Sent 3/11/82

3665

STATE OF COLORADO

COLORADO WATER CONSERVATION BOARD
Department of Natural Resources
823 State Centennial Building
1313 Sherman Street
Denver, Colorado 80203
Phone: (303) 866-3441

QUARTERLY REPORT

on the

208 CLEAN WATER GRANT

for the

WATER QUALITY CONTROL DIVISION

of the

COLORADO DEPARTMENT OF HEALTH

prepared by the

COLORADO WATER CONSERVATION BOARD

March 4, 1982

3666

STATE OF COLORADO

COLORADO WATER CONSERVATION BOARD
Department of Natural Resources
823 State Centennial Building
1313 Sherman Street
Denver, Colorado 80203
Phone: (303) 866-3441

March 4, 1982

Mr. Gary Broetzman, Director
Water Quality Control Division
Department of Health
4210 East 11th
Denver, CO 80220

Subject: 208 Clean Water Grant

Dear Gary:

In accordance with the contract between our agencies concerning the above subject, I have attached a copy of our quarterly report and a tabulation of our "in-kind" expenses for September, October, November and December, 1981.

If you have any questions, please feel free to give me or Dan Law a call.

Sincerely,

Signed & sent 3/11/82 DL

J. William McDonald
Director

JWM/gl

Attachments

D188
let/208

TABLE OF CONTENTS

208 Clean Water Grant
Summary of September Through December Activities

Work under this contract was initiated in September, 1981 with the personnel selection process. Over 40 applications were received and 23 were given an oral examination. The top five candidates were interviewed and an offer was extended to one individual. The individual, Dean Stindt, accepted the offer and began working on October 5. Mr. Stindt has a Bachelors of Science degree in Natural Resources Management and has worked for the Office of Surface Mining for two and one-half years.

In order to get Mr. Stindt acquainted with the salinity control program in the Colorado River Basin, a thorough review of several different reports was required. Once this was accomplished, work was begun on the four items listed in the "Scope of Services" in the contract. Initial emphasis was placed on existing projects and their cost-effectiveness and the inventorying and review of NPDES permits. While conducting this work, Mr. Stindt wrote several memoranda which are attached in the order they are discussed.

The initial project involved a review of all completed feasibility and planning studies authorized by Title II of the Colorado River Basin Salinity Control Act (Public Law 93-320). The review focused on the cost-effectiveness of the various salinity control proposals. Since planning on many of the projects was initiated several years ago, cost estimates were updated to current levels. The cost-effectiveness analysis is presented in a memorandum, dated November 2, 1981. The individual salinity control proposals are listed as they decrease in cost-effectiveness. The federal agency responsible for conducting the study is identified, and, where applicable, the title and date of the source document is also included. The second part of the analysis graphically depicts the cumulative cost-effectiveness ($1,000/mg/1/yr.) for all proposals and the resultant cumulative reduction in salt concentration (mg/1) at Imperial Dam.

As a follow up to the cost-effectiveness analysis, narrative status summaries were prepared for each of the salinity control units identified in Title II of PL 93-320. For each unit, the summary identified the location, total area involved, a description of the various salinity sources and a quantification of salts contributed by each source. This is followed by a

description of the recommended or selected plan as determined by the investigating agency. Where determined, the updated cost-effectiveness of each proposal is discussed as well as anticipated reductions in salt concentrations at Imperial Dam. Each summary is concluded by a statement regarding the current status of the investigation.

Work activities during the remainder of the quarter centered around an investigation of the significance of municipal and industrial discharges to Colorado River salinity which was based on information from the NPDES permit program. Initially, all Colorado municipal and industrial discharges to the Colorado River Basin were identified. Monitoring records for these permits were then examined to determine the availability of flow and total dissolved solids (TDS) data. Where this data was available, the cummulative annual salt loading was then calculated for the discharge point. Total flows, average TDS concentrations, and total salt yields were then used to assess the significance of these discharges relative to other sources of salinity. The investigations and conclusions reached are presented in memoranda dated November 30, 1981, and December 23, 1981.

Work in the next quarter will concentrate on the collection, review, and analysis of salt loading information from several sub-basins of the Colorado River within Colorado. The information will be gathered from published reports and from personal interviews where possible. Conflicts and/or gaps in the data will be determined.

gl

208 Clean Water Grant
Matching "In-Kind" Expenses

September 1981 -

J. William McDonald:
The major topics of work included the ongoing Grand Valley Project and amendments to PL 93-320.

11 Hours @ $24.28 = $267
Travel Expenses = $216
Total $484

Daniel L. Law:
The major topics of work included amendments to PL 93-320, funding of salinity gaging stations and selection of personnel for the subject grant.

48 Hours @ $18.12 = $870
Travel Expenses = $110
Total $980

Total September Expenses $1464

October 1981 -

J. William McDonald:
The major topics of work included preparation for and attendance at the Colorado River Basin Salinity Control Forum's meeting in Yuma, Arizona and amendments to PL 93-320.

27 Hours @ $24.28 = $656
Travel Expenses = $265
Total $921

Daniel L. Law:
The major topics of work included included amendments to PL 93-320, supervision of grant person and review of salinity studies.

36 Hours @ $18.12 = $652
Total $652

Total October Expenses $1573

November 1981 -

J. William McDonald:
The major topics of work included amendments to PL 93-320 and review of the Lower Gunnison Salinity Control Unit Report.

8 Hours @ $24.28 = $ 194
Total $ 194

Daniel L. Law:
The major topics of work included amendments to PL 93-320, review of the Lower Gunnison Salinity Control Unit Report, attendance at and preparation for the Glenwood-Dotsero Springs planning team meeting and supervision of grant person.

47 Hours @ $18.12 = $ 852
Travel Expenses = $ 114
Total $ 966

Total November Expenses = $1160

d188
tab/208

December 1981 -

J. William McDonald: 5 Hours @ $24.38 = $121
The major work topics was Total $121
the review of water quality
standards for salinity for the Water
Quality Control Commission.

Daniel L. Law: 21 Hours @ $18.12 = $381
The major topics of work included Travel Expenses = $ 3
amendments to PL 93-320, review of Total $384
the Mancos River Salinity Proposal
from the Soil Conservation Service,
review of water quality standards for
salinity for the Water Quality
Control Commission and supervision
of grant person.

Total December Expenses = $505

"In-Kind" Expense Summary

September	$1464
October	$1573
November	$1160
December	$ 505
Total	$4702

3672

MEMORANDUM

COLORADO WATER CONSERVATION BOARD
J. William McDonald
Director

TO: Dan Law

FROM: Dean Stindt DS

DATE: November 2, 1981

SUBJECT: Cumulative Cost-Effectiveness Analysis for Various Salinity Control Proposals

The subject analysis is presented in two parts. The first part lists all salinity control proposals for which cost-effectiveness determinations have been made. Many of these determinations are very preliminary and subject to change as proposals are modified or more information becomes available. The various proposals are listed in order as they decrease in cost-effectiveness. The agency responsible for developing individual proposals has been identified and, where applicable, the title and date of the source document has been included. Since planning on many of the projects was initiated several years ago, the cost estimates used are now outdated. All costs, for the purpose of this analysis, have been updated to July 1981 levels using the Bureau of Labor Statistics-Consumer Price Index Historical Table (1967=1.00).

The second part of the analysis graphically depicts the cumulative cost-effectiveness ($1000/mg/L/gr) for all proposals and the resultant cumulative reduction in salt concentration (mg/L) at Imperial Dam. It should be noted that several of the less cost-effective proposals represented on the graph have been temporarily deferred due to pbor cost-effectiveness.

Salinity control projects have been considered by the Bureau of Reclamation for the Crystal-Geyser Unit and the Colorado River Indian Reservation. The proposal for the Crystal-Geyser Unit is no longer being considered due to poor cost-effectiveness. It has also been determined that irrigation return flows from the Colorado River Indian Reservation do not contribute to the salt load in the Colorado River so that further consideration for this project has been discontinued (USBR-Concluding Report-October 1979). Neither of these Units was considered in this analysis.

DS:cs

Cost-Effectiveness of Various Salinity Control Proposals

1. Virgin River Unit - Virgin Valley Study Unit (SCS)
   Proposal: On farm program - water management
   Source: SCS Draft Report (preliminary figures - Final Report is due November 1981)
   Cost-Effectiveness: $130,000/mg/l/year
   6 mg/l reduction at Imperial

2. Grand Valley Unit (SCS)
   Proposal: On farm irrigation improvements and off farm lateral lining
   Source: Supplement #1 - Final Report of the Grand Valley Salinity Study - March 1980
   Cost-Effectiveness: $167,000/mg/l/yr
   24 mg/l reduction at Imperial

3. Paradox Valley Unit (BuRec)
   Proposal: Deep well injection
   Source: Feasibility Study - Deep Well Injection of Brine - Paradox Valley Unit - April 1981 (prepared for BuRec by Williams Brothers Engineering Co.)
   Cost-Effectiveness: $175,000/mg/l/yr
   18.2 mg/l reduction at Imperial

4. Big Sandy River Unit (SCS)
   Proposal: Land retirement - on farm improvements
   Source: Big Sandy River Salinity Control Study November 1980
   Cost-Effectiveness: $209,000/mg/l/year
   14.3 mg/l reduction at Imperial

5. Palo Verde Irrigation District Unit (BuRec)
   Purpose: On farm improvements and lateral lining
   Source: Special Report - July 1981
   Cost-Effectiveness: $255,000/mg/l/yr
   7.9 mg/l reduction at Imperial

6. McElmo Creek Unit (SCS)
   Proposal: On farm program - irrigation systems improvement (sprinklers)
   Source: In-house, very preliminary estimates, provided by SCS in Denver
   Cost-Effectiveness: $400,000/mg/l/year
   5 mg/l

