of streams and lakes on or tributary to the main stem of the Colorado River in preparation for developing TMDLs for impaired water bodies from DeBeque Canyon to the Utah state line. A very substantial accomplishment has been the piping of irrigation laterals in the Uncompahgre Basin with NPS and Bureau of Reclamation funding. This particular EF lateral project involved 6.5 miles of piping that will reduce loading by an estimated 171-214 lbs/year of selenium and 2,138 tons/year of salt. Construction is complete and the project is currently being evaluated by USGS. Additional funding is being sought for other piping projects, basin-wide monitoring, and conservation efforts.

Nevada

Scope

The Basin within Nevada consists of three major tributaries: 1) the Virgin River, 2) the Muddy River, and 3) the Las Vegas Wash. All of these tributaries flow into Lake Mead and provide nearly all of the inflow to the Colorado River from Nevada.

NPDES Permitting

The Nevada Division of Environmental Protection is the EPA delegated authority for the issuance of NPDES Permits. As of December 31, 2010, there were 56 active discharge permits in the Nevada portion of the Colorado River System. The largest dischargers, the City of Las Vegas, the Clark County Water Reclamation District, and the City of Henderson are permitted to discharge a maximum flow up to 91 mgd, 150 mgd, and 40 mgd respectively. The qualities of the waters affected by these permits are closely monitored and all necessary programs to protect water quality standards are being implemented. Nevada continues to apply the policies adopted by the Forum.

Water Quality Management Planning

Area-wide water quality management planning duties and powers have been vested to certain counties and entities. The Clark County Board of Commissioners was designated the Area-Wide Water Quality Management Planning organization within Clark County. The initial 208 Plan was adopted by the Clark County Board of Commissioners in 1978 and was approved by EPA. Since that time, several 208 Plan revisions have been made as needed to address changing needs.

TMDLs

In 1987, the Nevada Division of Environmental Protection established total phosphorus and total ammonia Waste Load Allocations (WLAs) in the Las Vegas Wash at Northshore Road as needed to meet the Las Vegas Bay water quality standards. The WLAs set are applicable for only April through September and were based upon target concentrations (0.64 mg/L – total phosphorus, 1.43 mg/L total ammonia) and average stream flows.

New Mexico

Scope

New Mexico's portion of the Basin above Imperial Dam is comprised of two major drainages: 1) the Rio Puerco, which is a tributary of the Little Colorado River, and 2) the San Juan River, which is a major tributary of the Colorado River.

NPDES Permitting

In New Mexico, authority for issuing permits is administered by EPA Region 6, except for facilities located on the Navajo Indian Reservation, which are administered by Region 9. All permits for industrial and municipal discharges are written in conformance with the associated Forum policies. Currently, there are 28 active discharge permits in the New Mexico portion of the Colorado River

system, of which Region 6 administers 16 permits and Region 9 administers 12 Navajo Reservation permits. Of these, 13 permits (9 non-Indian, 4 Navajo) are for industrial discharges and 15 permits (6 non-Indian, 1 Jicarilla Apache, 8 Navajo) are associated with municipal wastewater discharges.

Water Quality Assessment and TMDLs

The New Mexico Water Quality Control Commission has adopted the framework for water quality in New Mexico, which includes the State of New Mexico Water Quality Management Plan and the New Mexico Nonpoint Source Management Plan. Both plans cover the entire state, except for that portion of the Navajo Reservation lying therein. Planning within the reservation is the sole responsibility of the Navajo Tribe. Much of the Basin in New Mexico falls within the boundaries of the reservation.

The following TMDLs have been adopted by the New Mexico Water Quality Control Commission and approved by EPA within the New Mexico portion of the Basin at this time:

- Animas River: *E. coli*, nutrients
- Gallegos Canyon: selenium
- La Plata River: *E. coli*, siltation, dissolved oxygen
- San Juan River: *E. coli*, sedimentation/siltation

Sample collection for the most recent San Juan Basin Surface Water Quality Survey was completed in 2010 by the Surface Water Quality Bureau of the New Mexico Environment Department. An updated list of impairments is scheduled to be released in 2012, to be followed by an updated TMDL list.

Watershed Planning

Work plans are developed and grant funding secured under Clean Water Act Section 319(h) for watershed-associated development, riparian area restoration, certification of Section 404 permits, spill response, and treatment of abandoned mines. The work plans identify and coordinate efforts by state, federal, and local agencies, along with other groups and private citizens to reduce or prevent non-point source pollution and implement Best Management Practices to reduce non-point source pollutants. The New Mexico Environment Department and the San Juan Watershed Group, an unincorporated citizen and interagency group funded by the Section 319(h) program, are working to improve water quality in the San Juan River by implementing Best Management Practices for non-point source contributors of nutrients and *E. coli*. State Revolving Loan Funds and other funds are authorized and available for use in funding salinity control projects. State actions in support of salinity control include: 1) inclusion of salinity control measures in the Section 208 plans, 2) dissemination of information on salinity sources and control, 3) consultation with industries on potential salinity reduction measures, 4) implementation of Forum policy through NPDES permits, and 5) maintaining a continuous water quality planning program whereby new or additional salinity control measures can be addressed.

Utah

Scope

Utah's portion of the Colorado River Basin is comprised of ten major sections: 1) the main stem of the Colorado River from the Colorado border to the Arizona Border in Lake Powell, 2) the Green River Basin from the Wyoming state line in Flaming Gorge Reservoir to the confluence with the Colorado River, 3) the Duchesne River Basin, 4) the lower Yampa and White River Basins which flow to the Green River in Utah, 5) the Price and San Rafael River Basins, 6) the Dirty Devil and Escalante Rivers, 7) the lower portion of the San Juan River Basin which flows into the main stem of the Colorado River in Utah, 8) the Paria River, 9) the Kanab Creek Basin to the Arizona State Line, and 10) the Virgin River Basin to the Arizona state line.

NPDES Permitting

The Utah Division of Water Quality (DWQ) within the Utah Department of Environmental Quality administers the NPDES permitting program in Utah. Permits for industrial and municipal discharges within the Colorado River Basin are written in conformance with the associated Forum policies and are available for viewing on line at www.waterquality.utah.gov/permits/index.htm.

As of December 31, 2010, there are 79 active discharge permits issued by DWQ in the Utah portion of the Colorado River Basin. Of these, 34 are for municipal discharges and 45 are for industrial discharges. A specific listing of the individual permits and their compliance status is contained in Appendix B. By 2006, a total of 5 discharge permits for coal mining operations in Utah were developed to offset salinity contributions from industrial sources in accordance with the Forum policy adopted as part of the 2002 Triennial Review. The salinity-offset project plans for all 5 coal mine facilities have been finalized and all projects have been implemented as of 2010 to offset salinity contributions in excess of the one ton per day requirement from those facilities.

Water Quality Assessments and TMDLs

The waters in Utah's portion of the Colorado River Basin are generally of good quality. There have been 23 stream segments listed for impacts from salinity/TDS/chlorides. These segments are generally in the lower reaches of the respective basins and are the result of a combination of natural salt loadings as well as agricultural drainage. TMDLs have been developed to address these salinity/TDS/chloride impairments. For information about the completed studies and to view the current Utah 303(d) list of impaired water bodies please visit www.waterquality.utah.gov/TMDL.

Watershed Planning

Utah's Watershed Management and Planning program is focused on protecting and restoring the water quality of its streams, lakes and groundwater resources by employing the following key elements: Stewardship, Monitoring and Assessment, Coordination and Watershed Planning. Although projects exist in other regions, currently the Upper Colorado Basin region in Utah has no watershed planning projects in progress for water quality. The Basin Plans for the Utah State Water Plan include water quality as part of the process and these plans are updated periodically.

Wyoming

Scope

Wyoming's portion of the Basin is comprised of two major main stream drainages: 1) the Little Snake River, which is a tributary of the Yampa River in Colorado, and 2) the Green River which empties into Flaming Gorge Reservoir on the Wyoming-Utah border.

NPDES Permits

Currently there are 37 active discharge permits in the Wyoming portion of the Colorado River system. Of these, 15 are for industrial discharges related to fish hatcheries, coal mines, power plants or oil and gas production facilities. The largest discharge is from the City of Rock Springs Wastewater Treatment Plant which discharges approximately 7.67 tons/day of salt into Bitter Creek, a tributary of the Green River near Rock Springs. There are 22 permits associated with municipal wastewater discharges. These facilities serve a total population of approximately 50,000 people. A specific listing of the individual permits and compliance status is contained in Appendix B.

Water Quality Assessments and TMDLs

In general, water quality in the Wyoming portion of the Basin is good to very good. There are currently only 12 streams and rivers identified as either impaired or threatened in the state's 2010 Section 303(d) List (10 pollutant/segment combinations on 6 streams/rivers in the Green River Basin, 13 pollutant/segment combinations on 6 streams in the Little Snake River Basin). Of these impaired waters, Bitter Creek in the Green River Basin and Muddy Creek in the Little Snake River Basin are listed for salinity related impacts (chloride). The Bitter Creek TMDL is scheduled to begin in 2012. The Muddy Creek TMDL is not scheduled for development at this time. Complete assessment information can be found at http://deq.state.wy.us/wqd/watershed/index.asp.

Watershed Planning

Local watershed groups have written watershed plans for the majority of the impaired waters within the Green River and Little Snake River Basins. These groups have worked to implement the watershed plans through Wyoming's Clean Water Act Section 319 Grant Program and other state and federal cost share programs. In addition, the Wyoming Department of Environmental Quality (WDEQ) is currently in the process of developing TMDLs for five of the 23 water quality impairments in the two basins that are listed on the 2010 303(d) list. These TMDLs include one impairment listing on the Ham's Fork River and four impairment listings on Haggerty and West Fork Battle Creeks. Furthermore, the WDEQ plans to initiate TMDLs on the Blacks Fork River, Smiths Fork River, Willow Creek, Bitter Creek, and Killpecker Creek within the next two to three years. In 2010, the Wyoming Water Development Commission revised the river basin water plan for the Green River and Little Snake River drainages. This report updates information about the current uses and projected future uses of water in the basin, and includes other useful information such as irrigated lands delineation, hydrologic modeling of major streams, estimated availability of surface and groundwater for future use, and recommendations and strategies for facing current and future water use challenges. Detailed information can be accessed at: http://waterplan.state.wy.us .

CONCLUSION AND ADOPTION OF THE STANDARDS

The Standards consist of two components, the numeric criteria and the Plan of Implementation. No change has been made in the numeric criteria since their adoption in 1975 by the Basin States and approval by EPA. After having conducted this Review, the Forum has again found the numeric criteria to be appropriate and recommends no changes in these criteria. The Forum also finds that the updated Plan of Implementation is adequate to keep the salinity concentration of the Colorado River below the numeric criteria through 2030, thus providing significant benefits to the Basin. The effect of the Plan of Implementation on the Standard is that the probability of exceeding the numeric criteria is extremely low, less than 5 percent in any given year, for the review period and provides a measurable improvement to quality of the Colorado River.

The Forum and the states remain committed to continued improvement of the water quality of the Colorado River.

As water development occurs throughout the Basin, salinity concentrations and the associated economic damages will increase. The Forum's understanding of the anticipated salinity concentration increases, with and without control measures, is largely based on predictions made by Reclamation's CRSS model. That model is briefly described in Appendix D. As to economic damages, the Forum is also dependent on Reclamation's economic damage model. That model is briefly described in Appendix E. An aggressive salinity control program is needed to reduce these damages. The Program, while continuing to maintain salinity concentrations at or below the numeric criteria, will focus on the opportunities to further reduce future economic damages. The Forum will continue to advance an aggressive program over the next decade to continue to control as much salt loading as economically justifiable.

The Program is truly a unique program and it cannot be successful without the cooperation of a multitude of agencies and governments involved at the local, state and federal levels. First, the Program is reliant upon the cooperation of land owners in implementing important and cost-effective salinity control measures. Secondly, the Program is dependent on a multitude of agreements among the seven Basin States which have always been accomplished by consensus. Lastly, the Program depends upon the cooperation of a number of federal agencies for its success. In addition to the three federal implementing agencies, there are other federal agencies which are involved in the Program, and cooperation and coordination with these agencies is also essential. Three agencies are notable: United States Fish & Wildlife Service, United States Geological Survey and EPA. All the federal agencies are a critical part of the Program. It is expected that by their involvement in the preparation of this Review, those federal agencies will support the Plan of Implementation and its programs.

In May of 2011, the Forum adopted their proposed 2011 Review. During the summer of 2011 comments on the proposed 2011 Review were solicited. Each state sent out notice of the proposed 2011 Review and the proposed 2011 Review was posted on the Forum's website. No comments were received requesting modification of the draft 2011 Review. At a Forum meeting held in Santa Fe, New Mexico, the Forum approved the 2011 Review document.

Each of the seven Basin States will now include the Review as a part of its own water quality standards and, through procedures established by each state, consider the Review for adoption and submittal to the appropriate regional office of EPA for approval. Because the Basin contains portions of three EPA regions, the States of Utah, Colorado and Wyoming will make submittals to EPA

Region 8 in Denver, Colorado; New Mexico to EPA Region 6 in Dallas, Texas; and Nevada, Arizona and California to EPA Region 9 in San Francisco, California. It is anticipated that EPA, by approval of the states' submittals, will fully support this salinity control effort.

APPENDIX A

Forum Policies

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

Adopted by
The Colorado River Basin Salinity Control Forum

February 28, 1977
Revised October 30, 2002

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.

In 1977, the states of the Colorado River Basin adopted the "Policy for Implementation of Colorado River Salinity Standards through the NPDES Permit Program." 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.

NPDES Policy for Municipal and Industrial Discharges of Salinity in the Colorado River

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.) The objective of the policy, as provided in Sections I.A. and I.B., is to achieve "no salt return" whenever practicable for industrial discharges and an incremental increase in salinity over the supply water for municipal discharges. 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 River from Hoover Dam to Imperial Dam.

In October, 2002, the Forum substantially amended the NPDES policies relating to industrial discharges but made no changes to the procedures for municipal discharges. In the printing of the 2002 Review, however, the section relating to municipal discharges and an additional appendix entitled “Guidance on New Construction Determination” were inadvertently omitted.

Both errors have been corrected in this printing and the Forum reaffirms the validity of all of the policies as they appear in this document.

NPDES Policies Separately Adopted by the Forum

The Forum developed a separate and specific policy for the use of brackish and/or saline waters for industrial purposes on September 11, 1980. The Forum addressed the issue of intercepted ground water and adopted a specific policy dealing with that type of discharge on October 20, 1982. On October 28, 1988, the Forum adopted a specific policy addressing the water use and discharge associated with fish hatcheries. Each of these separately adopted policies is attached hereto.

NPDES Policies for Specified Industrial Discharges – 2002 Amendments

On October 30, 2002, the Forum amended this policy for implementation of Colorado River salinity standards through the NPDES permit program in order to address the following three additional types of industrial discharges: (1) water that has been used for once-through noncontact cooling water purposes; (2) new industrial sources that have operations and associated discharges at multiple locations; and (3) "fresh water industrial discharges" where the discharged water does not cause or contribute to exceedances of the salinity standards for the Colorado River System. This policy was also amended to encourage new industrial sources to conduct or finance one or more salinity-offset projects in cases where the permittee has demonstrated that it is not practicable to prevent the discharge of all salt from proposed new construction.

