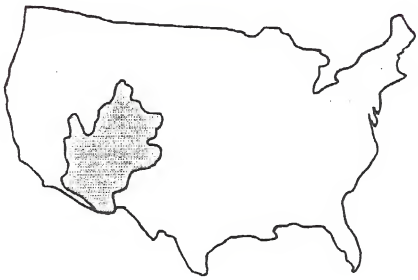
1988

Joint Evaluation of

Salinity Control Programs

in the



Colorado River Basin

1988 Joint Evaluation of Salinity Control Programs in the Colorado River Basin

December 1988

Prepared by

Colorado River Salinity Program Coordinator
Bureau of Reclamation

and the
USDA Salinity Control Coordinating Committee
U.S. Department of Agriculture

in cooperation with
Bureau of Land Management,
Geological Survey, Fish and Wildlife Service,
and the Environmental Protection Agency

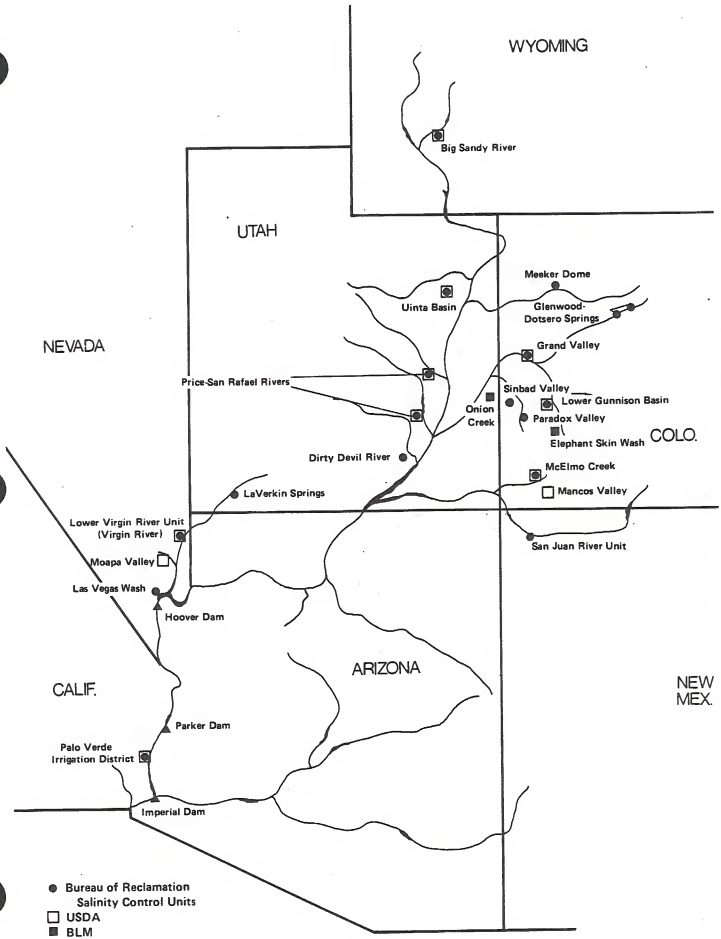


Figure 1. Colorado River Basin salinity control projects.

FOREWORD

Nothing in this report is intended to interpret the provisions of the Colorado River Compact (45 Stat. 1057); the Upper Colorado River Basin Compact (63 Stat. 31); the Water Treaty of 1944 with the United Mexican States (Treaty Series 994, 59 Stat. 1219); the decree entered by the Supreme Court of the United States in Arizona vs. California, et al. (376 U.S. 340); the Boulder Canyon Project Act (45 Stat. 1057); the Boulder Canyon Project Adjustment Act (54 Stat. 774; 43 U.S. Code 618a); the Colorado River Storage Project Act (70 Stat. 105; 43 U.S. Code 620); or the Colorado River Basin Project Act (82 Stat. 885; 43 U.S. Code 1501).

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1988 JOINT EVALUATION OF SALINITY CONTROL PROGRAMS IN THE COLORADO RIVER BASIN

This summary report and appended materials are a combined Department of the Interior and Department of Agriculture effort to fully coordinate and integrate the respective salinity control programs authorized in Public Law 98-569, amendments to the Colorado River Basin Salinity Control Act of 1974 (Public Law 93-320). Units under both programs are shown in figure 1. Data used in the analysis for all units reflect accomplishments to January 1, 1988. The report describes, however, program activities through fiscal year 1988.

The Quality of Water Colorado River Basin, Progress Report No. 14 contains a summary of agency and unit activities and most of the information gathered during the 1988 joint evaluation. This report does not duplicate that material. Progress Report No. 14, prepared by the Upper Colorado Region, to be distributed in January 1989, covers many water quality parameters and can be obtained by writing the Regional Director, Upper Colorado Region, Bureau of Reclamation, P.O. Box 11568, Salt Lake City, Utah 84147. Basic data tables and much of the information used in the 1988 analysis can be found in a separate appendix.

BACKGROUND AND ASSUMPTIONS

The 1988 evaluation was prepared using updated and adjusted data to more accurately compare the program information of the Department of the Interior and the Department of Agriculture. All costs were updated to January 1988 and interest or discount rates (8-5/8 percent) have been adjusted to the same base. Repayment analysis for the Lower Colorado River Basin Development Fund was based on the current 1988 rate of 9-3/8 percent interest for the years 1988 and beyond.

The base condition for the CRSS (Colorado River Simulation System) computer model evaluation assumes no funds expended on salinity control beyond those already spent on Grand Valley, Meeker Dome, Uinta Basin, Las Vegas Wash. These projects, or portions thereof, are currently removing approximately 156,000 tons of salt annually from the river system. Projections of future salinity conditions used the average of 15 sequences of historical hydrology (1906-1983) as a data base and current (1988) depletion projections developed jointly by Reclamation and the Forum.

The salinity at Imperial Dam, without further controls, is projected to reach about 966 mg/L by the year 2010. Figure 2 provides an historical perspective in addition to the numeric

standard and the projections at Imperial Dam. It is readily apparent that without the recommended controls, the salinity at Imperial Dam is expected to increase significantly over the next 7 years due in part to expected normal hydrologic conditions. Using the salinity projections at Imperial Dam, salt load reductions required to reduce projected TDS (total dissolved solids) levels to the numeric criteria of 879 mg/L are estimated to be about 1 million tons per year by the year 2010 and is referred to as the program objective. Figure 3 shows how the implementation plan meets the numeric criteria.

MAJOR FINDINGS

The recommended plan is expected to satisfy salt load reduction objectives and program goals using an average of results of 15 hydrologic cycles, by maintaining salinity levels at Imperial Dam at or below 879 mg/L. The recommended plan's implementation schedule is shown on table 1 and figure 4.

This analysis is based on current data (January 1988). Annual review is required to update project data, check progress against program objectives, and validate that the current investment level assumptions of approximately $530 million will satisfy program objectives. The reduction of $30 million from the estimated 1987 evaluation is a result of monies being expended in 1987 toward program goals, a removal of Lower Virgin River and Las Vegas Wash (Whitney) from the recommended plan, and other refinements in the program. As evidenced by past program activities, long lead times are required for project planning and implementation, and construction costs will continue to increase. To minimize program costs and to avoid increased inflation expenses, program planning, implementation schedules, and funding levels should be consistent with the recommended plan. Although high flows for the past few years have temporarily lowered salinity levels in the system, construction should not be delayed. Salinity levels are currently rising, as evidenced by figure 5, and any delay would impact program continuity and increase overall program costs.

- The recommended plan will satisfy the remaining salt load reduction objective of removing about 1 million tons per year by 2010 and the program goal of maintaining salinity at or below 879 mg/L at Imperial Dam using the average of the results of 15 hydrologic cycles to determine program goals.

- Total remaining construction cost for the program is now projected to be about $530 million. This schedule is predicated on receiving adequate annual funding for construction or implementation.

- In order to meet the program objectives and goals beyond the next decade, to minimize Lower Basin interest costs, and to maintain program continuity, construction of several new projects as specified in the implementation plan needs to be initiated in the next few years. The $530 million investment schedule appears to best satisfy the remaining long-term requirements with least investment costs.

- To meet the program salt load reduction objectives, it is necessary to have a mix of both USDA and Interior projects.

- Repayment analysis of the Lower Colorado River Basin Fund shows that sufficient funds are available to cover all costs (capital, O&M, interest, and 3.8 percent inflation) for the $530 million cost of the recommended plan.

- Continued close Federal and State coordination among Interior, USDA, the Interagency Committee, the Forum, and the Advisory Council is critical for effective management of the program.

- To keep the project implementation schedule on track and to allow for inclusion of newly formulated, more cost-effective projects and changes in technology, the evaluation will need to be reviewed annually for the next several years.

Management Recommendations

- DOI and USDA should support the $530 million investment level for program planning and budgeting.

- All involved agencies should continue to work toward full implementation of the USDA Colorado River Salinity Control Program in coordination with DOI.

- USDA should staff the CRSC projects to provide timely assistance and to maintain a balanced planning and application workload.

- USDA and DOI should accelerate the implementation of monitoring and evaluation activities to quantify program impacts and accomplishments.

- Reclamation should continue to refine the procedures to estimate the salt load reduction objectives for future program analysis.

- Involved agencies should continue analysis of project construction schedules for possible modifications to allow other cost-effective projects to be started earlier or inserted into the program as new data is made available.

- Reclamation and USDA should continue program evaluation annually to monitor progress and to improve on investment and repayment analysis.

- USDA should continue coordination with Reclamation by maintaining the Colorado River Salinity Control Basin Coordinator in Reclamation's coordinating office.

- Continue the Soil Conservation Service (SCS)/Reclamation technical policy coordination committee activities.

- Continue cooperation among the Federal agencies, the Forum, and the Advisory Council.

- SCS should provide more guidance to their offices on NEPA compliance issues encountered on past environmental impact statements (EIS's).

- Information/education efforts should be expanded as program implementation starts in new areas.

PROGRAM COORDINATION - TPCC

The Technical Policy Coordinating Committee (TPCC), organized by Reclamation and SCS in 1985, continued its role through 1988 by:

1. Providing recommendations to Utah on strategies to address requests for salinity control in the Tabiona, Fruitland, Strawberry, and Green River areas

2. Providing guidance to Colorado on a proposed supplement to expand the scope of the Grand Valley Salinity Control Report

3. Recommending and assisting a special joint agency work session to develop the updated economic impacts of salinity in the Colorado River

4. Providing guidance on Utah's proposal for projects to reduce salt loading from rangelands

USDA'S CRSC PROGRAM ACTIVITIES

This section contains a brief USDA program status and describes several key activities. More detailed information and the status reports for each of the USDA salinity projects are contained in the Quality of Water, Progress Report No. 14.

Congress appropriated $4.9 million in fiscal year 1988 for implementation of the USDA Colorado River Salinity Control Program. In addition, there was a carryover of Agriculture Conservation Program (ACP) salinity funds for the application of salinity reduction practices in the Grand Valley and Uinta Basin.

During fiscal year 1988, cost-share funds for salinity control contracts were allocated for the second year to the Uinta Basin and Grand Valley projects. In addition, first year cost-share funds were allocated in fiscal year 1988 to the Lower Gunnison and Big Sandy projects. During the fiscal year, a total of 135 salinity control contracts were signed in the Uinta Basin, Grand Valley, Lower Gunnison, and Big Sandy projects. As of September 30, 1988, there are 148 salinity control contracts in effect in these project areas. Also, approximately 375 participants utilized the ACP to apply salinity reduction practices in the Uinta Basin and Grand Valley project areas.

Individuals and groups exhibited a very high degree of interest in participating in the program during the year. Applications submitted by land users in the Uinta Basin, Grand Valley, Lower Gunnison, and Big Sandy projects represent a total need for approximately $17 million in USDA cost-share funds, if salinity control contracts were developed for each applicant. These applications also represent the willingness of the participants to expend over $7 million of their funds for program implementation. The total level of interest greatly exceeds the USDA fiscal year 1989 funding amount for contracts and the SCS technical assistance capacity to develop the requested salinity control plans. Because of this, it is anticipated that a large backlog of unserviced applications will be on hand at the close of fiscal year 1989.

USDA Salinity Control Coordinating Committee

The USDA Salinity Control Coordinating Committee is responsible for the coordination of program activities at the national level in consultation with the Bureau of Reclamation, the Colorado River Basin Salinity Control Forum and the Environmental Protection Agency. This committee has met regularly and has taken action on various program policies, procedures, and fund management issues. The committee reviewed all Project Implementation Plans and also made program implementation recommendations for effective agency coordination. The committee

prepared and submitted to Congress the USDA 1988 Report to Congress, Colorado River Salinity Control Program.

Uinta Basin Project, Utah

During the fiscal year ending September 30, 1988, 151 sprinkler irrigation systems, covering 15,201 acres were installed. There were also 42 surface systems installed involving 1,474 acres. Irrigation efficiencies were significantly improved on these treated fields and prevented over 10,000 acre-feet of water and 4,200 tons of salt from annually entering the Colorado River. During the fiscal year over $4 million of Agricultural Conservation Program (ACP) and Colorado River Salinity Control Program funds were obligated in salinity control contracts and long-term agreements.

Grand Valley Project, Colorado

In fiscal year 1988, over 25 miles of underground pipeline and ditch lining were installed. In addition 568 acres of land was leveled, 100 surface irrigation systems were improved and other salinity control practices were installed. These salinity control activities during the year reduced the annual salt loading to the Colorado River by approximately 2,800 tons. Approximately $3 million of Colorado River salinity control and ACP funds were obligated during the year in salinity control contracts and for cost-sharing assistance to ACP participants.