7. McElmo Creek Unit (BuRec)
   Proposal: Off farm canal and lateral lining
   Source: Special Report - July 1981
   Cost-Effectiveness: $474,000/mg/l/year
   6.1 mg/l reduction at Imperial

8. Virgin Valley Unit - Moapa Valley Study Unit (SCS)
   Proposal: Off farm canal and lateral lining - on farm irrigation systems improvements
   Source: USDA Salinity Control and Environmental Assessment - Moapa Valley - February 1981
   Cost-Effectiveness: $489,000/mg/l/year
   2.0 mg/l reaction at Imperial

9. Uintah Basin Unit (BuRec)
   Option #2 (no use of saved water
   Proposal: Selective canal and lateral lining
   Source: Status Report - July 1981
   Cost-Effectiveness: $518,000/mg/l/yr
   7.3 mg/l reduction at Imperial

10. Grand Valley Unit - Stage I - (BuRec)
    Proposal: Canal and lateral lining
    Source: Stage I Development - DPR - March 1980
    Cost-Effectiveness: $607,000/mg/l/year
    2.5 mg/l reduction at Imperial

11. Uintah Basin Unit (SCS)
    Proposal: On farm program - improved irrigation systems
    Source: USDA Salinity Report - January 1979
    Revised November 1980
    Cost-Effectiveness: $665,000/mg/l/year
    10.3 mg/l reduction at Imperial

12. Glenwood - Dotsero Springs Unit (BuRec)
    Proposal: Collection/Evaporation ponds
    Source: Engineering Appraisal level Design/Estimates and Environmental Assessment - April 1981 (prepared for BuRec by URS Corp.)
    Cost-Effectiveness: $698,000/mg/l/year
    26 mg/l reduction at Imperial
    (costs are preliminary and middle of the range identified in contractors report)

13. Lower Gunnison Unit (BuRec)
    Proposal: Canal/lateral lining
    Source: USBR Feasibility Study - October 1981
    Cost-Effectiveness: $722,000/mg/l/year
    15.2 mg/l reduction at Imperial

14. Las Vegas Wash Unit - Stage I (BuRec)
    Proposal: Evaporation ponds
    Source: Stage I - DPR - November 1978
    Cost-Effectiveness: $761,000/mg/l/year
    4 mg/l reduction at Imperial
    (construction has been deferred - project is being re-evaluated and reformulated)

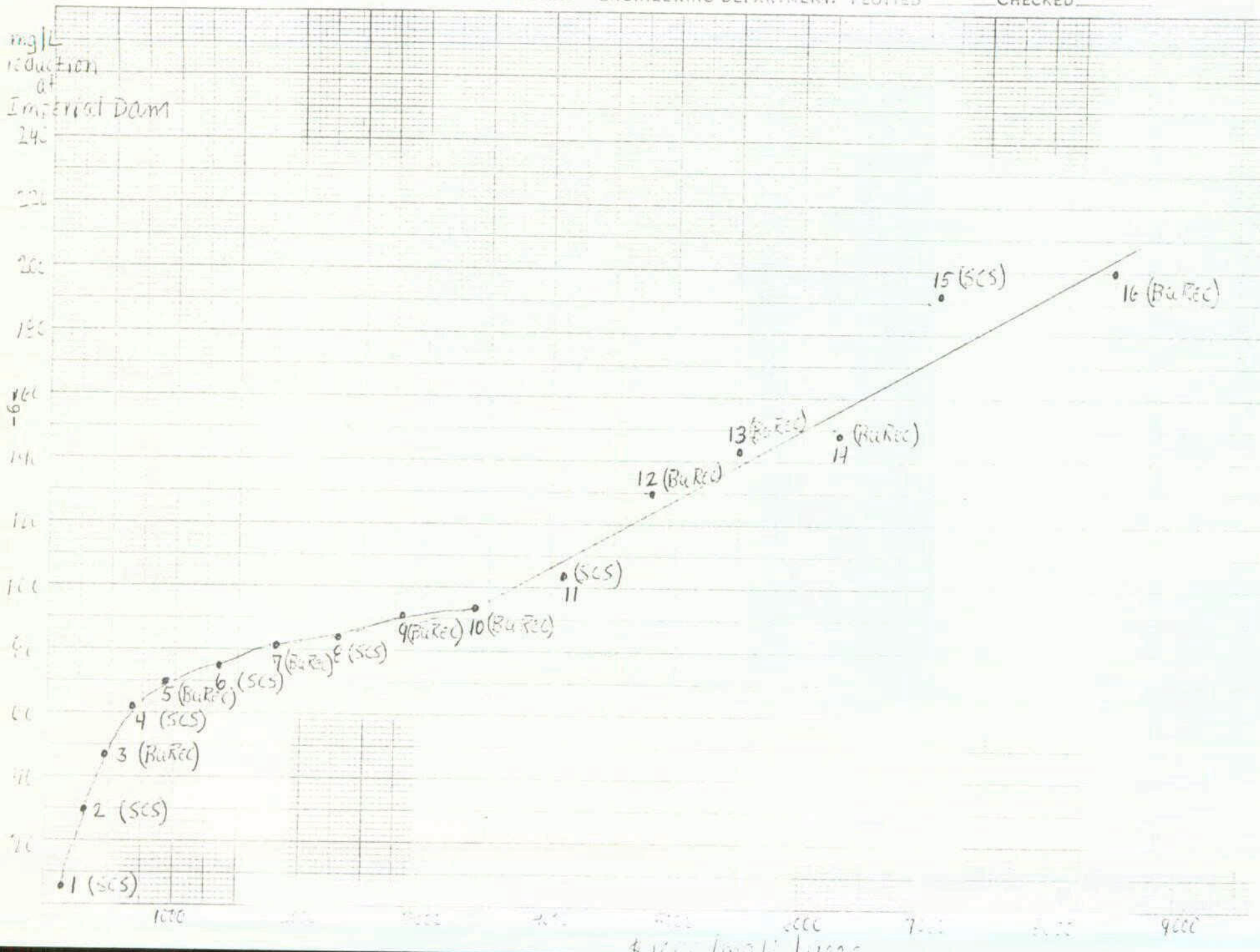
15. Lower Gunnison Unit (SCS)
    Proposal: On farm management and ditch lining
    Source: Draft Irrigation Improvements Planning Report - May 1981
    Cost-Effectiveness: $805,000/mg/l/year
    43.8 mg/l reduction at Imperial

16. LaVerkin Springs Unit (BuRec)
    Proposal: Desalting/Evaporation ponds
    Source: Concluding Status Report - December 1979
    Cost-Effectiveness: $1448,000/mg/l/year
    8.4 mg/l reduction at Imperial
    (construction has been indefinitely postponed due to poor cost-effectiveness)

DS:cs
10/29/81

Cumulative Cost-Effectiveness ... for Various Salinity Control Proposals

STATE OF COLORADO WATER CONSERVATION BOARD -- ENGINEERING DEPARTMENT. PLOTTED _____ CHECKED _____



3676

3677

MEMORANDUM

COLORADO WATER CONSERVATION BOARD
J. William McDonald
Director

TO: Dan Law

FROM: Dean Stindt DES

DATE: December 9, 1981

SUBJECT: Colorado River Salinity Control
Proposal Summaries

The following reports will serve to summarize and update the status of the various salinity control units identified in Title II of Public Law 93-320. Background information such as the location of the unit, total area (acres) included in the unit, a description of the various salinity sources, and a quantification of salts contributed by each source is presented initially. This is followed by a description of the recommended or selected plan as determined by the investigating agency through public participation. The cost-effectiveness as well as the anticipated reductions in salt concentration at Imperial Dam for each proposal is discussed. The summary is concluded with an assessment updating the progress of the investigation, planning, or construction stage associated with each unit.

The Soil Conservation Service is responsible for investigating all on-farm salinity programs. The Bureau of Land Management conducted the Sinbad Valley Unit investigation. The Bureau of Reclamation is responsible for the remaining investigations and resultant proposals.

DS:cs

BIG SANDY RIVER UNIT - WYOMING

The Big Sandy River Unit is located in southwestern Wyoming along the Big Sandy River which flows into the Green River. The unit involves the Eden Project area near the towns of Farson and Eden in Sweetwater County.

The project seeks to reduce salt pickup from seeps and springs along a 15-mile reach of the Big Sandy River west of Eden. To date, 100 wells have been drilled ranging in depth from 30 to 1,600 feet. These investigations indicate that the seeps total 20 to 30 cubic feet per second and are mainly from an aquifer which is 50 to 60 feet deep near Big Sandy Reservoir and which surfaces several miles downstream from Farson. The salt from the seeps is believed to result from excess irrigation water leaking through the shale of the Green River Formation. The seeps have a salt concentration that range from 3,000 to 5,000 mg/L which would result in an annual load of over 110,000 tons. This results in an increased salt concentration of 9 mg/L at Imperial Dam.

The Bureau is investigating off-farm methods of salinity control through a professional services contract awarded in July, 1981. Energy companies have indicated an interest in the use of Big Sandy water for coal-related energy development, and the contractor is expected to address this potential as well as alternative collection and disposal plans.

Among the least popular alternatives with the local people is the land and irrigation retirement plans. The state of Wyoming is concerned about an evaporation ponds proposal since this could involve over 13,000 acre-feet of water. The state would rather have the water used for industrial purposes although a coal slurry pipeline is not favored.

The public involvement program is being developed so that the selection of a recommended plan can be accomplished by the summer of 1982. The feasibility report is scheduled for completion in November 1984.

(updated 11/23/81)

DS:cs

Big Sandy River Unit (SCS) - Wyoming

The Soil Conservation Service released their Big Sandy River Salinity Control Study in November, 1980. It was determined that the Big Sandy River contributed about 149,000 tons of salt to the Colorado River annually. Of that total, approximately 125,000 tons were contributed as a result of inefficient on-farm irrigation practices while natural runoff, erosion, and seeps contributed an additional 24,000 tons annually.

