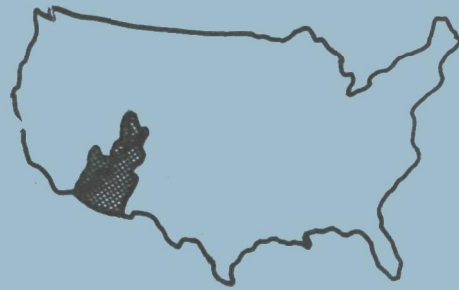


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State & Local
Management
Actions To
Reduce
Colorado River
Salinity

September , 1977

U.S.
ENVIRONMENTAL
PROTECTION
AGENCY



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STATE AND LOCAL MANAGEMENT ACTIONS TO REDUCE
COLORADO RIVER SALINITY

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FOREWORD

In September 1977, the U.S. Environmental Protection Agency, Region VIII, published and distributed advance copies of the Denver Research Institute (DRI) report, State and Local Management Actions to Reduce Colorado River Salinity. At that time, EPA extended invitations to a workshop held in Denver on December 5-6, 1977 in which DRI presented major results of the study to 208 planning officials from throughout the Colorado River Basin, to members of the Colorado River Basin Salinity Control Forum ("The Forum") and to other state officials. EPA officials also planned the workshop to include group discussion of the report and of procedures for implementing salinity control measures by state and local governments.

The discussion at the workshop provided some additional information on state and local circumstances that led Denver Research Institute to refine or modify certain aspects of its findings. Also, a few factual errors in the report were identified. Subsequently, representatives of the Forum made a more thorough review of the report content and sent written comments and suggestions to DRI. These have been carefully reviewed and where appropriate incorporated into the final report. The issuance of this final report gives Denver Research Institute the opportunity to modify and extend its analysis to include some workshop conclusions, to respond to additional review comments received after advance report publication, and to correct some factual or typographical errors.

The DRI report is not represented by DRI nor viewed by EPA and Forum members as a final, conclusive definition of state and local salinity

control actions, but instead is considered as a current baseline for an evolving process in which the states explore, adopt and implement actions that will help reduce or control salinity within the Colorado River Basin.

The Authors

March 1978

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LIST OF DEFINITIONS, ABBREVIATIONS, AND EQUIVALENTS

Definitions

Acre-foot (ac.-ft., a.f.): The quantity of water which if distributed uniformly over an area of one acre would be one foot deep

Animal unit month (aum): A measure of animal carrying capacity of grazing land

208: The areawide water quality planning process, or agency, specified in Section 208 of PL 92-500.

Abbreviations

ARS: Agricultural Research Service, U.S. Dept. of Agriculture
ARS: Arizona Revised Statutes
ASCS: Agricultural Stabilization and Conservation Service, USDA
BLM: Bureau of Land Management, U.S. Dept. of the Interior
Ca. Adm.: California Administrative Code
CEQA: California Environmental Quality Act
CRB: Colorado River Basin
CRS: Colorado Revised Statutes
CRWQIP: Colorado River Water Quality Improvement Program
DEPAD: Wyoming Department of Economic Planning and Development
EDS: Environmental Data Statement (California)
EIR: Environmental Impact Report (California)
FAC, F&A: California Food and Agricultural Code
F&G: California Fish and Game Code
FTE: Full-time equivalent
Gov.: California Government Code
H&S: California Health and Safety Code
maf: million acre-feet
M&I: Municipal and Industrial
mg/l: milligrams per liter
MWD: Metropolitan Water District of Southern California
NMS/NMSA: New Mexico Statutes Annotated
NPDES: National Pollutant Discharge Elimination System
NRS: Nevada Revised Statutes
O&M: Operation and Maintenance
PL: Public Law
ppm: parts per million
Pub. R./Pub. Res.: California Public Resources Code
RC&D: Rural Conservation and Development
SCS: Soil Conservation Service, USDA
TDS: Total dissolved solids
tns./yr.: tons per year

UCA: Utah Code Annotated
USBR: Bureau of Reclamation, USDI
USDA: U.S. Department of Agriculture
USDI: U.S. Department of the Interior
USGS: Geological Survey, USDI
WC: California Water Code
WS/WSA: Wyoming Statutes Annotated

Equivalents

1 acre = 4046.9 m²

1 acre-foot = 1233.5 m³

CHAPTER I

EXECUTIVE SUMMARY

Background of the Study

Although beginning in the purest of snowmelt in the high Rocky Mountains, the Colorado River (main stem) flows over 1,400 miles of weathering soils and rocks before it enters Mexico below Yuma, Arizona. The river and its tributaries dissolve minerals and soluble salts from the river beds, and are further tainted by heavily saline mineral springs fed by underground brines or by geologic salt deposits leached by groundwater. Dissolved and captured by storm runoff from 242,000 square miles of river basin, salty residues collect in the Colorado River, and the hot, dry climate concentrates these salts through constant evaporation of pure river water. Thus the Colorado grows saltier and saltier as it flows southwest. Had man never set foot in the river basin, the Colorado would be saltier than most other U.S. rivers have become after heavy agricultural, industrial and municipal development within their drainage areas.

The Colorado River Basin, compared with other regions of the United States, is undeveloped economically and is lightly and relatively recently populated. Yet it is developing and generally craves further economic development. Agriculture, heavily dependent on irrigated farming and livestock grazing, has existed for over a century. Although industry is sparser and newer than in most of the U.S., the rich mineral and energy resource deposits have stimulated rapid development, characterized by heavy water use and the generation

of various mineral/salt wastes. Finally, although municipal development adds relatively little salinity, the states of the Colorado River Basin are growing in population more rapidly than the U.S. average. For all of these reasons, further development in the basin will add salinity to the Colorado River.

The seven states of the Colorado River Basin (Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming) have in recent years agreed to cooperate to promote a basinwide program for control of river salinity. The states recognize that a unified water quality control program, aided by substantial federal government cooperation, offers the best hope for realizing their dual objectives: control of salinity in the lower Colorado main stem at or below 1972 levels; and continued development of compact-apportioned waters, particularly by the four states of the upper basin. To reach both objectives requires that efforts be made to reduce or eliminate some existing sources of salinity to compensate for the inevitable increases in salinity that will accompany development after 1972. The federal government is contributing to the reduction of some salinity through implementation of the "structural" actions called for in PL 93-320, the Colorado River Basin Salinity Control Act, and through numerous administrative, planning and control activities.

Purpose and Scope of Study

Since state and local governments also recognize their responsibility to assist in the reduction of salinity, the U.S. Environmental Protection Agency decided in 1975 to engage a research contractor

to analyze state and local management actions, on behalf of the seven basin states. The objectives of the study were:

To develop and analyze a series of management actions which may be taken state-by-state to reduce salinity of the Colorado River. These actions, which are to be developed in coordination with members of the Colorado River Basin Salinity Control Forum, are limited to those which may be taken by each of the governments of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming and their political subdivisions. All actions discussed, as well as selected combinations of actions, will be evaluated as to benefit, qualitative estimate of cost, and overall feasibility. Only actions which may be taken within the scope of existing legislation will be considered . . .

The essential prerequisite for implementing a desalinization policy within the existing institutional framework is to explore various mixtures of federal and state sanctions and incentives, to determine their relative effectiveness, and to identify those mixtures which can do the most to solve present and anticipated problems. That is the goal of this research study.