Discharges Of Once-Through Noncontact Cooling Water

Section I.C. of this policy has been added to address discharges of water that has been used for once-through noncontact cooling water purposes. The policy for such discharges shall be to permit these uses based upon a finding that the returned water does not contribute to the loading or the concentration of salts in the waters of the receiving stream beyond a *de minimis* amount. A *de minimis* amount is considered, for purposes of this policy, as an average annual increase of not more than 25 milligrams per liter (mg/L) in total dissolved solids measured at the discharge point or outfall prior to any mixing with the receiving stream in comparison to the total dissolved solids concentration measured at the intake monitoring point of the cooling process or facility. This policy is not intended to supersede any other water quality standard that applies to the receiving stream, including but not limited to narrative standards promulgated to prohibit impairment of designated uses of the stream. It is the intent of the Forum to permit the return of once-through noncontact cooling water only to the same stream from which the water was diverted. Noncontact cooling water is distinguished from blowdown water, and this policy specifically excludes blowdown or any commingling of once-through noncontact cooling water with another waste stream prior to discharge to the receiving stream. Sections I.A. and I.B. of this policy govern discharges of blowdown or commingled water.

New Industrial Sources with Operations and Discharges at Multiple Locations under Common or Affiliated Ownership or Management

Recently there has been a proliferation of new industrial sources that have operations and associated discharges at multiple locations. An example is the recent growth in the development of energy fuel and mineral resources that has occurred in the Upper Colorado River Basin. This type of industrial development may involve the drilling of relatively closely spaced wells into one or more geological formations for the purpose of extracting oil, gas or minerals in solution. Large-scale ground water remediation efforts involving multiple pump and treat systems operating for longer than one year may share similar characteristics. With such energy and mineral development and ground water remediation efforts there is the possibility of a single major industrial operation being comprised of numerous individual point source discharges under common or affiliated ownership or management that produce significant quantities of water as a waste product or byproduct over a long period. Given the large areal scope of these types of major industrial sources and the often elevated concentrations of salinity in their produced water, the total amount of salt loading that they could generate may be very large in comparison to the Forum's past and present salt removal projects. Relatively small quantities of this produced water could generate one ton per day in discharges to surface waters. Since salinity is a conservative water quality constituent, such discharges of produced water, if uncontrolled, could have an adverse effect on achieving the adopted numeric salinity standards for the Colorado River System.

These kinds of major industrial sources strain the conventional interpretation of the industrial source waiver for new construction set forth in Section I.A.1.a. of this policy, which authorizes a discharge of salinity from a single point source of up to one ton per day in certain circumstances. The Forum adopted this provision in 1977, well before most of the new major industrial sources that have operations and discharges at multiple locations began to appear in the Colorado River Basin. A new category of industrial sources is, therefore, warranted. NPDES permit requirements for New Industrial Sources with Operations and Discharges at Multiple Locations under Common or Affiliated Ownership or Management are set forth in Section I.D. of this policy. These new requirements are intended to apply to new industrial sources with operations that commence discharging after October 30, 2002.

For purposes of interpreting this policy, "common or affiliated ownership or management" involves the authority to manage, direct, superintend, restrict, regulate, govern, administer, or oversee, or to otherwise exercise a restraining or directing influence over activities at one or more locations that result in a discharge of salinity into the Colorado River System. Common or affiliated ownership or management may be through the ownership of voting securities or may be indicated where individual sources are related through one or more joint ventures, contractual relationships, landlord/tenant or lessor/lessee arrangements. Other factors that indicate two or more discharging facilities are under common or affiliated ownership or management include: sharing corporate executive officers, pollution control equipment and responsibilities, common

workforces, administrative functions, and/or payroll activities among operational facilities at different locations.

Fresh Water Industrial Discharges

Sections I.A. and I.B. of this policy have been amended to allow the permitting authority to authorize "fresh water industrial discharges" where the discharged water does not cause or contribute to exceedances of the adopted numeric salinity standards for the Colorado River System. Different end-of-pipe concentrations of salinity as shown in Table 1 of the policy, are appropriate for discharges to tributaries depending upon their location within the Basin. The concept of "benchmark concentrations" has been developed in order to address this need for different end-of-pipe concentrations. These benchmark concentrations are not to be interpreted as water quality standards. Rather, they are intended to serve solely for the establishment of effluent limits for implementing the waiver for "fresh water discharges." The allowance for freshwater discharges is intended to preserve flows from discharges in the Basin, which do not cause significant degradation of existing ambient quality with respect to salinity. Operations or individual discharges that qualify for the freshwater waiver shall not be subject to any further limitation on salt loading under this policy.

Salinity-Offset Projects

This policy has been amended to allow the permitting authority to authorize industrial sources of salinity to conduct or finance one or more salinity-offset projects when the permittee has determined that it is not practicable: (i) to prevent the discharge of all salt from proposed new construction; (ii) to reduce the salt loading to the Colorado River to less than one ton per day or 366 tons per year; or (iii) the proposed discharge is of insufficient quality in terms of TDS concentrations that it could be considered "fresh water" as defined below. Presently, the permitting authority can consider the costs and availability of implementing off-site salinity control measures to mitigate the adverse impacts of the permitted salt load. It is not intended that the applicant be required to develop or design an off-site salinity control project or establish a salt bank, but rather to assess the costs of conducting or buying into such projects where they are available. In the future the Forum or another entity may create a trading/banking institution to facilitate the implementation of a salinity-offset program, basin-wide. This would allow industrial sources to conduct or finance the most cost effective project available at the time an offset project is needed regardless of the project's location in the Basin.

NPDES PERMIT PROGRAM POLICY
FOR IMPLEMENTATION OF COLORADO RIVER SALINITY STANDARDS

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.) Attachment 1 provides guidance on new construction determination. "A new industrial source with operations and discharging facilities at multiple locations under common or affiliated ownership or management" shall be defined for purposes of NPDES permitting, as an industrial source that commenced construction on a pilot, development or production scale on or after October 30, 2002.

    a. The permitting authority may permit the discharge of salt upon a satisfactory demonstration by the permittee that:

        i. It is not practicable to prevent the discharge of all salt from the new construction or,

        ii. In cases where the salt loading to the Colorado River from the new construction is less than one ton per day or 366 tons per year, or

        iii. The proposed discharge from the new construction is of sufficient quality in terms of TDS concentrations that it can be considered "fresh water" that would have no adverse effect on achieving the adopted numeric standards for the Colorado River System. The permitting authority may consider a discharge to be fresh water if the maximum TDS concentration is: (i) 500 mg/L for discharges into the Colorado River and its tributaries upstream of Lees Ferry, Arizona; or, (ii) 90% of the applicable in-stream salinity standard at the appropriate benchmark monitoring station for discharges into the Colorado River downstream of Lees Ferry as shown in Table 1, below

Table 1

	Benchmark Monitoring Station	**Applicable Criteria**	**Freshwater Discharge (mg/L)**
1	Colorado River at Lees Ferry, Arizona	N/A	500
2	Colorado River below Hoover Dam	723	650
3	Colorado River below Parker Dam	747	675
4	Colorado River at Imperial Dam	879	790

b. Unless exempted under Sections I.A.1.a.ii. or iii., above, the demonstration by the applicant must include information on the following factors relating to the potential discharge:

(i) Description of the proposed new construction.

(ii) Description of the quantity and salinity of the water supply.

(iii) Description of water rights, including diversions and consumptive use quantities.

(iv) Alternative plans that could reduce or eliminate salt discharge. Alternative plans shall include:

(A) Description of alternative water supplies, including provisions for 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; and

(E) Unless the permitting authority has previously determined through prior permitting or permit renewal actions that it is not practicable to prevent the discharge of all salt from the new construction in accordance with Section I.A.1.a.i., the applicant must include information on project options that would offset all or part of the salt loading to the Colorado River associated with the proposed discharge or that would contribute to state or interstate salinity control projects or salt banking programs.

(v) A statement as to the one plan among the alternatives for reduction of salt discharge that is recommended by the applicant and also information as to which of the other evaluated alternatives are economically infeasible.

(vi) 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 under I.A.1.a.i., above, the permit issuing authority shall consider, but not be limited to the following:

(i) The practicability of achieving no-discharge of salt from the new construction.

(ii) 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.

(D) If applicable under I.A.1.b.(iv)(E), costs and practicability of offsetting all or part of the salt load by the implementation of salt removal or salinity control projects elsewhere in the Colorado River Basin. The permittee shall evaluate the practicability of offsetting all or part of the salt load by comparing such factors as the cost per ton of salt removal for projects undertaken by the Colorado River Basin Salinity Control Forum and the costs in damages associated with increases in salinity concentration against the permittee's cost in conducting or buying into such projects where they are available.

(iii) With regard to subparagraphs, (b) and (c) above, the permit issuing authority shall consider the compatibility of state water laws with either the complete elimination of a salt discharge or any plan for minimizing a salt discharge.

B. Existing Facilities or any discharging facility, the construction of which was commenced before October 18, 1975

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.(ii), 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:

a. The discharge of salt is less than one ton per day or 366 tons per year; or

b. The permitting authority determines that a discharge qualifies for a "fresh water waiver" irrespective of the total daily or annual salt load. The maximum TDS concentration considered to be fresh water is 500 mg/L for discharges into the Colorado River and its tributaries upstream of Lees Ferry, Arizona. For discharges into the Colorado River downstream of Lees Ferry the maximum TDS concentration considered to be afresh water shall be 90% of the applicable in-stream standard at the appropriate benchmark monitoring station shown in Table 1, above.

C. Discharge of Once-Through Noncontact Cooling Water

1. Definitions:

a. The terms "noncontact cooling water" and "blowdown" are defined as per 40CFR 401.11 (m) and (n).

b. "Noncontact cooling water" means water used for cooling that does not come into direct contact with any raw material, intermediate product, waste product or finished product.

c. "Blowdown" means the minimum discharge of recirculating water for the purpose of discharging materials contained in the water, the further buildup of which would cause concentration in amounts exceeding limits established by best engineering practice.

d. "Salinity" shall mean total dissolved solids as the sum of constituents.

2. Permits shall be authorized for discharges of water that has been used for once-through noncontact cooling purposes based upon a finding that the returned water does not contribute to the loading of salts or the concentration of salts in the waters of the receiving stream in excess of a *de minimis* amount.

3. This policy shall not supplant nor supersede any other water quality standard of the receiving stream adopted pursuant to the Federal Clean Water Act, including but not limited to impairment of designated uses of the stream as established by the governing water quality authority having jurisdiction over the waters of the receiving stream.

4. Noncontact cooling water shall be distinguished from blowdown, and Section 1.C. of this policy specifically excludes blowdown or any commingling of once-through noncontact cooling water with another waste stream prior to discharge to the receiving stream. Sections I.A. and I.B of this policy shall in all cases govern discharge of blowdown or commingled water.

5. Once-through noncontact cooling water shall be permitted to return only to the same stream from which the water was diverted.

6. Because the increase in temperature of the cooling water will result in some evaporation, a *de minimis* increase in the concentration of dissolved salts in the receiving water may occur. An annual average increase in total dissolved solids of not more than 25 milligrams per liter (mg/L) measured at the intake monitoring point, as defined below, of the cooling process or facility, subtracted from the effluent total dissolved solids immediately upstream of the discharge point to the receiving stream, shall be considered *de minimis*.

7. At the time of NPDES discharge permit issuance or reissuance, the permitting authority may permit a discharge in excess of the 25 mg/L increase based upon a satisfactory demonstration by the permittee pursuant to Section 1.A.1.a.

8. Once-through demonstration data requirements:

   a. Description of the facility and the cooling process component of the facility.

   b. Description of the quantity, salinity concentration and salt load of intake water sources.

   c. Description of the discharge, covering location, receiving waters, quantity of salt load and salinity concentration of both the receiving waters and the discharge.

   d. Alternative plans for minimizing salt discharge from the facility which shall include:

      (i) Description of alternative means to attain no discharge of salt.

      (ii) Cost of alternative plans in dollars per ton of salt removed from discharge.

      (iii) Such other information pertinent to demonstration of non-practicability as the permitting authority may deem necessary.

9. If, in the opinion of the permitting authority, the database for the salinity characteristics of the water source and the discharge is inadequate, the permit will require that the permittee monitor the water supply and the discharge for salinity. Such monitoring program shall be completed in two years and the permittee shall then present the once-through demonstration data as specified above.

10. All new and reissued NPDES permits for once-through noncontact cooling water discharges shall require at a minimum semiannual monitoring of the salinity of the intake water supply and the effluent, as provided below.

    a. The intake monitoring point shall be the point immediately before the point of use of the water.

    b. The effluent monitoring point shall be prior to the discharge point at the receiving stream or prior to commingling with another waste stream or discharge source.

    c. Discrete or composite samples may be required at the discretion of the permitting authority, depending on the relative uniformity of the salinity of the water supply.

    d. Analysis for salinity may be either total dissolved solids or electrical conductivity where a satisfactory correlation with total dissolved solids

has been established. The correlation shall be based on a minimum of five different samples.

D. Discharges of Salinity from a New Industrial Source with Operations and Discharging Facilities at Multiple Locations

1. The objective for discharges to surface waters from a new industrial source with operations and discharging facilities at multiple locations shall be to assure that such operations will have no adverse effect on achieving the adopted numeric salinity standards for the Colorado River System.

2. NPDES permit requirements for a new industrial source with operations and discharging facilities at multiple locations shall be defined, for purposes of establishing effluent limitations for salinity, as a single industrial source if these facilities meet the criteria:

   a. The discharging facilities are interrelated or integrated in any way including being engaged in a primary activity or the production of a principle product; and

   b. The discharging facilities are located on contiguous or adjacent properties or are within a single production area e.g. geologic basin, geohydrologic basin, coal or gas field or 8 digit hydrologic unit watershed area; and

   c. The discharging facilities are owned or operated by the same person or by persons under common or affiliated ownership or management.

3. The permitting authority may permit the discharge of salt from a new industrial source with operations and discharging facilities at multiple locations if one or more of the following requirements are met:

   a. The permittee has demonstrated that it is not practicable to prevent the discharge of all salt from the industrial source. This demonstration by the applicant must include detailed information on the factors set forth in Section I.A.1.b of the Policy for implementation of Colorado River Salinity Standards through the NPDES permit program; with particular emphasis on an assessment of salinity off-set options that would contribute to state or interstate salinity control projects or salt banking programs and offset all or part of the salt loading to the Colorado River associated with the proposed discharge.

   b. In determining what permit conditions shall be required under I.A.1.a.i., above, the permit issuing authority shall consider the requirement for an offset project to be feasible if the cost per ton of salt removal in the offset project options (i.e. the permittee's cost in conducting or buying into such projects where they are available) is less than or equal to the cost per ton

of salt removal for projects undertaken by the Colorado River Basin Salinity Control Forum or less than the cost per ton in damages caused by salinity that would otherwise be cumulatively discharged from the outfalls at the various locations with operations controlled by the industrial source; or

c. The pemittee has demonstrated that one or more of the proposed discharges is of sufficient quality in terms of TDS concentrations to qualify for a "fresh water waiver" from the policy of "no salt return, whenever practical." An individual discharge that can qualify for a fresh water waiver shall be considered to have no adverse effect on achieving the adopted numeric salinity standards for the Colorado River System.