Monitoring and Evaluation

USDA is implementing a monitoring and evaluation (M&E) program in each of the active salinity control projects. An M&E program has been underway for several years in the Grand Valley and Uinta Basin projects and is yielding valuable information on the effectiveness of applied salinity control practices. The Big Sandy, Moapa Valley, McElmo, and Lower Gunnison projects are in the early phases of initiating M&E activities.

Final EIS Big Sandy Project, Wyoming

The Big Sandy Final Environmental Impact Statement was published in November 1987 and the amended Record of Decision prepared in January 1988.

Habitat Evaluation Procedures Workshop

The Soil Conservation Service in Wyoming held a Habitat Evaluation Procedures (HEP) workshop on May 9-13, 1988, in Casper, Wyoming. The purpose of this workshop was to train SCS and other agency personnel on the benefits and use of HEP. In the Big Sandy project, HEP will be used extensively in the monitoring and evaluation of wetland and wildlife effects during implementation of the project.

Big Sandy Operating Procedures Workshop

To introduce USDA agency personnel to their duties and responsibilities for program implementation, and to facilitate agency cooperation and coordination during program implementation, the USDA conducted a Big Sandy interagency workshop. Personnel at the project level were trained in agency responsibilities as published in the rules and regulations and in USDA operating procedures developed to guide project implementation. The 2-day workshop was held at Farson, Wyoming.

Participants included representatives from the ASCS and the ASC County Committee, from the SCS, the Extension Service, Bureau of Reclamation, Wyoming State Government, the local Soil Conservation District, and others.

McElmo Draft EIS

The draft SCS McElmo EIS was published in May 1988. The major issues relate to the anticipated loss of wetlands during program implementation and the voluntary replacement of values foregone by the USDA program participants. SCS expects to publish a final EIS in 1989.

BUREAU OF RECLAMATION ACTIVITIES IN 1988

As stated earlier, the status of the units are included in the Quality of Water, Progress Report No. 14 and are not being repeated here; however, a few of the major accomplishments are noted.

Paradox Valley Unit, Colorado

Construction of the brine pipeline which will transport Paradox brine to the injection test well was completed. Surface treatment facilities and injection facilities to be used in conjunction with the brine pipeline are being constructed. The

5-1/2 inch-diameter special alloy injection string delivery was delayed because of production problems in Hereford, England, and in Huntington, West Virginia. The injection string has now been threaded, crated, and is awaiting delivery when needed.

Completion of the test well is expected between October and December 1988. Work will continue on the remainder of the surface facilities and should be hooked to the injection well in the summer of 1989.

Grand Valley Unit, Colorado

The construction of the west end Government Highline Canal was completed with an additional 5,600 tons of salt precluded from entering the river system annually.

Reclamation Reorganization in Effect

The reorganization of the Bureau of Reclamation became effective June 19, 1988. The effect on the Colorado River Salinity Control Program is expected to be minor; however, the Colorado River Water Quality Office no longer exists. All program activities will be managed through the Colorado River Salinity Program Coordinator, D-5090, at the same address, P.O. Box 25007, Denver, Colorado 80225.

Ken Pitney, the USDA Colorado River Salinity Control Basin Coordinator, will continue to be located adjacent to Reclamation's Colorado River Salinity Program Coordinator's office and will receive mail at the same address, code D-5090.

Salinity Update will continue to be published by the Colorado River Salinity Program Coordinator's office and most salinity coordination activities will continue unchanged. Staff support from the other divisions will be requested as needed to carry out the various salinity control activities.

Preconstruction Funds approved for Reclamation's Lower Gunnison Winter Water for FY 1989

The Appropriations bill for energy and water development (including Reclamation) for fiscal year 1989 includes $250,000 for beginning preconstruction activities in the Winter Water portion of the Lower Gunnison Basin Unit. These monies would be obligated to the Uncompahgre Valley Water Users Association and used to collect design data on their system in preparation for construction in fiscal year 1990.

Estimating Economic Impacts

The research study to update the economic impacts of salinity in the Colorado River was completed and the report published in February 1988. The report, Estimating Economic Impacts of Salinity of the Colorado River reported salinity damages as a range of dollars. The estimated 1986 total damages from the Colorado River salinity average $310.8 million annually based on the 1976-85 average level of river salinity and the 500 mg/L baseline value.

BUREAU OF LAND MANAGEMENT ACTIVITIES IN 1988

More detailed activities are provided in the Quality of Water, Progress Report No. 14; however, a summary of the activities are provided in this report. A total of 365 tons of salt were removed by eight separate activities: one in Colorado, two in Wyoming, and five in Utah. In addition, Colorado's Elephant Skin Wash project was maintained. Salinity control was also identified and evaluated in seven Resource Management Plans in 1988.

The Colorado State Director has been the BLM's official representative for the CRSC program. During a recent reorganization, the responsibility for salinity control activities and policy and program guidance was moved to the Washington Office. Mr. Dean Stepanek, Assistant Director, Land and Renewable Resources is now BLM's official representative. Mr. Ron Clark in the Branch of Soil, Water, and Air, Division of Rangeland Resources, is serving as BLM's CRSC Coordinator. The Service Center in Denver, Colorado, is responsible for technology transfer related to salinity control activities. Mr. Dan Muller, Chief, Physical Resources Section, is responsible for the Service Center activities.

WETLAND AND RIPARIAN HABITAT IMPACTS

Concern has been expressed over the impacts to wetland and riparian habitats associated with construction and implementation of the salinity control features. Progress is being made on these two concerns. The Bureau of Reclamation purchased over 500 acres of river bottom lands and sought transfer of over 500 acres of adjacent BLM lands to develop a wildlife management area in Grand Valley.

Under the USDA Colorado River Salinity Control Program, farmers have also volunteered to implement approximately 600 acres of wildlife practices in the Grand Valley area. Also under the salinity control program, farmers in the Uinta Basin have already applied 2,785 acres of wetland and upland wildlife habitat

management. The treatment includes the planting of trees, shrubs, and grasses and the installation of other practices to improve existing areas and create new upland wildlife habitat. The areas are specifically designed as wildlife habitat in the salinity control plans and are managed for this purpose by the participant. Wetland management involves the improvement of existing areas or the creation of new wetlands. The treatment varies according to needs and can involve the development of open water areas, improving and planting vegetation and controlling grazing. The areas are designated as wetlands and managed to increase wetland values.

SCS has made a concerted effort to staff biologists in each salinity control project area to work with the farmers on voluntary implementation practices.

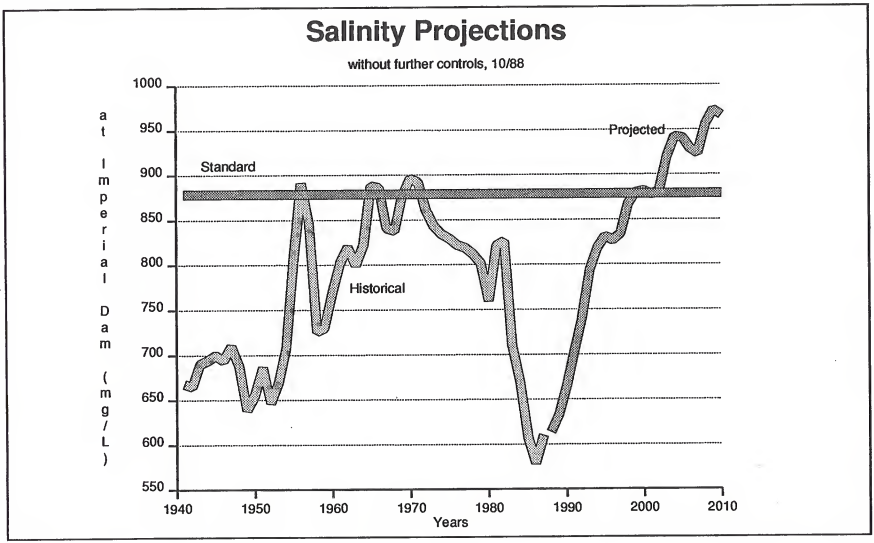


Figure 2.--Salinity projections at Imperial Dam without further controls

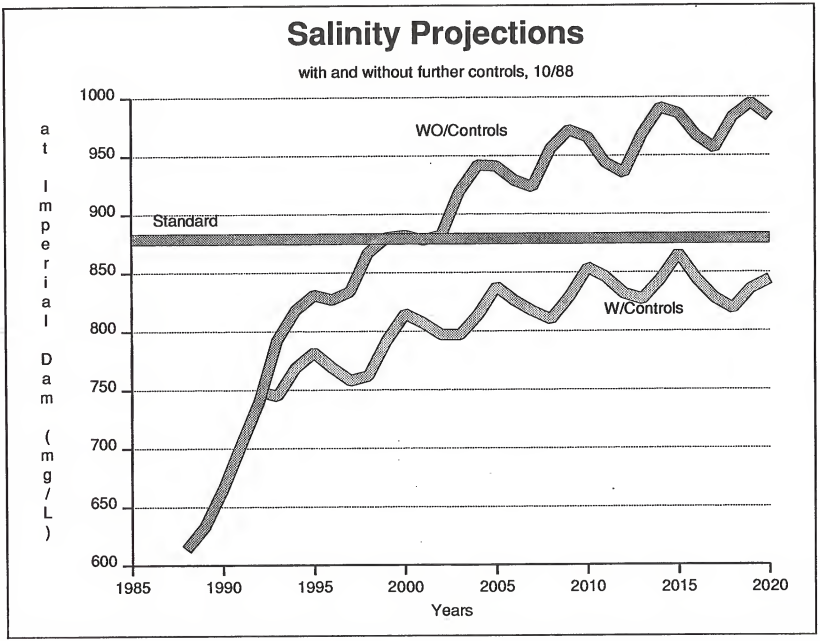


Figure 3.--Salinity projections at Imperial Dam with and without further controls

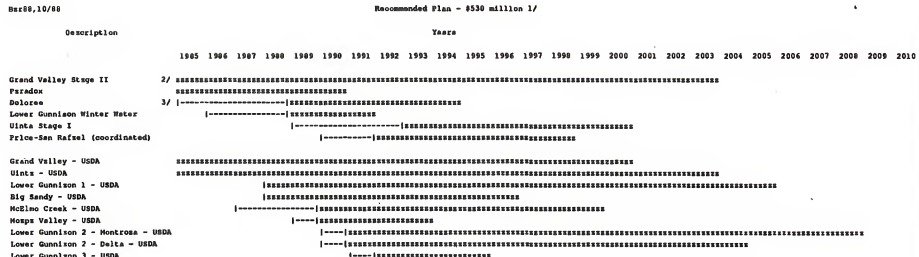
Table 1
Recommended Salinity Control Plan
Implementation Schedule

	Begin Implementation	Projected Date Complete	Tons/yr Removed to Jan 1988	Projected Salt Removed Tons/yr	Cost ** effectiveness $/ton
Meeker Dome (USBR)	1979	1983	48,000		14
Grand Valley Stage One (USBR)	1980	1984	21,900		121
BLM well plugging & nonpoint	1984	1988	7,965		*
Las Vegas Wash Pittman (USBR)	1984	1985	7,000		24
Grand Valley (USDA)	1979	2000	35,800	194,200	27
Paradox Valley (USBR)	1980	1990		180,000	49
Uinta Basin (USDA)	1980	2003	30,140	68,060	80
Grand Valley Stage Two (USBR)	1985	2003	5,600	107,500	113
Big Sandy River (USDA)	1988	1996		52,900	27
Dolores Project (McElmo, USBR)	1989	1994		23,000	84
Lower Gunnison Win Wtr (USBR)	1989	1991		74,000	38
Lower Gunnison 1 (USDA)	1988	2005		82,100	64
Moapa Valley (USDA)	1990	1993		19,500	43
Lower Gunnison 2, Mont. (USDA)	1991	2008		81,700	68
Lower Gunnison 2, Delta (USDA)	1991	2004		104,700	41
McElmo Creek (USDA)	1990	1999		38,000	83
Lower Gunnison 3, (USDA)	1992	1995		12,000	74
Uinta Basin I (USBR)	1993	2000		25,500	88
Price-San Rafael (Coordinated) 1/	1992	1998		70,800 2/	55
			156,405	1,133,960	

Others under consideration, not included in the plan.
San Juan River (USBR)
Sinbad Valley (USBR)
Mancos Valley (USDA)
Uinta Basin II (USBR)
Lower Gunnison Stage I Balance (USBR)
Lower Gunnison North Fork (USBR)
Grand Valley II Balance (USBR)
Las Vegas Wash Balance (USBR)
Virgin Valley (USDA)
Las Vegas Wash Whitney (USBR)
Lower Virgin River (USBR)

1/ Will be included in USDA implementation schedule, upon completion of plan.
2/ Total reduction in removing salt from the Colorado River system if the planned USDA partricipation by land users in each unit is achieved.
* A range of cost-effectiveness from several activities; other activities will be included as plans are completed and construction is accomplished.
** Cost-effectiveness numbers are values adjusted to the same base.

Figure 4.--Recommended salinity control plan implementation schedule



1/ Information based on 1988 data tables.
2/ Z's zzzzz designate construction activities.
3/ Lines |-----| designate advance planning activities for Reclamation and technical assistance activities for USDA.