Selection Criteria

Early in the study the investigators developed a list of over 30 possible state and local management actions that appeared likely to reduce salinity loading in the Colorado River Basin. This list served as a structure for interviews, as well as a basis for review of statutes, rules and regulations, and technical documents. During the course of the study the actions were discussed and amended. The final list, after some consolidation, contained 33 possible actions. These possible actions then were judged according to pre-established selection criteria. The criteria covered administrative and technical

feasibility, cost, legality, need, effectiveness in salinity control, scope of applicability, and political and social implications.

Of the original 33 possible actions considered, analysis according to the selection criteria resulted in the following categorization:

- 12 actions have been proposed as recommendations for state action. Some of these are partially or fully underway in several of the states, thus providing guidance for implementation elsewhere. These actions are legal, or at least not prohibited by law. They appear technically, economically and politically possible to implement; and they appear effective in controlling, to some degree, certain causes of salinity. These actions are listed and briefly discussed in the following section.
- 9 of the possible management actions were determined to be already underway in the Colorado River Basin. It was judged that the increased application of these actions would occur naturally, with little if any need for additional intervention by state or local governments.
- 7 actions have been determined infeasible in the Colorado River Basin following application of these criteria, for various reasons of illegality, ineffectiveness in controlling salinity, excessive costs and difficulty of implementation, political conflicts greater than

estimated benefits, or because such action was simply unnecessary.

- 5 actions have been determined to be out-of-scope for this study. These actions may be effective in reducing salinity but are considered by both EPA and Denver Research Institute as being outside the jurisdiction of this research project.

Actions Proposed for Implementation in the Colorado River Basin

The following 12 management actions, proposed to be taken by state and local agencies, meet most or all of the criteria discussed above. The actions are believed feasible in some or all of the seven states of the Colorado River Basin. Accompanying comments give a brief overview and perspective as to the feasibility of adoption and the potential effectiveness of each action in controlling salinity.

1. *Regulate irrigation water use so that the water rights holder reduces excess use and implements waste control measures. This may be done by:*
 - (a) *Direct action by the agency administering water rights, to limit or control amounts of water diverted if waste occurs; or*
 - (b) *Imposing sanctions by the State Engineer, irrigation district or other appropriate agency, on water users using excessive amounts of water.*

Action #1 is proposed as a means of reducing the excess application of water in irrigated agriculture on soils where excess water use causes leaching of excess salt. It is proposed for implementation in four of the basin states. In California, the Colorado River Basin is close to salt balance, so Action #1 would have little effect on salt loading. In Nevada, there is little irrigation and market forces are naturally accomplishing what the action proposes. In Wyoming, the law is too limited in authority to support the action. In other states, although

the actions are legal they would be a significant departure from present administrative practice and would be viewed with hostility by many irrigators. An evolutionary approach to the action is proposed, limited at first to the most clear-cut cases of excessive water use. Implementation would occur gradually, accompanied by needed increases in personnel, training in new enforcement standards and an accompanying public information program designed to enlist irrigator cooperation to control water waste. It is likely that within a few years, substantial savings in water use could be achieved. This should reduce salinity, so long as the water savings occur on saline irrigated lands (rather than lands in salt balance) and so long as the water saved is not used to bring new lands into irrigated agriculture.

2. *Through the federally funded 208 wastewater planning programs, establish salinity as a priority item to be dealt with and develop a series of local and/or state corrective actions.*

Action #2 proposes that the 208 wastewater management planning programs throughout the Colorado River Basin define various salinity control actions that could be implemented by local and state agencies, and thus promote and coordinate implementation of the other actions proposed in this report. Once the 208 plan is approved by state governments and by EPA, the designated 208 agencies that have legal and administrative jurisdiction will be expected to carry out the plan. Any 208 recommendations for salinity control must have a management agency designated responsibility for implementation. Such management agency may be a state agency rather than a local government unit.

A number of the proposed salinity control actions are likely to require state action, and the 208 plan can identify the need and build the justification for the state to undertake the action.

The integration of salinity control actions with 208 planning actions is recommended in all seven states of the basin. The effectiveness of Action #2 is very difficult to predict, and varies with the local area's need for salinity control and the nature of the source of salinity. Besides calling attention to the salinity control measure and designating a responsible agency, the 208 plan can help implement proposed measures by: (a) influencing the NPDES permit system; and (b) influencing the approval or disapproval of wastewater treatment construction grants.

3. *Because of the need for an integrated approach to salinity control programs, utilize an existing state agency (or establish such an agency) to coordinate and promote salinity control actions by different state institutions.*

Action #3 is based on the belief that if salinity control is to be achieved in the Colorado River Basin states, it must be given a high priority and central coordination by state governments. The key to this approach rests with members of the Colorado River Basin Salinity Control Forum whose specialized knowledge of salinity and influence with their state's governors (who usually appoint them) would be used to promote gubernatorial designation of a central agency responsible for coordinating state salinity control efforts. The agency might develop a series of policies, administrative actions and/or coordinating procedures to assure that salinity control priority is

achieved. Action #3 is feasible and is proposed for implementation in five of the basin states. The action is not recommended for California, where it would add little if any strength to the existing salinity control effort in the Basin, or for Nevada where the Division of Colorado River Resources serves much the same purpose of coordination.

4. *Require minimum standards for water well construction, and require plugging of abandoned water wells and exploratory drill holes to avoid contamination of groundwater strata.*

Action #4 proposes extending and strengthening state standards on well drilling and on exploratory drilling (e.g., for mineral exploration or seismic investigation) to require plugging. This is intended to avoid mixing of fresh and saline strata that will result in contamination of groundwater, and ultimately surface water also. In five of the basin states, Action #4 is believed likely to intensify and expand control over salinity contamination of groundwater, primarily as a result of increased enforcement personnel. However, in California, New Mexico and Utah, Action #4 appears to be adequately implemented already, and in California it has little or no potential for further salinity control.

5. *To reduce salinity from agriculture, use irrigation return flow in nonagricultural areas; e.g., for power plant cooling. Utilize energy facility siting procedures to encourage the use of low quality waters where the water requirements of such facilities could be met utilizing saline and other low quality waters.*

Action #5 proposes to use saline and other low quality waters, including saline agricultural return flows, in energy development and other consumptive uses rather than letting them grow increasingly saline through continuous irrigation use. There are identified low

quality waters throughout the basin (primarily from natural sources in the upper basin) which could be used in this way, leaving better quality waters in the Colorado River. However, the practicality of Action #5 depends on local conditions. California now successfully uses power plant siting regulations to assure that plants locate near sources of poor quality water, and use such water for industrial (cooling) processes. Nevada uses sewage effluent for power plant cooling. Other states of the basin do not always have the legal authority and the favorable locational factors that exist in California, but consideration of Action #5 is proposed in all of the basin states as a promising salinity control measure where conditions are appropriate.

6. *Through land use controls, prohibit (or limit) irrigated agriculture on lands with high natural salt content in soils and subsoils, and select new lands for irrigation having soils and subsoils that will contribute reduced salt loads to irrigation return flow.*

All of the Colorado River Basin states have passed land use legislation. Only six of these states, however, still have such legislation in effect as a 1974 referendum in Utah repealed its land use law.

Under the existing land use laws of the states in the study region, numerous different agencies appear to have sufficient authority to implement actions designed to reduce the salinity loading of the Colorado River Basin. Several states mandate state control of "areas of state interest." Such areas include environmental concern areas, hazard areas, etc. If specific soil types, the irrigation of which would cause continued increases in the salinity load of the river,

should be classified as areas of state interest their use could be regulated.