4. For the purpose of determining whether a freshwater waiver can be granted, the quality of water discharged from the new industrial source with operations and discharging facilities at multiple locations, determined as the flow weighted average of salinity measurements at all outfall points, must meet the applicable benchmark concentration in accordance with Section I.A.1.a.iii., as set forth above.

5. Very small-scale pilot activities, involving 5 or fewer outfalls, that are sited in areas not previously developed or placed into production by a new industrial source operations and discharges at multiple locations under common or affiliated ownership or management, may be permitted in cases where the discharge of salt from each outfall is less than one ton per day or 366 tons per year. However, no later than the date of the first permit renewal after the pilot activities have become part of a larger industrial development or production scale effort, all discharging facilities shall be addressed for permitting purposes as a single industrial source with operations and discharges at multiple locations under common or affiliated ownership or management.

6. The public notice for NPDES permits authorizing discharges from operations at multiple locations with associated outfalls shall be provided promptly and in the most efficient manner to all member states in the Colorado River Basin Salinity Control Forum in relation to this policy.

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 366 tons per year. 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:

Treatment Plant Design Capacity	Monitoring Frequency	Type of Sample
<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.

Attachment 1

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 [1]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 366 tons per year. 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 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.

[1]The term "intercepted ground water" means all ground water encountered during mining or other industrial operations.

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 366 tons per year. 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 B

States NPDES Permits List

LEGEND

NPDES PERMITS
EXPLANATION CODES

COLORADO RIVER BASIN SALINITY CONTROL FORUM
Through December 31, 2010

NPDES permits are reviewed under two different criteria under Forum policy; these being municipal and industrial. In order for a permittee to be in compliance under the municipal criteria, the increase in concentration between inflow and outflow cannot be greater than 400 mg/L. Forum industrial criteria 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

(M) Municipal user in compliance with Forum policy.

(M-1) Permit has expired or been revoked. No discharge.

(M-2) Permittee did not discharge during the reporting period.

(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.

Measurements of inflow are not consistent with Forum policy;

(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.

(M-5) Permittee is in violation of Forum policy in that there is an increase in concentration of >400 mg/L over the source waters.

(M-5A) The state is currently working to bring permittee into compliance.

(M-6) This permit requires no discharge or discharge only under rare and extreme hydrologic conditions. Thus, flow and concentration measurements are not required.

(M-7) Insufficient data to know the status of this permit.

* Permits shown for New Mexico are prepared by the state's environmental department and then issued by USEPA.

INDUSTRIAL

(I) Industrial user in compliance with Forum policy.

(I-A) Industrial user in compliance with the Forum's salinity offset policy.

(I-1) Permit has expired or been revoked. No discharge.

(I-2) Permittee did not discharge during the reporting period.

(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.

(I-4) Either concentration or volume of outflow are not currently being reported, thus the permittee is in violation of Forum policy. It is not known if the discharge is in excess of the <1.00 ton/day requirement.

Permittee appears to be in violation of Forum policy in that discharge of salts is >1.00 ton/day.

(I-5A) No provision has been made allowing this violation of Forum policy.

(I-5B) Though discharge is >1.00 ton/day, in keeping with Forum policy the permittee has demonstrated the salt reduction is not practicable and the requirement has been waived.

(I-5C) The use of ground water under this permit is for geothermal energy and only heat is extracted. The intercepted salt and water are naturally tributary to the Colorado River System and hence, this discharge does not increase salt in the river. The permit is covered by the Forum's policy on intercepted ground waters.

(I-5D) This permit is in compliance with the Forum's policy for fish hatcheries. The use of the water is a one-time pass through, and the incremental increase in salinity is ≤ 100 mg/l.

(I-5E) This permit is for the interception and passage of ground waters and thus is excepted under the Forum's policy on intercepted ground waters .

(I-6) This permit requires no discharge or discharge only under rare and extreme hydrologic conditions. Thus, flow and concentration measurements are not required.

(I-7) Insufficient data to know the current status of this permit.

LEGEND (continued)

NPDES PERMITS
REACH DEMARCATIONS

COLORADO RIVER BASIN SALINITY CONTROL FORUM

In order to provide a better understanding of the location of the various NPDES permits and the geographical sequence in the Colorado River System, each of the following NPDES permits is identified with a Colorado River reach number. The reach numbers have their origin in the old CRSS river model. Though this model is no longer used, the reach numbers assist in understanding the general location of the permits. The reaches are defined as:

100	Upper Main Stem	from headwaters of Colorado River to Colorado River near Cameo
190	Taylor Park	from headwaters of Gunnison River to above Blue Mesa Reservoir
200	Blue Mesa	from above Blue Mesa Reservoir to below Blue Mesa Dam
210	Morrow Point	from below Blue Mesa Dam to Crystal Reservoir
220	Lower Gunnison	from Crystal Reservoir to confluence with Colorado River
300	Grand Valley	from Colorado River near Cameo to confluence with Green River
310	Dolores River	from headwaters of Dolores River to confluence with Colorado River
401	Fontenelle	from headwaters of Green River to Green River near Green River, WY
411	Flaming Gorge	from Green River near Green River, WY to confluence with White and Duchesne Rivers
500	Yampa River	from headwaters of Yampa River to confluence with Green River
510	White River	from headwaters of White River to confluence with Green River
600	Green River	Green River from confluence with White and Duchesne Rivers to confluence with Colorado River
610	Duchesne River	from headwaters of Duchesne River to confluence with Green River
700	Lake Powell	Colorado River from confluence of with Green River to Lees Ferry
710	San Rafael River	from headwaters of San Rafael River to confluence with Green River
801	Upper San Juan River	from headwaters of San Juan River to San Juan near Bluff
802	Lower San Juan River	from San Juan near Bluff to confluence with Lake Powell
900	Glen Canyon to Lake Mead	Colorado River from Lees Ferry to backwaters of Lake Mead
905	Virgin River	from headwaters of Virgin River to backwaters of Lake Mead
910	Lake Mead	from backwaters of Lake Mead to Colorado River below Hoover Dam
920	Lake Mohave	Colorado River from below Hoover Dam down to I-40 bridge
930	Lake Havasu	Colorado River from I-40 bridge to below Parker Dam
940	Parker Dam to Imperial Dam	Colorado River from below Parker Dam to above Imperial Dam
945	Imperial Dam	Colorado River from above Imperial Dam to Gila and Yuma users

NPDES PERMITS

Colorado River Basin Salinity Control Forum

January 1, 2008 through December 31, 2010

NPDES PERMIT#	REACH	NAME of Discharging Facility	TDS Conc. AVG.(Mg/L)	Flow Rate AVG.(MGD)	Salt Load Tons/Day	Explanantion Code
Arizona						
AZ0000132	910	UNITED STATES FISH AND WILDLIFE SERVICE, WILLOW BEACH NATIONAL FISH HATCHERY	610	6.79	15.677	I
AZ0020427	900	FLAGSTAFF, CITY OF WILDCAT HILL POTW	430	3.57	5.810	M
AZ0022152	900	USNPS/GRAND CANYON/SOUTH RIM WWTP	552	0.228	0.476	M
AZ0022268	930	PHELPS DODGE BAGDAD COPPER DIV	-	-	-	I
AZ0022489	930	KINGMAN, CITY OF DOWNTOWN POTW	760	0.198	0.570	M
AZ0022756	930	PETRO STOP CENTER/KINGMAN	-	0.0431	-	M-3
AZ0023035	930	BLUE BEACON OF KINGMAN	-	-	-	I
AZ0023477	900	SOUTH GRAND CANYON SANITARY DISTRICT WWTP, TUSAYAN WASTEWATER TREATMENT RECLAMATION FACILITY	575	0.081	0.176	M
AZ0023523	920	USNPS/KATHERINE'S LANDING WTP	8.3	0.0574	0.002	I
AZ0023612	900	USNPS/GRAND CANYON/ DESERT VIEW	759	0.104	0.299	M
AZ0023621	900	USNPS/GRAND CANYON/INDIAN GARDENS	163	0.5336	0.329	I
AZ0023639	900	FLAGSTAFF, CITY OF RIO DE FLAG POTW	280	1.711	1.813	M-4B
AZ0023655	905	VIRGIN RIVER DOMESTIC WW ID	700	0.04	0.106	M
AZ0023752	940	QUARTZSITE, CITY OF POTW	1413.3	0.1801	0.963	M
AZ0023833	900	WINSLOW, CITY OF POTW	1200	0.97	4.406	M-7
AZ0023841	900	SHOW LOW, CITY OF POTW	539	0.903	1.842	M
AZ0023990	930	CAWCD-HAVASU PUMPING PLANT	639	0.046	0.111	I
AZ0024015	900	CANYON-VALLE AIRPORT WWTP	-	-	-	M-2
AZ0024279	900	HIGH COUNTRY PINES	<400	0.0034	-	M
AZ0024287 (replaced by AZ0026034)		SNOWFLAKE, CITY OF POTW	-	-	-	M-1
AZ0026034	900	SNOWFLAKE, CITY OF POTW	590	0.271	0.605	M
AZ0024356 (replaced by AZ0025755)	900	WILLIAMS, CITY OF POTW	-	-	-	M-1
AZ0024422	900	SANDERS SCHOOL DISTRICT NO. 6 WWTP	<400	0.0107	-	M
AZ0025160	910	USBR/HOOVER DAM	703	0.0613	0.163	M-2
AZ0025224	900	APACHE-SITGREAVES NATIONAL FOREST BLACK MESA RANGER STATION WASTEWATER TREATMENT PLANT	290	0.00195	0.002	M
AZ0025399	900	BISON RANCH	353	0.0064	0.009	M
AZ0025437	900	PINETOP LAKESIDE SANITARY DISTRICT WWTP	-	-	-	M-2
AZ0025542	900	HOLBROOK, CITY OF PAINTED MESA POTW	-	0.801	-	M-2
AZ0025666	900	USBR/GLEN CANYON SUMPS	-	-	-	I-3
AZ0110019	900	USBR/GLEN CANYON CRSP	1075	0.015	0.061	M
AZ0110248	920	USBR/DAVIS DAM	-	-	-	I
AZ0110426	900	USNPS/GRAND CANYON/NORTH RIM	471	0.0432	0.077	M
AZ 0025755		CITY OF WILLIAMS - WASTEWATER TREATMENT PLANT	-	-	-	M-7
California						
CA7000005	940	USBR Parker Dam & Power Plant DWF(R7-2007-0037)	560	0.009	0.02	M

NPDES PERMITS

Colorado River Basin Salinity Control Forum

January 1, 2008 through December 31, 2010

NPDES PERMIT#	REACH	NAME of Discharging Facility	TDS Conc. AVG.(Mg/L)	Flow Rate AVG.(MGD)	Salt Load Tons/Day	Explanantion Code
Colorado						
COG500419	500	3B ENTERPRISES	2386	0.539	5.36	I
COG072739	100	ALDER CONSTRUCTION CO..	4041	0.055	0.93	I
COG588012	190	ALMONT WWTP	437	0.012	0.02	M
COG600476	510	ANDRIKOPOULOS, A.G., RESOURCES	4724	0.552	10.87	I-5A
CO0026387	100	ASPEN CONSOLIDATED SAN DISTRCT	567	1.458	3.45	M
COG588085	100	ASPEN VILLAGE, INC.	335	0.034	0.05	M
COG600993	300	ASPEN WELL OPERATING, LLC				I-7
COG603050	100	ASPEN, CITY OF	390	0.002	0.00	I-1
COG641066	100	ASPEN, CITY OF	321	0.038	0.05	I
COG600426	100	ASPEN, CITY OF - WATER DEPT.	194	0.000		I
COG603119	100	BANK OF THE WEST				I-2
COG588063	100	BASALT SANITATION DISTRICT	306	2.493	3.18	M
COG641095	100	BASALT, TOWN OF	96	0.004	0.00	I
COG589086	100	BATTLEMENT MESA METRO DISTRICT	507	0.471	1.00	M
CO0044377	220	BEAR COAL COMPANY	3061	0.010	0.13	I
COG603012	100	BIG SKI PROPERTIES LLC	296			I
COG588074	100	BLUE CREEK RANCH LLC	603	0.007	0.02	M
CO0038024	510	BLUE MOUNTAIN ENERGY, INC.	1064	0.028	0.12	I
CO0020826	100	BLUE RIVER WASTEWATER T.P.	400	1.832	3.06	M
CO0044776	220	BOWIE RESOURCES LIMITED	1130	0.117	0.55	I
CO0021539	100	BRECKENRIDGE SAN DISTRICT		0.976		M-4B
COG641119	100	BRECKENRIDGE SKI RESORT	29	0.001	0.00	I-7
COG641020	100	BRECKENRIDGE, TOWN OF				I-2
COG641053	100	BRECKENRIDGE, TOWN OF	137	0.186	0.11	I
CO0045217	190	BROOKWAY IRWIN, LLC				M-2
CO0034142	500	BTU EMPIRE CORPORATION	1403	0.925	5.41	I-5A
COG588072	100	C LAZY U RANCH, INC.	219	0.005	0.00	M
CO0047376	310	CAMP RED CLOUD	411	0.002	0.00	M
COG588112	220	CAMP GUNNISON INC.	304	0.003	0.00	M
COG588081	100	CANYON CREEK ESTATES WWTF	1173	0.064	0.31	M
COG641094	100	CARBONDALE, CITY OF				I-2
COG588050	100	CARBONDALE, TOWN OF	294	0.508	0.62	M
COG641027	100	CARBONDALE, TOWN OF				I-2
CO0042480	100	CBS OPERATIONS, INC.	2824	0.170	2.00	I-5A
CO0031984	220	CEDAREDGE, TOWN OF	388	0.153	0.25	M
COG641015	220	CEDAREDGE, TOWN OF	85	0.016	0.01	I
COG589066	100	CENTER SANITATION DISTRICT	217	0.035	0.03	M
CO0040827	100	CENTRAL APPALACHIA MINING, LLC				I-2
CO0032638	500	CHEVRON MINING INC, THE	4339	0.368	6.66	I
COG603105		CHEVRON USA, INC.				I-2
CO0033791	300	CLIFTON SANITATION DISTRICT #2	740	0.936	2.89	M
COG588076	100	CO DEPT OF TRANSPORTATION	504	0.001	0.00	M
COG588075	100	CO. DEPT OF TRANSPORTATION	1168	0.000		M
COX042731	200	CO. DEPT. OF TRANSPORTATION	992	0.003	0.01	I-7
CO0046566	100	CO. MTN. RESORT INVESTORS, LLC	436	0.012	0.02	M-7
CO0040487	100	COLLBRAN, TOWN OF	861	0.074	0.27	M
COG588032	220	COLO DEPARTMENT OF CORRECTIONS	426	0.018	0.03	M
COG600141	500	COLO DEPT OF TRANSPORTATION				I-2
COG588067	100	COLO. DEPT. OF TRANSPORTATION	779	0.001	0.00	M
COG600393	300	COLO. DIVISION OF WILDLIFE		0.001		I-7
COG130001	100	COLORADO DIVISION OF WILDLIFE	300	8.511	10.65	I-5D
COG130004	190	COLORADO DIVISION OF WILDLIFE	118	4.212	2.07	I-5D
COG130005	801	COLORADO DIVISION OF WILDLIFE				I-5D
COG130006	190	COLORADO DIVISION OF WILDLIFE	203	5.001	4.23	I-5D
COG130007	100	COLORADO DIVISION OF WILDLIFE	166	2.571	1.78	I-5D
COG130011	100	COLORADO DIVISION OF WILDLIFE	351	6.301	9.22	I-5D
CO0045161	500	COLOWYO COAL COMPANY L.P.	1605	0.168	1.12	I