Note: Units not currently in plan:	Reclamation:	USDA:	Deferred (Reclamation):	Completed Units (Reclamation)
*Data not available	Grand Valley II, Balance	Virgin Valley	Dirty Devil River	Meeker Dome
	Lower Gunnison I, Balance	Hancock Valley	*Palo Verde Irrig. Dist.	Grand Valley Stage I
	*Lower Gunnison North Fork		*Big Sandy	Las Vegas Wash - Pittman
	*Uinta Stage II		Las Vegas Wash, Whitney	
	*San Juan		Las Vegas Wash Stage II	
	Sinbad Valley		Lower Virgin	
	Glenwood-Dotsero Springs			

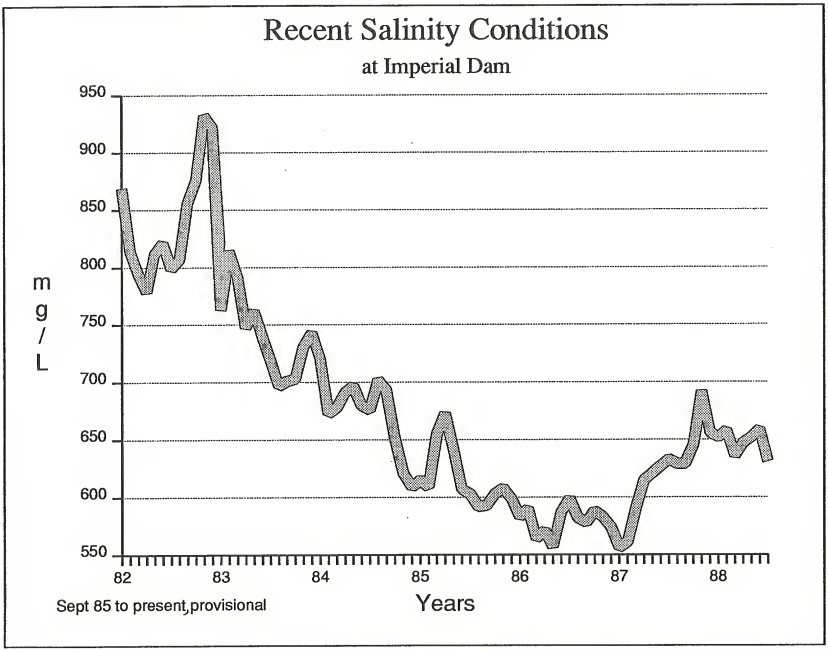


Figure 5.--Recent salinity levels at Imperial Dam.

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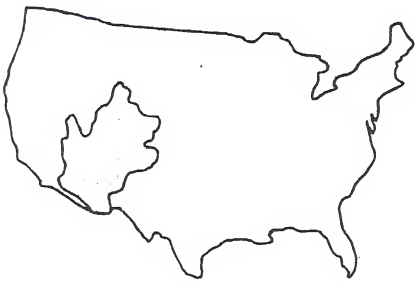

Colorado River Basin

Appendices

Appendix A

Data Tables

	USBR Sinbad Valley COLORADO	BR Meeker Dome COLORADO	BR Grand Valley Stage One COLORADO
Date of Estimate:	1/82	Completed	Completed
Interest Rate:	7.63%		
Estimate Adjustment for 1/88	110.14%		
1/88 Interest Rate	8.63%		
IDC Adjustment for 1/88	13.11%		
Project Area			
1. Irrigated Area (total acres)			6,000
2. Potential Participants:			
a. Individuals (number)			
b. Groups (number)			
3. Canals (total miles)			
4. Laterals (total miles)			
5. Point Sources (number)	1	3	
Salt Load Contribution			
1. On-farm (tons/year)			
2. Canals (tons/year)			
3. Laterals (tons/year)			
4. Point Sources (tons/year)	8,938	57,000	
5. Other (tons/year)			
Implementation Plan			
1. Construction Start (year)	1991		1980
2. Construction Period (years)	3		3
3. Expected Participants:			
a. Individuals (number)			
b. Groups (number)			
4. On-farm Practices:			
a. Treated Area (acres)			
b. Land Leveling (acres)			
c. Sprinkler Systems (acres)			
d. Farm Ditches/Pipelines (miles)			
5. Canal Lining (miles)			6.70
6. Lateral Lining (miles)			
7. Pipe Laterals (miles)			29.7
8. Winter Water Systems (miles)			
9. Collection Features (type)	low dam		
10. Delivery Systems (type)	pipeline		
11. Disposal Facilities (type)	deep well inj	well plugs	
12. Habitat Replacement (acres)			
Salt Load Reduction			
1. To date:			
a. On-farm (tons/year)			
b. Canals (tons/year)			21,900
c. Laterals (tons/year)			
d. Point Sources (tons/year)		19,000	
2. Potential/Balance:			
a. On-farm (tons/year)			
b. Canals (tons/year)			
c. Laterals (tons/year)			
d. Point Sources (tons/year)	7,470		
e. Other (tons/year)			

Data Source:	9/82 BLM Rpt	7/85 Clc Rpt	1986 EIS

	BLM Sinbad Valley	BR Meeker Dome	BR Grand Valley Stage One
	COLORADO	COLORADO	COLORADO
Economic and Financial Analyses			
Department of the Interior:			
1. Plan Formulation Costs		3,118,000	
2. Nonsalinity Planning Costs			
3. Advance Planning Costs:			
a. Prior to Authorization			25,000
b. After Authorization	500,000		
4. Nonsalinity Design Costs			
5. Salinity Const. Costs To Date			27,744,000
6. Balance Salinity Const. Costs	7,369,142		
7. Nonsalinity Construction Costs			
8. Habitat Replacement Costs			
9. Salinity IDC:			
a. Economic	317,653		1,112,000
b. Financial			
10. Nonsalinity IDC			
a. Economic			
b. Financial			
11. Salinity OM&R Costs w/o Power	55,068		104,000
12. Nonsalinity OM&R w/o Power			8,000
13. Economic Cost of Power			
14. Financial Cost of Power	9,582		
15. Salinity M & E Costs			
16. Nonsalinity M & E Costs			
Department of Agriculture:			
1. Technical Assistance Costs			
2. M & E Costs			
3. Information and Education Costs			
4. Federal Cost-share Obligations			
5. Federal Const. Cost-share To Date			
6. Balance Federal Const. Cost-share			
7. Local Construction Cost-share			
8. Percent Federal Cost-share:			
9. Federal Habitat Costs			
10. Local Habitat Costs			
11. Other Local Costs			
12. Local O&M Costs			
13. Annual Value of Replacement Costs			
14. Federal IDC			
Cost Effectiveness:			
1. Total Salinity Construction Costs	7,369,142	3,118,000	27,744,000
2. Advance Planning Costs	500,000		
3. Habitat Replacement Costs			
4. IDC (Economic)	317,653		1,112,000
5. Investment Cost	8,186,794	3,118,000	28,856,000
6. Annual Equivalent Investment Costs	717,573	273,293	2,529,228
7. Annual Salinity OM&R Costs	55,068		104000
8. Annual Economic Cost of Power	9,582		
9. Annual M & E Costs			
10. Annual Habitat OM&R Costs			8000
11. Annual Salinity Costs	782,222	273,293	2,641,228
12. Tons of Salt Removed Annually	7,470	19,000	21,900
13. Cost Effectiveness - $/ton	105	14	121

	BR Grand Valley Stage Two COLORADO	BR Grand Valley Stage Two Balance COLORADO	USDA Grand Valley COLORADO
Date of Estimate:	1/85	1/85	3/88
Interest Rate:	8.63%	8.63%	8.63%
Estimate Adjustment for 1/88	104.49%	104.49%	
1/88 Interest Rate	8.63%	8.63%	8.63%
IDC Adjustment for 1/88	0.00%	0.00%	
Project Area			
1. Irrigated Area (total acres)	45,270	8,730	66,000
2. Potential Participants:			
a. Individuals (number)			920
b. Groups (number)			250
3. Canals (total miles)			
4. Laterals (total miles)			190
5. Point Sources (number)			
Salt Load Contribution			
1. On-farm (tons/year)			300,000
2. Canals (tons/year)			
3. Laterals (tons/year)			100,000
4. Point Sources (tons/year)			
5. Other (tons/year)			
Implementation Plan			
1. Construction Start (year)	1985	1996	1979
2. Construction Period (years)	19	9	22
3. Expected Participants:			
a. Individuals (number)			920
b. Groups (number)			250
4. On-farm Practices:			
a. Treated Area (acres)			53,000
b. Land Leveling (acres)			16,900
c. Sprinkler Systems (acres)			800
d. Farm Ditches/Pipelines (miles)			1,790
5. Canal Lining (miles)	31.86	6.14	
6. Lateral Lining (miles)	234.00	90.00	15
7. Pipe Laterals (miles)			175
8. Winter Water Systems (miles)			
9. Collection Features (type)			
10. Delivery Systems (type)			
11. Disposal Facilities (type)			
12. Habitat Replacement (acres)			1,200
Salt Load Reduction			
1. To date:			
a. On-farm (tons/year)			19,631
b. Canals (tons/year)	5,600		
c. Laterals (tons/year)			16,168
d. Point Sources (tons/year)			
2. Potential/Balance:			
a. On-farm (tons/year)			110,369
b. Canals (tons/year)	24,300	15,300	
c. Laterals (tons/year)	83,200	11,100	83,832
d. Point Sources (tons/year)			
e. Other (tons/year)			

Data Source: 5/86 Ver Memo 5/86 Ver Memo SCS/CO

	BR Grand Valley Stage Two COLORADO	BR Grand Valley Stage Two Balance COLORADO	USDA Grand Valley COLORADO
Economic and Financial Analyses			
Department of the Interior:			
1. Plan Formulation Costs	164,256	110,744	
2. Nonsalinity Planning Costs			
3. Advance Planning Costs:			
a. Prior to Authorization			
b. After Authorization			
4. Nonsalinity Design Costs			
5. Salinity Const. Costs To Date	23,835,429		
6. Balance Salinity Const. Costs	101,862,648	71,887,179	
7. Nonsalinity Construction Costs			
8. Habitat Replacement Costs	5,033,175	1,862,979	
9. Salinity IDC:			
a. Economic	5,389,908	3,005,229	
b. Financial			
10. Nonsalinity IDC			
a. Economic			
b. Financial			
11. Salinity OM&R Costs w/o Power	128,590	217,932	
12. Nonsalinity OM&R w/o Power	47,215	31,151	
13. Economic Cost of Power			
14. Financial Cost of Power			
15. Salinity M & E Costs			
16. Nonsalinity M & E Costs			
Department of Agriculture:			
1. Technical Assistance Costs			20,467,000
2. M & E Costs			3,464,000
3. Information and Education Costs			1,700,000
4. Federal Cost-share Obligations			38,024,000
5. Federal Const. Cost-share To Date			9,413,320
6. Balance Federal Const. Cost-share			28,610,680
7. Local Construction Cost-share			16,280,000
8. Percent Federal Cost-share:			70
9. Federal Habitat Costs			
10. Local Habitat Costs			
11. Other Local Costs			
12. Local O&M Costs			543,300
13. Annual Value of Replacement Costs			583,400
14. Federal IDC			
Cost Effectiveness:			
1. Total Salinity Construction Costs	125,698,077	71,887,179	60,191,000
2. Advance Planning Costs	0	0	
3. Habitat Replacement Costs	5,033,175	1,862,979	0
4. IDC (Economic)	5,389,908	3,005,229	0
5. Investment Cost	136,121,160	76,755,388	60,191,000
6. Annual Equivalent Investment Costs	11,931,020	6,727,610	5,275,741
7. Annual Salinity OM&R Costs	128,590	217,932	583,400
8. Annual Economic Cost of Power			
9. Annual M & E Costs			303,620
10. Annual Habitat OM&R Costs	47,215	31,151	
11. Annual Salinity Costs	12,106,825	6,976,693	6,162,761
12. Tons of Salt Removed Annually	107,500	26,400	230,000
13. Cost Effectiveness = $/ton	113	264	27

	BR Paradox COLORADO	BR Lower Gunnison Stage One Winter Water COLORADO	BR Lower Gunnison Stage One Deferred COLORADO
Date of Estimate:	10/85	1/86	1/85
Interest Rate:	8.63%	8.63%	8.63%
Estimate Adjustment for 1/88	103.16%	103.16%	104.49%
1/88 Interest Rate	8.63%	8.63%	8.63%
IDC Adjustment for 1/88	0.00%	0.00%	0.00%
Project Area			
1. Irrigated Area (total acres)			
2. Potential Participants:			
a. Individuals (number)			
b. Groups (number)			
3. Canals (total miles)			
4. Laterals (total miles)			
5. Point Sources (number)			
Salt Load Contribution			
1. On-farm (tons/year)			
2. Canals (tons/year)			
3. Laterals (tons/year)			
4. Point Sources (tons/year)	205,000		
5. Other (tons/year)		74,000	
Implementation Plan			
1. Construction Start (year)	1986	1989	1990
2. Construction Period (years)	5	3	6
3. Expected Participants:			
a. Individuals (number)			
b. Groups (number)			
4. On-farm Practices:			
a. Treated Area (acres)			
b. Land Leveling (acres)			
c. Sprinkler Systems (acres)			
d. Farm Ditches/Pipelines (miles)			
5. Canal Lining (miles)			58.90
6. Lateral Lining (miles)			195.40
7. Pipe Laterals (miles)			
8. Winter Water Systems (miles)			
9. Collection Features (type)	shallow wells		
10. Delivery Systems (type)	pipeline		
11. Disposal Facilities (type)	deep well inj		
12. Habitat Replacement (acres)			2,100
Salt Load Reduction			
1. To date:			
a. On-farm (tons/year)			
b. Canals (tons/year)			
c. Laterals (tons/year)			
d. Point Sources (tons/year)			
2. Potential/Balance:			
a. On-farm (tons/year)			
b. Canals (tons/year)			
c. Laterals (tons/year)			
d. Point Sources (tons/year)	180,000		66,500
e. Other (tons/year)		74,000	