State land use laws which prohibit new agricultural use, and encourage the cessation of existing irrigated agriculture on lands having a high natural salt content would decrease the amount of salinity resulting from the irrigation of such lands. For this to be done in states desiring to maintain agricultural production, land use regulations should encourage new development of agriculture on lands having lower natural salt loads. This would, of course, be dependent on the availability of such lands within the states of the study region.

The primary problem with Action #6 is that it may not be politically feasible to implement, at least on currently irrigated farmland. An implementation strategy, however, which would phase out irrigated agriculture on lands with high natural salt levels over a multi-year period may be an acceptable means of implementing the proposed action. This strategy would consider irrigated agriculture in prohibited areas (e.g., areas where salt levels in soils exceed specific levels) a nonconforming use. These nonconforming uses would be curtailed over a time period adequate in length to allow amortization of the costs of the facilities being removed from production. Such a strategy may require that specific landowners be compensated for loss of land values.

Although Action #6 is proposed in all of the states of the basin (even Utah, where action could be taken only at the county and

local level) it is recognized that the potential feasibility is severely limited by major political and administrative obstacles, and that even limited implementation is relatively unlikely in the immediate future.

7. *Through state economic incentives, promote conversion of land used for irrigated agriculture to other uses when highly saline return flows cannot be prevented, controlled or treated and encourage the modification of vegetation on rangeland (e.g., convert sagebrush to grassland) to reduce natural salinity from storm runoff.*

Action #7 proposes the use of state economic incentives to stimulate changes in land use to reduce salinity. The proposed action contrasts with Action #6, which proposes to reach the same goals through the use of governmental sanctions: land use restrictions, zoning prohibitions, and similar regulatory actions.

Three forms of economic incentive have been identified, although there probably are others that could be used:

- (a) Direct economic incentives, such as reductions in state income taxes or local property tax exemptions to landowners who voluntarily change land uses from those causing a high degree of salinity to other uses. A more direct incentive, of course, is an offer to purchase land for conversion to a new use causing less salinity. While it is conceivable that a state government might itself purchase land, it is more likely to act as a catalyst to promote sales of land to private interests such as industry or energy developers. This

could be done in connection with a state business or industrial development agency which normally encourages and assists industrial firms to locate in the state.

- (b) A state grant or loan fund to landowners to encourage changes in land use, e.g., from irrigated agriculture to less intensive agriculture (perhaps dryland farming or grazing), or to persons purchasing irrigated land for conversion to a new use (such as residential development, industrial use, etc.).
- (c) An incentive payment to landowners to encourage modification of vegetation that would reduce natural saline runoff. Mechanical uprooting or chemical treatment of sagebrush, followed by planting of native grasses, would be rewarded by a cash payment or a tax reduction.

Because of the unpopularity of legal sanctions by government, particularly among farmers and ranchers whose freedom to use their land is threatened, the use of economic incentives appears to offer a far more acceptable way to bring about salinity reductions. Questions of authority to encroach on property rights are bypassed, and actions are taken voluntarily, with the economic costs shared among all state residents.

Nevertheless, there are evident concerns over the role of the state in bringing about salinity reduction through actions which negatively affect the agricultural sector, and the processing, transportation and supply sectors dependent on them.

There also is likely to be state hesitation to fully fund a grant or incentive payment program when analogous federal programs (e.g., ASCS, RC&D) pay 50 to 75 percent of the cost.

In summary, Action #7a (tax incentives and promotion of land purchases) is partially underway in Arizona and Utah, possible in Nevada, and unlikely in the other states. Action #7b (state grant or loan fund) is operational in New Mexico, Utah, and Wyoming but questionable in the other four states. Action #7c (encouraging vegetation modification) appears possible in Nevada but questionable elsewhere for a variety of reasons.

8. *Establish special use charges for irrigation water provided from reclamation projects to cause more efficient usage and to encourage waste control measures. Use excess funds derived to finance waste control capital improvements on farms and in the conveyance systems.*

Action #8 has the underlying assumption that if the amount of irrigation water diverted and applied is kept to the minimum, salinity from agricultural sources will also be kept at a minimum. This action further assumes that higher costs per quantity of water used will cause the amount diverted to be kept at the minimum needed for the crop.

Initiation of this action would rest with the local irrigation and/or water conservation districts. The greatest results in terms of salinity reduction would be achieved in areas where irrigation return flows are a source of increased salinity, such as in areas of Mancos Shale.

In implementing Action #8, at least three different approaches might be utilized. The first approach is to establish special use

charges that would raise the unit cost of irrigation water to a level that will reduce demand to the bare minimum necessary for crop production, yet not endanger the economic health of the farms served. Because of the variations in farm prices, costs and water needs of various crops, this level may be very difficult to calculate.

A second approach is to determine the amount of water needed in a given year for a given crop and retain current charges for that quantity of water use. However, water usage above the pre-determined amount would incur special use charges to discourage the unneeded usage.

A third and perhaps simplest form of approach is that used in California's Imperial Irrigation District--to measure the amount of tailwater and, if it exceeds 15 percent of the water delivered, a penalty charge is assessed. In the Imperial District example, the water cost triples.

The intent of this action is not to raise additional dollars for local water delivery districts; it is designed to reduce unnecessary water consumption. It is possible to design a water rate structure that would not change a district's total revenue from delivered water, but this would be particularly difficult to calculate in the first year of implementation. Any increased revenue from water deliveries could be spent on conveyance system improvements or on-farm improvements. Ideally, the farmer who reduces water use to the minimum needed for crop growth would not suffer any out of pocket loss overall and might even save money; only those who persist in over-application of water would pay more.

Generally, Action #8 appears legally feasible throughout the basin. As a salinity control measure, it would be most effective in areas of saline soil subject to excess water application which causes saline irrigation return flows to the Colorado River or its tributaries. Thus Action #8 would have little effect in Arizona or Nevada (because of the limited amount of irrigation return flow reaching the Colorado, although future development in Arizona may increase the potential for Action #8), or California (because the irrigated lands are moving toward salt balance), or New Mexico or Wyoming (because currently irrigated lands are relatively low in salts). In Colorado and Utah, where the action has a relatively high potential effectiveness, Action #8 would encounter severe political opposition which may well exceed the motivation of those states to control salinity from agricultural sources.

9. *By use of state economic incentives, promote conversion of marginal agricultural water to other uses, or increase irrigation efficiency, to reduce or eliminate salinity resulting from irrigation return flows.*

Recognizing the resistance of the agricultural sector to sanctions or administrative regulation of water use as a means of controlling salinity, this action proposes state economic incentives designed to stimulate voluntary actions by irrigators. There is some equity in the proposal, which avoids placing the major financial burden of salinity control on the agricultural irrigators and instead spreads the burden over all state residents by using state tax monies to finance improvements.

State grant or loan fund. One form of economic incentive would be to establish a state grant or loan fund to supplement federal programs of cost sharing to finance on-farm improvements promoting irrigation efficiency. New Mexico, Utah and Wyoming now have grant or loan programs for this purpose.