The selected plan would involve retiring 13,700 acres of farmland from irrigation. Three pumping plants would be installed along the Big Sandy River and a distribution pipeline would deliver water to irrigate the remaining 2000 acres. Of the 2000 acres, 90 acres would have no structural improvements, 420 acres would have minimal structural improvements, 880 acres would have automatic border and sprinkler irrigation, and 610 acres would have a reduced water supply. Completed implementation of the plan would result in a 14.3 mg/L reduction at Imperial Dam at a cost of $209,000 mg/L/year.

To this time, no steps toward implementing the selected plan have been made. The Wyoming State Engineer's Office was not satisfied with the report recommendations and implementation has been indefinitely delayed pending further consideration from that office.

DRS/ql

12/8/81

COLORADO RIVER INDIAN RESERVATION UNIT - ARIZONA

The Colorado River Indian Reservation is located in the lower Colorado River Basin below Parker Dam in northern Yuma County, Arizona, and the eastern part of San Bernardino and Riverside Counties in California. It has a total of 268,850 acres of land with 107,588 of this total being designated as irrigable. The United States Supreme Court allocated a maximum diversion of 717,148 acre-feet. In 1978, 75,405 acres were irrigated with Colorado River water from Headgate Park Dam. This area is served by 200 miles of canals and 100 miles of drainage canals.

A salinity control study was conducted on this area to determine its effect on the river's salinity. The analysis of the inflow and outflow indicated that there was no net salt contribution to the river. Consequently, the investigation was terminated and the concluding report was released in October, 1979. Monitoring will continue.

(updated 11/23/81)

DS:cs

CRYSTAL GEYSER UNIT - UTAH

Crystal Geyser is a privately owned and abandoned oil test well which is located 3.5 miles south of the Town of Green River along the east bank of the Green River. It is estimated that this geyser, which erupts on 5-hour intervals due to accumulation of carbon dioxide buildup, discharges approximately 150 acre-feet of water and 3,000 tons of salt annually to the Colorado River System. The concentration of the discharge brine ranges from 11,000 to 14,000 mg/L.

The salinity control plan for this unit was to collect and convey the flows to evaporation ponds about 3 miles downstream. A compacted earth embankment would be constructed on the stream side of the geyser to collect and temporarily store the water from the eruptions. A plastic pipe would convey this water to the lined evaporation ponds. This plan would eliminate the entire 3,000 tons of salt from the river system, and would reduce the salt concentration at Imperial Dam by 0.3 mg/L.

The Definite Plan Report, Environmental Assessment, and Negative Determination of Environmental Impact are complete and were submitted in June, 1976. Construction on this unit has been delayed indefinitely due to high costs and low cost-effectiveness.

(updated 11/20/81)

DS:cs

DIRTY DEVIL UNIT - UTAH

The Dirty Devil River is located in south central Utah and has a drainage area of about 4,200 square miles. The Dirty Devil River is formed by the confluence of the Fremont River and Muddy Creek.

The irrigation of alluvial soils derived from shales is the main contributor of salinity in the basin. The annual salt load of the Dirty Devil River is estimated at 200,000 tons. The estimated amount of salt that could be removed is 80,000 tons which would reduce the salinity concentration at Imperial Dam by about 5 mg/L.

Various investigations and studies have been conducted since 1974. In March 1981, a work statement was prepared. Shortly thereafter, a literature search regarding all aspects of the unit began and data collection continued. The feasibility report and environmental impact statement is due for completion in 1985.

(updated 11/24/81)

DS:cs

GLENWOOD-DOTSERO SPRINGS UNIT - COLORADO

The Glenwood-Dotsero Springs Unit is located in western Colorado in Eagle and Garfield Counties. It covers a narrow stretch of canyon along the Colorado River between Dotsero and New Castle. Glenwood Springs lies within the study area and is located about 13 miles east of New Castle and 18 miles west of Dotsero.

This area contributes approximately 500,000 tons of salt annually to the Colorado River. It is estimated that about 50 percent of this salt comes from 18 identified mineral springs in the area. If the springs could be controlled and the salt removed, the salt concentration at Imperial Dam would be reduced by 23 mg/L. This is the second largest source of salinity in the state of Colorado, with an annual discharge of approximately 25,000 acre-feet.

The project is currently in the feasibility stage with collection and chemical analysis of the springs and the determination of flow quantities already completed. The Bureau and its contractor, URS Corporation, have identified five specific candidate plans:

Candidate Plan	TDS change at Imperial Dam (mg/L)	Cost-effectiveness ($ per mg/L/a)
1. Reverse osmosis desalting of Glenwood Springs surface and subsurface water at Silt, Colo.	-22.7	$1,000,000
2. Natural evaporation of Glenwood and Dotsero surface water at Mack, Colo.	-25.7	700,000
3. Natural evaporation of Glenwood surface water only at Mack, Colo.	-17.6	500,000
4. Enhanced (spray) evaporation of Glenwood and Dotsero surface water at Silt, Colo.	-25.7	525,000
5. Enhanced (spray) evaporation of Glenwood surface water at Silt, Colo.	-17.6	489,000

In all the candidate plans, there appear to be opportunities for staging and/or sizing to accommodate future uses of saline water for energy development. These plans will be further refined at the appraisal level for use in public meetings scheduled for the end of this year.

The Regional Director's proposed feasibility report is scheduled for midcalendar year 1984 and Commissioner's report seeking authorization is scheduled for early 1985.

(updated 11/13/81)

DS:cs

GRAND VALLEY UNIT - COLORADO

The Grand Valley Unit is located in the western portion of Mesa and Garfield counties in western Colorado. Grand Junction in the southern part of the valley is the largest Colorado city west of the Continental Divide. The area has about 71,000 acres of irrigated land with 38,000 of these acres served by the Grand Valley project.

The valley was carved into the Mancos Shale formation by the Colorado River and its tributaries. This salt bearing shale is very thick, and as a result, it is estimated that the valley contributes 780,000 tons of salt annually to the Colorado River. It is estimated that 300,000 tons of this salt is contributed by on-farm irrigation practices and systems.

The selected plan for removing a portion of this salt includes better management practices and physical improvements including canal lining, land leveling, subsurface drains and changing to drip or sprinkler irrigation systems. It is estimated that 410,000 tons of salt could be removed with the implementation of this program. This would reduce the salt concentration at Imperial Dam by 43 mg/L.

Stage One of this project, which covers about 10% of the overall unit area, was initiated during the winter of 1980-81. The construction involved the lining of 6.8 miles of the Government Highline Canal. Additional work under Stage One will involve the consolidating of 13 laterals that now serve the recently lined section of canal into 11 and placing them in pipe sections. The contract for this work has been awarded and is expected to take 2 years for completion. A series of detention ponds and an interceptor ditch have been constructed above the lined canal section. A field station was constructed for use as project headquarters for the entire unit. It is estimated that Stage I will reduce the salt load by 24,000 tons per year and will lower the salt concentration by 2.5 mg/L of Imperial Dam. The estimated cost for this salinity reduction is $607,000 per mg/L (July '81).

Planning for Stage II of the Grand Valley Unit has been initiated with the issuance of the plan of study and the public involvement programs. That planning is being scheduled such that as Definite Plan Report and Draft Environmental Statement will be available in early 1985, allowing for a construction start on Phase II in fiscal year 1986.

(updated 11/20/81)

DS:cs

Grand Valley Unit (SCS) - Colorado

In December, 1977, the Soil Conservation Service presented its "On Farm Program for Salinity Control" in the Grand Valley Unit. Investigations revealed that the Grand Valley contributes about 700,000 tons of salt annually to the Colorado River. Approximately 300,000 tons of this total was attributed to inefficient on-farm irrigation practices and systems while runoff and erosion from upland areas adds an additional 80,000 tons.

The selected plan recommends management in addition to physical improvements for both irrigated lands and grazed non-irrigated lands. The plan is comprised of individual conservation plans to be implemented by farmers and ranchers on land under their ownership or control. Management practice improvements on irrigated lands include regulating size of streamflow, number of irrigations, and duration and frequency of each irrigation. Similar practices to be implemented on non-irrigated lands include regulating the number of grazing animals, the season of grazing, and the duration of grazing.

Ditch lining or pipelines, land leveling, subsurface closed drains, and drip or sprinkler irrigation were identified as physical improvements for irrigated lands while range seeding, fencing, stockwater development, erosion control dams, and gully plugs are just a few of the physical improvements planned for non-irrigated grazing lands.

The initial on-farm program was modified in 1979 to include the lining of 190 miles of off-farm laterals necessary for proper functioning of the on-farm improvements.

The program specifies a 10-year implementation plan that when completed could reduce salt loading in the Colorado River by 230,000 tons/year. The salt concentration at Imperial Dam could be reduced by 24 mg/L at a cost of $167,000 mg/L.

The 10-year implementation plan is in its fourth year. Forty-four projects are under construction and 52 others are ready for construction. Some 142 management improvement practices have been completed. Approximately 140,000 feet of on-farm laterals have been lined or laid in pipeline since the programs inception and nearly 124,00 feet of that was installed in Fiscal Year 1981. In addition, 63,000 feet of off-farm laterals have been lined and 1400 acres of land have been leveled. Several hundred automated irrigation systems have been installed.

DRS/gl

12/7/81

LA VERKIN SPRING UNIT - UTAH

La Verkin Springs is located on the Virgin River in the southwestern corner of Utah. It has a flow of about 11.5 cubic feet per second and a salinity concentration of 9,650 mg/L which amounts to 109,000 tons annually.