Data Source: MPO/PF-65 Preconst Est 1/84 FR/FES

	BR Paradox COLORADO	BR Lower Gunnison Stage One Winter Water COLORADO	BR Lower Gunnison Stage One Deferred COLORADO
Economic and Financial Analyses			
Department of the Interior:			
1. Plan Formulation Costs			
2. Nonsalinity Planning Costs			
3. Advance Planning Costs:			
a. Prior to Authorization			
b. After Authorization			
4. Nonsalinity Design Costs			
5. Salinity Const. Costs To Date	32,224,519		
6. Balance Salinity Const. Costs	53,645,532	28,252,646	142,833,974
7. Nonsalinity Construction Costs			
8. Habitat Replacement Costs			
9. Salinity IDC:			
a. Economic			
b. Financial			
10. Nonsalinity IDC			
a. Economic			
b. Financial			
11. Salinity OM&R Costs w/o Power	309,494	368,297	
12. Nonsalinity OM&R w/o Power		76,342	68,962
13. Economic Cost of Power	1,036,804		
14. Financial Cost of Power	160,937		
15. Salinity M & E Costs			
16. Nonsalinity M & E Costs			
Department of Agriculture:			
1. Technical Assistance Costs			
2. M & E Costs			
3. Information and Education Costs			
4. Federal Cost-share Obligations			
5. Federal Const. Cost-share To Date			
6. Balance Federal Const. Cost-share			
7. Local Construction Cost-share			
8. Percent Federal Cost-share:			
9. Federal Habitat Costs			
10. Local Habitat Costs			
11. Other Local Costs			
12. Local O&M Costs			
13. Annual Value of Replacement Costs			
14. Federal IDC			
Cost Effectiveness:			
1. Total Salinity Construction Costs	85,870,051	28,252,646	142,833,974
2. Advance Planning Costs			
3. Habitat Replacement Costs			
4. IDC (Economic)			
5. Investment Costs	85,870,051	28,252,646	142,833,974
6. Annual Equivalent Investment Costs	7,526,510	2,476,344	12,519,398
7. Annual Salinity OM&R Costs	309,494	368,297	
8. Annual Economic Cost of Power	1,036,804		
9. Annual M & E Costs			
10. Annual Habitat OM&R Costs			
11. Annual Salinity Costs	8,872,807	2,844,642	12,519,398
12. Tons of Salt Removed Annually	180,000	74,000	66,500
13. Cost Effectiveness - $/ton	49	38	188

	BR Lower Gunnison North Fork	USDA Lower Gunnison 1	USDA Lower Gunnison 2 Montrose
	COLORADO	COLORADO	COLORADO
Date of Estimate:		3/88	3/88
Interest Rate:		8.63%	8.63%
Estimate Adjustment for 1/88			
1/88 Interest Rate		8.63%	8.63%
IDC Adjustment for 1/88			0
Project Area			
1. Irrigated Area (total acres)		22,609	32,468
2. Potential Participants:		330	350
a. Individuals (number)		22	310
b. Groups (number)		50	30
3. Canals (total miles)		46	70
4. Laterals (total miles)		0	13
5. Point Sources (number)		0	0
Salt Load Contribution			
1. On-farm (tons/year)		66,000	76,000
2. Canals (tons/year)		41,400	37,800
3. Laterals (tons/year)		11,400	2,900
4. Point Sources (tons/year)		0	0
5. Other (tons/year)		0	0
Implementation Plan			
1. Construction Start (year)	1990	1989	1991
2. Construction Period (years)	8	18	18
3. Expected Participants:			
a. Individuals (number)		220	230
b. Groups (number)		15	15
4. On-farm Practices:			
a. Treated Area (acres)		20,400	26,000
b. Land Leveling (acres)		8,400	12,000
c. Sprinkler Systems (acres)		2,600	3,700
d. Farm Ditches/Pipelines (miles)		305	440
5. Canal Lining (miles)		40.00	56.00
6. Lateral Lining (miles)		9	3
7. Pipe Laterals (miles)		28	8
8. Winter Water Systems (miles)		0	0
9. Collection Features (type)		0	0
10. Delivery Systems (type)		0	0
11. Disposal Facilities (type)		0	0
12. Habitat Replacement (acres)		950	1,300
Salt Load Reduction			
1. To date:			
a. On-farm (tons/year)		0	0
b. Canals (tons/year)		0	0
c. Laterals (tons/year)		0	0
d. Point Sources (tons/year)		0	0
2. Potential/Balance:			
a. On-farm (tons/year)		38,700	48,300
b. Canals (tons/year)		34,000	31,000
c. Laterals (tons/year)		9,400	2,400
d. Point Sources (tons/year)		0	0
e. Other (tons/year)		0	0
Data Source:		SCS/CO	SCS/CO

	BR Lower Gunnison North Fork COLORADO	USDA Lower Gunnison 1 COLORADO	USDA Lower Gunnison 2 Montrose COLORADO
Economic and Financial Analyses			
Department of the Interior:			
1. Plan Formulation Costs			
2. Nonsalinity Planning Costs			
3. Advance Planning Costs:			
a. Prior to Authorization			
b. After Authorization			
4. Nonsalinity Design Costs			
5. Salinity Const. Costs To Date			
6. Balance Salinity Const. Costs			
7. Nonsalinity Construction Costs			
8. Habitat Replacement Costs			
9. Salinity IDC:			
a. Economic			
b. Financial			
10. Nonsalinity IDC			
a. Economic			
b. Financial			
11. Salinity OM&R Costs w/o Power			
12. Nonsalinity OM&R w/o Power			
13. Economic Cost of Power			
14. Financial Cost of Power			
15. Salinity M & E Costs			
16. Nonsalinity M & E Costs			
Department of Agriculture:			
1. Technical Assistance Costs		17,526,000	18,600,000
2. M & E Costs		2,295,000	2,622,000
3. Information and Education Costs		1,631,000	1,891,000
4. Federal Cost-share Obligations		32,548,000	34,541,000
5. Federal Const. Cost-share To Date		0	0
6. Balance Federal Const. Cost-share		32,548,000	34,541,000
7. Local Construction Cost-share		13,949,000	14,803,000
8. Percent Federal Cost-share:		70	70
9. Federal Habitat Costs		0	0
10. Local Habitat Costs		0	0
11. Other Local Costs		0	0
12. Local O&M Costs		465,000	493,600
13. Annual Value of Replacement Costs		499,200	530,000
14. Federal IDC		0	0
Cost Effectiveness:			
1. Total Salinity Construction Costs		51,705,000	55,032,000
2. Advance Planning Costs		0	0
3. Habitat Replacement Costs		0	0
4. IDC (Economic)		0	0
5. Subtotal Investment		51,705,000	55,032,000
6. Annual Equivalent Investment Costs		4,531,943	4,823,555
7. Annual Salinity OM&R Costs		499,200	530,000
8. Annual Economic Cost of Power		0	
9. Annual M & E Costs		201,157	229,818
10. Annual Habitat OM&R Costs		0	0
11. Annual Salinity Costs		5,232,300	5,583,373
12. Tons of Salt Removed Annually		82,100	81,700
13. Cost Effectiveness		64	68

	USDA Lower Gunnison 2 Delta	USDA Lower Gunnison 3	BR Dolores
	COLORADO	COLORADO	COLORADO
Date of Estimate:	3/88	3/88	1/86
Interest Rate:	8.63%	8.63%	8.63%
Estimate Adjustment for 1/88			103.16%
1/88 Interest Rate	8.63%	8.63%	8.63%
IDC Adjustment for 1/88	0	0	0.00%
Project Area			
1. Irrigated Area (total acres)	26,667	62,366	
2. Potential Participants:	310	700	
a. Individuals (number)	255	595	
b. Groups (number)	25	60	
3. Canals (total miles)	88	0	
4. Laterals (total miles)	23	0	
5. Point Sources (number)	0	0	
Salt Load Contribution			
1. On-farm (tons/year)	97,000	32,000	
2. Canals (tons/year)	47,100	0	
3. Laterals (tons/year)	5,300	0	
4. Point Sources (tons/year)	0	0	
5. Other (tons/year)	0	0	
Implementation Plan			
1. Construction Start (year)	1991	1992	1989
2. Construction Period (years)	14	4	3
3. Expected Participants:			
a. Individuals (number)	200	450	
b. Groups (number)	15	30	
4. On-farm Practices:			
a. Treated Area (acres)	21,300	50,000	
b. Land Leveling (acres)	9,900	23,200	
c. Sprinkler Systems (acres)	3,100	0	
d. Farm Ditches/Pipelines (miles)	360	0	
5. Canal Lining (miles)	70	0	
6. Lateral Lining (miles)	4	0	
7. Pipe Laterals (miles)	14	0	
8. Winter Water Systems (miles)	0	0	
9. Collection Features (type)	0	0	
10. Delivery Systems (type)	0	0	
11. Disposal Facilities (type)	0	0	
12. Habitat Replacement (acres)	1,100	500	
Salt Load Reduction			
1. To date:			
a. On-farm (tons/year)	0	0	
b. Canals (tons/year)	0	0	
c. Laterals (tons/year)	0	0	
d. Point Sources (tons/year)	0	0	
2. Potential/Balance:			
a. On-farm (tons/year)	61,600	12,000	
b. Canals (tons/year)	38,700	0	23,000
c. Laterals (tons/year)	4,400	0	
d. Point Sources (tons/year)	0	0	
e. Other (tons/year)	0	0	

1/ Deferred pending identification of beneficial use of water

Data Source: SCS/CO SCS/CO PF-65

	USDA Lower Gunnison 2 Delta COLORADO	USDA Lower Gunnison 3 COLORADO	BR Dolores COLORADO
Economic and Financial Analyses			
Department of the Interior:			
1. Plan Formulation Costs			
2. Nonsalinity Planning Costs			
3. Advance Planning Costs:			
a. Prior to Authorization			
b. After Authorization			
4. Nonsalinity Design Costs			
5. Salinity Const. Costs To Date			
6. Balance Salinity Const. Costs			21,937,943
7. Nonsalinity Construction Costs			
8. Habitat Replacement Costs			
9. Salinity IDC:			
a. Economic			
b. Financial			
10. Nonsalinity IDC			
a. Economic			
b. Financial			
11. Salinity OM&R Costs w/o Power			
12. Nonsalinity OM&R w/o Power			
13. Economic Cost of Power			
14. Financial Cost of Power			
15. Salinity M & E Costs			
16. Nonsalinity M & E Costs			
Department of Agriculture:			
1. Technical Assistance Costs	14,562,000	2,989,000	
2. M & E Costs	1,802,000	492,000	
3. Information and Education Costs	1,261,000	315,000	
4. Federal Cost-share Obligations	27,042,000	5,439,000	
5. Federal Const. Cost-share To Date	0	0	
6. Balance Federal Const. Cost-share	27,042,000	5,439,000	
7. Local Construction Cost-share	11,581,000	2,330,000	
8. Percent Federal Cost-share:	70	70	
9. Federal Habitat Costs	0	0	
10. Local Habitat Costs	0	0	
11. Other Local Costs	0	0	
12. Local O&M Costs	386,600	77,300	
13. Annual Value of Replacement Costs	415,000	83,200	
14. Federal IDC	0	0	
Cost Effectiveness:			
1. Total Salinity Construction Costs	42,865,000	8,743,000	21,937,943
2. Advance Planning Costs	0	0	
3. Habitat Replacement Costs	0	0	
4. IDC (Economic)	0	0	
5. Subtotal Investment	42,865,000	8,743,000	21,937,943
6. Annual Equivalent Investment Costs	3,757,117	766,324	1,922,861
7. Annual Salinity OM&R Costs	415,000	83,200	
8. Annual Economic Cost of Power	0	0	
9. Annual M & E Costs	157,945	43,124	
10. Annual Habitat OM&R Costs	0	0	
11. Annual Salinity Costs	4,330,063	892,648	1,922,861
12. Tons of Salt Removed Annually	104,700	12,000	23,000
13. Cost Effectiveness	41	74	84

	USDA McElmo	BR Glen Dot	USDA Mancos
	COLORADO	COLORADO	COLORADO
Date of Estimate:	3/88	1/83	3/88
Interest Rate:	8.63%	7.88%	8.63%
Estimate Adjustment for 1/88		107.95%	
1/88 Interest Rate	8.63%	8.63%	8.63%
IDC Adjustment for 1/88		9.52%	
Project Area			
1. Irrigated Area (total acres)	29,100		9,200
2. Potential Participants:			
a. Individuals (number)	342		95
b. Groups (number)			34
3. Canals (total miles)			104
4. Laterals (total miles)	235		
5. Point Sources (number)			
Salt Load Contribution			
1. On-farm (tons/year)	51,000		13,000
2. Canals (tons/year)			10,000
3. Laterals (tons/year)	9,000		
4. Point Sources (tons/year)		429,000	
5. Other (tons/year)			
Implementation Plan			
1. Construction Start (year)	1990	1/	
2. Construction Period (years)	10	3	4
3. Expected Participants:			
a. Individuals (number)	238		57
b. Groups (number)			15
4. On-farm Practices:			
a. Treated Area (acres)	19,700		5,500
b. Land Leveling (acres)			
c. Sprinkler Systems (acres)	19,700		3,200
d. Farm Ditches/Pipelines (miles)	33		
5. Canal Lining (miles)			17
6. Lateral Lining (miles)			
7. Pipe Laterals (miles)	235		
8. Winter Water Systems (miles)			
9. Collection Features (type)		sp boxes & wells	
10. Delivery Systems (type)		pipeline	
11. Disposal Facilities (type)		evap ponds	
12. Habitat Replacement (acres)			
Salt Load Reduction			
1. To date:			
a. On-farm (tons/year)			
b. Canals (tons/year)			
c. Laterals (tons/year)			
d. Point Sources (tons/year)			
2. Potential/Balance:			
a. On-farm (tons/year)	29,000		1,100
b. Canals (tons/year)			7,700
c. Laterals (tons/year)	9,000		
d. Point Sources (tons/year)		287,000	
e. Other (tons/year)			