Establish an agency to trade in water rights. Under one proposal the state government would establish an agency to trade in water rights, buying lower value water rights from marginal agricultural lands, and excess water rights from farmers. The rights would be held and later sold for higher valued uses. The proposal envisions an agency with a probable dual purpose of economic development and control of salinity. This agency should be able to acquire water rights or excess water from certain agricultural users and sell the rights to nonagricultural users or to agricultural lands with low salinity. As only willing seller-willing buyer transactions would occur, there would be no undue coercion on the land owner. The agency, of course, would require adequate appropriations, particularly in the early years.

In all Colorado River Basin states, there is no statutory authority to create such an agency. However, in all states there is an existing agency which has adequate powers to acquire water in the best interests of the state.

Throughout the West, implementation of this action could be restricted by legal problems regarding transferability of water, statutes requiring basin-of-origin protection, need to protect the rights of junior appropriators, etc.

Action #9a (state grant or loan fund) would primarily contribute to salinity control in the upper basin states, because of soil

conditions and the nature of irrigation return flow. Three of the states already have some form of grant or loan fund, and an increase in funding would permit expansion of its effectiveness. In Colorado, there is little evidence of legislative willingness to establish such a program.

Action #9b (agency to trade in water rights) also would be useful as a salinity control measure primarily in the upper basin. It is less needed in New Mexico and Wyoming because irrigation return flow is not perceived as a major contributor to salinity. The concept has promise in Colorado (once legal barriers are overcome). In Utah it is legally and administratively feasible but requires state direction to overcome potentially heavy political resistance.

10. *Administratively modify leases of state lands (at time of lease or renewal) to prohibit agricultural practices which cause erosion or excess runoff of saline water, and to improve the land to reduce runoff by: prohibiting agriculture or grazing on certain soil types, restricting grazing intensity, and modifying vegetation on rangeland to reduce salinity from runoff.*

There are several different actions which could be taken to reduce salinity loading resulting from the use of state lands. Grazing leases, for example, could be conditioned to prevent over-grazing in areas where such over-grazing would substantially disturb the topsoil. Subsequent rains and the resultant runoff from such lands return highly saline waters to the stream system.

If state lands were leased for irrigated agriculture, conditional leases requiring efficient agricultural practices would result in a reduction of irrigation return flows. This would result

in a reduction of both the quantities of water required and the salinity level of the Colorado River. Such conditional agricultural leases could require specific methods of irrigation (sprinkler or trickle instead of flood or ditch-and-furrow). The production of specific crops could be encouraged by lease rates.

Action #10 is not appropriate for California or Nevada, as no state lands are currently being leased within the Colorado River Basin portion of those states, for agricultural or grazing purposes. The action seems reasonably feasible in the other states; however, the critical constraint on a system of conditional leases of state land is enforcement. The ability of state land agencies in the states of the Colorado River Basin to administer a system of conditional leases is essential to the overall success of such a program. Without the reality of enforcement, a conditional lease system may prove to be relatively ineffective.

Politically, the imposition of any new constraints in state land leases is likely to be resisted by the agricultural interests who consider state lease renewals almost as a property right and understandably object to lease provisions that increase their operating expenses.

11. *To reduce salinity from municipal sources, regulate salt loading appliances such as water softeners.*

This action has been classified "feasible--but of limited applicability" because of the generally limited contribution of salt loading appliances to the salt load in the Colorado River. Home water softeners, used to reduce the mineral hardness of water supplies, are

recharged periodically by an ion exchange process, using a concentrated solution of common table salt. After recharge, the used salt is discharged to the sewer system. An industry source estimates total salt loading from water softeners throughout the Colorado River Basin as less than 1.7 ppm of a total (1972) loading of 879 ppm at Imperial Dam.

Salinity control can be accomplished in any of three ways: water can be centrally softened; regeneration of softening systems can be handled centrally by exchange of cylinders; or on-site regenerative salt use efficiency can be optimized. The first two options provide administrative control over salt loads, avoiding disposal that will return to the river; while salt use efficiency provides savings in salt costs as well as a reduction in (but not elimination of) salt loading.

Because of the relative hardness of the water, water softeners are most used in Nevada and California among the basin states. In Arizona, because bottled water is commonly used instead of household water softeners and because municipal wastewater is consumed by downstream agriculture or by municipal irrigation of parks rather than returned to the Colorado River, state officials do not consider salt loading appliances to be a significant salinity problem. Because salt loading appliances are not yet a significant source of salinity in most parts of the Colorado River Basin, Action #11 is presented as a potential action which cities, counties or even states have the ability to implement locally when the need arises.

12. *To reduce salinity from industrial sources, require reuse of wastewater to reduce industrial water demand.*

Water reuse is a fact of life in the seven Colorado River Basin states. It has been pointed out correctly that almost all Colorado River water is reused by downstream appropriators as it passes through the system. The existing de facto water reuse system is based primarily on agricultural, municipal and industrial return flows.

Action #12, which has been classified "partially underway--extension feasible," addresses itself to more specific aspects of water reuse; especially to those which have arisen as a result of the no-salt return standards being applied to the river. A "Policy for Implementation of the Colorado River Salinity Standards Through the NPDES Permit Program" was adopted by the Colorado River Basin Salinity Control Forum on February 28, 1977. The policy, which has been accepted by EPA, amplifies the standards for industrial and municipal sources of salinity. The goal for industry is "a no salt return policy whenever practicable," and is the policy for all new industrial sources.

Some types of reuse included in this action are recycling of wastewater within an industrial plant, diversion of highly saline waters, from natural or agricultural sources, for certain industrial uses; and use of wastewater treatment plant effluent for industrial purposes. Not only will these forms of water reuse reduce industrial demands on high quality water supplies, they also will alleviate some problems in the NPDES permit system by eliminating some portion of undesirable discharges to the river. The action contemplates that

water either would be reused to total consumption, or reused until it becomes unsuitable for further industrial use and then disposed of in an evaporation pond. Such reuse will make more efficient use of scarce water, and thus will help effectuate the Colorado River Basin Salinity Control Forum's policy of no salt return to the river wherever practicable.

Impacts of Proposed Actions on Parties-at-Interest

One of the selection criteria for the management actions proposed in this report relates to political acceptability: "Any action which would overcome implementation obstacles should be generally acceptable to all parties involved . . . and particularly to those most greatly affected." The authors of this report have, by consensus judgment, analyzed the impacts that application of each of the various proposed actions would have on the various *parties-at-interest*, i.e., one of several identifiable groups of persons whose common interests are affected or impacted.

The analysis (see Figure 5-1, page 307) reveals that certain *parties-at-interest* are favorably impacted by nearly every action recommended. This is true of water quality agencies and federal government agencies, both of which logically can be expected to favor the implementation of any state and local management action that will decrease river salinity. Environmentalists also tend to favor most salinity control actions, except for those which negatively impact wildlife habitat (e.g., modifying natural vegetation on rangeland) or which appear likely to promote power plant or energy development.

Construction firms logically will favor many of the actions which potentially may involve new structures; only land use actions prohibiting development will negatively impact construction firms.

One very important constituency in the Colorado Basin--irrigated agriculture--is threatened or potentially impacted unfavorably by several proposed actions. Since nearly all (97 percent of) man-made salinity has a source in irrigated agriculture, it is inevitable that most proposed corrective actions will interfere with or add costs to the operations of the agricultural sector. Other actions, such as the federal 208 program, are judged as having a negative impact because of the change envisaged by some of the impacted parties. This does not preclude achievement of positive attitudes or the eventual welcoming of federal participation, but it does mean that considerable educational effort providing reassurance will be necessary before achieving positive attitudes and cooperation from some of the parties-at-interest.