A feasibility report was forwarded to the Commissioner's Office in December, 1974, which proposed collecting and desalting the springs and then evaporating the remaining brine in ponds. The salt load would have been reduced by 103,000 tons and the salinity at Imperial Dam by 10 mg/L. However, due to high costs and a possible hydraulic connection between La Verkin and Littlefield Springs which may take years to surface, this plan has been scrapped.

Additional alernatives including deep well injection, power plant cooling and evaporation in a dry lake bed are currently being examined. Water rights appear to be a problem and a replacement supply would need to be secured for any consumed water.

(updated 11/23/81)

DS:cs

LAS VEGAS WASH UNIT - NEVADA

Las Vegas Wash is located in southern Nevada southeast of the city of Las Vegas. It is a natural drainage channel providing the only surface water outlet for the entire 2,193 square miles of the Las Vegas Valley. This drainage channel conveys stream runoff and wastewater to Las Vegas Bay, an arm of Lake Mead.

Before urban development in the valley, the Las Vegas Wash was generally a dry barren and sandy channel with flow occurring only during major storms. Now, the flow has become perennial due to sewage effluent, industrial cooling water, urban irrigation and agricultural drainage. In addition to the nutrients and salts contained in these discharges, the flow leaches additional salts from the soil prior to entering Lake Mead. The average discharge carries approximately 196,000 tons of dissolved solids annually.

Construction according to a draft definite plan was begun in 1977, but was delayed in 1978, to reevaluate the changing groundwater conditions in the Lower Las Vegas Valley. The objectives of the reevaluation were to identify the potential for cost-effective salinity control and to formulate a practical and cost-effective plan. Data has been collected and analyzed, but the formulation of a cost-effective plan is contingent upon the development of a wastewater management of the valley water users. During the development of this plan, monitoring of changes in the saline groundwater will continue.

A report on the groundwater investigations will be provided in a status report that is scheduled for completion by the end of 1981. The comprehensive wastewater management plan for the valley is to be finished in 1981 which would provide the basis for a salinity control definite plan report in mid 1982.

(updated 11/23/81)

DS:cs

LOWER GUNNISON BASIN UNIT - COLORADO

The Lower Gunnison Basin Unit--Stage I study area pertains only to the Uncompahgre Valley in the vicinity of the towns and counties of Montrose and Delta in west-central Colorado. The area begins approximately 9 miles above Montrose on the Uncompahgre River and continues downstream (north) on either side until the confluence with the Gunnison River. It is approximately 14 miles wide at the lower end of the valley and is almost equally divided by the river. The elevation of the irrigated lands range from 6,400 feet above Montrose to 4,900 feet near Delta. The Stage II study area, centered around Hotchkiss, is not currently under study.

The lands involved in the Stage I study are centered on the distribution system of the Uncompahgre Project. The entire project has approximately 550 miles of canals and laterals with about 254 miles lying on the east side of the Uncompahgre River. The system is maintained and operated by the Uncompahgre Valley Water Users Association.

The annual salt loading from the study area is estimted at 360,000 tons. The salt load is derived from both on-farm and off-farm sources and results in an increase of about 37 mg/L of total dissolved solids at Imperial Dam. The major contributions are from the seepage and leaching effect of unlined canals and irrigation return flow.

The current salinity control plan calls for lining all of the canals and laterals on the east side of the river. This would involve lining about 59 miles of canals, 195 miles of laterals and the replacement of more than 2,000 structures. This program would reduce the annual salt load by 140,500 tons and correspondingly reduce the salinity concentration at Imperial Dam by 15.2 mg/L. The estimated cost (July, 1981, prices) per mg/L of salinity reduction at Imperial Dam is $722,000.

The Regional Director's proposed feasibility report and draft environmental impact statement was released in October, 1981. Once the final environmental impact statement is completed, the Secretary of the Interior could forward his report to Congress for authorization in 1984. Based on this schedule and the required subsequent advance planning studies, the construction of these facilities could begin in 1987. It is expected to be built in stages and that it will take 9 years to complete.

(updated 11/20/81)

DS:cs

Lower Gunnison Basin Unit (SCS) - Colorado

The Soil Conservation Service released their "Final Report of the Lower Gunnison Salinity Control Study" in November, 1981. The scope of the study was limited to inventorying and analyzing current on-farm irrigation systems and practices on about 107,000 acres of irrigated land and 320 miles of off-farm canals and laterals. The result of these analyses were expanded to be representative of the approximately 171,000 acres of irrigated land and about 485 miles of off-farm canals and laterals in the Lower Gunnison and Uncompahgre River Valleys. Approximately 550 miles of canals and laterals within the Uncompahgre Project were included in the Bureau of Reclamation feasibility study and were not considered by the SCS.

The recommended plan combines irrigation water management at the minimum level of implementation on 89,400 acres, irrigation water management and on-farm ditch lining at the minimum level for 7,900 acres, irrigation water managment and on farm ditch lining at the maximum level of implementation for 71,700 acres, and the lining of 104 miles of off-farm laterals. The minimum level of implementation involves installation of water measuring devices and land leveling whereas the maximum level of implementation includes items such as pipe structures, closed drains, and semi-automated water release systems. If implemented, the recommended plan would result in an annual salt load reduction of 335,000 tons at a cost of $477,000 mg/L reduction at Imperial Dam.

Implementation of the proposal will be held up indefinitely pending funding clarification.

DRS/gl

12/7/81

LOWER VIRGIN RIVER UNIT - ARIZONA, NEVADA

This study encompasses southeast Nevada and northwest Arizona and is located north of Lake Mead. The area includes Littlefield Springs and the irrigated areas along the Virgin River between the springs and Lake Mead. The salinity control potential of this unit could be 80,000 tons per year.

Currently, a salt balance study in the groundwater in the area is being conducted by the Desert Research Institute. Data collected so far would not warrant a water quality improvement project. However, if the salt balance study proves otherwise, a salinity control plan could include a groundwater barrier and extraction wells and industrial use in a pipeline collector system.

The Bureau of Reclamation's feasibility study did not identify a source of saline water ~~whose~~ for which treatment or removal from the river system would be cost-effective. A concluding report is being prepared on this investigation.

(updated 11/20/81)

DS:cs

McELMO CREEK UNIT - COLORADO

The McElmo Creek drainage is located in Montezuma County in southwestern Colorado. It has an area of about 720 square miles with approximately 37,000 acres of irrigated land. Most of the irrigated land is in the eastern portion of Montezuma Valley around the town of Cortez.

The major water supplier in the area is the Montezuma Valley Irrigation Company (MVIC). The MVIC distribution system has approximately 115 mile of canals and laterals that vary in capacity from 10 to 400 cubic feet per second. McElmo Creek yields approximately 32,500 acre-feet of water per year, but this is supplemented with Dolores River water by the MVIC. This supplemental water will be enlarged upon completion of the Dolores Project.

The annual salt discharge from McElmo Creek is estimated at 115,000 tons. Some of this comes from the Dolores River water which averages between 200 and 300 mg/L of total dissolved solids while McElmo Creek water contains about 2600 mg/L. Leaching from the irrigation canal system, irrigation return flow and natural sources contribute to the salinity problem.

The preferred plan outlined in a status report dated July 1981 consists of combining the Rocky Ford Ditch into the Highline Ditch and concrete lining 34 miles of high and moderate seepage canals in the remainder of the MVIC system. The preferred plan would have a cost-effectiveness of $450,000 per mg/L, and reduce salinity concentrations at Imperial Dam by 6.1 mg/L.

The feasibility studies on McElmo Creek are scheduled for completion in 1982 with the Regional Director's feasibility report and the draft environmental statement set for review by other agencies and the Water Resources Council in 1983. Once this is completed, the final environmental statement could be completed and the Secretary of the Interior could forward his report to Congress for authorization in December 1985. Based on this schedule and the required subsequent advance planning studies, construction could begin in 1990.

(updated 11/24/81)

DS:cs

McElmo Creek Unit (SCS) - Colorado

The McElmo Creek Unit is located in southwestern Colorado. Inefficient irrigation conveyance systems and on-farm management systems result in approximately 115,000 tons of salt annually reaching the San Juan River from McElmo Creek. The San Juan, in turn, flows into the Colorado River. The Soil Conservation Service is responsible for developing an on-farm program for salinity reduction on this unit.

The study is currently in only very preliminary stages. In house estimates for irrigation systems improvements project a potential for reducing salt concentrations at Imperial Dam by 5.0 mg/L at a cost of $400,000 mg/L/year.

DRS/gl

12/9/81

MEEKER DOME UNIT - COLORADO

Meeker Dome is located approximately 3 miles east of the town of Meeker on the north side of the White River between Coal and Curtis Creeks. This is a local anticlinal uplift which has been penetrated by numerous oil and gas wells.

The salinity problem arose due to oil and gas wells that were drilled in the 1920's and subsequently abandoned. The Meeker Well was identified in 1968 as having a flow of 3 cubic feet per second and a salt concentration of 19,200 mg/L. This would yield an annual salt load of approximately 57,000 tons. After the well was identified as a significant point source, it was plugged. Analysis a few months later revealed a flow emanating from two abandoned wells located about two miles north. These wells were then plugged, but later a diffuse flow appeared on the south flank of the dome.

Investigations, done in conjunction with the feasibility report, indicate that of the eight oil and gas exploratory wells drilled on the Dome, four are adequately plugged. The four other wells, the Scott, James, Marland, and Meeker wells, were believed to be unplugged or inadequately plugged and are acting as conduits for the subsurface saline water. To verify this assumption, a monitoring network was installed, as well as a cleaning, testing, and plugging program for the Marland, Scott and James wells. This program is currently in progress. Because major problems were encountered in cleaning the Marland bore, a parallel hole was drilled and an attempt made to plug the well by hydraulically fracturing the formation using a pressure cementing procedure from the nearby parallel hole.