NPDES PERMITS

Colorado River Basin Salinity Control Forum

January 1, 2008 through December 31, 2010

NPDES PERMIT#	REACH	NAME of Discharging Facility	TDS Conc. AVG.(Mg/L)	Flow Rate AVG.(MGD)	Salt Load Tons/Day	Explanantion Code
COG600757	500	COLOWYO COAL COMPANY L.P.	1959	0.005	0.04	I
COG500350	500	CONNELL RESOURCES, INC.	241	1.240	1.25	1-5A
COG500475	500	CONNELL RESOURCES, INC.				I-2
COG500484	510	CONNELL RESOURCES, INC.	298	0.137	0.17	I
COG501522	500	CONNELL RESOURCES, INC.	734	0.607	0.19	I
COG584028	300	CONSOLIDATED METROPOLITAN DIST	763	0.493	1.57	I
COG641068	300	CONSOLIDATED METROPOLITAN DIST	307	0.267	0.34	I-2
COG600036	100	COPPER MOUNTAIN, INC				I-2
COG603140	100	COPPER MOUNTAIN INC.				I-2
CO0021598	100	COPPER MTN CONS METRO DISTRICT	342	0.249	0.36	M
CO0036251	310	COTTER CORPORATION				I-2
COG589001	100	COTTONWOOD WASTEWATER TREATMENT	848	0.977	3.45	M
COG605009	100	COVERED BRIDGE BUILDING ASSN.		0.387		I-7
CO0040037	500	CRAIG, CITY OF	534	0.625	1.39	M
CO0037729	220	CRAWFORD, TOWN OF	343	0.208	0.30	M
COG588045	190	CRESTED BUTTE SOUTH METRO DIST	341	0.081	0.12	M
CO0020443	190	CRESTED BUTTE, TOWN OF	187	0.202	0.16	M
COG072823	100	CROSSROAD REDEVELOPMENT INC	588	0.140	0.34	I
COG584043	100	DEBEQUE, TOWN OF	953	0.872	3.47	M
CO0048135	100	DEBEQUE, TOWN OF	754	0.030	0.09	M
CO0039641	220	DELTA, CITY OF	1671	1.050	7.32	M
COG500458	220	DIAMOND LAZY L RANCH	1541	0.135	0.87	I
COG641006	100	DILLON, TOWN OF	79	0.079	0.03	I
CO0023876	100	DUNDEE REALTY USA, LLC	653	0.007	0.02	M
CO0021369	100	EAGLE RIVER WATER & SAN. DIST.	402	1.272	2.13	M
CO0024431	100	EAGLE RIVER WATER & SAN. DIST.	462	1.971	3.80	M
CO0037311	100	EAGLE RIVER WATER & SAN. DIST.	579	1.094	2.64	M
CO0021059	100	EAGLE, TOWN OF				M-4B
COG588080	100	EAGLE, TOWN OF	691	3.157	9.10	M
COG641031	100	EAGLE, TOWN OF				I-2
COG588079	100	EAST RIVER REGIONAL SAN. DIST.	248	0.056	0.06	M
COG588029	100	EL ROCKO MOBILE HOME PARK	498	0.003	0.01	M
COG500427	220	ELAM CONSTRUCTION, INC.				I-2
COG500429	100	ELAM CONSTRUCTION, INC.				I-2
COG600633	100	ENCANA OIL & GAS (USA), INC.				I-2
CO0047562	300	ENERGY FUELS RESOURCES CORP.	420	0.003	0.01	I
COG600951	510	ENTERPRISE PRODUCTS OPERATING				I-2
COG500433	100	EVERIST MATERIALS, LLC	1316	1.000	5.49	I-7
COG850046	100	EXXON COMPANY, USA				I-2
COG603022	300	FMC PROPERTIES, LLC				I-2
COG603008	100	FOUNDERS PARKING ASSOCIATION	386	0.001	0.00	I-5A
COG603167	100	FRASER CROSSING/FOUNDERS POINTE				I-2
CO0040142	100	FRASER SANITATION DISTRICT	291	0.731	0.89	M
CO0020451	100	FRISCO SANITATION DISTRICT		0.572		I-7
COG600916	100	FRISCO SANITATION DISTRICT		0.153		i-7
COG641067	100	FRISCO, TOWN OF				I-2
COG603117	100	FRISCO SANITATION DISTRICT	271	0.518	0.59	I
CO0046175	100	FRUITA MARKETING & MANAGEMENT				I-2
COG589094	100	FRUITA, CITY OF	681	0.691	1.96	M
COG583002	100	FRUITA, TOWN OF	856	0.835	2.98	M
COG641072	100	GATEWAY METRO DIST.	1171	0.005	0.02	I
COG600744	100	GE JOHNSON CONSTRUCTION CO.	622	3.163	8.20	I-5A
COG600308	100	GLENWOOD HOT SPGS LODGE & POOL	20305	2.648	224.21	I-5A
CO0020516	100	GLENWOOD SPRINGS, CITY OF	790	0.220	0.72	M
COG641052	100	GLENWOOD SPRINGS, CITY OF	79	0.048	0.02	I-2
CO0020699	100	GRANBY SANITATION DISTRICT	357	0.315	0.47	M
COG600965	100	GRAND COUNTY		0.004		I-7
COG603111	100	GRAND COUNTY				I-2
COG641087	100	GRAND COUNTY W&SD #1				I-2

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COG500161	300	GRAND JUNCTION PIPE & SUPPLY	3784	0.629	9.93	I-2
COG500308	300	GRAND JUNCTION PIPE & SUPPLY				I-2
COG500364	300	GRAND JUNCTION PIPE & SUPPLY	1771	0.322	2.38	I
COG500444	300	GRAND JUNCTION PIPE & SUPPLY				I-2
COG501505	300	GRAND JUNCTION PIPE & SUPPLY	756	0.758	2.39	I-2
CO0041530	220	GUNNISON, CITY OF	377	1.095	1.72	M
COG641041	220	GUNNISON, COUNTY OF				I-2
CO0047155	190	GYPSUM, TOWN OF	272	0.409	0.46	M
COG500402	500	HOCKIN GRAVEL LLC	730	0.323	0.98	i
COG588035	100	H LAZY F LLC	587	0.016	0.04	M
COG500487	510	HARDROCK CUSTOM CRUSHING LLC				I-1
COG072601	500	HASELDEN RESORT CONSTRUCTORS	834	0.280	0.97	I
CO0040959	500	HAYDEN, TOWN OF	519	0.227	0.49	M
COG600398	100	HOLLAND CREEK METRO DISTRICT	343	0.003	0.00	I-5A
COG588084	100	HOT SULPHUR SPRINGS, TOWN OF	298	0.075	0.09	M
COG641019	100	HOT SULPHUR SPRINGS, TOWN OF	128	0.038	0.02	I
CO0044903	220	HOTCHKISS, TOWN OF	1120	0.155	0.72	M
COG641091	220	HOTCHKISS, TOWN OF				I-2
COG588049	100	INDEPENDENCE ENVRIONMENTAL SERVICES	314	0.030	0.04	M
COG600307	100	INDUSTRIAL INSULATION GRP, LLC	1408	0.046	0.27	I
CO0045420	100	IOWA HILL WATER RECLAMATION	293	0.651	0.80	M
COG588052	200	L & N, INC.	855	0.003	0.01	M
COG500003	100	LAFARGE WEST, INC.	2930	0.108	1.32	I-1
COG500088	100	LAFARGE WEST, INC.	1394	0.140	0.81	I-1
COG500267	500	LAFARGE WEST, INC.	305	0.213	0.27	I-1
COG500408	100	LAFARGE WEST, INC.	883	0.160	0.59	I-1
COG500482	100	LAFARGE WEST, INC.	747	0.170	0.53	I-1
COG501502	100	LAFARGE WEST, INC.				I-2
COG603045	500	LAKE CATAMOUNT #1 METRO DIST	265	0.003	0.00	I
CO0040673	200	LAKE CITY, TOWN OF	286	0.054	0.06	M
COG601008	100	LARAMIE ENERGY II LLC	264	0.008	0.01	I
CO0048119	100	LKA INTERNATIONAL LLC		0.030		I-7
CO0031062	500	LOWELL WHITEMAN SCHOOL CRP THE	312	0.002	0.00	M
COG500380	100	M.A. CONCRETE CONSTRUCTION INC	5888	0.621	15.25	I
COG500491	100	M.A. CONCRETE CONSTRUCTION INC	6408	0.575	15.36	I
COG501513	100	M.A. CONCRETE CONSTRUCTION INC				I-2
COG641065	801	MANCOS RURAL WATER COMPANY				I-2
COG603120	510	MANOR VAIL LODGE	721	0.001	0.00	I
CO0038342	100	MCCLANE CANYON MINING LLC	2237	0.007	0.07	I
CO0047139	510	MEEKER SANITATION DISTRICT	610	0.169	0.43	M
CO0040053	300	MESA CO./GRAND JUNCTION - CITY	804	0.809	2.71	M
COG583001	300	MESA WATER & SANITATION DIST.	608	0.049	0.12	M
COG589096	300	MESA WATER & SANITATION DIST.	666	0.013	0.04	M
COG588105	100	MID VALLEY METROPOLITAN DIST.	439	0.307	0.56	M
CO0039691	310	MILL CREEK LODGE ESTATES, LLC				M-7
COG850009	100	MINREC, INC.				I-2
CO0048233	100	MINREC, INC.	1342	3.667	20.52	I
COG589040	500	MOFFAT COUNTY IMPROVEMENT DIST	300	0.060	0.08	M
CO0039624	220	MONTROSE, CITY OF	927	2.169	8.38	M
COG603009	220	MONTROSE, CITY OF	1098	21.88	100.18	I
CO0022969	220	MORRISON CREEK METRO W&SD	447	0.598	1.11	M
CO0038776	220	MOUNTAIN COAL COMPANY, LLC	1060	0.227	1.00	I-5A
COG600986	100	MOUNTAIN VIEW SURFACES LLC				I-2
COG600776	100	MSL, LLC				I-2
CO0027171	190	MT. CRESTED BUTTE W&S DISTRICT	265	0.384	0.42	M
COG641111	220	MUSTANG WATER AUTHORITY				I-7
CO0024007	310	NATURITA, TOWN OF	696	0.051	0.15	M
COG588062	100	NEW CASTLE, TOWN OF	676	0.306	0.86	M
COG641092	100	NEW CASTLE, TOWN OF	270	0.008	0.01	I

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COG900010	500	NORTH FINN LLC				I
COG501524	500	NORTHWEST AGGREGATES INC.	160	0.350	0.23	I
COG589067	100	NUCLA, TOWN OF	1158	0.035	0.17	M
COG582002	310	NUCLA SANITATION DISTRICT	1206	0.230	1.16	M
CO0041106	500	OAK CREEK, TOWN OF	198	0.192	0.16	M
COG641057	500	OAK CREEK, TOWN OF	209	0.019	0.02	I
CO0045802	100	OAK MEADOWS SERVICE COMPANY	1215	0.010	0.05	M
COG600452	100	OCCIDENTAL OIL SHALE, INC.				I-2
CO0020907	220	OLATHE, TOWN OF	1869	0.354	2.76	M
COG500010	190	OLDCASTLE SW GROUP INC.	331	1.750	2.42	I-1
COG500119	100	OLDCASTLE SW GROUP INC.	515	0.349	0.75	I-1
COG500136	190	OLDCASTLE SW GROUP INC.	1430	0.300	1.79	I-1
COG500437	100	OLDCASTLE SW GROUP INC.	2397	0.450	4.50	I
COG500216	100	OLDCASTLE SW GROUP, INC.	4110	0.264	4.52	I
COG500243	500	OLDCASTLE SW GROUP, INC.	300	0.000	0.00	I
COG500299	100	OLDCASTLE SW GROUP, INC.	7453	0.266	8.27	I
COG500397	190	OLDCASTLE SW GROUP, INC.	468	0.362	0.71	I
COG500400	190	OLDCASTLE SW GROUP, INC.	1388	0.145	0.84	I
COG500420	190	OLDCASTLE SW GROUP, INC.				I-2
COG500441	300	OLDCASTLE SW GROUP, INC.	985			I-7
COG500464	190	OLDCASTLE SW GROUP, INC.	2416	0.974	9.81	I
COG500467	100	OLDCASTLE SW GROUP, INC.	985	0.438	1.80	I
COG500497	100	OLDCASTLE SW GROUP, INC.	1604	0.715	4.78	I
COG500498	190	OLDCASTLE SW GROUP, INC.	2304	0.628	6.03	I
COG501510	190	OLDCASTLE SW GROUP, INC.	881	0.860	3.16	I
COG641081	220	ORCHARD CITY, TOWN OF	77	0.020	0.01	I
COG603147	100	OSP CONDOMINIUMS AT APRES SKI WAY	912	0.006	0.02	I
COG588041	100	OURAY RANCH HOMEOWNERS ASSN.	180	0,002	0.75	M
CO0043397	220	OURAY, CITY OF	474	2.780	5.49	M
COG600544	220	OURAY, CITY OF	1560	0.402	2.62	I-5A
CO0000132	220	OXBOW MINING, LLC	1234	0.595	3.06	I-2
COG641007	801	PAGOSA AREA WATER & SAN DIST				I-7
COG641022	801	PAGOSA AREA WATER & SAN DIST				I-7
COG641085	801	PAGOSA AREA WATER & SAN DIST				I-7
CO0031755	801	PAGOSA AREA WATER & SAN. DIST.				M-7
COG641077	801	PAGOSA AREA WATER & SAN. DIST.				I-2
COG584004	300	PALISADE, TOWN OF	465	0.198	0.38	M
COG589083	300	PALISADE, TOWN OF	500	0.207	0.43	M
COG641037	300	PALISADE, TOWN OF				I-2
CO0021709	220	PAONIA, TOWN OF	796	0.176	0.58	M
CO0047431	220	PAONIA, TOWN OF	1053	1.450	6.37	M
COG600908	100	PCL CONSTRUCTION SERVICES, INC		0.006		I-7
COG600178	500	PETE LIEN & SONS				I-2
COG900011	100	PIONEER NATURAL RESOURCES USA		0.425		I-5A
COG600534	100	PITKIN IRON CORPORATION				I-2
COG500356	100	POLYCOR COLORADO STONEQUARRIES	130	0.011	0.01	I
CO0023485	300	POWDERHORN METRO DISTRICT NO 1	363	0.103	0.16	M
COG500396	500	PRECISION EXCAVATING	305	1.790	2.28	I
CO0000027	300	PUBLIC SERVICE CO. OF COLORADO	909	19.525	74.01	I
COG600536	500	PUBLIC SERVICE CO. OF COLORADO	304	0.029	0.04	I
COG588051	100	RANCH AT ROARING FORK HOA	415	0.036	0.06	M
COG589088	510	RANGELY, TOWN OF	380	0.157	0.25	M
CO0021385	100	RED CLIFF, TOWN OF	203	0.054	0.05	M
CO0046370	100	REDSTONE WATER & SAN DISTRICT	472	0.021	0.04	M
COG603031	100	RELATED WESTPAC	550	0.038	0.09	I
COG588047	310	RIDGWAY, TOWN OF	492	0.085	0.17	M
COG584024	100	RIFLE, CITY OF	1187	0.673	3.33	M
COG584053	100	RIFLE, CITY OF	899	0.187	0.70	M
COG589092	100	RIFLE, CITY OF SOUTH	1082	0.147	0.66	M