Generally, the only actions which are not judged as negative by irrigators are those involving economic incentives rather than sanctions. In other words, the irrigated agricultural sector does not appear likely to accept new salinity control policies except by a voluntary choice in response to an economic reward, presumably provided by state government. Authority exists for numerous actions involving sanctions or regulations by state and local governments, but the feasibility of such actions depends on the willingness of the states to face agricultural opposition. This seems to vary among states, depending on their policies of supporting agriculture vs.

industrial and energy development, and also on the states' perceptions of the seriousness of the salinity problem.

CHAPTER II

INTRODUCTION

Background of the Study

Although beginning in the purest of snowmelt in the high Rocky Mountains, the Colorado River (main stem) grows saltier and saltier as it flows southwest. Had man never set foot in the river basin, the Colorado would be saltier than most other U.S. rivers have become after heavy agricultural, industrial and municipal development within their drainage areas.

The Colorado River Basin, compared with other regions of the United States, is undeveloped economically and is lightly and relatively recently populated. Yet it is developing and generally craves further economic development. Agriculture, heavily dependent on irrigated farming and livestock grazing, has existed for over a century. Although industry is sparser and newer than in most of the U.S., the rich mineral and energy resource deposits have stimulated rapid development, characterized by heavy water use and the generation of various mineral/salt wastes. Finally, although municipal development adds relatively little salinity, the states of the Colorado River Basin are growing in population more rapidly than the U.S. average. For all of these reasons, further development in the basin will add salinity to the Colorado River.

The development pressures in the seven states of the Colorado River Basin (Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming) are constrained by the shortage of water. After decades

of competition, often violent, over the rights to water, the states reached an accord--the Colorado River Compact of 1922--which divided the river flow into upper and lower basin allocations. (These have been subsequently divided into state shares: the Upper Colorado River Compact established shares for Wyoming, Colorado, New Mexico, and Utah; the courts allocated shares among Arizona, California and Nevada.)

Despite a fundamental conflict of interests, particularly between the upper basin states and those of the lower basin, the states have in recent years agreed to cooperate to promote a basin-wide program for control of river salinity. It is feared that, without interstate cooperation, the implementation of federal water pollution control legislation might jeopardize additional desired development in both the upper and lower basins of the Colorado, and conceivably might create stresses that would breach the 1922 Compact, with unpredictable but grave results. The states recognize that a unified water quality control program, aided by substantial federal government cooperation, offers the best hope for realizing their dual objectives: control of salinity in the lower Colorado main stem at or below 1972 levels; and continued development of apportioned waters by the seven states of the river basin.

As described later (in the fourth section of Chapter III), the seven basin states began in 1966 a series of conferences concerning the relationship between proposed water quality standards and the future development of apportioned Colorado River water. By 1973, the

states agreed on a mechanism for interstate cooperation and established the Colorado River Basin Salinity Control Forum.* The Forum, made up of representatives of the seven states, is charged with carrying out "the most appropriate plan of implementation for salinity control for the Colorado River system." This plan of implementation is stated in a 1975 document.¹ The Forum document includes an extensive list of actions to be taken to reduce or control salinity, together with a schedule and an indication of the entity responsible for taking each action. Among the "research and special studies actions," are the following:²

| <u>Action to be Taken</u> | <u>Timing</u> | <u>Entities Responsible for Taking Action</u> |
|--|---------------|---|
| Identify and evaluate state water resources management programs, policies and regulations and assess them for the purpose of identifying where they can be redirected toward salinity control policy | October 1977 | Each basin state |
| Identify recommended changes in water resources programs, regulations and policies | October 1978 | Each basin state |

Purpose and Scope of Study

In furtherance of the two actions named above, the U.S.

Environmental Protection Agency decided in 1975 to engage a research

*Public Law 92-500, The Federal Water Pollution Control Act Amendments of 1972, directed the EPA Administrator to encourage cooperative activities by the states for the prevention, reduction, and elimination of pollution. (Section 103.a.)

¹Colorado River Basin Salinity Control Forum, Proposed Water Quality Standards for Salinity Including Numeric Criteria and Plan of Implementation for Salinity Control, [n.p.] June 1975. The standards apply to the mainstream and tributaries of the Colorado above Imperial Dam.

²Ibid., p. 117.

contractor to analyze state and local management actions, on behalf of the seven basin states. The objectives of the study were:

To develop and analyze a series of management actions which may be taken state-by-state to reduce salinity of the Colorado River. These actions, which are to be developed in coordination with members of the Colorado River Basin Salinity Control Forum, are limited to those which may be taken by each of the governments of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming and their political subdivisions. All actions discussed, as well as selected combinations of actions, will be evaluated as to benefit, qualitative estimate of cost, and overall feasibility. Only actions which may be taken within the scope of existing legislation will be considered. The potential actions considered feasible for adoption will be presented at a workshop for Forum members and 208 planning officials of the seven affected states.

Summary of Methodology

The methodology of this study, as contractually specified by EPA, included, but was not limited to, legal reviews of existing authorities, personal interviews with appropriate state administrators and quantification of man-years of state effort actually provided in [1976] to the execution of various regulations, programs and policies. The criteria for prioritizing the recommendations included the following elements: (1) the "costs" of any action in terms of additional manpower, etc.; (2) the "benefits" in terms of potential quantity of water saved and salt withheld from the river system.

The study contractor was directed to identify ongoing, regulatory and administrative water resources, agricultural and land use programs, regulations and policies in each of the states of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming, and assess these for the purpose of identifying those that could most

cost-effectively be redirected toward the salinity policy identified in 40 CFR 120.5 (EPA Regulation, "Colorado River System Salinity Standards and Implementation Plan," December 1974).

The evaluation was to address both surface and groundwater management programs, regulations and policies that are currently being carried out by duly constituted agencies, commissions and boards of each state's executive branch of government.

Two facets of the problem were to be considered: (1) measures that will result in more efficient water use, and therefore, less water use per unit of production; and (2) measures that will result in a reduction of total dissolved solids discharged to surface waters.

During the conduct of this work, the contractor was instructed to maintain continuing liaison with members of the Colorado River Basin Salinity Control Forum, to promote communication and obtain the opinions of the states' representatives on the Forum concerning proposed actions relating to state salinity policy.

For each state, the contractor was to identify what actions or changes in operating practices or procedures, policies, and regulations in the three broad areas of water resources, agriculture and land use could most cost-effectively be executed without the need for additional legislation.

The output of each state study was specified to be a report that identifies a priority list of specific actions or redirections needed to meet the Colorado River Basin policy, the agency responsible for executing the action, the existing legal authority (if so constituted) and the opportunities for decreasing salt input

and minimizing water use. In developing the list of priority actions, the concepts of best management practices and best available treatment as conceptualized in Section 304 of Public Law 92-500 and as described or quantified in recent publications, were to be considered.

There clearly is a need for developing a basin-wide management strategy which implements present salt control capabilities. Federal statutes and regulations are limited in their scope and effectiveness. State statutes and regulations, which supplement federal powers, provide an independent source of authority but vary among states in power, effectiveness and scope. In addition to the power to impose sanctions against those who do not adhere to salinity control regulations, there may be authority to offer incentives to those who do. The essential prerequisite for implementing a desalinization policy within the existing institutional framework is to explore various mixtures of federal and state sanctions and incentives, to determine their relative effectiveness, and to identify those mixtures which can do the most to solve present and anticipated problems. That is the goal of this research study.