The final verification program report explaining the plugging program, present conclusions reached, and recommendations for future action was received in October, 1981.

The feasibility report, as well as the draft environmental statement and public hearing, is scheduled for early 1984. The final environmental statement is set for late 1984.

(updated 11/12/81)

DS:cs

3694

Moapa Valley Subevaluation Unit (SCS) - Nevada

The Moapa Valley Subevaluation Unit, Nevada, is the first part of a study of the Virgin River Unit in Arizona, Nevada, and Utah. Located in southeastern Nevada, the Muddy River flows through the Moapa Valley into Lake Mead. The river contributes an average of 73,400 tons of salt annually to Lake Mead. The SCS Salinity Control Study, completed in February of 1981, identified a potential to reduce salt loading by 19,500 tons with improvements to water management systems and water delivery systems.

The preferred alternative would improve canal, pipeline and lateral systems, on-farm irrigation systems, and erosion control. Off-farm delivery systems will be improved by installing approximately 80,000 feet of pipeline and lining another 1,400 feet. On-farm systems improvements would take the form of pipeline installation and ditch lining with appurtenant items for irrigation automation and water measuring. If implemented, the proposal could result in 1.0 mg/L reduction in salt concentration at Imperial Dam at a cost of $489,000 mg/L/year.

Implementation of the proposal will be held up indefinitely pending funding clarification.

DRS/gl

12/9/81

PALO VERDE IRRIGATION DISTRICT UNIT - CALIFORNIA

The Palo Verde Irrigation District (PUDI) is located around Blythe, California, between Parker Dam and Imperial Dam. It extends for approximately 30 miles below its diversion point and is about 10 miles wide at its widest location.

The PUDI has about 92,000 acres of irrigated land with approximately 32% of this land having a multiple cropping operation. It has over 290 miles of canals and laterals for water delivery and a 150-mile system of open drains. The PUID has an unlimited water right to irrigate a gross acreage of 104,500 acres. It annually diverts an average of about 915,000 acre-feet and discharges as return flow about 450,000 acre-feet annually.

The salt discharge from the drainage system was estimated at 1,097,000 tons in 1974. The net salt increase from diversion to discharge was estimated at 152,000 tons. The majority (144,000 tons) of this increase was found to be coming from the Palo Verdes subarea in the southwestern portion of the District. This subarea is approximately 11½ miles long and has a maximum width of about 3½ miles, and contains a gross area of about 12,550 acres.

The main plan for reducing the salt leading from this subarea would involve the implementation of an irrigation efficiency program and lining about 20 miles of laterals. Currently, the present on-farm efficiency in this subarea is about 42 percent, and it was felt that this could be increased to 60% with the construction of some on-farm improvements. The increase in efficiency and lateral improvements would decrease the salt concentration at Imperial Dam by about 7.9 mg/L at an annual equivalent cost of $255,000 mg/L (July, '81). This program would result in a net decrease of 88,600 tons of salt being annually discharged to the Colorado River.

Since the District has an unlimited water supply, there is little incentive to attain a greater irrigation efficiency. However, the reduction of water use can result in labor and fertilizer savings and in some instances increase crop yield. In these ways the cost of an irrigation management program could be recouped. The WPRS did have a demonstration program in effect in the PUID from 1973 to 1977, but at the request of the District it was discontinued. It appears that the irrigators in the District are not sufficiently interested in an irrigation management program without considerable federal incentive.

More detailed studies, including ground water modeling, are required to verify a potential for a salinity control project and to provide a basis for initiating a Federal expenditure program. Detailed studies could be completed by 1985, and with timely Congressional authorization, construction could begin in 1989.

(updated 11/12/81)

DS:cs

3696

PARADOX VALLEY UNIT - COLORADO

Paradox Valley is located in Montrose County in southwestern Colorado and is approximately 24 miles long and from 1 to 3 miles wide. The Dolores River crosses this valley near its midpoint about 4 miles upstream from its confluence with the San Miguel River.

The climate of this area is generally semiarid with hot and dry summers and cold and dry winters. Economic activity in this area consists of about 3,600 acres of irrigated cropland in the northwestern half of the valley along with livestock grazing, oil exploration, mining and some lumbering production.

Paradox Valley is one of five major collapsed salt inclines (elongated swells) in southwestern Colorado and southeastern Utah. The erosion of faulted and uplifted sandstone and shale formations has exposed a residual gypsum cap which covers about 15,000 feet of nearly pure salt and salt-rich shale. Groundwater comes into contact with the top of this salt formation and eventually surfaces as salt brine in the channel of the Dolores River near the middle of the valley. The effect of this brine varies considerably with the amount of flow in the river. High flows dilute its effect, but low flows have had salt concentrations as high as 166,000 mg/L which is approximately 5 times as saline as sea water.

The current plan and initial test studies indicate that wells could be drilled into the brine on both sides of the river to pump the saline groundwater. This pumping would then lower the interfare between the relatively fresh water and the extremely saline brine. It was initially thought that it would require a pumping rate of 5.0 cubic feet per second (cfs) to effectively lower this interfare, but recent studies indicate a rate of 1.5 to 2.0 cfs may accomplish the same objective. These wells and appurtenant disposal facilities would be designed to remove an average of 180,000 tons of salt per year which translates to a decrease of 18 mg/L of salt concentration at Imperial Dam. There are currently two alternative disposal methods being investigated: deep well injection and an evaporation pond.

The estimated annual cost based on July, 1981, prices for the evaporative pond alternative is $301,000 per mg/L. The construction of the project with the evaporative pond was estimated in early 1980 to be finished by the end of 1986. The draft report on "Deep Well Injection of Brine--Paradox Valley Unit" prepared by Williams Brothers Engineering Company for BuRec has estimated the annual cost for this disposal method to be between $100,000 per mg/L and $250,000 per mg/L depending on the number of injection wells required. Various information is currently being prepared in order to file for an Underground Injection Control Permit with the State of Colorado and the EPA.

(Updated 11/20/81)

DS:cs

3697

PRICE - SAN RAFAEL RIVERS UNIT - UTAH

The Price and San Rafael Rivers are located in east-central Utah and provide tributary flows to the Green and Colorado Rivers. The drainage areas contain 1,900 and 1,600 square miles for the Price and San Rafael Rivers, respectively.

The salinity problem from these basins results from the irrigated lands, which are located on the salt producing shale formations in the upper portions of the drainages. The salinity concentrations average 3,500 mg/L and 4,000 mg/L for the Price and San Rafael Rivers, respectively. The combined salt load from the rivers is 430,000 tons per year. It is estimated that approximately 180,000 tons could be removed from an evaporative system. This would reduce the salinity concentration at Imperial Dam by 11 or 12 mg/L, but would also deplete the flows by 60,000 acre-feet.

A professional services contract was awarded in September, 1981, to conduct investigations and identify alternative plans capable of reducing the salinity in the river systems. A planning team and public involvement program are being organized to assist the contractor in selecting a recommended plan by September, 1983. The feasibility study is scheduled for completion in December, 1986.

(updated 11/24/81)

DS:cs

SINBAD VALLEY UNIT - COLORADO

Salt Creek drains Sinbad Valley and is tributary to the Dolores River. The mouth of Salt Creek is located nine miles southeast of Gateway, Colorado. Baseflow is furnished by several small springs at or near the mouth of Sinbad Valley. High flow comes from snowmelt and rainfall runoff. Surface flow in Salt Creek is ephemeral and subsurface flow is perennial, yielding approximately 100 gallons of water per minute or 160 acre-feet per year. Concentration of salts in this water is 61,200 mg/L, resulting in a total salt yield of 13,317 tons annually. If the flow from these springs could be kept from entering the Dolores River, the result would be a reduction of salt concentrations of 1.11 mg/L at Imperial Dam. Total annual costs (updated to July '81 prices) per mg/L reduction at Imperial is $288,000.

The BLM proposed a system of collecting water using a barrier dam, and pumping the water via a pipeline a short distance to be evaporated in four ponds. The site proposed for the ponds is located just south of the proposed collection site so as to reduce the length of the pipeline.

Initial BLM budgeting figures for 1982 have identified money for advanced planning in the Sinbad Valley Unit.

(updated 11/20/81)

DS:cs

3699

Uintah Basin Unit - Utah

The Uintah Basin Unit study area is located in northeastern Utah in Duchesne and Uintah counties. Approximately 204,000 acres of land are irrigated within the Uintah Basin, although the Bureau's present study is limited to an area of 104,200 irrigated acres. The combined length of canals and major laterals serving the area exceeds 800 miles.

Much of the irrigation system is cut directly into saline soils and rock. The Unit area contributes about 500,000 tons of salt annually to the Colorado River. Irrigation return flows from the area contribute an estimated 240,000 tons annually, which results in an increase in salinity of about 24 mg/l at Imperial Dam.

In July 1981 the planning team recommended concrete lining for laterals and canals in 11 of the evaluation units studied. The option selected restricts the use of saved water. The plan would result in a reduction of TDS concentration at Imperial Dam of 7.3 mg/l at a cost of $518,000/mg/l/year.

The Regional Director's proposed feasibility report for the Uintah Basin Unit is scheduled for completion in 1982. Assuming the Secretary's report is forwarded in December 1985, advance planning studies would begin in 1987. Based on this schedule, construction on the Uintah Basin Unit could begin in 1989.

cs
2/24/82

Uintah Basin Unit (SCS) - Utah

The Uintah Basin Unit lies in the northwestern part of Utah and includes all of the Duchesne River, Ashley Creek, and Brush Creek drainages. The SCS was given the responsibility of studying the effects of on-farm improvements on irrigation efficiencies and the resultant salinity in the Colorado River while the Bureau of Reclamation is responsible for studying off-farm conveyance systems. The SCS released a revised version of their Uintah Basin Salinity Report in November, 1980.