1/ Deferred pending identification of beneficial use of water

Data Source:	SCS/CO	SCS/CO

	USDA McElmo	BR Glen Dot	USDA Mancos
	COLORADO	COLORADO	COLORADO
Economic and Financial Analyses			
Department of the Interior:			
1. Plan Formulation Costs			
2. Nonsalinity Planning Costs			
3. Advance Planning Costs:			
a. Prior to Authorization			
b. After Authorization			
4. Nonsalinity Design Costs			
5. Salinity Const. Costs To Date			
6. Balance Salinity Const. Costs		333,750,596	
7. Nonsalinity Construction Costs			
8. Habitat Replacement Costs			
9. Salinity IDC:			
a. Economic		20,688,663	
b. Financial			
10. Nonsalinity IDC			
a. Economic			
b. Financial			
11. Salinity OM&R Costs w/o Power		2,830,371	
12. Nonsalinity OM&R w/o Power			
13. Economic Cost of Power			
14. Financial Cost of Power		876,530	
15. Salinity M & E Costs			
16. Nonsalinity M & E Costs			
Department of Agriculture:			
1. Technical Assistance Costs	11,017,000		2,343,000
2. M & E Costs	1,119,000		54,000
3. Information and Education Costs	1,081,000		160,000
4. Federal Cost-share Obligations	18,999,000		3,729,000
5. Federal Const. Cost-share To Date	0		0
6. Balance Federal Const. Cost-share	18,999,000		3,729,000
7. Local Construction Cost-share	10,229,000		2,486,000
8. Percent Federal Cost-share:	65		60
9. Federal Habitat Costs	0		0
10. Local Habitat Costs	0		0
11. Other Local Costs	0		0
12. Local O&M Costs	292,000		62,600
13. Annual Value of Replacement Costs	314,300		66,800
14. Federal IDC	0		0
Cost Effectiveness:			
1. Total Salinity Construction Costs	31,097,000	333,750,596	6,232,000
2. Advance Planning Costs	0		0
3. Habitat Replacement Costs	0		0
4. IDC (Economic)	0	20,688,663	0
5. Subtotal Investment	31,097,000	354,439,259	6,232,000
6. Annual Equivalent Investment Costs	2,725,652	31,066,601	546,235
7. Annual Salinity OM&R Costs	314,300	2,830,371	66,800
8. Annual Economic Cost of Power	0	876,530	0
9. Annual M & E Costs	98,080		4,733
10. Annual Habitat OM&R Costs	0		
11. Annual Salinity Costs	3,138,032	34,773,502	617,768
12. Tons of Salt Removed Annually	38,000	287,000	8,800
13. Cost Effectiveness	83	121	70

	BR Lower Virgin 1/	USDA Virgin Valley 2/	USDA Moapa
	NEVADA	NEVADA	NEVADA
Date of Estimate:	8/87	3/88	3/88
Interest Rate:	8.75%	8.63%	8.63%
Estimate Adjustment for 1/88	103.16%		
1/88 Interest Rate	8.63%	8.63%	8.63%
IDC Adjustment for 1/88	-1.43%		
Project Area			
1. Irrigated Area (total acres)		4,625	4,982
2. Potential Participants:			
a. Individuals (number)		45	70
b. Groups (number)		4	1
3. Canals (total miles)		15.70	78.00
4. Laterals (total miles)			
5. Point Sources (number)			
Salt Load Contribution			
1. On-farm (tons/year)		47,200	20,300
2. Canals (tons/year)		8,200	1,850
3. Laterals (tons/year)			
4. Point Sources (tons/year)	359,000		
5. Other (tons/year)			2,000
Implementation Plan			
1. Construction Start (year)	1992		1990
2. Construction Period (years)	3	3	4
3. Expected Participants:			
a. Individuals (number)		45	70
b. Groups (number)		4	1
4. On-farm Practices:			
a. Treated Area (acres)		3,525	4,982
b. Land Leveling (acres)			
c. Sprinkler Systems (acres)			
d. Farm Ditches/Pipelines (miles)		27	14.30
5. Canal Lining (miles)		6.40	0.27
6. Lateral Lining (miles)			
7. Pipe Laterals (miles)			17.80
8. Winter Water Systems (miles)			
9. Collection Features (type)			
10. Delivery Systems (type)	38 mi. pipeline	open lined	pipeline
11. Disposal Facilities (type)			
12. Habitat Replacement (acres)		2,040	2,814
Salt Load Reduction			
1. To date:			
a. On-farm (tons/year)			
b. Canals (tons/year)			
c. Laterals (tons/year)			
d. Point Sources (tons/year)			
2. Potential/Balance:			
a. On-farm (tons/year)		30,407	17,395
b. Canals (tons/year)		6,800	1,835
c. Laterals (tons/year)			
d. Point Sources (tons/year)	22,500		
e. Other (tons/year)			270

1/ Assumes allocation of a share of the costs to water supply.

2/ Based on net tons removed at 2640 mg/L. Assuming that w/o project water source is AWT plant a 1,300 mg/L reduction would occur without the project.

Data Source:	LCR 3/86	SCS/NV	SCS/NV

	BR Lower Virgin	USDA Virgin Valley	USDA Moapa
	NEVADA	NEVADA	NEVADA
Economic and Financial Analyses			
Department of the Interior:			
1. Plan Formulation Costs			
2. Nonsalinity Planning Costs			
3. Advance Planning Costs:			
a. Prior to Authorization			
b. After Authorization			
4. Nonsalinity Design Costs			
5. Salinity Const. Costs To Date			
6. Balance Salinity Const. Costs	14,404,545		
7. Nonsalinity Construction Costs			
8. Habitat Replacement Costs			
9. Salinity IDC:			
a. Economic			
b. Financial			
10. Nonsalinity IDC			
a. Economic			
b. Financial			
11. Salinity OM&R Costs w/o Power	276,567		
12. Nonsalinity OM&R w/o Power			
13. Economic Cost of Power	1,884,109		
14. Financial Cost of Power			
15. Salinity M & E Costs			
16. Nonsalinity M & E Costs			
Department of Agriculture:			
1. Technical Assistance Costs		2,161,000	2,350,000
2. M & E Costs		339,000	400,000
3. Information and Education Costs		210,000	350,000
4. Federal Cost-share Obligations		4,719,000	5,117,000
5. Federal Const. Cost-share To Date		0	0
6. Balance Federal Const. Cost-share		4,719,000	5,117,000
7. Local Construction Cost-share		2,541,000	2,193,000
8. Percent Federal Cost-share:		65	70
9. Federal Habitat Costs		17,300	132,500
10. Local Habitat Costs		9,400	56,800
11. Other Local Costs		0	0
12. Local O&M Costs		65,900	380,900
13. Annual Value of Replacement Costs		142,200	99,000
14. Federal IDC		0	0
Cost Effectiveness:			
1. Total Salinity Construction Costs	16,565,221	7,090,000	7,880,200
2. Advance Planning Costs		0	0
3. Habitat Replacement Costs		17,300	132,500
4. IDC (Economic)	0	0	0
5. Subtotal Investment	16,565,221	7,107,300	8,012,700
6. Annual Equivalent Investment Costs	1,296,870	622,955	702,313
7. Annual Salinity OM&R Costs	194,530	142,200	99,000
8. Annual Economic Cost of Power	1,884,109	0	0
9. Annual M & E Costs		29,713	35,060
10. Annual Habitat OM&R Costs			
11. Annual Salinity Costs	3,375,509	794,868	836,373
12. Tons of Salt Removed Annually	22,500	37,207	19,500
13. Cost Effectiveness	150	21	43

	BR Las Vegas Wash Stage I Pittman NEVADA	BR Las Vegas Wash Stage I Whitney NEVADA	BR Las Vegas Wash Stage II NEVADA
Date of Estimate:	Complete		
Interest Rate:			
Estimate Adjustment for 1/88			
1/88 Interest Rate			
IDC Adjustment for 1/88			
Project Area			
1. Irrigated Area (total acres)			
2. Potential Participants:			
a. Individuals (number)			
b. Groups (number)			
3. Canals (total miles)			
4. Laterals (total miles)			
5. Point Sources (number)			
Salt Load Contribution			
1. On-farm (tons/year)			
2. Canals (tons/year)			
3. Laterals (tons/year)			
4. Point Sources (tons/year)			
5. Other (tons/year)			
Implementation Plan			
1. Construction Start (year)	1984	1986	1992
2. Construction Period (years)	1	3	10
3. Expected Participants:			
a. Individuals (number)			
b. Groups (number)			
4. On-farm Practices:			
a. Treated Area (acres)			
b. Land Leveling (acres)			
c. Sprinkler Systems (acres)			
d. Farm Ditches/Pipelines (miles)			
5. Canal Lining (miles)			
6. Lateral Lining (miles)			
7. Pipe Laterals (miles)			
8. Winter Water Systems (miles)			
9. Collection Features (type)			
10. Delivery Systems (type)			
11. Disposal Facilities (type)			
12. Habitat Replacement (acres)			
Salt Load Reduction			
1. To date:			
a. On-farm (tons/year)			
b. Canals (tons/year)			
c. Laterals (tons/year)			
d. Point Sources (tons/year)	7,000		
2. Potential/Balance:			
a. On-farm (tons/year)			
b. Canals (tons/year)			
c. Laterals (tons/year)			
d. Point Sources (tons/year)		1,000	66,000
e. Other (tons/year)			
Data Source:	CRWQO	CRWQO	CRWQO

	BR Las Vegas Wash Stage I Pittman NEVADA	BR Las Vegas Wash Stage I Whitney NEVADA	BR Las Vegas Wash Stage II NEVADA
Economic and Financial Analyses			
Department of the Interior:			
1. Plan Formulation Costs			
2. Nonsalinity Planning Costs			
3. Advance Planning Costs:			
a. Prior to Authorization			
b. After Authorization			
4. Nonsalinity Design Costs			
5. Salinity Const. Costs To Date	1,381,800		
6. Balance Salinity Const. Costs		1,400,000	9,609,565
7. Nonsalinity Construction Costs			
8. Habitat Replacement Costs			
9. Salinity IDC:			
a. Economic			
b. Financial			
10. Nonsalinity IDC			
a. Economic			
b. Financial			
11. Salinity OM&R Costs w/o Power	50,000	75,000	300,000
12. Nonsalinity OM&R w/o Power			
13. Economic Cost of Power			
14. Financial Cost of Power			
15. Salinity M & E Costs			
16. Nonsalinity M & E Costs			
Department of Agriculture:			
1. Technical Assistance Costs			
2. M & E Costs			
3. Information and Education Costs			
4. Federal Cost-share Obligations			
5. Federal Const. Cost-share To Date			
6. Balance Federal Const. Cost-share			
7. Local Construction Cost-share			
8. Percent Federal Cost-share:			
9. Federal Habitat Costs			
10. Local Habitat Costs			
11. Other Local Costs			
12. Local O&M Costs			
13. Annual Value of Replacement Costs			
14. Federal IDC			
Cost Effectiveness:			
1. Total Salinity Construction Costs	1,381,800	1,400,000	9,609,565
2. Advance Planning Costs			
3. Habitat Replacement Costs			
4. IDC (Economic)			
5. Subtotal Investment	1,381,800	1,400,000	9,609,565
6. Annual Equivalent Investment Costs	121,115	122,710	842,278
7. Annual Salinity OM&R Costs	50,000	75,000	300,000
8. Annual Economic Cost of Power			
9. Annual M & E Costs			
10. Annual Habitat OM&R Costs			
11. Annual Salinity Costs	171,115	197,710	1,142,278
12. Tons of Salt Removed Annually	7,000	1,000	66,000
13. Cost Effectiveness	24	198	17

	BR San Juan	BR Uinta Stage One	BR Uinta Stage Two
	NEW MEXICO	UTAH	UTAH
Date of Estimate:		1/85	
Interest Rate:		8.63%	
Estimate Adjustment for 1/88		104.49%	
1/88 Interest Rate		8.63%	
IDC Adjustment for 1/88		0.00%	
Project Area			
1. Irrigated Area (total acres)		97,447	
2. Potential Participants:			
a. Individuals (number)			
b. Groups (number)			
3. Canals (total miles)			
4. Laterals (total miles)			
5. Point Sources (number)			
Salt Load Contribution			
1. On-farm (tons/year)			
2. Canals (tons/year)			
3. Laterals (tons/year)			
4. Point Sources (tons/year)			
5. Other (tons/year)		450,000	
Implementation Plan			
1. Construction Start (year)		1993	
2. Construction Period (years)		8	
3. Expected Participants:			
a. Individuals (number)			
b. Groups (number)			
4. On-farm Practices:			
a. Treated Area (acres)			
b. Land Leveling (acres)			
c. Sprinkler Systems (acres)			
d. Farm Ditches/Pipelines (miles)			
5. Canal Lining (miles)		43.90	
6. Lateral Lining (miles)		11.60	
7. Pipe Laterals (miles)			
8. Winter Water Systems (miles)			
9. Collection Features (type)			
10. Delivery Systems (type)			
11. Disposal Facilities (type)			
12. Habitat Replacement (acres)			
Salt Load Reduction			
1. To date:			
a. On-farm (tons/year)			
b. Canals (tons/year)			
c. Laterals (tons/year)			
d. Point Sources (tons/year)			
2. Potential/Balance:			
a. On-farm (tons/year)			
b. Canals (tons/year)		25,500	
c. Laterals (tons/year)			
d. Point Sources (tons/year)			
e. Other (tons/year)			