CHAPTER III

OVERVIEW OF COLORADO RIVER BASIN SALINITY PROBLEM

Basinwide Salinity

The Colorado River (main stem) extends for 1,400 miles from its origin in Colorado until it reaches the Mexican border near Yuma, Arizona. The Colorado and its tributaries drain a primarily arid and semiarid river basin of 242,000 square miles in the southwestern United States. The salt content of the river increases downstream because its tributary streams flow over soils and rocks which, because of the arid climate, are less intensively weathered than soils in more humid regions, and because of flow into the Colorado River system from highly saline springs. Figure 3-1 illustrates 17 gaging station locations along the river and its tributaries and Table 3-1 shows 1974 salinity levels at these stations.

The historic salinity of the Colorado River can be accounted for by such natural sources. Even today, nearly 65 percent of the measured salt load at Hoover Dam is from natural diffuse and point sources.¹ The diffuse sources include runoff of rain and snowmelt across saline lands. Point sources which contribute substantial surface or groundwater inflow of salts include Blue Springs, LaVerkin Springs, Littlefield Springs, Glenwood/Dotsero Springs, and Paradox Valley (see Figure 3-1). The saltiness of the river is naturally

¹U.S. Environmental Protection Agency, The Mineral Quality Problem in the Colorado River Basin, Summary Report, Washington, D.C.: Government Printing Office, 1971, pp. 15-16. The salt load data are historical from the 1942-1961 period, adjusted to 1960 conditions. DRI has further adjusted the percentages to delete salt loading caused by storage releases from Hoover Dam.

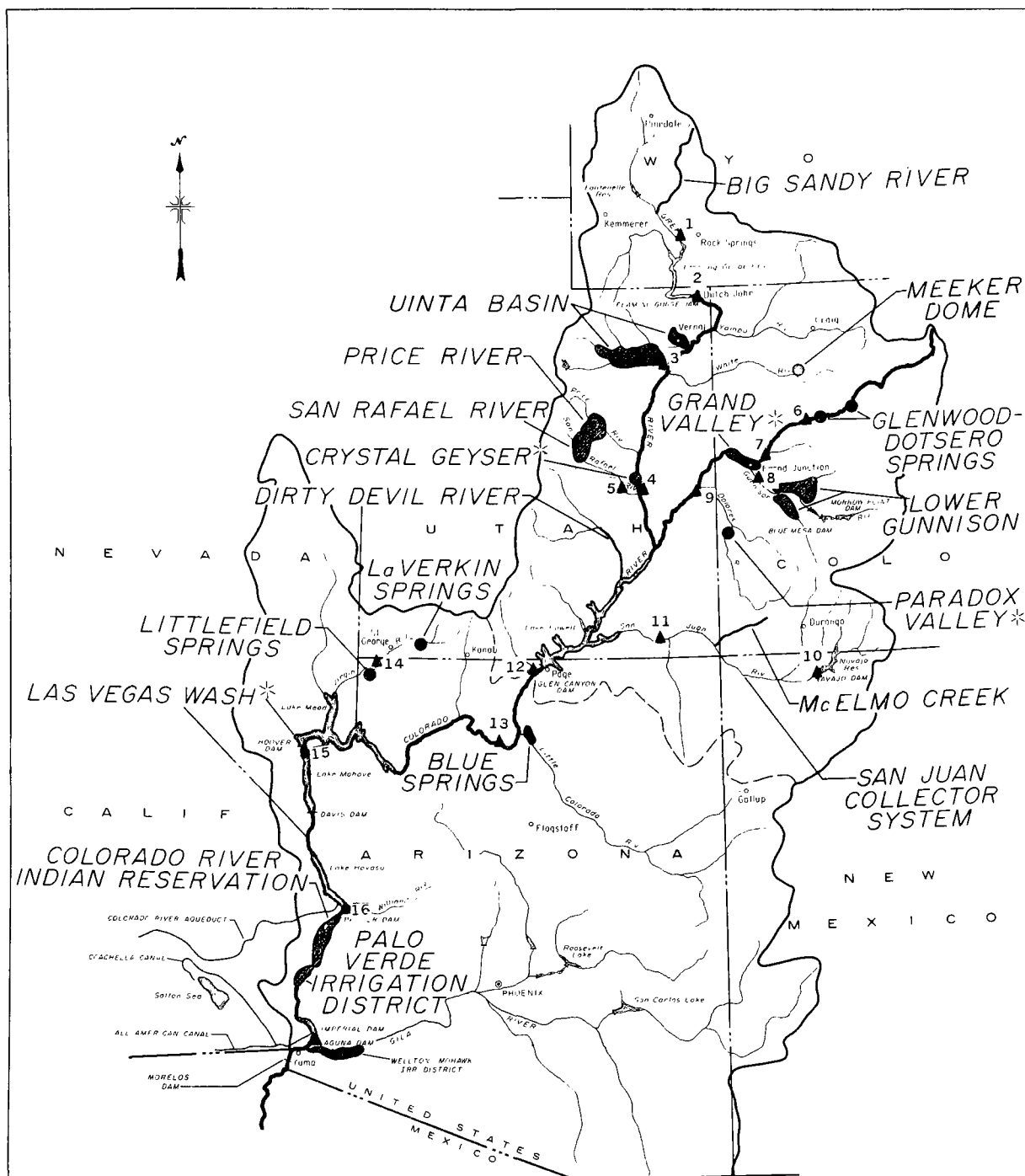


Figure 3-1. Colorado River Basin Showing Location of Seventeen Gaging Stations and Proposed Salinity Control Projects.

Source: U.S. Bureau of Reclamation

* UNITS AUTHORIZED FOR CONSTRUCTION

TABLE 3-1
Historical and Present Modified Water Conditions
at Seventeen Stations
Colorado River Basin

| Station | Historical Condition | | | Present Modified Condition (1974) | | |
|--|-------------------------|--------|-------|-----------------------------------|--------|-------|
| | Flow (1,000 A.F.) | TDS | | Flow (1,000 A.F.) | TDS | |
| | | Tns/yr | Mg/l | | Tns/yr | Mg/l |
| 1. Green River near Green River, WY | 1,312 | 552 | 309 | 1,285 | 562 | 324 |
| 2. Green River near Greendale, UT | 1,575 | 913 | 426 | 1,599 | 970 | 446 |
| 3. Duchesne River near Randlett, UT | 438 | 404 | 678 | 402 | 401 | 735 |
| 4. Green River at Green River, UT | 4,193 | 2,602 | 456 | 4,153 | 2,666 | 471 |
| 5. San Rafael River near Green River, UT | 91 | 210 | 1,699 | 78 | 212 | 1,999 |
| 6. Colorado River near Glenwood Springs, CO | 1,640 | 595 | 267 | 1,467 | 598 | 300 |
| 7. Colorado River near Cameo, CO | 2,793 | 1,531 | 403 | 2,548 | 1,523 | 440 |
| 8. Gunnison River near Grand Junction, CO | 1,729 | 1,454 | 618 | 1,708 | 1,474 | 635 |
| 9. Colorado River near Cisco, UT | 4,959 | 4,104 | 609 | 4,639 | 4,140 | 656 |
| 10. San Juan River near Archuleta, NM | 904 | 198 | 161 | 826 | 195 | 174 |
| 11. San Juan River near Bluff, UT | 1,611 | 983 | 449 | 1,497 | 997 | 496 |
| 12. Colorado River at Lees Ferry, AZ | 10,346 | 7,856 | 558 | 10,335 | 8,580 | 610 |
| 13. Colorado River near Grand Canyon, AZ | 10,659 | 8,943 | 617 | 10,648 | 9,667 | 668 |
| 14. Virgin River at Littlefield, AZ | 157 | 349 | 1,634 | 157 | 349 | 1,634 |
| 15. Colorado River below Hoover Dam, AZ-NV | 10,244 | 9,654 | 693 | 10,176 | 10,393 | 751 |
| 16. Colorado River below Parker Dam, AZ-CA | 9,235 | 8,745 | 696 | 8,748 | 8,923 | 750 |
| 17. Colorado River at Imperial Dam, AZ-CA | 8,540 | 8,891 | 766 | 7,844 | 9,183 | 861 |

Source: Table E, page 65, "Progress Report No. 8, Quality of Water, Colorado River Basin", January 1977, USBR.

concentrated by the loss of fresh water, which otherwise would dilute the salt, to phreatophytes and to surface evaporation.