The selected plan developed two types of improved surface irrigation systems and three types of sprinkler systems. Improved surface systems are to be implemented on 42,800 acres and involve such things as land leveling, ditch lining, and pipeline installation. Sideroll, pivot, and gated pipe sprinkler systems are to be installed over 79,400 acres. The selected plan will result in a salt reduction of 76,600 tons in the Colorado River and reduce the salt concentration by 10.3 mg/L at Imperial Dam. The cost-effectiveness of this proposal was determined to be $665,000 mg/L/year.

The 10-year implementation program is now in its third year. Since the program began, 436,000 feet of on-farm laterals have been laid in pipeline and 132,000 feet of sprinkler systems have been installed. Approximately 150 measuring devices have also been installed. These figures include both long term agreements and one year projects.

DRS/gl

12/8/81

3701

MEMORANDUM

COLORADO WATER CONSERVATION BOARD
J. William McDonald
Director

TO: Dan Law

FROM: Dean Stindt DRS

DATE: November 17, 1981

SUBJECT: Colorado Water Quality Control Commission Policy for Implementing the Colorado River Salinity Standards through the NPDES Permit Program

The Regulations concerning this subject were adopted on March 7, 1978 and became effective on May 10, 1978. For all new industrial discharge permits issued after May 10, 1978, and all existing industrial discharge permits up for reissuance after May 10, 1978, the Water Quality Control Commission has required that salinity be sampled on a monthly basis until six samples have been analyzed. Following submittal of the first six months of data, the Commission shall determine the eligibility for a waiver of the no salt return policy based on salt-loading of less than one ton per day. If this waiver cannot be granted, the permittee has an additional six months to submit a report addressing the economic practicability of achieving salt removal in accordance with Regulations 3.10.0-3.10.5 and Appendix A. Continued monitoring for salinity is required regardless of whether the less than one ton/day waiver is granted or the practicability of salt removal study proves uneconomical.

The policy with regard to municipal discharge permits is much the same with one exception. The Commission shall allow municipal discharges to release water with an incremental increase in salinity of 400 mg/L or less above the flow weighted average salinity of the intake water supply. Discharge in excess of the 400 mg/L incremental increase may be permitted upon satisfactory demonstration by the permittee that it is not practicable to attain the limit.

At this time, there are very few permits for which the implementation of no salt return policy has not been initiated. These instances involve older permits up for reissuance and are currently being rewritten to require salinity monitoring.

Although the implementation of the policy has been initiated in most cases, completion of the process has been slow. This is primarily due to the fact that many of the industrial discharges to the Colorado River Basin in Colorado are coal mine sedimentation ponds. The ponds are oftentimes designed for full containment making it difficult to obtain the first six months discharge data. In all situations where the first six months data was available in the minimal amount of time and salt-loading exceeded one ton/day, the permittee has been able to convincingly demonstrate that salt removal is not economically practicable

DS:cs

2702

MEMORANDUM

COLORADO WATER CONSERVATION BOARD
J. William McDonald
Director

TO: Dan Law

FROM: Dean Stindt DES

DATE: December 15, 1981

SUBJECT: Issuance and Expiration Dates for Industrial NPDES Permits

The following is a listing of issuance and expiration dates for all industrial discharge permits identified in the November 19, 1981, memo. The State Water Quality Division issues NPDES permits for a period of no longer than 5 years with the expiration date landing on the last day of a quarter. The Division notifies all permittees 180 days before permit expiration. Prior to expiration the permittee is required to indicate whether or not he will seek to renew the permit. Upon expiration, all permits are automatically extended for two years. In cases where operations are temporary, permits for less than 5 years can be issued. Expiration dates followed by an "X" represent effective extension dates.

		Issuance	Expiration
Amax-Mt. Emmons	CO 0036394	10/1/79	6/30/84
Cotter Corporation	CO 0036285	9/30/80	9/30/85
Union Carbide	CO 0000515	5/14/75	10/25/79 X
GEX Colorado, Inc.	CO 0027146	8/2/79	12/31/80 X
Mid-Continent Resources, Inc.	CO 0000396	11/22/77	6/30/82
Northern Coal Co.	CO 0036439	12/27/79	9/30/84
Peabody Coal Co.	CO 0000213	7/1/81	3/31/86
Peabody Coal Co.	CO 0000221	7/1/81	3/31/86
Pittsburg and Midway	CO 0032638	12/26/80	9/30/85
Snowmass Coal Company	CO 0029599	10/8/77	3/31/82
Sunlight Coal Co.	CO 0036501	6/9/79	12/31/80 X
U. S. Steel Corporation	CO 0000132	2/11/75	6/30/79 X
Utah International, Inc.	CO 0032115	9/18/81	6/30/86
Western Slope Carbon	CO 0033146	1/15/77	6/30/80 X
Cathedral Bluff Shale Oil	CO 0033961	4/30/79	12/31/80 X
Energy Reserves Group	CO 0000051	2/13/78	9/30/82
Occidental Oil Shale	CO 0029947	4/22/79	12/31/83
Rio Blanco Oil Shale	CO 0034045	11/25/77	6/30/78
Fleet Resources, Inc.	CO 0000108	1/27/77	12/31/81
U. S. Energy Corporation	CO 0029831	permit not	issued
Great Guennol Gold Mining Co.	CO 0036781	5/1/81	12/31/85
Hi-Z Mining Corp.	CO 0021326	7/12/81	9/30/85

		Issuance	Expiration
Gold Field Mining Corp.	CO 0038016	6/4/81	3/31/86
Union Carbide	CO 0027588	7/13/77	3/31/79 X
Blue Ribbon Mine	CO 0033553	8/1/77	3/31/82
Chimney Rock Coal	CO 0036081	8/17/81	9/30/85
Colouryo Coal Co.	CO 0032832	11/21/81	6/30/86
Dorchester Coal Co.	CO 0036609	1/4/80	12/31/80 X
Dorchester Coal Co.	CO 0036960	8/27/81	3/31/86
Energy West Incorporated	CO 0036048	4/3/81	12/31/85
Flatiron Paving Co.	CO 0036471	12/5/79	6/30/84
Getty Mining Co.	CO 0027154	4/17/81	12/31/85
Grand Mesa Coal Co.	CO 0036935	9/17/81	9/30/84
H-G Coal Co.	CO 0038164	11/26/81	12/31/85
National King Coal	CO 0036561	4/13/80	9/30/84
Northern Coal Co.	CO 0036293	1/3/80	9/30/84
Palisade Mining Co.	CO 0036617	10/2/79	6/30/84
Quinn Coal Co.	CO 0035807	11/22/81	6/30/86
Sackett Mining Co.	CO 0036277	1/8/80	9/30/84
Sun Coal Co.	CO 0036765	2/2/80	9/30/84
Sunland Mining Corp.	CO 0036668	12/25/80	9/30/85
Maverick Mining Co.	CO 0036790	4/30/81	12/31/85
Timberline Mining, Inc.	CO 0037672	9/6/81	12/31/85
Bear Coal Co.	CO 0036943	8/27/81	3/31/86
Bendetti Henry Coal CO.	CO 0036871	permit not issued	
Bendetti Louis Coal Co.	CO 0036889	permit not issued	
Energy West, Inc.	CO 0036684	4/3/81	12/31/85
Lackey-William & Assoc.	CO 0037231	9/24/81	3/31/86
Northern Coal CO.	CO 0037117	1/22/81	9/30/85
Northern Coal Co.	CO 0037354	1/22/81	9/30/85
Northern Coal Co.	CO 0037931	10/8/81	3/31/86
Rockcastle Co.	CO 0035653	9/10/81	3/31/86
Sun Coal CO.	CO 0036030	4/1/79	12/31/80 X
American Smeltering and Refining	CO 0000591	6/13/81	3/31/86
Anaconda Co.	CO 0029793	7/3/76	12/31/80 X
Idarado Mining Co.	CO 0026956	12/2/76	3/31/81 X
New Jersey Zinc	CO 0000035	1/18/74	7/1/78 X
Standard Metals Corp.	CO 0000426	1/31/80	3/31/82
Standard Metals Corp.	CO 0027529	1/31/80	3/31/82
Amax-Climax Facility	CO 0000248	2/17/75	12/31/78 X
Standard Metals Corp.	CO 0036056	1/31/80	12/31/80 X
Empire Energy Corp.	CO 0034142	3/10/79	12/31/79 X

DS:cs

3704

MEMORANDUM

COLORADO WATER CONSERVATION BOARD
J. William McDonald
Director

TO: Dan Law

FROM: Dean Stindt DKS

DATE: November 19, 1981

SUBJECT: Summary of Salt Contributions to the Colorado River Basin by Industrial Dischargers through the NPDES Permit Program

The subject summary concentrates on those industrial dischargers which fall into one of the following mine or mine processing facility categories: lead and zinc, gold, silver, ferroalloy, uranium, bituminus coal and oil shale. Of these 62 NPDES permits authorizing discharge to the Colorado River Basin, discharge data (quantity and quality) was available to determine annual salt contributions for 18 of the dischargers. Three of these permits stipulate TDS limitations.