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CO0048151	100	RIFLE REGIONAL WASTEWATER RECLAMATION	843	0.738	2.59	
COG589093	100	RIFLE, CITY OF	1013	0.648	2.74	M
COG641107	100	RIFLE, CITY OF				I-2
COG641108	100	RIFLE, CITY OF	197	0.053	0.04	I
COG501517	510	RIO BLANCO				I-2
COG603127	100	RITZ CARLTON RESIDENCES AND CLUB AT VAIL	492	0.004	0.01	I
COG588006	100	RIVERBEND SUBDIVISION WWTF	1759	0.272	2.00	M
COG588066	220	RIVERSBEND APARTMENTS WWTF	590	0.002	0.00	M
CO0044750	100	ROARING FORK WATER & SAN DIST	741	0.055	0.17	M-4A
COG588083	100	ROCK GARDENS MHP & CAMPGROUND	633	0.008	0.02	M
COG603151	100	ROCK RESORTS INTL	679	1.224	3.47	I
COG589026	500	ROUTT CO. FOR PHIPPSBURG COMM.	545	0.012	0.03	M
COG588037	500	ROUTT COUNTY FOR MILNER COMM.	650	0.011	0.03	M
CO0047449	500	ROUTT COUNTY	554	0.015	0.03	M
COG588013	801	SAN JUAN RIVER VILLAGE METRO				M-7
COG603031	200	SANCTUARY/SNOWMASS CONDO ASSOC	260	0.013	0.01	I-5A
CO0043753	310	SAVAGE MINING & OIL CO., INC.	NONE	NONE		i-2
CO0000221	500	SENECA COAL COMPANY	2360	0.394	3.88	I-5A
COG500312	500	SENECA COAL COMPANY	160	0.141	0.09	I
COG600162	510	SHELL FRONTIER OIL & GAS, INC.	1421	0.108	0.64	I-5A
COG603102	100	SHELL FRONTIER OIL & GAS, INC.		0.001	0.00	I-2
COG600677	500	SIDNEY PEAK RANCH	2483	0.014	0.14	I
COG641112	100	SILT TOWN OF	524	0.017	0.04	I
COG588046	100	SILT, TOWN OF	724	0.237	0.72	M
COG500493	100	SILT SAND AND GRAVEL	1027	1.017	4.36	I
COG070867	200	SILVERTHORNE/DILLON JSA	198	1.263	1.04	I-1
CO0020311	801	SILVERTON, TOWN OF				M-7
COG641008	801	SILVERTON, TOWN OF				I-7
CO0027146	300	SNOWCAP COAL COMPANY, INC.	1252	0.390	2.04	I-5A
CO0023086	100	SNOWMASS WATER & SAN DISTRICT	301	0.816	1.02	M
COG603155	100	SOLARIS PROPERTY OWNER LLC	700	0.175	0.51	I
COG603014	100	SONNENALP RESORT OF VAIL				I-2
COG588057	801	SOUTH DURANGO SANITATION DIST				M-7
CO0046124	100	SPRING VALLEY SANITATION DIST.	820	0.048	0.16	M
COG588033	310	ST. BARNAVAS CHURCH CAMPS, INC				M-7
COG072678		STANEK CONSTUCTORS INC.	4041	0.197	3.32	I
COG600603	500	STEAMBOAT HEALTH & REC ASSOC.	1552	0.012	0.08	I
CO0035556	500	STEAMBOAT LAKE W&SD	451	0.035	0.07	M
CO0020834	500	STEAMBOAT SPRINGS, CITY OF	322	1.996	2.68	M
COG600127	500	STEAMBOAT SPRINGS, CITY OF				I-2
COG603096	500	STEAMBOAT SPRINGS, CITY OF				I-2
CO0038598	100	SUNLIGHT, INC.	262	0.005	0.01	I
COG588086	300	SW MESA CO RURAL PUB IMP DIST	1175	0.013	0.06	M
CO0045501	100	TABERNASH MEADOWS W&SD	266	0.032	0.04	M
COG603053	100	TABERNASH MEADOWS W&SD				I-2
COG588061	100	TALBOTT ENTERPRISES, INC.	1631	0.061	0.41	M
CO0041840	310	TELLURIDE, TOWN OF				M-7
COG641024	310	TELLURIDE, TOWN OF				I-7
CO0037681	100	THREE LAKES WATER AND SANITATION DIST	240	0.465	0.47	M
CO0032115	500	TRAPPER MINING, INC.	1785	0.263	1.96	I
CO0042447	100	TRI-STATE GEN & TRANS ASSN.	1473	0.014	0.09	I
CO0000540	310	TRI-STATE GENERATN &TRANSMISSN	1421	0.295	1.75	I-5A
CO0027154	500	TWENTYMILE COAL COMPANY	2272	0.074	0.70	I
CO0036684	500	TWENTYMILE COAL COMPANY	3666	0.015	0.23	I
CO0042161	500	TWENTYMILE COAL COMPANY	4106	0.015	0.26	I-2
COG588070	100	TWO RIVERS VILLAGE METRO DIST	663	0.018	0.05	M
CO0041548	300	U.S. DEPARTMENT OF ENERGY				I-2
CO0035394	190	U.S. MOLY CORP.	813	0.470	1.59	I-5A
COG641105	100	UPPER EAGLE REG WATER AUTH.	199	0.022	0.02	I

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COG641058	100	UPPER EAGLE REG WATER AUTHORTY	219	0.001	0.00	I
CO0047147	801	UPPER VALLEY WATER & SAN DIST.				M-7
COG641104	220	USCDWUA	104	0.035	0.02	I
COG588109	190	UTE TRAIL RANCH FOUNDATION	358	0.002	0.00	M
COG641070	300	UTE WATER CONSERVANCY DISTRICT				I-2
COG600381	100	VAIL ASSOCIATES, INC.				I-2
COG603076	100	VAIL RESORTS INC.	304	0.663	0.84	I
COG500134	220	VALCO, INC.				I-1
COG588026	801	VALLECITO RESORT, LLC				M-7
COG600409	100	VILLAGE AT COPPER ASSOCIATION				I-2
CO0037702	801	VISTA VERDE VILLAGE, LLC				M-7
CO0042617	220	VOLUNTEERS OF AMERICA CARE FAC	360	0.007	0.01	M
CO0037206	220	WALKER RUBY MINING COMPANY,INC	102	5.758	2.45	I-5A
COG600706	100	WEITZ COMPANY				I-2
COG588008	100	WEST GLENWOOD SPRINGS SAN DIST	344			M
CO0030449	220	WEST MONTROSE SANITATION DIST	580	0.151	0.37	M
CO0000213	310	WESTERN FUELS-COLORADO, LLC	2061	0.196	1.68	I-5A
COG500451	190	WESTERN GRAVEL INC.				I-2
COG500486	100	WESTERN GRAVEL INC.				I-2
COG500473	510	WHITE RIVER AGGREGATES				I-2
COG588048	510	WHITERIVER RV, LLC				M-2
CO0026051	100	WINTER PARK WATER & SAN DIST	309	0.179	0.23	M
CO0000051	100	WINTER RIDGE ENERGY, LLC		0.920		I-5A
COG603042	100	WOODRUN PLACE CONDOS HOA BOARD	116	0.409	0.20	I-1
COG588103	100	WOODY CREEK MOBILE HOA	303	0.015	0.02	M
CO0046931	310	WYNNE, LEE				I-7
COG603167	100	XCEL ENERGY	6900	0.007	0.21	I
CO0030635	500	YAMPA, TOWN OF	335	0.034	0.05	M
CO0045411	100	YOUNG LIFE CAMPAIGN, INC.	773	0.009	0.03	M
Nevada						
NV0000060	910	Titanium Metals Corp	1083	1.789	8.08	I
NV0000078	910	TRONOX - LLC-Kerr McGee Corporation	569	0.021	0.05	I
NV0020133	910	City of Las Vegas Water Pollution Control Facility	1100	61.233	281.14	M-4B
NV0020192	910	NDOW - Lake Mead Fish Hatchery	642	0.248	0.66	I-5D
NV0021261	910	CCWRD - AWT Plant	1155	44.685	215.29	M-4B
NV0021563	910	CCWRD Laughlin	1108	2.027	9.37	M-4B
NV0021750	910	Hilton, Las Vegas	2009	0.001	0.01	I
NV0021911	910	Las Vegas Valley Municipal Stormwater Permit	0	0.000	0.00	M-2
NV0022098	910	City of Henderson	1238	12.168	62.88	M-4B
NV0022195	910	Valley Hospital Medical Center	2425	0.001	0.01	I-5E
NV0022420	910	Union Oil Company	0	0.000	0.00	I-5E
NV0022691	910	Lake Las Vegas Resort	0	0.000	0.00	I-2
NV0022748	910	Bonneville Ave Underpass	1768	0.016	0.12	I-5E
NV0022772	910	Sterling/Squire/Crescendo HOAs (fomerly Saxton)	5407	0.118	2.66	I-5E
NV0022781	910	Shanghai Partners - 7030 Tomiyasu Lane	2767	0.112	1.29	I-5E
NV0022837	910	Circle K Store #0695	1800	0.000	0.00	I-5E
NV0022845	910	Harrah's Las Vegas Hotel/Casino	0	0.000	0.00	I
NV0022870	910	7-Eleven, Inc Store #19653	0	0.000	0.00	I-5E
NV0022888	910	Venetian Casino Resort	1557	0.003	0.02	I-5E
NV0022942	910	US General Services Administration	2269	0.000	0.00	I-7
NV0022985	910	Planet Hollywood (formerly Aladdin Resort)	184	0.000	0.00	I-7

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NV0022993	910	Golden Nugget Hotel & Casino	1235	0.000	0.00	I-7
NV0023035	910	City of Las Vegas Neonopolis	1648	0.115	0.79	I
NV0023043	910	Maryland Villas Apartment Complex	1565	0.123	0.81	I
NV0023060	910	TRONOX - Kerr McGee Perchlorate	6446	1.342	36.09	I
NV0023078	910	7 Eleven, Store #21850	0	0.000	0.00	I-1
NV0023086	910	Conoco Phillips Co Union 76 # 5558	0	0.000	0.00	I-1
NV0023094	910	Former Union 76 Service Station #4616	3023	0.001	0.01	I
NV0023141	910	Sahara Hotel and Casino	2544	0.136	1.44	I
NV0023159	910	Clark County Regional Justice Center	1444	0.007	0.04	M
NV0023183	910	COLV City Center Place	1356	0.005	0.03	M
NV0023191	910	Caesar's Palace Hotel Casino	2355	0.006	0.06	I
NV0023221	910	7 Eleven Store # 27607	1850	0.000	0.00	I-7
NV0023230	910	Kinder Morgan Sloan Lane	1004	0.008	0.03	I
NV0023248	910	Riviera Hotel Casino	0	0.000	0.00	I-2
NV0023256	910	Turnberry Place Tower II	2635	0.008	0.09	I
NV0023264	910	7-eleven store #29644	0	0.000	0.00	I-1
NV0023281	910	7-Eleven Store No. 23129	0	0.000	0.00	I-1
NV0023282	910	Chevron Station No. 9-7537	0	0.000	0.00	I-1
NV0023311	910	7-Eleven Store No 25586	0	0.000	0.00	I-2
NV0023353	910	Former Chevron Station No. 9-7753	4097	0.001	0.02	I
NV0023361	910	Former Chevron Station No.9-2567	0	0.000	0.00	I-1
NV0023396	910	7-Eleven Store #20826	980	0.001	0.00	I
NV0023477	910	Sky Las Vegas Condominiums	1806	0.008	0.06	I
NV0023485	910	Las Vegas Academy	2345	0.002	0.02	M
NV0023507	910	National Nuclear Security Admin/NV Site Office	951	0.010	0.04	M
NV0023515	910	The Cosmopolitan Resort and Casino	2088	0.027	0.23	I
NV0023523	910	Terribles Hotel Casino	2573	0.000	0.00	I-7
NV0023558	910	Panorama Towers III	2373	0.006	0.06	I
NV0023566	910	Fontainebleau Casino & Resort/Icahn NV Gaming	2577	0.384	4.13	I-5E
NV0023604	910	Hughes Center 3883 & 3893 Howard Hughes Pkwy	2911	0.005	0.06	I
NV0023621	910	Echelon Las Vegas	2450	0.206	2.11	I-5E
NV0023639	910	Morgan's Mondrian-Delano Hotel	0	0.000	0.00	I-2
NV0023647	910	City of N Las Vegas Water Reclamation Facility	0	0.000	0.00	M-2
NV0023663	910	Former Conoco Station No 28003	0	0.000	0.00	I-2
NV0023671	910	Cappy's Cleaners	7167	0.179	5.36	I
NV0023701	910	CityCenter	2467	0.003	0.03	I
NV0023728	910	Southeast Interceptor Project	3380	0.112	1.58	I-5E
NV0023736	910	SNWA- Bowman Reservoir Muddy River Outfalls	566	0.540	1.28	M-4B
NV0023744	910	Holiday Inn Hotel	0	0.000	0.00	I-7
NV0023761	910	McCarran International Airport - Terminal 3	1236	0.016	0.08	I
NV0023795	910	SNWA - Lower Narrows Weir & Homestead Weir	0	0.000	0.64	M
NV0023809	910	Terrible Herbst #225 (former D&G Oil Co)	790	0.001	0.00	I
NV0023817	910	Alfred Merritt Smith WTF	0	0.000	0.00	M-2
NV0023833	910	SNWA - 5 Upper Wash Weirs	0	0.000	0.00	I-2
NV0023841	910	Hudson Cleaners	0	0.000	0.00	I-7
NV0023868	910	Pittman Wash Work Area	3656	0.246	3.74	I-5E
NV0023876	910	SNWA-Demonstration Replacement Weir	0	0.000	0.00	I-2
NV0023884	910	CCWRD - Proj 634 Location Rehab 04 Eastern/Trop	0	0.000	0.00	I-2
NV0023906	910	CCWRD 643 Circus Circus Blvd	0	0.000	0.00	I-2
NV0023914	910	SNWA - Historic Lateral Weir Expansion	0	0.000	0.00	I-2
NV0023922	910	Flamingo Wash Flood Control Channel	0	0.000	0.00	I-2
NV0023931	910	Mendenhall Center	0	0.000	0.00	I-2
NV0023949	910	Former Texaco Service Station	0	0.000	0.00	I-2
NV0023957	910	CCWRD Proj 644 Add-On 1 E Sahara Ave	0	0.000	0.00	I-2
NV0023965	910	CCWRD Proj 644 Add-On 5 Annie Oakley Dr	0	0.000	0.00	I-2
NV0023973	910	CCWRD Proj 644 Add-On 3 Mountain Vista St	0	0.000	0.00	I-2
NV0023990	910	Las Vegas Lateral - Langtry Channel	0	0.000	0.00	I-2
NV0024007	910	CCWRD Proj 644 Add-on 2 E Desert Inn Rd	0	0.000	0.00	I-2
NV0024015	910	Pittman Wash Work Area	0	0.000	0.00	I-2