The salinity of the river has always increased from its headwaters to its mouth. However, the increase has become more pronounced and has accelerated with man's development of the river system. The river supplies water for two and one-half million irrigated acres and various other industrial and municipal needs within the Colorado River Basin. Also, enough fresh water is exported from the basin to supply about 12 million people with full or partial domestic supplies and to irrigate hundreds of thousands of acres of farmland, and this export adds to salinity concentrations in the Colorado River.

The processes which increase salinity--salt loading and salt concentrating--are affected by development as well as by nature. The major man-made contributor of salinity is irrigated agriculture which both loads and concentrates salts. Of the 35.3 percent of the salt load attributable to man's activities, nearly all (34.3 percent of the total salt load) is linked to irrigated agriculture. The remaining contribution from municipal and industrial sources² is being partially brought under control by the National Pollutant Discharge Elimination System (NPDES) imposed policy of "no salt return" whenever practicable.

As further development on the Colorado River occurs it is apparent that, since all use increases salinity, control measures must apply to natural as well as man-caused sources of salinity. To

²Municipal and industrial sources contribute 1.4 percent of total salt loading, but 0.4 percent of salt load is exported in the water used for out-of-basin diversions. Source: EPA, The Mineral Quality Problem, p. 15.

this effect PL 92-500 and PL 93-320 are being implemented by the basin states, the Environmental Protection Agency, the United States Bureau of Reclamation, and other involved federal agencies. PL 92-500 calls for maintenance, improvement and protection of all U.S. water quality; and PL 93-320 specifically requires control of salinity in the Colorado River.

Economic impacts of salinity. Salinity has several negative economic impacts on users of the water. These include: increased water treatment costs, primarily for chemical softening; damage to plumbing, utensils, and textiles; and the expenses of extra soap and detergents needed for cleaning. These costs have been estimated for household consumers by Bruvold and Mitchell³ who found from studies in 15 California communities that as the mineral content of domestic water (as measured by mg/l of total dissolved solids, TDS) increased, so did the "penalty cost," or monthly expenditures per household for bottled water (for drinking and other purposes), for water softening additives, and for water softener operation. In communities where TDS exceeded 470 mg/l, mean monthly penalty costs ranged from \$3.24 to \$6.00 per household. The Bruvold and Mitchell study also established the willingness of residents to pay more if water quality were improved. The willingness to pay more increased with increasing mineral content and ranged from \$2.35 to \$3.34 monthly per household in communities where TDS exceeded 470 mg/l.⁴

³William H. Bruvold and Raymond N. Mitchell, Jr., Consumer Evaluation of the Quality and Cost of Domestic Water, Contribution No. 159 Davis: University of California Water Resources Center, July 1976, pp. 49

⁴Ibid., pp. 53-56.

Health impacts of salinity. Salinity in drinking water is objectionable largely because of its effect on taste (at concentrations above 300 or 400 mg/l of sulfates) and its associated hardness. However, saline water is known to have negative health effects on certain sensitive persons, particularly at higher sodium levels. Gastrointestinal effects are associated with high levels of sulfates (over 600 mg/l), among persons unconditioned to such levels.⁵ A 1977 study by the National Research Council for EPA found that water hardness and health are related:

A large body of scientific information indicates that certain inorganic or mineral constituents of drinking water are correlated with increased morbidity and mortality rates.

However, the report said that "hard water" (i.e., water containing more than a certain level of calcium carbonate) is linked to a decreased incidence of heart disease, hypertension and strokes, whereas "soft" water is harmful because of its high levels of cadmium, lead, copper and zinc.⁶

Agricultural impacts of salinity. The effects of salinity on irrigated agriculture include decreases in crop yields, damage to soils and damage to irrigation systems. The negative effect of salinity on crops can cause various forms of economic penalty to the irrigator: (a) he can take no remedial action and suffer a loss

⁵U.S. Environmental Protection Agency, "Proposed National Secondary Drinking Water Regulations," Federal Register, Vol. 42, No. 62, March 31, 1977.

⁶"Research Council Study: Water Improvement Could Cut Deaths," The Denver Post, May 29, 1977, p. 17.

in yield due to increased salt in the crop root zone; (b) he can use additional irrigation water (if soil conditions permit) to leach excess salt from the root zone, at the cost of additional labor, fertilizer, and drainage facilities, plus the cost of water and possibly the loss of other land taken out of production to concentrate water on the better land; or (c) he can replace salt-sensitive crops with less sensitive crops.⁷ Each of these alternatives will involve an economic penalty to the irrigator which, because of the complexity, is difficult to quantify. However, the estimated total penalty costs to irrigated agriculture in Southern California are estimated at \$4.6 million in 1980 and \$10.0 million in 2010. Penalty costs in Arizona, both in Yuma County and in the Central Arizona Project area, are estimated at \$1.1 million in 1980 and \$2.7 million in 2010.⁸

International impacts of salinity. United States relations with Mexico will continue to suffer if the quality of Colorado River water entering Mexico remains unacceptably saline, in violation of what Mexico considers to be an agreement between the two nations. Minute 242 of the International Boundary and Water Commission, United States and Mexico, states that the quality of water delivered to Mexico shall be no more than 115 ppm (plus or minus 30 ppm) over the annual average salinity measured at Imperial Dam. It has since

⁷U.S. Environmental Protection Agency, Regions VIII and IX, The Mineral Quality Problem in the Colorado River Basin, Appendix B, Physical and Economic Impacts, 1971, pp. 59-78.

⁸Ibid., pp. 99, 117, 127.

been resolved by the Colorado River Salinity Control Forum, and adopted by the seven basin states, that salinity at Imperial Dam should be maintained at or below 1972 levels (879 mg/l). Thus each state, as well as the federal government, is aware of, studying, planning and implementing programs to achieve that objective through local, state and basin-wide efforts.

State-by-state Overview of the Salinity Problem

The following very brief overviews attempt to present the states' views of their salinity problems. Because site-specific information is scarce, the descriptions are not limited to the Colorado River Basin portions of each state. The intent is simply to describe the state's sense of the water quality and quantity situation within its borders, with emphasis on the causes, sources and effects of salinity.

Arizona Salinity

Water--both quantity and quality--is widely considered to be the major statewide issue in Arizona. Salinity and sedimentation are the major water quality problems; and, by mining groundwater, the state is using water at twice the rate of replenishment.