A tabulation identifying the name of the permittee and facility, NPDES permit number, annual salt contribution to the Colorado River from 7/80 to 6/81, and where applicable, TDS limitations, follows:

1. Amax - Mt. Emmons CO 0036394
   Annual salt contribution for 7/80 to 6/81: 704 tons

2. Cotter Corporation - J D-9 Mine CO 0036285
   Annual salt contribution for 7/80 to 6/81: 171 tons

3. Union Carbide - Uravan Mill CO 0000515
   TDS limiations: daily average - 48990 Kg/d
   daily maximum - 122,470 kg/d
   Annual salt contribution for 7/80 to 6/81: 8498 tons

4. GEX Colorado, Inc. CO 0027146
   Annual salt contribution for 7/80 to 6/81: 625 tons

5. Mid-Coninent Resources, Inc. CO 0000396
   Annual salt contribution for 7/80 to 6/81: 230 tons

6. Northern Coal Co.- #1 CO 0036439
   Annual salt contribution for 7/80 to 6/81: 71 tons

7. Peabody Coal Co. - Nucla CO 0000213
   Annual salt contribution for 7/80 to 6/81: 344 tons

8. Peabody Coal Co. - Seneca CO 0000221
   Annual salt contribution for 7/80 to 6/81: 735 tons

9. Pittsburg & Midway Coal Mining Co. CO 0032638
   Annual salt contribution for 7/80 to 6/81: 126 tons

10. Snowmass Coal Co. CO 0029599
    Annual salt contribution for 7/80 to 6/81: 57 tons

11. Sunlight Coal Co. CO 0036501
    Annual salt contribution for 7/79 to 6/80: 32 tons

12. U. S. Steel Corporation CO 0000132
    Annual salt contribution for 7/80 to 6/81: 1334 tons

13. Utah International, Inc. CO 0032135
    Annual salt contribution for 7/80 to 6/81: 23 tons

14. Western Slope Carbon, Inc. CO 0033146
    Annual salt contribution for 7/80 to 6/81: 16 tons

15. Cathedral Bluff Shale Oil CO 0033961
    TDS limitations: 30 days average 1200 mg/l
    daily maximum 1800 mg/l
    Annual salt contribution for 7/80 to 6/81: 2689 tons

16. Energy Reserves Group CO 0000051
    TDS limitations: maximum daily 2250 mg/l
    Annual salt contribution for 7/80 to 6/81: 604 tons

17. Occidental Oil Shale - D tract CO 0029947
    Annual salt contribution for 7/80 to 6/81: 37 tons

18. Rio Blanco Oil Shale Project CO 0034045
    Annual salt contribution for 7/80 to 6/81: 1018 tons

Annual salt contributions to the Colorado River Basin were not determined for the remaining 44 industrial dischargers for one of three reasons. The following permits have no recorded discharge for the past two years:

Fleet Resources, Inc. CO 0000108
U. S. Energy Corporation - Keystone Co 0029831
Great Guennol Gold Mining Co. CO 0036781
Hi-Z Mining Corp. CO 0021326
Gold Field Mining Corp. CO 0038016
Union Carbide-Mill CO 0027588
Blue Ribbon Mine CO 0033553
Chimney Rock Coal-Martinez Mine CO 0036081
Colowyo Coal Co. CO 0032832
Dorchester Coal Co.-Fruita Mine CO 0036609
Dorchester Coal Co. CO 0036960
Energy West Incorporated-Sugar CO 0036048

Flatiron Paving Co. CO 0036471
Getty Mining Co. CO 0027154
Grand Mesa Coal Co. CO 0036935
H-G Coal Co.-Hayden Gulch CO 0038164
National King Coal, Inc. CO 0036561
Northern Coal Co.-Rienau #2 CO 0036293
Palisade Mining Co.-Cottonwood CO 0036617
Quinn Coal Co. CO 0035807
Sackett Mining Co.-Shalako Mine CO 0036277
Sun Coal Co., Inc.-Trout Ck. #1 CO 0036765
Sunland Mining Corp.-Apex #2 CO 0036668

The following permits were just recently issued initially or were reissued to require salinity monitoring recently enough so that no quarterly monitoring reports have yet been received:

Maverick Mining Co., Inc. CO 0036790
Timberline Mining, Inc. CO 0037672
Bear Coal Co., Inc.-Bear Mine CO 0036943
Bendetti Henry Coal Co. CO 0036871
Benditti Louis Coal Co. CO 0036889
Energy West, Inc.-20 Mile Mine CO 0036684
Lackey-William & Assoc. CO 0037231
Northern Coal Co.-Craig Loadout CO 0037117
Northern Coal Co. CO 0037354
Northern Coal Co. CO 0037931
Rockcastle Co.-Grassy Creek Mine CO 0035653
Sun Coal Co., Inc. CO 003630

The following are older permits for which salinity monitoring was not a requirement. These permits are currently being considered for reissuance and will stipulate salinity monitoring:

American Smeltering and Refining CO 0000591
Anaconda Co. CO 0029793
Idarado Mining Co. CO 0026956
New Jersey Zinc CO 0000035
Standard Metals Corp. CO 0000426
Standard Metals Corp. CO 0027529
Amax-Climax Facility CO 0000248
Standard Metals Corp.-Terry Tunnel CO 0036056
Empire Energy Corp. CO 0034142

3707

MEMORANDUM

COLORADO WATER CONSERVATION BOARD
J. William McDonald
Director

TO: Dan Law

FROM: Dean Stindt DES

DATE: November 30, 1981

SUBJECT: Impact Analysis of NPDES Industrial Discharges on Colorado River Salinity

The subject analysis takes a close look at information presented in the memorandum dated November 19, 1981. The eighteen NPDES permits for which annual salt contributions were determined are considered cumulatively in an attempt to determine the importance of Colorado industrial discharges to resultant increases in salinity levels of the river. The following tabulation will develop, for the 18 permits analyzed, the total flow (acre feet/year), the average TDS concentration (mg/L), and the total salt discharged (tons/year).

	NPDES permit #	Average flow of discharge for 6/80 to 7/81 (MGD)	Average TDS Concentration of discharge for 6/80 to 7/81 (mg/L)	Salt discharged for 6/80 to 7/81 (tons)
1.	CO 0036394	.467	990	704
2.	CO 0036285	.086	1308	171
3.	CO 0000515	.302	18439	8498
4.	CO 0027146	.128	3168	625
5.	CO 0000396	.080	1095	230
6.	CO 0036439	.027	1714	71
7.	CO 0000213	.085	2445	344
8.	CO 0000221	.214	1908	735
9.	CO 0032638	.044	1722	126
10.	CO 0029599	.029	1314	57
11.	CO 0036501	.013	1653	32
12.	CO 0000132	.239	3706	1334
13.	CO 0032135	.010	1586	23
14.	CO 0033146	.027	2240	16
15.	CO 0033961	1.307	1418	2689
16.	CO 0000051	.238	1672	604
17.	CO 0029947	.005	5505	37
18.	C0 0034045	.562	1204	1018
		Average flow= 3.863 MGD = 4365 AF/year	Average TDS Concentration = 2949 mg/L	Total salt discharged = 17314 tons/yr.

Assuming that 10,000 tons of salt would have to be removed from the river system in order to reduce the TDS concentration of Imperial Dam by 1 mg/L, the best case achievement of zero salt discharge for all 18 permits considered would only reduce the concentration at Imperial Dam by 1.7 mg/L. Relative to point source salinity control proposals presented by the Bureau of Reclamation the potential for significantly improving the water quality of the Colorado River by controlling industrial discharges appears low. This observation is supported by the relatively small amount of salt (tons) contributed by industrial discharges as well as the relatively low salt concentrations (mg/L) associated with most industrial discharges. As a general rule, the cost-effectiveness of removing salt from water with TDS levels similar to those discussed above is much less atttractive than removing salts from waters associated with natural point source discharges, such as those investigated by the Bureau of Reclamation.

Annual salt discharged and average TDS concentration associated with Union Carbide's permit (#CO 0000515) deviate considerably from the other 17 permits analyzed. In a "No Salt Return Study" submitted February 4, 1980, Union Carbide identified several alternatives which would reduce or eliminate salt discharges from the facility. Costs ranged from $121 to $175/tons of salt removed. It was determined by the Division of Water Quality that none of the possible alternatives are economically feasible. The Division is currently in the process of determining the Best Available Technology (BAT) for dealing with the Uravan Mill discharge. One possibility is that Union Carbide will be required to convert the mill to a non-discharging facility.

Although this analysis does not consider all sources of industrial discharge to the Basin, it does look at a good cross section of discharges that could be expected to contribute to the salt load in the river. The analysis should serve well to contrast the significance of industrial point source discarges with other natural and man-made contributors to Colorado River salinity.

DS/gl

3709

DRAFT

TO: Dan Law

FROM: Dean Stindt

DATE: January 4, 1982 (1st Draft December 23, 1981)

SUBJECT: Significance of NPDES Municipal Discharges to Colorado River Salinity

The subject analysis considers all municipal discharges to the Colorado River Basin through the NPDES permit program. Of the 75 permits involved, annual salt loading was determined in 28 cases. Twenty-nine permittees are not monitoring for salinity, 8 permittees report no discharge for the past several years, and monitoring records for 10 permits are lacking information that would allow an accurate assignment of annual salt loading. Many of the 29 permits for which salinity is not being monitored were issued several years ago and are currently being considered for re-issuance. The new permits will stipulate salinity monitoring.

Annual salt loading for several permits was determined on the assumption that the TDS concentration of intake (raw) water was 200 mg/L in cases where the permittee had failed to report this information. These salt loading determinations are marked by an asterik. Where monitoring records were only slightly incomplete, averages were used to fill the gaps.

The following list identifies Colorado River Basin municipal discharges by NPDES permit number, facility name, and issuance and expiration date. Average flow and annual salt contribution for 7/1/80 to 6/30/81 are provided, in addition, for the first 28 permits on the list.