Data Source: 4/86 PR/EIS

	BR San Juan	BR Uinta Stage One	BR Uinta Stage Two
	NEW MEXICO	UTAH	UTAH
Economic and Financial Analyses			
Department of the Interior:			
1. Plan Formulation Costs		2,500,000	
2. Nonsalinity Planning Costs			
3. Advance Planning Costs:			
a. Prior to Authorization		1,200,000	
b. After Authorization			
4. Nonsalinity Design Costs			
5. Salinity Const. Costs To Date			
6. Balance Salinity Const. Costs		21,552,000	
7. Nonsalinity Construction Costs			
8. Habitat Replacement Costs		1,000,000	
9. Salinity IDC:			
a. Economic			
b. Financial			
10. Nonsalinity IDC			
a. Economic			
b. Financial			
11. Salinity OM&R Costs w/o Power		157,800	
12. Nonsalinity OM&R w/o Power		7,300	
13. Economic Cost of Power			
14. Financial Cost of Power			
15. Salinity M & E Costs			
16. Nonsalinity M & E Costs			
Department of Agriculture:			
1. Technical Assistance Costs			
2. M & E Costs			
3. Information and Education Costs			
4. Federal Cost-share Obligations			
5. Federal Const. Cost-share To Date			
6. Balance Federal Const. Cost-share			
7. Local Construction Cost-share			
8. Percent Federal Cost-share:			
9. Federal Habitat Costs			
10. Local Habitat Costs			
11. Other Local Costs			
12. Local O&M Costs			
13. Annual Value of Replacement Costs			
14. Federal IDC			
Cost Effectiveness:			
1. Total Salinity Construction Costs		21,552,000	
2. Advance Planning Costs		1,200,000	
3. Habitat Replacement Costs		1,000,000	
4. IDC (Economic)			
5. Subtotal Investment		23,752,000	
6. Annual Equivalent Investment Costs		2,081,863	
7. Annual Salinity OM&R Costs		157,800	
8. Annual Economic Cost of Power			
9. Annual M & E Costs			
10. Annual Habitat OM&R Costs		7,300	
11. Annual Salinity Costs		2,246,963	
12. Tons of Salt Removed Annually		25,500	
13. Cost Effectiveness		88	

	USDA Uinta 1/	BR/USDA Price-Sn Rfael	USDA Price-Sn Rfael
	UTAH	UTAH	UTAH
Date of Estimate:	3/88	7/88	
Interest Rate:	8.63%	8.63%	
Estimate Adjustment for 1/88		100.00%	
1/88 Interest Rate	8.63%	8.63%	
IDC Adjustment for 1/88		0.00%	
Project Area			
1. Irrigated Area (total acres)	205,000		
2. Potential Participants:			
a. Individuals (number)	1,300		
b. Groups (number)	250		
3. Canals (total miles)	576		
4. Laterals (total miles)	859		
5. Point Sources (number)			
Salt Load Contribution			
1. On-farm (tons/year)	82,300		
2. Canals (tons/year)	25,000		
3. Laterals (tons/year)	15,900		
4. Point Sources (tons/year)	45,000		
5. Other (tons/year)	235,000		
Implementation Plan			
1. Construction Start (year)	1980	1992	
2. Construction Period (years)	24	6	
3. Expected Participants:			
a. Individuals (number)	800		
b. Groups (number)	150		
4. On-farm Practices:			
a. Treated Area (acres)	128,100		
b. Land Leveling (acres)	42,800		
c. Sprinkler Systems (acres)	79,400		
d. Farm Ditches/Pipelines (miles)	1,540	287	
5. Canal Lining (miles)		83	
6. Lateral Lining (miles)			
7. Pipe Laterals (miles)	306		
8. Winter Water Systems (miles)			
9. Collection Features (type)			
10. Delivery Systems (type)	Pipeline		
11. Disposal Facilities (type)			
12. Habitat Replacement (acres)	4,500		
Salt Load Reduction			
1. To date:			
a. On-farm (tons/year)	25,718		
b. Canals (tons/year)			
c. Laterals (tons/year)	4,417		
d. Point Sources (tons/year)			
2. Potential/Balance:			
a. On-farm (tons/year)	56,582		
b. Canals (tons/year)			
c. Laterals (tons/year)	11,483		
d. Point Sources (tons/year)			
e. Other (tons/year)		70,800	

1/ Revised to reflect current studies

Data Source: SCS/UT 7/88 Drft PFWD

		USDA Uinta	BR/USDA Price-Sn Rfael	USDA Price-Sn Rfael
		UTAH	UTAH	UTAH
Economic and Financial Analyses				
	Department of the Interior:			
1.	Plan Formulation Costs			
2.	Nonsalinity Planning Costs			
3.	Advance Planning Costs:			
	a. Prior to Authorization			
	b. After Authorization			
4.	Nonsalinity Design Costs			
5.	Salinity Const. Costs To Date			
6.	Balance Salinity Const. Costs		33,294,000	
7.	Nonsalinity Construction Costs			
8.	Habitat Replacement Costs		0	
9.	Salinity IDC:			
	a. Economic		0	
	b. Financial			
10.	Nonsalinity IDC			
	a. Economic			
	b. Financial			
11.	Salinity OM&R Costs w/o Power		0	
12.	Nonsalinity OM&R w/o Power			
13.	Economic Cost of Power			
14.	Financial Cost of Power			
15.	Salinity M & E Costs			
16.	Nonsalinity M & E Costs			
	Department of Agriculture:			
1.	Technical Assistance Costs	10,284,000		
2.	M & E Costs	4,053,000		
3.	Information and Education Costs	1,683,000		
4.	Federal Cost-share Obligations	61,326,000	12,900,000	
5.	Federal Const. Cost-share To Date	11,739,000	0	
6.	Balance Federal Const. Cost-share	49,586,957	0	
7.	Local Construction Cost-share	26,283,000	0	
8.	Percent Federal Cost-share:	70		
9.	Federal Habitat Costs	456,000	0	
10.	Local Habitat Costs	232,500		
11.	Other Local Costs	707,800		
12.	Local O&M Costs	3,225,000		
13.	Annual Value of Replacement Costs	1,041,600	217,000	
14.	Federal IDC	0		
	Cost Effectiveness:			
1.	Total Salinity Construction Costs	73,292,957	41,694,000	
2.	Advance Planning Costs	0		
3.	Habitat Replacement Costs	456,000		
4.	IDC (Economic)	0	0	
5.	Subtotal Investment	73,748,957	41,694,000	
6.	Annual Equivalent Investment Costs	6,464,096	3,654,479	
7.	Annual Salinity OM&R Costs	1,041,600	657,000	
8.	Annual Economic Cost of Power	0		
9.	Annual M & E Costs	355,245		
10.	Annual Habitat OM&R Costs	0	0	
11.	Annual Salinity Costs	7,860,942	3,872,000	
12.	Tons of Salt Removed Annually	98,200	70,800	
13.	Cost Effectiveness	80	55	

	BR Dirty Devil	BR Big Sandy	USDA Big Sandy
	UTAH	WYOMING	WYOMING
Date of Estimate:	1/85		12/87
Interest Rate:	8.63%		8.63%
Estimate Adjustment for 1/88	104.49%		
1/88 Interest Rate	8.63%		8.63%
IDC Adjustment for 1/88	0.00%		
Project Area			
1. Irrigated Area (total acres)			15,700
2. Potential Participants:			
a. Individuals (number)			84
b. Groups (number)			9
3. Canals (total miles)			
4. Laterals (total miles)			
5. Point Sources (number)			
Salt Load Contribution			
1. On-farm (tons/year)			90,100
2. Canals (tons/year)			
3. Laterals (tons/year)			
4. Point Sources (tons/year)		164,000	
5. Other (tons/year)	150,000		24,300
Implementation Plan			
1. Construction Start (year)	1991		1989
2. Construction Period (years)	3		9
3. Expected Participants:			
a. Individuals (number)			84
b. Groups (number)			9
4. On-farm Practices:			
a. Treated Area (acres)			15,700
b. Land Leveling (acres)			2,500
c. Sprinkler Systems (acres)			9,000
d. Farm Ditches/Pipelines (miles)			175
5. Canal Lining (miles)			
6. Lateral Lining (miles)			
7. Pipe Laterals (miles)			
8. Winter Water Systems (miles)			
9. Collection Features (type)	shallow wells		
10. Delivery Systems (type)	15000 ft pipeln		
11. Disposal Facilities (type)	injection wells		
12. Habitat Replacement (acres)			800
Salt Load Reduction			
1. To date:			
a. On-farm (tons/year)			
b. Canals (tons/year)			
c. Laterals (tons/year)			
d. Point Sources (tons/year)			
2. Potential/Balance:			
a. On-farm (tons/year)			52,900
b. Canals (tons/year)			
c. Laterals (tons/year)			
d. Point Sources (tons/year)			
e. Other (tons/year)	20,900		

	BR Dirty Devil	BR Big Sandy	USDA Big Sandy
	UTAH	WYOMING	WYOMING
Economic and Financial Analyses			
Department of the Interior:			
1. Plan Formulation Costs	3,343,590		
2. Nonsalinity Planning Costs			
3. Advance Planning Costs:			
a. Prior to Authorization	992,628		
b. After Authorization			
4. Nonsalinity Design Costs			
5. Salinity Const. Costs To Date			
6. Balance Salinity Const. Costs	11,284,615		
7. Nonsalinity Construction Costs			
8. Habitat Replacement Costs			
9. Salinity IDC:			
a. Economic	1,667,615		
b. Financial			
10. Nonsalinity IDC			
a. Economic			
b. Financial			
11. Salinity OM&R Costs w/o Power	505,718		
12. Nonsalinity OM&R w/o Power			
13. Economic Cost of Power	383,468		
14. Financial Cost of Power	106,577		
15. Salinity M & E Costs			
16. Nonsalinity M & E Costs			
Department of Agriculture:			
1. Technical Assistance Costs			2,459,100
2. M & E Costs			800,000
3. Information and Education Costs			550,000
4. Federal Cost-share Obligations			8,151,400
5. Federal Const. Cost-share To Date			0
6. Balance Federal Const. Cost-share			8,151,400
7. Local Construction Cost-share			3,551,400
8. Percent Federal Cost-share:			70
9. Federal Habitat Costs			414,700
10. Local Habitat Costs			177,700
11. Other Local Costs			2,298,700
12. Local O&M Costs			300,900
13. Annual Value of Replacement Costs			375,000
14. Federal IDC			0
Cost Effectiveness:			
1. Total Salinity Construction Costs	11,284,615		11,160,500
2. Advance Planning Costs	992,628		0
3. Habitat Replacement Costs			414,700
4. IDC (Economic)	1,667,615		0
5. Subtotal Investment	13,944,859		11,575,200
6. Annual Equivalent Investment Costs	1,222,267		998,361
7. Annual Salinity OM&R Costs	505,718		375,000
8. Annual Economic Cost of Power	383,468		0
9. Annual M & E Costs			69,000
10. Annual Habitat OM&R Costs			0
11. Annual Salinity Costs	2,111,453		1,442,361
12. Tons of Salt Removed Annually	20,900		52,900
13. Cost Effectiveness	101		27

Appendix B

Salt Load Reduction Objective Estimate
and
Cost Effectiveness Summary

SALT LOAD REDUCTION OBJECTIVE ESTIMATE

Salt load reduction required to maintain the Lower Basin standards was estimated using a 3-step procedure.

1. A 15-trace CRSS simulation was made using the Reclamation demand data base (given in Progress Report 14) and initialized at 1988 conditions. Existing and ongoing salinity control project salt load reductions were included as shown in Table B-1. The simulation period was 1988-2040.

2. CRSS output was used to compute the salt load reduction required to reduce the TDS at Imperial Dam to the standard (879 mg/L). This was done using the future-effects equation for projects above Parker Dam:

$$\Delta TDS = Q_{BP} \frac{L_{AP} - \Delta L}{Q_{AP}} - L_{BP} \frac{k}{Q_I}$$

where: ΔTDS = change in TDS (mg/L) at Imperial Dam
Q_{BP} = discharge (kac.ft) below Parker Dam
L_{AP} = salt load (kton) above Parker Dam
ΔL = change in salt load above Parker Dam
Q_{AP} = adjusted discharge above Parker Dam
L_{BP} = salt load below Parker Dam
k = conversion from ton/ac.ft to mg/L = 735.46
Q_I = discharge at Imperial Dam

The difference between the predicted TDS at Imperial Dam (TDS_I) and the standard was substituted for TDS and the equation was solved for ΔL:

$$\Delta L = L_{AP} - \frac{Q_{AP}}{Q_{BP}} \frac{Q_I (TDS_I - 879)}{735.46} + L_{BP}$$

The required salt load reduction, ΔL, was then evaluated for each year of the simulation period using CRSS output values for L_{AP}, Q_{AP}, Q_{BP}, L_{BP}, Q_I, and TDS_I. These values and resultant values are displayed in Table B-2.

3. Computed reductions (ΔL) exhibited significant scatter due to oscillations due to the 5 year increments on which the CRSS output was based. Therefore, a smooth curve was fit through the data. The best fit was achieved using a logistic growth curve of the form:

$$y = \frac{a}{1 + \exp(b - cx)}$$

The coefficients were evaluated using non-linear, least-squares regression with the SPSS (Statistical Package for the Social Sciences) Marquardt method (Robinson, B; 1984; SPSS Program NONLINEAR - Nonlinear Regression; Manual 433, Vogleback Computing Center, Northwestern University). The computed reductions were regressed against sequential year numbers, with year on corresponding to 1996, the first year in which the standard was exceeded. The resultant best fit target values are given in Table B-2 and plotted on Figure B-1.