NPDES PERMITS

Colorado River Basin Salinity Control Forum

January 1, 2008 through December 31, 2010

NPDES PERMIT#	REACH	NAME of Discharging Facility	TDS Conc. AVG.(Mg/L)	Flow Rate AVG.(MGD)	Salt Load Tons/Day	Explanantion Code
New Mexico						
NM0028762	801	Aztec, City of / WTP	407.5	0.1625	0.1614	I
NM0020168	801	Aztec, City of / WWTP	253	0.584	0.61	M
NM0030317	801	Blanco MDWA / WTP	0	0	0	I-1
NM0028142	801	Bloomfield Municipal Schools	0	0	0	I-1
NM0030902	801	Bloomfield Water	0	0	0	I-2
NM0029319	801	Central Consolidated School District	385	0.033	0.05	I
NM0020770	801	Bloomfield, City of / WWTP	315	0.85	1.11	M
NM0000043	801	Farmington, City of / Animas Steam Plant	471.33	11.56	22.59	I-7
NM0028258	801	Farmington Sand & Gravel Co.	0	0	0	I-2
NM0020583	801	Farmington WWTP	398	5.15	8.95	M-5A
NM0020672	900	Gallup WWTP	-	2.25	9.97	M-4A
NM0029025	801	Harper Valley Subd.	372.4	0.4	0.05	M
NM0030953	801	Navajo Dam DWC & NSW, Inc	0	0	0	I-2
NM0027995	801	Oldcastle SW Group, Inc.		0.7	1.5	I-1
NM0028606	801	Public Service Co of NM - San Juan	0	0	0	I-2
NM0020524	900	Quivira Mining Company - Church Rock	0	0	0	I-1
NM0023396	900	Ramah Water & Sanitation Dist.	580	0.03	0.045	M-5
NM0029505	801	San Juan Coal Company - La Plata	0	0	0	I-2
NM0028746	801	San Juan Coal Company - San Juan	0	0	0	I-2
NM0030473	801	San Juan County McGee Park WWTP	0	0	0	I-1
NM0029432	801	Yampa Mining Co. (De-na-zin Mine)	0	0	0	I-1
NM0029475	801	Yampa Mining Co. (Gatew.)	0	0	0	I-1
Utah						
UTG040027	900	Alton Coal Development	-	0	0	I-2
UTG040007	600	Andalex Wildcat Loadout	-	0	0	I-2
UT0025674	600	Andalex-Pinnacle Coal Mine	1698	0.959	6.7	I-A
UTG640027	411	Ashely Valley WTP	-	-	-	M-6
UTG640003	411	Ashley Springs WTP	-	-	-	M-6
UT0025348	411	Ashley Valley Water & Sewer, Mechanical	522	2.5	5.44	M
UTG640019	802	Blanding Culinary Water Treatment	-	-	-	M-6
UTG040011	600	Canyon Fuel Co.- Banning Loadout	-	0	0	I-2
UT0024759	600	Canyon Fuel Co.- Dugout Mine	880	1	3.66	I-A
UT0023540	600	Canyon Fuel Co.- Skyline Mine	539	5.2	11.8	I-A
UT0022918	700	Canyon Fuel Co.- SUFCo Mine	661	4	11	I-5B
UT0023680	600	Canyon Fuel Co.-Soldier Creek Coal	-	0	0	I-2
UT0025828	300	Canyonlands by Night	3000	0.005	0.06	I
UT0025798	700	Capital Reef National Park	-	-	-	I-2
UTG040028	600	Carbon Resources-Kinney No. 2 Mine	-	0	0	I-2
UT0023663	710	Castle Valley SSD-Castle Dale	2188	0.08	0.73	M
UT0020052	710	Castle Valley SSD-Ferron	-	0	0	M-2
UT0021296	710	Castle Valley SSD-Huntington	1291	0.13	0.7	M
UTG040026	700	Consolodated Coal Co.-Hidden Valley Mine Site	-	0	0	I-2
UT0022616	700	Consolodated Coal Co.-Underground	3858	0.98	15.76	I-5B
UTG040006	700	Hiawatha Coal Co.-Bear Canyon Mine	1160	0.172	0.83	I
UT0020095	610	Duchesne City Corp.	961	0.082	0.33	M
UT0025801	610	Duchesne Valley	-	-	-	M-7
UTG640028	610	Duchesne Valley WTP	-	-	-	M-6
UTG640014	411	Dutch John WTP	-	-	-	M-6
UTG640012	600	E. Carbon City-Sunnyside CWTP	-	-	-	M-6
UTG640030	710	Emery WTP	-	-	-	M-6
UT0025712	300	Energy Queen Mine	-	0	0	I-2
UTG640039	710	Ferron WTP	-	-	-	M-6
UT0024368	710	Genwal Resources, Inc.-Crandall Canyon Mine	776	0.678	2.21	I-A
UTG640017	600	Green River WTP	-	-	-	M-6
UT0025232	600	Green River, City of	-	0	0	M-1

NPDES PERMITS

Colorado River Basin Salinity Control Forum

January 1, 2008 through December 31, 2010

NPDES PERMIT#	REACH	NAME of Discharging Facility	TDS Conc. AVG.(Mg/L)	Flow Rate AVG.(MGD)	Salt Load Tons/Day	Explanantion Code
UT0025771	600	Green River, City of	5395	1.05	23.6	M
UTG790021	905	Haycock Petroleum Remediation Site	4800	0.0075	0.15	I
UT0023094	600	Hiawatha Coal Co.	747	0.48	1.495	I-5B
UTG040019	600	Horizon Coal	367	0.48	0.735	I
UTG640040	710	Huntington WTP	-	-	-	M-6
UT0024015	411	Intermountain Concrete	1800	0.07	0.5	I
UT0023922	300	International Uranium Dension Mines	-	0	0	I-2
UTG040013	600	UEI Horse Canyon Mine (reclaimed)	-	0	0	I-1
UTG040024	600	UEI Lila Canyon Mine	-	0	0	I-2
UT0025488	600	J.W. Operating Corp.	-	0	0	I-1
UT0025534	710	James Canyon Well System	-	0	0	I-2
UTG640023	411	Manilla WTP	-	-	-	M-6
UT0020419	300	Moab, City of	407	0.954	1.81	M
UT0024503	802	Monticello	-	0	0	M-2
UTG640015	802	Monticello City (Culinary WTP)	-	-	-	M-6
UTG040004	600	Mountain Coal Co.-Gordon Cr. Mine (reclaimed)	0	0	0	I-1
UTG640008	610	Myton Community Water System	-	-	-	M-6
UTG040010	600	NEICO	-	0	0	I-2
UT0023001	610	Neola Town Water & Sewer Assoc.	-	0	0	M-2, M-3
UTG790014	600	Olsen-Durrant (Former Bulk Fuel Facility)	-	0	0	I-2
UTG790029	600	Former Circle C Store In Price	-	0	0	I-2
UTG790028	600	Bill Barrett Corp-Nine Mile Compressor Station	427	0.026	0.046	I
UTG640031	710	Orangeville WTP	-	-	-	M-6
UT0000094	600	PacifiCorp-Carbon Plant	2467	0.25	2.57	I-5B
UT0023604	710	PacifiCorp-Deer Creek Mine	472	0.5	0.98	I
UTG040009	710	PacifiCorp-Hunter Plant Coal Prep & Blend Facility	-	0	0	I-2
UT0025607	710	PacifiCorp-Huntington Plant	-	0	0	I-2
UT0023728	710	PacifiCorp-Trail Mountain Mine	-	0	0	I-2
UT0022896	710	PacifiCorp-Wilberg Mine	755	0.04	0.126	I
UTG640035	600	Price City WTP	-	-	-	M-6
UT0021814	600	Price River Water Imp. Dist.	1232	1.57	8.06	M
UTG640034	600	Price River WID	-	-	-	M-6
UTG040012	600	RAG Plateau Mining Corp.(reclaimed)	-	0	0	I-1
UTG040005	600	Savage Industries Coal Terminal (CV-Spur)	-	0	0	I-2
UT0025224	905	Springdale	815	0.2	0.68	M
UTG640021	905	St. George WTP	-	-	-	M-6
UT0024686	905	St. George, City of	1182	9.1	44.8	M
UTG040025	600	Star Point Refuse Pile(Sunnyside Cogen)	-	0	0	I-2
UT0024759	600	Sunnyside Cogen.	-	0	0	I-2
UTG070309	905	The Industrial Company (Millcreek project)	-	0	0	I-1
UTG640002	610	Tridell-Lapoint Water IDWTP	-	-	-	M-6
UTG130003	700	UDWR-Egan/Bicknell Fish Hatchery	186	10.14	7.87	I-5D
UTG130007	700	UDWR-Loa Fish Hatchery	174	8.9	4.17	I-5D
UTG130012	610	UDWR-Whiterocks Fish Hatchery	234	5.4	5.27	I-5D
UT0020338	411	USBOR-Flaming Gorge Dam	-	0.00265	-	M-3
UTG130001	411	USFWS-Jones Hole Fish Hatchery	185	7	5.4	I-5D
UTG640006	700	USNPS-Capitol Reef WTP	0	0	0	M-6
UTG640004	700	USNPS-Glen Canyon Hite WTP	0	0	0	M-6
UT0025810	300	Velvet Mine	-	0	0	I-2
UT0025640	600	West Ridge Resources Mine	1595	1.2	7.98	I-A
UTG040021	600	White Oak Mine (reclaimed)	-	-	-	I-1
UT0000035	411	Western Energy Operating-Ashley Valley Lease	1262	1.16	6.1	I-5B
UT0000124	411	Western Energy Operating-Pan American Lease	1354	0.9	5.08	I-5B
UT0021768	411	Western Energy Operating-T.Hall Lease	1800	0.4	3	I-5B

NPDES PERMITS

Colorado River Basin Salinity Control Forum

January 1, 2008 through December 31, 2010

NPDES PERMIT#	REACH	NAME of Discharging Facility	TDS Conc. AVG.(Mg/L)	Flow Rate AVG.(MGD)	Salt Load Tons/Day	Explanantion Code
Wyoming						
WY0026671	401	American Family Inn			0.00	M-1
WY0022128	401	B & R Mobile Home Village	239	0.22	0.22	M
WY0022888	500	Baggs Wastewater Lagoons	500	0.06	0.13	M
WY0020133	401	Big Piney Wastewater Lagoon	93.3	0.029	0.01	M
WY0030261	401	Black Butte Mine		0	0.00	M-2
WY0052515	401	Boulder Oilfield Waste Recycling Facility			0.00	M-2
WY0000094	401	Boulder Rearing Station	0		0.00	I-5D
WY0032697	411	Carter Creek Gas Plant			0.00	I-1
WY0023132	411	Company's Green River Plant(Church & Dwight)			0.00	I-6
WY0035301	401	County (Sweetwater) Picnic Grounds WTP			0.00	M-1
WY0035858	500	Cow Creek #1-X-12				I-1
WY0054038	500	Cow Creek CBNG Project			0.00	I-1
WY0042145	500	Cow Creek Unit	1800	0.03	0.23	I
WY0000086	401	Daniel Fish Hatchery	10		0.00	I-5D
WY0023124	401	Daniels Mobile Home Park			0.00	M-2
WY0021938	500	Dixon Wastewater Lagoon	200	0.05	0.04	M
WY0036021	500	Dixon Water Treatment Plant			0.00	M-1
WY0048437	500	Doty Mountain CBM Project			0.00	I-1
WY0035947	500	Dripping Rock Unit Well No 1			0.00	I-1
WY0022071	411	Fort Bridger Sewer District	345	0.2	0.29	M
WY0036153	411	Ft. Bridger Travel Stop		0	0.00	M-2
WY0022373	411	Granger Wastewater Lagoon			0.00	M-2
WY0020443	401	Green River Wastewater Lagoon	400	1.2	2.00	M
WY0000027	401	Green River-Rock Springs JPB Water Plant			0.00	M-2
WY0051152	401	James Hodder Feed Lot			0.00	I-2
WY0054224	401	Jensen Disposal Facility - New Fork Discharge	50		0.00	I
WY0054232	401	Jensen Disposal Facility - Sand Draw Discharge			0.00	I-2
WY0030350	401	Jim Bridger Mine	1200		0.26	I
WY0000051	411	Kemmerer Mine			1.00	I
WY0020320	411	Kemmerer Wastewater Treatment	506	0.45	0.95	M
WY0000116	411	Kemmerer Water Treatment Plant	262	0.1	0.11	M
WY0032689	401	Labarge Project Field			0.00	I-1
WY0032450	401	Labarge Project Shute Creek Site			0.00	I-1
WY0022080	401	LaBarge Wastewater Lagoon	<500	0.06	0.13	M-4B
WY0028886	401	Leucite Hills Mine			0.00	I-2
WY0020117	411	Lyman Wastewater Lagoon	547	0.3	0.68	M
WY0021997	401	Marbleton Wastewater Lagoon	100	0.4	0.17	M
WY0056847	500	Morgan Run Unit II			0.00	I--2
WY0022896	401	Mountain View Wastewater Lagoon	390	0.26	0.42	M
WY0020311	411	Naughton Plant	1300	3	12.50	I-5B
WY0033111	411	Phosphate Slurry Pump Station			0.00	I-1
WY0020656	401	Pinedale Wastewater Lagoons	166	0.875	0.61	M-4B
WY0056499	401	Pioneer Cryogenic Gas Plant	1250	0.02	0.10	I
WY0022357	401	Rock Springs WWTP	742	2.48	7.67	M-5
WY0044199	401	Silver Eagle Refinery			0.00	I-2
WY0027626	401	Skull Point Mine			0.00	I-1
WY0033448	401	Skull Point Sulphur Terminal			0.00	I-1
WY0023825	401	Stansbury Mine			0.00	I-2
WY0021806	401	Superior Waste Water Lagoon	<500		0.00	M-4B
WY0032727	401	Table Rock Village Wastewater			0.00	M-1
WY0052311	401	Wyoming Lodge	550	0.003	0.01	M

APPENDIX C

EPA NPDES Permits List

LEGEND

NPDES PERMITS
EXPLANATION CODES

COLORADO RIVER BASIN SALINITY CONTROL FORUM
Through December 31, 2010

NPDES permits are reviewed under two different criteria under Forum policy; these being municipal and industrial. In order for a permittee to be in compliance under the municipal criteria, the increase in concentration between inflow and outflow can not be greater than 400 mg/L. Forum industrial criteria 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

(M) Municipal user in compliance with Forum policy.