CO 0021491 Basalt Sanitation District 780310 811231
Annual salt contribution for 7/1/80 to 6/30/81: 36 tons
Average flow: .085 MGD

CO 0031984 Cedaredge - Town of 810303 851231
Annual salt contribution for 7/1/80 to 6/30/81: 102 tons*
Average flow: .200MGD

CO 0033791 Clifton Sanitation District 771225 821231
Annual salt contribution for 7/1/80 to 6/30/81: 188 tons*
Average flow: .152 MGD

CO 0021563 Collbran - Town of 791007 841231
Annual salt contribution for 7/1/80 to 6/30/81: 162 tons*
Average flow: .140 MGD

CO 0021598 Copper Mountain Sanitation District 780831 821231
Annual salt contribution for 7/1/80 to 6/30/81: 239 tons
Average flow: .235 MGD

CO 0027545 Cortez Sanitation District 800616 841231
Annual salt contribution for 7/1/80 to 6/30/81: 121 tons
Average flow: .150 MGD

CO 0027880 Cortez Sanitation District 800616 841231
Annual salt contribution for 7/1/80 to 6/30/81: 278 tons
Average flow: .418 mGD

CO 0031836 Crested Butte So. Metro District 810604 860331
Annual salt contribution for 7/1/80 to 6/30/81: <1 ton
Average flow: .010 MGD

CO 0027171 Crested Butte W&S District 800702 850630
Annual salt contribution for 7/1/80 to 6/30/81 28 tons
Average flow: .110 MGD

CO 0020966	Fraser Sanitary District	761205	810630X
Annual	Salt concentration for 7/1/80 to 6/30/81:		86 tons
	Average flow: .400 MGD		
CO 0020257	Fruita - City of	800413	840930
Annual	salt contribution for 7/1/80 to 6/30/81:		509 tons*
	Average flow: .313MGD		
CO 0020516	Glenwood Springs - City of	800822	850630
Annual	salt contribution for 7/1/80 to 6/30/81:		666 tons
	Average flow: .780 MGD		
CO 0020699	Granby Sanitation District	800413	840930
Annual	salt contribution for 7/1/80 to 6/30/81:		120 tons
	Average flow: .275 MGD		
CO 0032964	Grand Water and Sanitation Dis.	800403	840930
Annual	salt contribution for 7/1/80 to 6/30/81:		19 tons
	Average flow: .275 MGD		
CO 0026417	Grand Junction - City of	810302	830630
Annual	salt contribution for 7/1/80 to 6/30/81:		3824 tons
	Average flow: 5.053 MGD		
CO 0021229	Grand Valley Sanitation Dist.	761219	810630X
Annual	salt contribution for 7/1/80 to 6/30/81		5 tons
	Average flow: .039 MGD		
CO 0024350	Hot Sulphur Sprgs. - Town of	790311	830930
Annual	salt contribution for 7/1/80 to 6/30/81:		5 tons
	Average flow: .018 MGD		
CO 0021687	Mancos - town of	810503	860331
Annual	salt contribution for 7/1/80 to 6/30/81:		11 tons*
	Average flow: .018 MGD		
CO 0020192	New Castle - Town of	790802	831231
Annual	salt contribution for 7/1/80 to 6/30/81:		28 tons*
	Average flow: .039 MGD		
CO 0021893	Oak Creek - Town of	791102	840630
Annual	salt contribution for 7/1/80 to 6/30/81:		27 tons*
	Average flow: .258 MGD		
CO 0026972	Rangley Sanitation Dist.	790701	8203331
Annual	salt contribution for 7/1/80 to 6/30/80:		32 tons
	Average flow: .153 MGD		
CO 0020117	Rifle - City of	800523	840930
Annual	salt contribution for 7/1/80 to 6/30/81:		225 tons
	Average flow: .244 MGD		

CO 0029181	Silt - Town of	791230	811231
Annual salt contribution for 7/1/80 to 6/30/81:			160 tons*
Average flow: .100 MGD			
CO 0020834	Steamboat Springs - Town of	800515	841231
Annual salt contribution for 7/1/80 to 6/30/81:			173 tons
Average flow: 1.571 MGD			
CO 0020869	Telluride - Town of	760903	810630X
Annual salt contribution for 7/1/80 to 6/30/81:			6 tons*
Average flow: .116 MGD			
CO 0020940	Three Lakes Water & Sant. Dist.	790901	810630X
Annual salt contribution for 7/1/80 to 6/30/81:			31 tons
Average flow: .299 MGD			
CO 0024317	W. Glenwood Springs Sant. Dist.	790609	830630
Annual salt contribution for 7/1/80 to 6/30/81:			164 tons
Average flow: .212 MGD			
CO 0030635	Yampa - Town of	791101	840630
Annual salt contribution for 7/1/80 to 6/30/81:			3 tons
Average flow: .088 MGD			

3713

Permits For Which No Discharge Has Been Recorded

CO 0020982	Aspen Sanitary District	800817	801231X
CO 0033260	Clifton Sanitary District	790421	831281
CO 0020401	Craig - City of	791021	840630
CO 0030996	Gypsum Sanitation	780212	821231
CO 0021636	Kremmling Sanitation District	810529	860331
CO 0032727	Mesa Water and Sanitation Dist.	790901	840930
CO 0030970	Rifle Village So. Metro Dist.	810502	860331
CO 0024431	Upper Eagle Valley Sant.	801124	850630

Permits For Which Salinity Is Not Being Monitored

CO 0026387	Aspen Metro Sanitation District	760809	810630X
CO 0020273	Bayfield Sanitary District	760807	810331X
CO 0021539	Breckenridge Sanitation District	780828	810930X
CO 0020443	Crested Butte - Town of	760227	801231X
CO 0023418	Debeque - Town of	761218	810930X
CO 0020036	Delta - City of	760616	810331X
CO 0020001	Dolores - Town of	760816	810331X
CO 0023434	Dove Creek Sanitation District	810502	860331
CO 0024082	Durango - City of	760205	800930X
CO 0021059	Eagle Sanitation District	780212	821231
CO 0020486	Hayden - Town of	761217	810630X
CO 0021415	Hotchkiss Sanitary District	810502	860331
CO 0020371	Lake City Area Water & Sant. Dist.	810416	850930
CO 0020419	Montrose - City of	770326	791231X
CO 0024007	Naturita - Town of	811028	860630
CO 0032191	Norwood Sanitation District	810502	860331
CO 0020591	Nucla Sanitary District	810604	860331
CO 0020907	Olathe - City of	761017	810630X
CO 0020087	Ourary Sanitary District	810604	810630X
CO 0031755	Pagosa Area Water & Sanitation	810827	860630
CO 0021709	Paonia - City of	760610	810331X
CO 0022632	S. Blue River Sanitation	780827	821231
CO 0020826	Silverthorne - Dillon Jt SW	780311	821231
CO 0020311	Silverton - Town of	760809	810630X
CO 0023086	Snowmass Water & Sanitation	771125	820930
CO 0020770	Steamboat II Water & Sant. Dist.	780115	791231X
CO 0029955	Summit County	780827	821231
CO 0024431	Upper Eagle Valley Sant.	780312	810630X
CO 0021369	Vail Sanitary District	780312	810930X

Permits For Which Monitoring Records Are Incomplete

CO 0036226	Durango West Metro District	800705	840930
CO 0020451	Frisco Sanitary District	791010	840930
CO 0020141	Gunnison - City of	810122	851231
CO 0022853	Ignacio Sanitary District	810205	850331
CO 0022781	Meeker Sanitary District	791010	840630
CO 0038032	Pagosa Area Water & Sant. Dist.	810827	860331
CO 0023922	Redstone Water & Sant. Dist.	801103	850930
CO 0029106	Ridgway - Town of	770711	820630
CO 0035556	Steamboat Lake Sant. Dist.	780115	791231
CO 0030449	W. Montrose Sanitation Dist.	790902	840630

The NPDES permits for which annual salt contributions were determined are now considered cumulatively in an attempt to determine the importance of Colorado River Basin municipal discharges to existing salinity levels in the River. The following tabulation will develop, for the 28 permits analyzed, the total flow (acre-feet/year), the average TDS concentration (mg/L), and the total salt discharge (tons).

NPDES permit #	Average flow of discharge for 7/80 to 6/81 (MGD)	Average net TDS Concentration of discharge for 7/80 to 6/81 (mg/L)	Salt discharged for 7/80 to 6/81 (tons)
CO 0021491	.085	267	36
CO 0031984	.200	339	102
CO 0033791	.152	790	188
CO 0021563	.140	760	162
CO 0021598	.235	689	239
CO 0027545	.150	535	121
CO 0027880	.418	434	278
CO 0031836	.010	29	1
CO 0027171	.110	157	28
CO 0020966	.400	127	86
CO 0020257	.313	1062	509
CO 0020516	.780	561	666
CO 0020699	.366	222	120
CO 0032964	.275	48	19
CO 0026417	5.053	486	3824
CO 0021229	.039	70	5
CO 0024350	.018	217	5
CO 0021687	.018	400	11
CO 0020192	.039	470	28
CO 0021393	.258	72	27
CO 0026972	.153	141	32
CO 0020117	.244	595	225
CO 0029181	.100	850	160
CO 0020834	1.571	74	173
CO 0020869	.116	38	6
CO 0020940	.299	74	31
CO 0024317	.212	463	164
CO 0030635	.088	27	3
Total	11.842 MGD	Average Net TDS Concentration	total salt discharged
	= 13403 AF/Year	357 mg/L	7249 Tons/Yr.

Assuming that 10,000 tons of salt would have to be removed from the river system in order to reduce the TDS concentration at Imperial Dam by 1 mg/L, the best case achievement of zero salt discharge for all 28 municipal dischargers considered would only reduce the salt concentration at Imperial Dam by .7 mg/L. relative to other sources of salinity to the river, Colorado municipal discharges through the NPDES program appear to be insignificant. Due to the relatively small amount of salt (7,249 tons) and the relatively low salt concentrations (357 mg/L) associated with the municipal discharges, the potential for significantly improving Colorado River water quality with better control over municipal discharges appears low. The cost-effectiveness of achieving zero discharge treating such low concentrations of TDS is extremely poor.

Although this investigation considered salt loading only from discharges for which the appropriate information was available, it serves well to assess the relative importance of municipal discharges to the Colorado River system.

DRS/gl