Table B-1. - Salt Load Reduction from Existing Salinity Control Projects

Project	Reduction (kTon/yr)
Reclamation	
Grand Valley, Stage I	21.90
Grand Valley, Stage II	5.60
Meeker Dome	48.00
Las Vegas Wash, Pittman Bypass	7.00
USDA	
Grand Valley	35.80
Uinta Basin	30.14
BLM	7.96
	156.40

Table B-2. CRSS Results and Salt Load Reduction Targets at Imperial Dam

YEAR	TDS AT IMPERIAL (mg/L)	---DISCHARGE (KACFT)--- ABOVE PARKER	BELOW PARKER	AT IMPERIAL	----------SALT LOAD (KTON)---------- ABOVE PARKER	BELOW PARKER	COMPUTED REDUCTION	BEST FIT TARGET
1988	614.0	11074.1	8703.0	7918.0	8131.0	6390.0	0.0	0.0
1989	633.0	12332.8	9632.0	8873.0	9424.1	7360.3	0.0	0.0
1990	665.0	11303.5	8599.0	7705.0	8883.5	6750.0	0.0	0.0
1991	704.0	10405.7	7859.0	6987.0	8517.4	6432.9	0.0	0.0
1992	741.0	9749.7	7091.0	6176.0	8391.4	6103.1	0.0	0.0
1993	793.0	9775.6	7275.0	6357.0	9038.4	6726.4	0.0	0.0
1994	818.0	10327.9	7867.0	6973.0	9956.3	7584.0	0.0	0.0
1995	831.0	9921.0	7317.0	6422.0	9604.6	7083.6	0.0	0.0
1996	827.0	10193.3	7558.0	6686.0	9840.5	7296.4	0.0	0.0
1997	834.0	10028.1	7391.0	6476.0	9790.0	7215.5	0.0	0.0
1998	867.0	9649.9	7286.0	6368.0	9801.3	7400.3	0.0	0.0
1999	880.0	10059.3	7762.0	6868.0	10422.3	8042.1	12.1	111.6
2000	882.0	9662.3	7202.0	6256.0	9879.6	7364.0	34.2	150.0
2001	878.0	9618.0	7117.0	6194.0	9768.9	7228.7	0.0	199.2
2002	882.0	9862.6	7378.0	6411.0	10151.5	7594.1	35.0	260.0
2003	920.0	9444.5	7169.0	6200.0	10119.2	7681.1	455.3	332.6
2004	942.0	9520.2	7323.0	6378.0	10498.0	8075.2	710.3	415.5
2005	941.0	9519.3	7088.0	6142.0	10380.5	7729.3	695.4	505.6
2006	929.0	9533.0	7202.0	6278.0	10278.8	7765.5	564.9	598.3
2007	923.0	10005.5	7572.0	6606.0	10815.5	8185.0	522.2	688.6
2008	956.0	9127.3	6855.0	5885.0	10164.1	7633.7	820.4	771.8
2009	972.0	9359.1	7183.0	6238.0	10638.6	8164.9	1027.8	844.7
2010	966.0	9245.6	6901.0	5955.0	10358.6	7731.8	943.8	905.9
2011	944.0	9789.9	7502.0	6578.0	10782.1	8262.3	758.7	955.4
2012	935.0	10098.0	7669.0	6702.0	11107.7	8435.8	671.9	994.2
2013	968.0	9309.4	6987.0	6017.0	10531.4	7904.1	970.2	1023.9
2014	991.0	9244.3	7039.0	6093.0	10709.1	8154.4	1218.6	1046.3
2015	986.0	8986.3	6856.0	5909.0	10275.8	7839.8	1126.8	1062.8
2016	967.0	9265.0	7097.0	6173.0	10405.6	7970.7	964.3	1075.0
2017	956.0	9726.2	7443.0	6475.0	10910.4	8349.2	885.9	1083.9
2018	983.0	9285.4	6979.0	6009.0	10668.4	8018.5	1130.5	1090.3
2019	995.0	9611.3	7397.0	6451.0	11225.8	8639.5	1322.1	1095.0
2020	983.0	9146.3	6938.0	5991.0	10458.8	7933.6	1116.8	1098.3

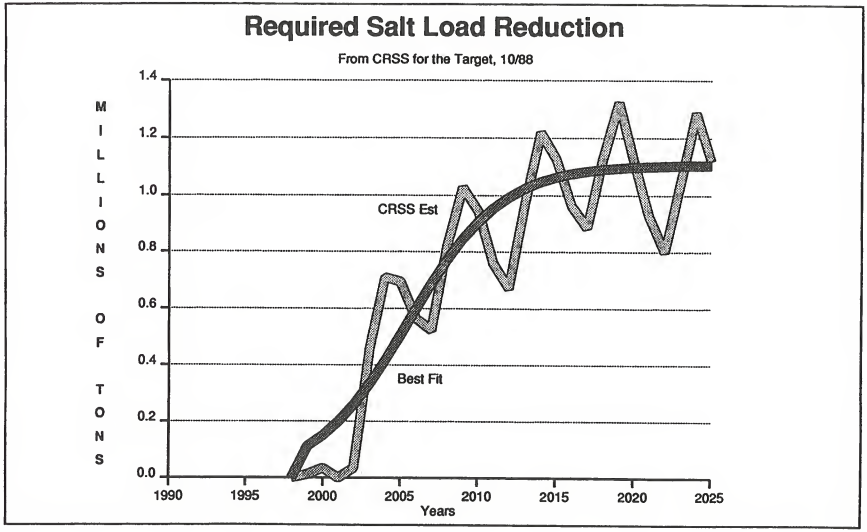

Figure B-1. Required salt load reduction.

Salinity Control Unit Cost-Effectiveness Summary
With Costs and Interest Rates Adjusted to Same Base

Unit	Potential Salt Reduction (kton/yr)	Salt Reduction to Date (kton/yr)	Cost effectiveness ($/ton)
BLM		7.9 *	
Meeker Dome (BR)	48.0	48.0 3/	14
Las Vegas Wash, Stg II (BR)	66.0 2/		17
Virgin Valley (USDA)	37.2		21
Las Vegas Wash, Pittman (BR) 1/	7.0	7.0	24
Big Sandy (USDA)	52.9		27
Grand Valley (USDA)	230.0	35.8	27
Lower Gunnison, WW (BR)	74.0		38
Lower Gunnison 2 Delta (USDA)	104.7		41
Paradox Valley (BR)	180.0		49
Moapa Valley (USDA)	19.5		43
Price-San Rafael Rivers (BR/USDA)	70.8		55
Lower Gunnison 1 (USDA)	82.1		64
Lower Gunnison 2 Montrose (USDA)	81.7		68
Mancos Valley (USDA)	8.8		70
Lower Gunnison 3 (USDA)	12.0		74
Uinta Basin (USDA)	98.2	30.1	80
McElmo Creek (USDA)	38.0		83
Dolores Project 1(BR)	23.0		84
Uinta Basin Stage I (BR)	25.5		88
Dirty Devil River (BR)	20.9		101
Sinbad Valley (BLM)	7.5		105
Grand Valley Stage Two (BR)	107.5	5.6	113
Grand Valley Stage One (BR)	24.0	21.9	121
Lower Gunnison Stage I Balance (BR)	66.5		188
Las Vegas Wash, Whitney (BR) 1/	1.0 2/		198
Grand Valley Stage Two Balance	26.4		264
Lower Gunnison N Fork (BR)			
San Juan River (BR)			
Lower Virgin River (BR)			
Glenwood-Dotsero Springs			
Uinta Basin Stage II (BR)			
Big Sandy River (BR)			
PVID (BR/USDA)			

1/ Stage I.
2/ Best estimates at this time.
3/ Cost effectiveness based on 19,000 tons. Almost 29,000 tons were removed prior to salinity control program.
* BLM, as of January 1, 1988, has removed salt loading at a range of cost effectiveness from several different activities.

Appendix C

Least Cost Investment Model
Data and Supplemental Results

Least Cost Investment Model Data

and Supplemental Results

The least cost investment computer model developed by Reclamation and Colorado State University was used to evaluate project investment levels. This model initially determines the optimal combination of projects and construction timing to meet salt load reduction goals at minimum investment levels. The investment level, modified to meet program needs and continuity results in a remaining investment level for the selected schedule of $530 million.

The model is driven by the overall cost of the total construction and implementation schedule. Cost-effectiveness ($/ton) is an important factor in selecting the projects to implement (as directed in Public Law 98-569), but it is not the only consideration in the development of an implementation schedule. The basinwide program must consider the uncertainties of implementation in the technical, social, political, institutional, and legal arenas. Local concerns and needs, management of irrigation systems, and regional impacts are involved in the final selection of an implementation schedule.

Table C-1 Project Data Used in the Least Cost Investment Model

PROJECT	SALINITY COST		REMAINING CONSTRUC-TION PERIOD (Years)	FIXED START (Year)	REMAINING SALT LOAD REDUCATION (kton)	DELAYED IMPACT 1/
	CONSTRUCTION (Total remaining) (millions of dollars)	OM&R (Annual)				
Reclamation						
Grand Valley, Stage II	124.3	0.13	16	1985 2/	107.5	
Grand Valley, balance	76.8	0.21	9		26.4	
Paradox Valley	53.6	0.46	3	1986 2/	180.0	yes
Dolores	21.9	0.00	6	1989	23.0	
Lower Gunnison, Winter Water	28.3	0.37	3	1989	74.0	
Lower Gunnison, Stage I balance	142.8	0.00	6		66.5	
Las Vegas Wash, Whitney	1.4	0.08	1	1986	1.0	
Las Vegas Wash, remaining area	9.6	0.30	10		66.0	
Uinta Basin, Stage 1	21.5	0.16	8		25.5	
Dirty Devil	11.3	0.49	3		20.9	yes
Price-San Rafael, combined	49.6	0.66	7		70.8	
Lower Virgin	16.5	0.34	3		48.1 4/	yes
BLM						
Sinbad Valley	7.4	0.06	3		7.5	yes
USDA						
Grand Valley	28.6	0.00	14	1986 2/	194.2	
Uinta Basin	49.6	0.00	17	1986 2/	68.1	
Lower Gunnison 1	32.5	0.00	18		82.1	
Lower Gunnison 2 - Montrose	34.5	0.00	18		81.7	
Lower Gunnison 2 - Delta	27.0	0.00	14		104.7	
Lower Gunnison 3	5.4	0.00	4		12.0	
Mospa Valley	5.1	0.00	4		19.5	
Virgin Valley	4.7	0.00	3		37.2	
McElmo Creek	19.0	0.00	10	1990 3/	38.0	
Mancos Valley	3.7	0.00	4		8.8	
Big Sandy	8.2	0.00	8		52.9	

1/ Projects with delayed impacts must be completely built before any salt load reduction occurs
2/ Ongoing projects - remaining costs, construction period and salt load reductions are given.
3/ McElmo will start the year following completion of Dolores.
4/ Inclues 25,700 tons attributed to AWT flows which would be otherwise used by Nevada Power's Harry Allen.

Grand Valley Two
Paradox Valley
Dolores
Low Gunn WW
Uinta I
Price San Rafael com
Grand Valley USDA
Uinta USDA
Lower Gunn1
Lower Gunn2
Lower Gunn2
Lower Gunn3
Moapa
McElmo Creek
Big Sandy

YEAR	PROJECT 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	SALT RED	SALT TRGT	COST
1988	.01.00.35.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.08.06.01.00.00.00.00.00.00.00.00.00.04	0.	0.	26.0
1989	.05.00.70.08.27.00.00.00.00.00.00.00.00.00.00.00.00.00.15.12.04.00.00.00.00.00.00.00.00.00.14	23.	0.	65.7
1990	.10.00***.27.67.00.00.00.00.00.00.00.00.00.00.00.00.00.23.19.08.00.00.00.18.00.03.00.00.00.27	75.	0.	113.4
1991	.18.00***.47***.00.00.00.00.00.00.00.00.00.00.00.00.00.30.25.14.01.02.00.47.00.12.00.00.00.41	329.	0.	148.8
1992	.25.00***.67***.00.00.00.00.00.00.00.06.00.00.00.00.00.38.31.21.04.06.18.76.00.24.00.00.00.54	409.	0.	180.9
1993	.32.00***.86***.00.00.00.00.05.00.00.22.00.00.00.00.00.45.37.27.08.13.47***.00.35.00.00.00.67	476.	0.	219.8
1994	.40.00*********.00.00.00.00.18.00.00.39.00.00.00.00.00.53.43.34.14.22.76***.00.47.00.00.00.80	557.	0.	259.6
1995	.47.00*********.00.00.00.00.32.00.00.55.00.00.00.00.00.60.50.41.21.30******.00.59.00.00.00.93	636.	111.	296.5
1996	.54.00*********.00.00.00.00.47.00.00.72.00.00.00.00.00.68.56.47.27.39******.00.71.00.00.00***	712.	150.	331.7
1997	.62.00*********.00.00.00.00.62.00.00.89.00.00.00.00.00.75.62.54.34.47******.00.82.00.00.00***	782.	199.	366.3
1998	.69.00*********.00.00.00.00.76.00.00***.00.00.00.00.00.83.68.60.41.55******.00.94.00.00.00***	849.	260.	398.4
1999	.76.00*********.00.00.00.00.91.00.00***.00.00.00.00.00.90.74.67.47.64******.00***.00.00.00***	911.	333.	425.5
2000	.84.00*********.00.00.00.00***.00.00***.00.00.00.00.00.97.80.73.54.72******.00***.00.00.00***	963.	416.	450.0
2001	.91.00*********.00.00.00.00***.00.00***.00.00.00.00.00***.87.80.60.81******.00***.00.00.00***	1011.	506.	471.3
2002	.98.00*********.00.00.00.00***.00.00***.00.00.00.00.00***.93.86.67.89******.00***.00.00.00***	1048.	598.	490.8
2003	***.00*********.00.00.00.00***.00.00***.00.00.00.00.00***.98.93.73.97******.00***.00.00.00***	1078.	689.	504.4
2004	***.00*********.00.00.00.00***.00.00***.00.00.00.00.00******.98.80*********.00***.00.00.00***	1103.	772.	511.9
2005	***.00*********.00.00.00.00***.00.00***.00.00.00.00.00*********.86*********.00***.00.00.00***	1117.	845.	516.5
2006	***.00*********.00.00.00.00***.00.00***.00.00.00.00.00*********.93*********.00***.00.00.00***	1124.	906.	520.6
2007	***.00*********.00.00.00.00***.00.00***.00.00.00.00.00*********.98*********.00***.00.00.00***	1130.	955.	524.2
2008	***.00*********.00.00.00.00***.00.00***.00.00.00.00.00*********************.00***.00.00.00***	1134.	994.	526.6
2009	***.00*********.00.00.00.00***.00.00***.00.00.00.00.00*********************.00***.00.00.00***	1136.	1024.	528.4
2010	***.00*********.00.00.00.00***.00.00***.00.00.00.00.00*********************.00***.00.00.00***	1136.	1046.	530.2
2011	***.00*********.00.00.00.00***.00.00***.00.00.00.00.00*********************.00***.00.00.00***	1136.	1063.	531.9
2012	***.00*********.00.00.00.00***.00.00***.00.00.00.00.00*********************.00***.00.00.00***	1136.	1075.	533.7

Recommended plan output from Least Cost Investment Model.