(M-1) Permit has expired or been revoked. No discharge.

(M-2) Permittee did not discharge during the reporting period.

(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.

Measurements of inflow are not consistent with Forum policy;

(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.

(M-5) Permittee is in violation of Forum policy in that there is an increase in concentration of >400 mg/L over the source waters.

(M-5A) The state is currently working to bring permittee into compliance.

(M-6) This permit requires no discharge or discharge only under rare and extreme hydrologic conditions. Thus, flow and concentration measurements are not required.

(M-7) Insufficient data to know the status of this permit.

INDUSTRIAL

(I) Industrial user in compliance with Forum policy.

(I-A) Industrial user in compliance with the Forum's salinity offset policy.

(I-1) Permit has expired or been revoked. No discharge.

(I-2) Permittee did not discharge during the reporting period.

(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.

(I-4) Either concentration or volume of outflow are not currently being reported, thus the permittee is in violation of Forum policy. It is not known if the discharge is in excess of the <1.00 ton/day requirement.

Permittee appears to be in violation of Forum policy in that discharge of salts is >1.00 ton/day.

(I-5A) No provision has been made allowing this violation of Forum policy.

(I-5B) Though discharge is >1.00 ton/day, in keeping with Forum policy the permittee has demonstrated the salt reduction is not practicable and the requirement has been waived.

(I-5C) The use of ground water under this permit is for geothermal energy and only heat is extracted. The intercepted salt and water are naturally tributary to the Colorado River System and hence, this discharge does not increase salt in the river. The permit is covered by the Forum's policy on intercepted ground waters.

(I-5D) This permit is in compliance with the Forum's policy for fish hatcheries. The use of the water is a one-time pass through, and the incremental increase in salinity is ≤ 100 mg/l.

(I-5E) This permit is for the interception and passage of ground waters and thus is excepted under the Forum's policy on intercepted ground waters .

(I-6) This permit requires no discharge or discharge only under rare and extreme hydrologic conditions. Thus, flow and concentration measurements are not required.

(I-7) Insufficient data to know the current status of this permit.

LEGEND (continued)

NPDES PERMITS
REACH DEMARCATIONS

COLORADO RIVER BASIN SALINITY CONTROL FORUM

In order to provide a better understanding of the location of the various NPDES permits and the geographical sequence in the Colorado River System, each of the following NPDES permits is identified with a Colorado River reach number. The reach numbers have their origin in the old CRSS river model. Though this model is no longer used, the reach numbers assist in understanding the general location of the permits. The reaches are defined as:

100	Upper Main Stem	from headwaters of Colorado River to Colorado River near Cameo
190	Taylor Park	from headwaters of Gunnison River to above Blue Mesa Reservoir
200	Blue Mesa	from above Blue Mesa Reservoir to below Blue Mesa Dam
210	Morrow Point	from below Blue Mesa Dam to Crystal Reservoir
220	Lower Gunnison	from Crystal Reservoir to confluence with Colorado River
300	Grand Valley	from Colorado River near Cameo to confluence with Green River
310	Dolores River	from headwaters of Dolores River to confluence with Colorado River
401	Fontenelle	from headwaters of Green River to Green River near Green River, WY
411	Flaming Gorge	from Green River near Green River, WY to confluence with White and Duchesne Rivers
500	Yampa River	from headwaters of Yampa River to confluence with Green River
510	White River	from headwaters of White River to confluence with Green River
600	Green River	Green River from confluence with White and Duchesne Rivers to confluence with Colorado River
610	Duchesne River	from headwaters of Duchesne River to confluence with Green River
700	Lake Powell	Colorado River from confluence of with Green River to Lees Ferry
710	San Rafael River	from headwaters of San Rafael River to confluence with Green River
801	Upper San Juan River	from headwaters of San Juan River to San Juan near Bluff
802	Lower San Juan River	from San Juan near Bluff to confluence with Lake Powell
900	Glen Canyon to Lake Mead	Colorado River from Lees Ferry to backwaters of Lake Mead
905	Virgin River	from headwaters of Virgin River to backwaters of Lake Mead
910	Lake Mead	from backwaters of Lake Mead to Colorado River below Hoover Dam
920	Lake Mohave	Colorado River from below Hoover Dam down to I-40 bridge
930	Lake Havasu	Colorado River from I-40 bridge to below Parker Dam
940	Parker Dam to Imperial Dam	Colorado River from below Parker Dam to above Imperial Dam
945	Imperial Dam	Colorado River from above Imperial Dam to Gila and Yuma users

EPA ADMINISTERED NPDES PERMITS
Colorado River Basin Salinity Control Forum
January 1, 2008 through December 31, 2010

NPDES PERMIT#	REACH	NAME of Discharging Facility	TDS Conc. AVG.(Mg/L)	Flow Rate AVG.(MGD)	Salt Load Tons/Day	Explanantion Code
* Permit issued to a federal agency or an Indian tribe and the responsibility of EPA						
** Issued by a tribal entity with delegation of the NPDES program						
CO0000086	220	HOTCHKISS NTL. FISH HATCHERY		3.88		I-5D
CO0022853	801	SOUTHERN UTE INDIAN TRIBE(E)		0.36		M-3
CO0034398	801	USDINPS-MESA VERDE NAT PARK (E)	271.17	0.105	0.119	M
CO0034622	801	USDINPS-MESA VERDE NAT PARK (E)				M-3
CO0034665	801	FOUR CORNER MATERIALS	163.33	1.949	1.33	I
CO0034959	801	IGNACIA PEAK WASTEWATER LAGOON				M-6
CO0034967	801	SOUTHERN UTE WATER TRTMNT PLNT				M-3
CO0034975	190	USNPS - Colorado National Monument				M-6
COG589201	801	TOWAOC WASTEWATER LAGOON				M-6
COG589202	801	WHITE MESA WASTEWATER LAGOONS				M-6
COG589203	801	TAWAOC WASTEWATER LAGOON 2				M-6
UT0000167	510	American Gilsonite Co.	2330	0.285	2.77	I-7
UT0025259	510	American Gilsonite Co.	2657	0.0000492	0.23	I
UT0025496	411	White Mesa Waste Water Lagoon				M-7
UT0023868	510	Ziegler Chemical and Mineral				I-7
AZ0021415*	940	COLORADO RIVER JOINT VENTURE	<400	1.2		M
AZ0021920*	802	NTUA/MANY FARMS		0.07		M-6
AZ0022471*	802	NTUA/KAIBETO		0.1		M-6
AZ0022560*	900	BIA/KEAMS CANYON		0.03		M-6
AZ0022802*	900	NTUA/ROUGH ROCK LAGOONS		0.007		M-6
AZ0024619*	900	HOPI INDIAN NATION/ UPPER VILLAGE OF MOENKOPI WWTP				M
NN0020133	803	Mountain States Petroleum				I-1
NN0020265**	802	NTUA/CHINLE	<400	0.783		M-
NN0020281**	802	NTUA/KAYENTA	<400	0.9		M
NN0020290**	900	NTUA/TUBA CITY	<400	1.1		M-6
NN0021555**	900	NTUA/WINDOW ROCK-FT.DEFIANCE	<400	1.32		M-6
NN0021610**	900	CAMERON TRADING POST		0.054		M-6
NN0022179**	900	PEABODY WESTERN COAL COMPANY/BLACK MESA COMPLEX				I
NN0022195**	900	NTUA/GANADO	<400	0.4		M
NN0024228**	900	NTUA/PINON WWTP				M
NN0030337**	900	BIA/LOW MOUNTAIN BOARDING SCHOOL	<400	0.014		M
NN0030339**		BIA/LUKACHUKAI COMMUNITY SCHOOL				M-6
NN0030341**		BIA/TORREON DAY SCHOOL				M-6
NN0110043**	802	BIA/NAZLINI BOARDING SCHOOL	<400	0.013		M
NN0110094**	801	BIA/TEEC NOS POS SCHOOL	<400	0.08		M
NN0110167**	900	BIA/HUNTERS POINT SCHOOL	<400	0.014		M
NN0110183**	900	BIA/SEBA DALKAI BOARDING SCHOOL	<400	0.01		M
NM0030520	801	Dulce, Village of		0.6		M-6
NN0000019	801	APS Four Corners Power Plant				I-7
NN0028193	801	BHP Navajo Mine				I-7
NN0020869	801	BIA Crystal Boarding School		0.015		M-6
NN0021016	801	BIA Lake Valley Boarding School		0.012		M-6
NN0020800	801	BIA Nenahnezad Community School		0.024		M-6
NN0020991	801	BIA Pueblo Pintado		0.016		M-6
NN0020958	900	BIA Wingate School		0.1		M-6
NN0029386	900	Chevron Mining, Inc. / McKinley Mine				I-7
NN0028584	801	Consolidation Coal Co Burnham Mine				I-7
NN0020621	801	NTUA Shiprock		1		M-6
NN0030335	900	NTUA Navajo Townsite		0.32		M-6
NN0030325	900	Ramah Navajo School Board - Pine Hill		0.035		M-6

APPENDIX D

Colorado River Simulation System Model Description

COLORADO RIVER SIMULATION SYSTEM MODEL DESCRIPTION

The Colorado River Simulation System (CRSS) is the official long-term basin-wide planning model used by Reclamation's Upper Colorado and Lower Colorado Regions to simulate future Colorado River system conditions. The model framework used for this process is a commercial river modeling software called RiverWare™; a generalized river basin modeling software package developed by the University of Colorado through a cooperative arrangement with Reclamation, the Tennessee Valley Authority and the U.S. Army Corps of Engineers.

CRSS was originally developed by Reclamation in the early 1970s and was implemented in RiverWare™ in 1996. The model projects future river and reservoir conditions on a monthly timestep over a period of decades into the future. CRSS has been used for most major modeling studies on the Colorado River, including several National Environmental Policy Act Environmental Impact Statements (EIS), most recently the Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead EIS. CRSS will be the primary modeling tool for system projections in Reclamation's Colorado River Basin Study under Water SMART.

There are numerous inputs to, and assumptions made by, CRSS with respect to future conditions on the Colorado River. The input data for CRSS includes hydrologic inflows, various physical process parameters such as the evaporation rates for each reservoir, initial reservoir conditions, and the future diversion and depletion schedules for entities in the Basin States and for Mexico. These future schedules are based on demand and depletion projections prepared and submitted by the Basin States. The rules of operation of the Colorado River mainstream reservoirs, including Lake Powell and Lake Mead, are also provided as input to the model. These sets of operating rules describe how water is released and delivered under various hydrologic conditions.

As the period of analysis increases, the uncertainty in these inputs and assumptions also increases. Therefore, a large amount of uncertainty in the corresponding outputs is expected. Consequently, CRSS is not used to predict future conditions, but rather to project what might occur. CRSS is particularly useful in making a relative comparison between hydrologic impacts from different operational alternatives by holding constant most inputs, as well as other key modeling assumptions, so as to isolate the differences due to each alternative. Also, sensitivity analyses that answer the question, "What is the sensitivity of the output to a particular set of inputs or assumptions?" are commonly performed.

Future conditions of the Colorado River system are most sensitive to assumptions with respect to future inflows. Because it is impossible to predict the actual future inflows into the system, a range of possible future inflows are analyzed and used to quantify the probability of occurrences of particular events (e.g., higher or lower lake elevations). This technique involves running multiple hydrologic sequences for each scenario or operational alternative. These sequences can be derived from a number of techniques. Reclamation has used techniques based on the historic observed flow record (1906-2007),

the paleo record derived from tree-rings (762-2005) and is currently working to develop techniques that will use 112 downscaled Global Climate Model (GCM) projections based on 16 unique GCMs.

The CRSS RiverWare™ model includes a salinity module to analyze salinity concentration throughout the Colorado River Basin. The salinity model simulates the effects of water development projects and the salinity control program (SCP) on future salinity concentration levels in the Colorado River. The salinity control criteria are purposely designed to be long-term and non-degradational goals, rather than exceedence standards such as those used for industry or drinking water. Efforts of the SCP are designed to meet the criteria by implementing, as needed, the most cost effective salinity control projects. This ensures that the salinity control criteria will continue to be met in the future, even with the salinity impacts produced by increasing Upper Basin depletions.

Salinity module inputs include salinity accompanying hydrologic inflows, initial reservoir salinity concentrations and estimates of salt loading due to agricultural return flows. Model results simulate annual average salinity concentrations at the numeric criteria stations downstream of Hoover Dam and Parker Dam and at Imperial Dam and can be used to analyze the probability of exceeding the numeric criteria in future years.

The salinity module within CRSS is intended for long-term (15 to 20 years) simulation and it is highly sensitive to initial conditions during the first 10 to 12 years. The model assumes salinity is a conservative water quality parameter, and reservoirs are modeled as fully mixed systems.

Modeling Assumptions for the 2011 Triennial Review

The following lists major modeling assumptions in a bulleted format for the 2011 Triennial Review. These assumptions reflect the January 2011 Configuration of CRSS. Documents referenced in these assumptions include the Final Environmental Impact Statement (Final EIS), Record of Decision (ROD) for Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead and Prairie and Rajagopalan's (2007) article entitled "A basin wide stochastic salinity model." Refer to these documents for additional detail regarding specific assumptions. All runs were performed using the Colorado River Simulation System (CRSS) long-term planning model.

<u>Key Assumptions Common to All Scenarios Updated Since the 2008 Triennial Review</u>

- Simulations performed from January 2011 through December 2030 at a monthly time step
- Initial conditions for all reservoirs are 2010 end-of-calendar year (EOCY) actual values
    - Includes pool elevation and reservoir salt concentration
- For modeling purposes, certain provisions (i.e., Shortage, Surplus, and Coordinated Operations) of the Interim Guidelines as adopted in the ROD (Section XI.G.) were extended 4 years from 2026 through 2030
- Future water demands for Upper Division water users are based on depletion projections prepared by the Upper Division states in coordination with the Upper Colorado River Commission (UCRC) dated December 2007
- Intentionally Created Surplus (ICS)
    - ICS creation and delivery schedules and initial ICS balances were updated in December 2009 by the Lower Division states

    - Rules for ICS activity remain unchanged from the ROD
- Water Quality Improvement Project's (WQIP) have been updated to reflect historic and projected control levels based on the Salinity Control Forum Science Team efforts completed January 2011

Description of 2011 Triennial Review Scenarios

1) Scenario 1

- Salinity controls currently built or under construction BUT without additional controls
- 1,205,125 tons of control in 2030

2) Scenario 2

- Salinity controls currently built or under construction AND with Plan of Implementation
- 1,850,000 tons of control in 2030

Other Assumptions Common to All Scenarios

1) Future hydrologic inflows are generated at 29 separate inflow points or nodes in the Colorado River watershed using the Indexed Sequential Method (Final EIS, Chapter 4.2.5). This technique is applied to the 103-year (1906 through 2008) historical record of calculated natural flows to produce 103 hydrologic inflow sequences or traces for each scenario.

2) Future salinity concentrations are generated at 20 nodes in Colorado River watershed using Reclamation's nonparametric natural salt model. The natural salt model includes annual (Upper Basin) and monthly (Lower Basin) regressions built with 1971-2008 natural flow and salt mass data. The natural salt model provides salt mass based on flows. Salt concentrations are computed from flow and salt mass. Prairie and Rajagopalan (2007) describes the methods used in the basinwide salinity modeling framework.

3) Salt loading values from agriculture are input as a constant tons per month. Variations in salt mass resulting from variation in flow conditions (high and low) are not considered; therefore, when computing natural salt we expect negative natural salt values.

4) Reservoirs upstream of Lake Powell are generally operated to meet monthly storage targets or downstream demands (Final EIS, Appendix A).

5) Lake Mead flood control procedures are always in effect.

6) Except during flood control conditions, Lake Mead is operated to meet downstream demands under the applicable water supply condition (Normal, Surplus, or Shortage).

7) If Lake Mead elevation falls below 1,000 feet, delivery to the Southern Nevada Water Authority (SNWA) is reduced to zero for that month.

8) Lake Mohave and Lake Havasu are operated in accordance with their existing rule curves.

9) Future water demands for Lower Division water users are based on depletion schedules prepared by the Lower Division states for the Final EIS (Final EIS, Appendix D).

10) Future water deliveries to Mexico are made as follows:

a. CRSS accounts for the entire delivery to Mexico at the Northerly International Boundary (NIB)

b. Mexico's annual delivery schedule is set to 1,500 kaf

c. An additional 7 kaf[1] is delivered at the NIB for a total annual delivery to Mexico of 1,507 kaf

d. Mexico's annual delivery schedule is set to 1,700 kaf during Flood Control

11) Brock Reservoir is assumed to operate every year and is assumed to conserve approximately 90 percent of the historical average of non-storable flows from 1964 through 2008 (excluding flood years). This reduces the volume of non-storable flows arriving at the NIB from 74 kaf to 7 kaf annually.

12) Bypass of return flows from the Wellton-Mohawk Irrigation and Drainage District to the Cienega de Santa Clara in Mexico is assumed to be 109 kaf annually (historical average from 1990 through 2008), and is not counted as part of the 1944 Treaty delivery to Mexico.

13) Yuma Desalting Plant is assumed to not operate.

[1] The estimated annual average volume of non-storable (excess) flows with the Brock Reservoir in operation

APPENDIX E

Colorado River Salinity Damage Model

COLORADO RIVER SALINITY DAMAGE MODEL

The Salinity Damage Model estimates the quantitative damages that are incurred in the metropolitan and agricultural areas in the Lower Colorado Basin that receive Colorado River water. The model estimates the impacts from salinity levels greater than 500 TDS on household water-using appliances, damages in the commercial sector, industrial sector, water utilities, and agricultural crop revenues. It also estimates the additional costs related to meeting statewide water quality standards for groundwater and recycled water use (Metropolitan Water District of Southern California (MWD) service area).

The model only estimates damages that can be quantified at the present time. For example, the model does not account for on-farm management costs related to high salinity levels or the costs associated with the replacement of low-tolerant crops to high-tolerant crops in the Lower Basin agricultural areas. There has been some initial investigation on the impact of high salinity levels on golf course turf in the southwestern portion of the United States. Currently, Reclamation is in the process of signing a memorandum of understanding with MWD to update and enhance the MWD portion of the salinity damage model. This cooperative effort hopes to identify other salinity damages that are not currently identified with the present model. Other areas for future research could be identifying the costs or damages due to salinity contribution to groundwater areas in the southwest and the management costs associated with brine removal.

The salinity damage model was updated from 2005 price levels to 2008 price levels. Population projections were updated also for the Central Arizona metropolitan areas, the Las Vegas/Clark County area, and the communities along the lower portion of the Colorado River in Nevada, Arizona and California.

The Colorado River Salinity Damage Model consists of a number of EXCEL spreadsheets. The initial worksheet displays some overall input data and the summary quantifiable dollar damages by economic sector and primary agricultural and metropolitan areas that receive Colorado River water.

I. Summary Salinity Input and Dollar Damage Output Sheet

The upper portion of this spreadsheet contains the salinity levels of the lower Colorado River that are measured at Hoover, Parker and Imperial dams. This data can come from actual sampling at these sites, or projected values can be obtained from the CRSS hydrologic salinity model. Also, this portion of the spreadsheet contains input data for present valuing damages that may occur in the future. The present value data consists of the latest Reclamation planning interest rate, base dollar year, and the projected year the damages are to be calculated.

The remaining portion of this spreadsheet displays the salinity levels and total damages (based on a 500 TDS salinity baseline) for each primary agricultural and metropolitan area that receives Colorado River water. There are six economic sectors: agriculture, households, commercial, water utilities, industrial and policy related (groundwater and recycled water requirements). The agricultural areas currently in the model are the Central Arizona Project, Arizona; La Paz County, Arizona; Yuma County, Arizona; Imperial County, California; Riverside County (non

MWD), California; and the MWD service area (covers all or portions of six southern California counties). The metropolitan areas currently in the model are: Maricopa County/Phoenix; Pima County/Tucson; Clark County/Las Vegas; the MWD service area; and lower Colorado River communities. Data is being incorporated into the model to include the Yuma, Arizona metropolitan area.

II. Summary Damage Calculation Sheet

In this spreadsheet, the dollar damages from each of the sectors and areas are displayed for the baseline salinity level (500 TDS) and the current or projected salinity levels. It is a rather large spreadsheet because it is linked to all the calculation spreadsheets. For example, the household damages are listed by metropolitan area and by household item for the baseline and current or projected salinity levels. Displaying the damage estimates in this manner aids in identifying particular household items or crops that are impacted by salinity damage functions differently or where salinity levels are higher in a particular area. The differences in dollar damages between the 500 TDS salinity level and the current or projected salinity level are summed by sector and by Lower Basin areas. This procedure estimates the current or projected damages which are greater than the damages at the 500 TDS level. To estimate the benefits of the Colorado River Salinity Control Program, a series of model runs are made based on the concept of "with versus without" additional salinity control projects being implemented in the Program. This application of the model uses salinity levels provided by the CRSS salinity model. The procedure is to estimate the difference in dollar damages from the 500 TDS baseline and TDS levels based on no additional salinity control projects and then estimate the difference in dollar damages based on TDS levels which include additional salinity control projects. With the inclusion of additional projects, salinity levels are less than the "without project" TDS levels and this results in lower dollar damages in the Lower Basin areas. The difference in dollar damages based on the "with versus without" project conditions are identified as the avoided damages, or simply the benefits of the Salinity Control Program with the implementation of the projects.

To convert the avoided damages (benefits) to a mg/L or tons of salt removed basis, the damages by area are summed for each numeric criteria diversion site, i.e., Hoover Dam, Parker Dam and Imperial Dam. For Hoover Dam, the difference in total dollar damages for the Las Vegas/Clark County area are converted to a mg/L basis using the difference in TDS levels for Hoover. This approach is done for the areas that receive Colorado River water at Parker Dam and at Imperial Dam and then summed to a total avoided damage per mg/L for the Lower Basin average. To convert the avoided dollar damages per mg/L to a per ton of salt removal basis, a conversion factor in tons per mg/L is used for each diversion point to calculate the avoided damages per ton of salt. The conversion factors for the diversion points are 13,100 tons/mg/L at Hoover, 9,900 tons/mg/L at Parker, and 8,300 tons/mg/L at Imperial. Again this is done for each diversion point and then summed to a total benefit value per ton of salt removed from the Lower Colorado Basin area.

III. Additional Input Data Sheets

The next two spreadsheets contain input data. The first spreadsheet contains data to calculate weighted average salinity levels based on different water sources with differing salinity levels for

the MWD service area and the Central Arizona area. The blending of water sources has a significant impact on the overall water quality that is used by residences, commerce, and industry as well as meeting groundwater and recycled water requirements. The second spreadsheet contains population and number of households projections for each of the metropolitan areas. This data contains the most current and projected population estimates. The population and household data is primarily used in the calculation of household and commercial damages.

IV. Damage Calculation Spreadsheets

The next six spreadsheets are linked to the other input spreadsheets to actually calculate the salinity damages for each sector and area covered by the model. Salinity crop yield or useful life functions are contained in these spreadsheets, which tie salinity levels to crop yields or product use. Below is a brief explanation of each damage spreadsheet:

A. Household Damage Spreadsheet

This spreadsheet consists of three parts. The first part (Part A) consists of the household items per unit average costs (e.g. water heater cost plus installation), number of units per household, and the salinity-useful life functions for each household item considered in the model. There are ten household items that are included in the model. These are: galvanized water pipe systems (older houses), water heaters, faucets, garbage disposals, clothes washers, dishwashers, bottled water, water softeners, water treatment systems, and soaps and detergents. Unit cost prices for each household item were obtained from sources on Internet websites such as Sears, Home Depot, Lowes or supermarkets in the local area. The number of units per household was obtained from the latest Census data for each metropolitan area considered in the model. Salinity useful life functions were developed to estimate the average life of a household appliance based on a given salinity level. Most of the useful life functions were taken from previous salinity research and can be found in the Milliken-Chapman study (1988). MWD had contracted for additional research of bottled water use, water softeners, and water treatment systems and found a relationship between these household items and salinity.

The second part (Part B) of this spreadsheet is the calculation of the useful life and average household costs based on a given salinity level that has been calculated in the input spreadsheet for weighted average salinity values of each metropolitan area in the model and the salinity functions in Part A.

The third part (Part C) of this spreadsheet takes the information from the other sections of the spreadsheet and calculates the total annual cost per household item for each of the areas considered by the model. From the input spreadsheet on population and number of households, the number of households per area is multiplied by the average cost per household item and then divided by the average life of the item or percentage of household use for that item at a given salinity level. The costs are summed for each metropolitan area and are linked to the summary damage spreadsheet.

B. Commercial Damage Spreadsheet

This spreadsheet has been changed from the original Milliken-Chapman study model when commercial damages were calculated as a percentage of household damages and added to the total household damage estimate. MWD and their contractor, Bookman and Edmonson, did some research based on the relationship between salinity and water use for commercial and institutional activities in their service area. MWD was able to collect commercial water use for particular uses such as sanitary, cooling, irrigation, kitchen, and other uses. Based on the type of commercial water use, salinity cost functions were developed. From MWD water resource management plans, projected commercial water use was used to calculate salinity damages in future years. From their research on household and commercial salinity costs, it was estimated that the percentage of commercial salinity related damages to household damages is approximately 26 percent. For the Phoenix area, a similar methodology was used to estimate commercial salinity damages. The advantage of the commercial water use methodology is that it ties salinity damages to actual commercial water use for a given area. Due to the lack of available data for types of commercial water use in the other metropolitan areas, the 26 percent of household damages is used as an estimate for commercial damages in those areas. Ongoing research is attempting to better estimate the commercial related salinity damages for the Las Vegas/Clark County area.

C. Industrial Damage Spreadsheet

From research done for the MWD Salinity Management Study, salinity damages can be calculated for industrial water use. Salinity damage functions were developed based on three major types of industrial water use: process water, boiler feed water, and cooling water. MWD was able to estimate the amount of water used for these industrial types of production. Related salinity costs are on a dollar per acre-foot per mg/L basis. A change in salinity from the 500 TDS baseline would show a change in salinity costs as it relates to industrial water use. This methodology was applied to the Phoenix and Tucson metropolitan areas to estimate industry salinity costs.

D. Utility Damage Spreadsheet

The MWD research estimated the per capita costs for capital investments in replacement of water production and distribution facilities. The salinity useful life functions that were developed for the Milliken-Chapman study model are used in this spreadsheet. The methodology is similar to the household damage spreadsheet. The per capita costs for water production and distribution costs are divided by the average life of the facilities, based on the given salinity level, and then multiplied by the metropolitan population for time period.

E. Agricultural Damage Spreadsheet

This spreadsheet estimates the change in gross revenue due to a change in crop yields of salt sensitive crops that receive Colorado River water in the Lower Basin. The

agricultural areas considered by the model are irrigated lands in the Central Arizona Project; La Paz County, Arizona; Yuma County, Arizona; Imperial County, California; Riverside County (non MWD), California; and MWD service area irrigated lands. This spreadsheet consists of three parts in calculating the salinity costs associated with crop yields.

The first part consists of the salinity-crop yield functions that were derived from a 1998 Reclamation study, *Final Report, Crop Salinity Estimation Procedures*. For the MWD, ten salinity-crop yield functions were used to estimate changes in crop yield due to changing salinity conditions of irrigation water in the service area. For the remaining irrigated areas in the Lower Basin, fourteen salinity-crop yield functions were selected due to their lower tolerances to salinity.

The next part of the spreadsheet consists of the irrigated crop acreages and crop prices. These were updated to year 2007 prices and acreages for the Central Arizona areas and Imperial County and Riverside County outside of the MWD service area.

The final part takes the above data and estimates the gross crop revenue based on the crop yield per acre at a given salinity level and the price per unit per acre times the total irrigated acres for that crop. This method is done to estimate the gross crop revenue at the 500 TDS baseline salinity level and the given salinity level to estimate the salinity damages.

Research data from the Central Arizona Salinity Study (CASS) was collected for CAP irrigated acres in the Phoenix area to identify for management costs associated with flushing out salts that build up in the soil. This would reduce the impact on yield but would add to the costs of salinity due to the additional purchase of water. It is hoped that more research can be conducted to identify these types of costs in other agricultural areas in the Lower Basin.

F. Policy Related Spreadsheet.

This spreadsheet is based on research conducted by MWD for their *Salinity Management Study* (June, 1999). One of the purposes of the MWD study was to conduct extensive research on the costs associated to meet groundwater and recycling requirements within their service area. The model calculates the costs of removing salts to maintain water quality requirements for groundwater and recycled water that is used extensively in their service area. MWD was able to estimate the amount of water that drains into the groundwater system and the amount that is used for recycled water purposes. To meet regional water quality standards for these types of water sources, MWD was able to develop salinity cost functions (costs to desalt these sources of water) that could estimate the costs at given salinity levels. As of now, this methodology has not been extended to other metropolitan areas in the model.

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