Appendix D

Repayment Analysis

Repayment Analysis

The basin fund revenues used in this analysis are estimates provided by Western Area Power Administration in late 1986 and verified in late 1987. Payments have been deducted for Hoover deficiencies. The result is revenue available annually for all of the projects required to meet salt load reduction objectives. Table D-1 shows the repayment dollars used in the analysis.

Table D-2 is the latest information on power revenues for 1987 and 1988.

Tables D-3 and D-4 show the repayment dollars needed and the repayment capability of the Basin States for the $530 million investment level without and with inflation costs added.

For purposes of basin fund repayment analysis, the USDA costs for technical assistance, education, and monitoring and evaluation are excluded. However, these Federal costs are costs of implementation and are considered in the computed cost-effectiveness values.

Table D-1
Colorado River Basin Salinity Control Program
Available Revenue in LCRBD Fund
For Salinity Control Programs
($1,000's)

Year	Hoover Revenue Available	Plus Parker-Davis Revenue Available	Less Hoover Deficiency Payments	Equals Total Revenue Available
1987	3,770	0	0	3,770
1988	10,304	0	1,556	8,749
1989	9,458	0	1,556	7,902
1990	9,336	0	1,556	7,780
1991	9,168	0	1,556	7,613
1992	9,451	0	1,556	7,895
1993	9,120	0	1,556	7,564
1994	9,120	0	1,556	7,564
1995	9,120	0	1,556	7,564
1996	9,120	0	1,556	7,564
1997	9,120	0	1,556	7,564
1998	9,355	0	1,556	7,799
1999	9,132	0	1,556	7,576
2000	9,252	0	1,556	7,696
2001	8,964	0	1,556	7,408
2002	8,917	0	1,556	7,362
2003	9,033	0	1,556	7,477
2004	8,858	0	1,556	7,303
2005	8,942	879	1,556	8,265
2006	8,921	2,637	0	11,559
2007	8,881	2,637	0	11,518
2008	8,670	2,637	0	11,307
2009	8,828	2,637	0	11,465
2010	8,779	2,637	0	11,417
TOTAL	213,618	14,066	28,000	199,684

Table D-2
BOULDER CANYON PROJECT
CALIFORNIA/NEVADA SURCHARGE 2.1/2 MILS
HOOVER POWERPLANT ACT OF 1984

MONTH	CAL-NEV ENERGY SALES KWH	CAL-NEV SURCHARGE ($)
JUNE 1987	306,695,000	766,737.50
JULY	309,587,000	773,967.50
AUGUST	388,096,000	970,240.00
SEPTEMBER	338,487,000	846,217.50
TOTAL FY 1987	1,342,865,000	3,357,162.50
OCTOBER 1987	246,727,000	616,817.50
NOVEMBER	189,465,000	473,662.50
DECEMBER	244,709,000	611,772.50
JANUARY 1988	340,298,000	850,745.00
FEBRUARY	285,973,000	714,932.50
MARCH	312,595,000	781,487.50
APRIL	386,076,000	965,190.00
MAY	331,255,000	828,137.50
JUNE	345,149,000	862,872.50
JULY	334,900,000	837,250.00
AUGEUST	377,175,000	942,937.50
SEPTEMBER	225,798,000	564,495.00
TOTAL FY 1988 TO DATE	3,620,120,000	9,050,300.00

A1 B C D E F G H I J K L M N O P Q R S T U V W X Y Z AA AB AC AD AE

2 CRWQIP RECOMMENDED PLAN - OCT 1988/BASE1988 — $560 Million Alternative - Without Inflation — Repayment Interest Rates - 1985 @ 0.12375, 1986 @ 0.10625, 1987 @ 0.07500, 1988 through 2010 @ 0.09375

4 $ in 1,000's — CRWQIP Data Table — May 5, 1987

Row	P.L.93-320 Units	Total Investment Costs	O&M Costs	Total thru 1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
8	Grand Valley Stage I	28,856	192	28,856			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	Grand Valley Stage II	153,071	1,208		3,950	15,500	1,330	4,013	6,606	9,364	9,364	9,364	9,364	9,364	9,364	8,026	9,364	9,364	9,364	9,364	9,364	6,026	2,675	173	173	173	173	173	173	173
10	Grand Valley - Balance -	0	0																											
11	Crystal Geyser	0	0																											
12	Las Vegas Wash - Pittman -	1,382	1,300	1,382	80	80	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
13	Las Vegas Wash - Whitney -																													
14	Las Vegas Wash Stage II	0	0																											
15	Paradox Valley Unit	84,290	9,255	13,390	2,300	4,700	10,586	17,224	16,586	15,396	462	462	462	462	462	462	462	462	462	462	462	462	462	462	462	462	462	462	462	462
17	Subtotal P.L.93-320 Units:	267,599	11,935	43,628	6,330	20,166	17,081	21,295	25,332	22,018	9,883	9,883	9,885	9,883	9,883	8,346	9,883	9,883	9,883	9,883	9,883	8,346	3,195	692	692	692	692	692	692	692
18	Cumulative Subtotal:			43,628	49,978	70,142	88,123	109,418	132,750	155,387	165,491	175,334	180,217	195,101	204,984	213,530	223,413	233,297	243,180	253,064	262,947	271,493	274,686	275,380	276,075	276,765	277,437	278,150	278,842	279,534
20	LCRB Fund Share																													
21	Grand Valley Stage I						123	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124
22	Grand Valley Stage II																							651	687	687	687	687	687	687
23	Grand Valley - Balance -																													
24	Las Vegas Wash - Pittman -								6	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
25	Las Vegas Wash - Whitney -																													
26	Las Vegas Wash Stage II																													
27	Paradox Valley Unit										358	458	458	456	456	458	456	458	458	458	456	456	456	458	458	456	456	456	456	456
29	Subtotal - LCRB Fund Share				0	0	123	124	130	141	439	597	597	597	597	597	597	597	597	597	597	597	597	1,240	1,204	1,204	1,204	1,204	1,204	1,204
31	P.L.98-569 Units																													
33	Grand Valley USDA	37,095		6,000	1,870	641	2,207	2,001	2,207	2,001	2,207	2,001	2,207	2,001	2,207	2,001	2,207	2,001	2,001	858										
34	Uinta USDA	61,782	0	6,689	3,305	1,176	3,032	3,032	3,337	3,032	3,032	3,032	3,032	3,537	3,032	3,032	3,032	3,032	3,032	3,537	5,032	2,527	1,011							
35	Lower Gunnison - Winter Water -	27,753	6,889						7,480	11,093	4,152	362	362	362	362	362	362	362	362	362	362	362	362	362	362	362	362	362	362	362
36	Lower Gunnison Stage I	0	0																											
37	Lower Gunnison - North Fork -	0	0																											
38	Lower Gunnison 1 USDA	31,752	0						310	953	1,270	1,905	2,223	1,905	2,223	2,223	1,905	2,223	1,905	2,223	1,905	2,223	1,905	2,223	1,588	635				
39	Lower Gunnison 2 Montrose USDA	33,696	1,944								337	1,011	1,348	2,022	2,359	2,022	2,359	2,359	2,022	2,359	2,022	2,359	2,022	2,359	2,022	2,359	1,685	674		
40	Lower Gunnison 2 Delta USDA	26,381	0								528	1,055	1,847	2,374	2,110	2,374	2,110	2,110	2,374	2,110	2,574	2,110	2,110	791						
41	Lower Gunnison 3 USDA	5,306	0									950	1,339	1,839	1,273															
42	Dolores - Salinity Control -	21,554	0						1,723	4,391	4,307	4,307	4,091	3,015																
43	McElmo Creek USDA	10,534	0							556	1,668	2,224	2,039	2,224	2,224	2,039	2,039	2,224	1,297											
44	Big Sandy USDA	8,566	0						428	1,114	1,199	1,288	1,285	1,139	1,288	771														
45	Virgin Valley USDA	0	0																											
46	Moapa Valley USDA	5,362	0							965	1,880	1,880	1,287																	
47	Price USDA	0	0																											
48	Mancos Valley USDA	0	0																											
49	Palo Verde Irrig District USDA	0	0																											
51	Subtotal P.L.98-569 Units	277,741	8,813	12,689	5,255	1,818	5,319	5,033	15,780	23,808	23,334	19,692	21,338	[illegible]	17,154	14,823	14,093	14,310	12,993	11,448	9,695	9,588	7,410	5,734	3,971	3,355	2,046	1,035	362	362
52	Cumulative Subtotal:			12,689	17,944	19,761	25,080	30,113	43,393	69,698	93,032	114,723	138,062	[illegible]	173,394	188,218	202,310	216,620	229,613	241,061	250,755	260,335	267,745	273,479	277,450	280,805	282,852	283,887	284,249	284,610
54	Subtotal - LCRB Fund Share						1,482	1,289	4,024	6,070	6,460	5,021	5,441	8,140	4,574	3,780	3,594	3,649	3,315	2,919	2,472	2,443	1,889	1,462	1,013	856	532	264	92	92
56	Remaining Units																													
58	Sinbad Valley (BLM)	0	0																											
59	Uinta Stage I	22,552	58										1,120	2,932	5,157	3,383	3,383	3,107	3,383	2,030	4	4	4	4	4	4	4	4	4	4
60	Uinta Stage II	0	0																											
61	Dirty Devil	0	0																											
62	Price-San Rafael (Combined)	49,600	7,920									2,976	7,938	8,432	7,938	8,432	8,432	5,408	660	660	660	660	660	660	660	660	660	660	660	660
63	Lower Virgin	0	0									0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64	Palo Verde Irrigation District	0	0																											
65	Big Sandy	0	0																											
66	San Juan River	0	0																											
68	Subtotal Remaining Units	72,152	7,856								0	2,976	9,064	11,364	11,393	11,815	11,810	8,613	4,043	2,690	664	664	664	664	664	664	664	664	664	664
69	Cumulative Subtotal:										0	2,976	12,040	23,403	34,497	46,311	58,120	66,740	70,782	73,472	74,138	74,799	75,463	76,126	76,790	77,454	78,117	78,781	79,444	80,108
71	Subtotal - LCRB Fund Share										0	789	2,311	2,898	2,829	3,015	3,013	2,188	1,031	686	169	169	169	169	169	169	169	169	169	169
73	TOTAL - ALL UNITS	617,492	28,704	38,317	11,605	21,881	23,300	26,327	39,112	46,622	33,210	32,351	40,285	41,425	38,131	35,183	35,791	32,807	28,919	24,021	20,242	18,789	11,260	7,090	5,327	4,711	3,402	2,591	1,717	1,717
74	CUMULATIVE TOTAL:			38,517	67,922	89,903	113,203	139,530	178,642	225,263	260,483	293,034	335,319	374,743	412,670	448,058	483,849	516,638	545,575	587,596	587,838	606,627	617,895	624,986	630,313	635,024	638,426	640,817	642,535	644,252
76	TOTAL - LCRB Fund Share			0	0	0	1,604	1,408	4,154	6,211	6,909	6,377	8,350	8,660	7,800	7,390	7,204	6,443	4,941	4,202	3,239	3,209	2,656	2,079	2,466	2,309	1,975	1,710	1,546	1,546
78	LCRB Funds			0	0	0	3,770	8,749	7,638	7,469	6,271	6,553	6,222	6,222	6,222	6,222	8,222	8,457	8,254	6,354	6,066	6,020	6,135	5,961	6,923	10,217	10,176	9,965	10,125	10,075
79	Balance			0	0	0	2,166	7,341	3,492	1,258	(608)	176	(2,127)	(2,418)	(1,578)	(1,167)	(881)	10	1,293	2,152	2,828	2,810	3,479	3,082	4,457	7,907	8,201	8,248	8,578	8,529
80	Previous Balance			0	0	0	0	2,164	9,507	12,989	14,247	13,559	13,735	11,607	9,139	7,611	6,444	5,463	5,477	8,770	8,922	11,750	14,560	18,039	21,121	25,378	33,485	41,686	49,934	50,511
82	Balance			0	0	0	2,166	9,507	12,989	14,247	13,359	13,735	11,607	9,109	7,611	6,444	5,463	8,477	6,770	8,922	11,750	14,560	18,039	21,121	25,578	33,485	41,686	49,934	58,511	67,040
83	Interest Component			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85	TOTAL - Balance			0	0	0	2,166	9,507	12,989	14,247	13,359	13,735	11,607	9,109	7,611	6,444	5,463	5,477	6,770	8,922	11,750	14,560	18,039	21,121	25,078	33,485	41,686	49,934	58,511	67,040