Much of the state is arid, with over 70 percent of the land owned federally or by Indian tribes. Of the remaining 21.8 million acres of privately owned and leased state trust lands, only 1.2 million acres are under irrigated agriculture.⁹ Yet fully 89 percent of the state's water depletions are used in irrigated agriculture.¹⁰ In Arizona's Colorado River Basin, agricultural use of water rises to 95 percent.¹¹

Generally the quality of the renewable surface water supplies is acceptable for all uses. Groundwater supplies, which are being depleted, range from acceptable to unusable, with one aquifer containing up to 100,000 mg/l TDS,¹² three times saltier than seawater. Because of scarce supplies, usable quality water is valued and reused wherever possible, thus increasing consumptive use and providing little return flow into the Colorado River. The single

⁹Arizona Water Commission, Arizona State Water Plan; Phase I--Inventory of Resource and Uses, Phoenix: July 1975, p. 21.

¹⁰Ibid., p. 97.

¹¹Earl V. Miller Engineers and Metcalf & Eddy, Inc., Water Quality Management Plan, Colorado Main Stem River Basin, Arizona, Arizona Department of Health Services, 1976, p. 2-7.

¹²Water Commission, State Water Plan, p. 95.

greatest source of Colorado River salinity is the naturally salty groundwater of the Blue Springs, which add 550,000 tons of salt annually to the river. Blue Springs is not considered structurally or economically feasible for correction by the Bureau of Reclamation and furthermore is an area sacred to the Hopi and hence not politically susceptible to corrective action.¹³ Irrigated agriculture is the second largest source of salinity, but a relatively small source since much of the irrigation water is consumptively reused. Municipal effluents are commonly reused and, like industrial effluents, are coming under control by NPDES permits.

The Gila River Basin, which contains a major portion of the State's land area, population, and economic development, drains naturally into the Colorado River downstream from Imperial Dam. However, runoff from this basin rarely reaches the River. Salinity control in the Colorado River below Imperial Dam is being carried out by various measures authorized under Title I of P.L. 93-320, the Colorado River Basin Salinity Control Act.

Most of the development in the Little Colorado River Basin is located in the middle and upper reaches of the basin where surface water or groundwater supplies are available, and agriculture or municipal and industrial return flows seldom if ever reach the mainstream of the Colorado River. The Little Colorado River, except for headwater areas, is perennial only for a few miles near its mouth because of the existence

¹³Bureau of Reclamation, Progress Reports on Colorado River Basin Salinity Control Act--Title II and Colorado River Water Quality Improvement Program, Denver, January 1975, p. BS-1.

of several saline springs, including the Blue Springs. At the lower most gage on the river near Cameron, there is little or no flow for four to six months each year. Significant flow at this point occurs in response to heavy but infrequent rainfall or from spring snowmelt in the higher elevations. The larger flows are usually low in dissolved solids, although they often carry large concentrations of suspended sediment.

In the remaining areas of the State tributary to the Colorado River, the principal developed areas are immediately adjacent to the Colorado River. These include the large agricultural area on the Colorado River Indian Reservation, two small non-Indian irrigation districts, and the communities of Parker, Lake Havasu City and the Bullhead City-Riveria area. Only the Colorado River Indian Reservation has measured return flows to the River. The Reservation has already reached its maximum water entitlement in terms of diversion from the River, and is implementing measures to increase irrigation efficiencies and reduce return flows so that remaining lands can be brought into production.

California Salinity

The Colorado River provides the primary water source for southern California. The river supplies 75 percent of the water used by six public agencies (metropolitan water and irrigation districts) supplying water to lands representing about one-half the assessed valuation of the State of California.

In the metropolitan areas of Los Angeles and San Diego, high salinity Colorado River water causes problems for both municipal and industrial users. These include: "high soap consumption, formation of objectionable scale in heating vessels, and damage through corrosive attack on distribution pipelines and user plumbing systems and appliances."¹⁴ In addition, there is an adverse effect on the taste of the water. Because of these problems the Metropolitan Water District of Southern California (Los Angeles area) formerly centrally softened much of its Colorado River water. Instead, it now achieves reduced hardness by mixing Colorado River water with higher quality Northern California water supplies from the State Water Project.

The Palo Verde and Bard Irrigation Districts, along with the Yuma Indian Reservation, use Colorado River water for irrigation in an area with a high water table. Open ditch drains have been constructed with good success. But even with good draining soils, extra water must be applied to leach salt out of the soil root zone.¹⁵

Water users in the Imperial Irrigation District and Coachella Valley County Water District have to contend with the additional problem

¹⁴California, Colorado River Board, Need for Controlling Salinity of the Colorado River, Los Angeles: Colorado River Board of California, August 1970, pp. 46-47.

¹⁵Ibid., p.49.

of clay and heavy loam soils in the application of saline water.¹⁶ Not only do irrigators have to install expensive drainage systems, they also must regularly overapply water to leach salt from the root zone. This in turn requires extra application of fertilizer to replace that leached along with the salt.¹⁷

The major effect of increasing salinity in Southern California's water supply is increasing irrigation costs (water and drain installation) and fertilizer costs, along with a decreasing yield per acre with over application of water and concurrent salt damage. However, a recent study indicates that salinity damage costs in the municipal and industrial (M&I) sector are beginning to equal those of agriculture in the lower Colorado River Basin.¹⁸

¹⁶Ibid., p. 51.

¹⁷Ibid., p. 52.

¹⁸Alan Kleinmann and Jay Anderson, Draft Report for Consortium of Water Research Institutes and Centers, unpublished.

Colorado Salinity

Colorado is a semiarid state which obtains about two-thirds of its annual water supply from the Colorado River Basin.¹⁹ However, salinity does not have a direct impact within Colorado itself. The salinity problem occurs downstream. While state water officials admit some obligation to downstream water users, it is felt that the burden should be shared among the basin states and with the federal government.

After natural sources, irrigation return flow is admitted to be a major source of salinity. About 38 percent of Colorado's irrigated cropland lies within the Colorado River Basin.²⁰ Even so, salinity levels along the Colorado River are considerably lower than those along the Arkansas and South Platte rivers in Eastern Colorado, which also are used for agricultural irrigation.²¹ This has led some state officials to claim that downstream users of Colorado River water have not, for various reasons, adjusted irrigation practices to handle saline water. Colorado is indirectly achieving reductions in irrigation return flow as irrigation improvements are made for economic reasons.

There are several major sources of natural salinity in Colorado: the Dolores River picks up a salt load of 200,000 tons per year as it flows through the salt deposits of the Paradox Valley;

¹⁹U.S. Department of the Interior, Water for Tomorrow: Colorado State Water Plan, Phase 1: Appraisal Report, February 1974, p. 3.3.

²⁰Ibid., p. 5.3.

²¹Ibid., pp. 3.7-3.10.

and the Glenwood/Dotsero Springs, a group of natural thermal springs along a reach of the Colorado River, add over 500,000 tons of dissolved solids annually.²² Both of these major sources of natural salinity are under federal study for possible control. The state does not feel that municipal and industrial salinity contributions warrant much concern at this time.

²²Bureau of Reclamation, Progress Reports on Colorado River Basin Salinity Control Act--Title II and Colorado River Water Quality Improvement Program, Denver, January 1975, p. PV-1 and p. GD-1.

Nevada Salinity

The Colorado River Basin portion of southern Nevada includes primarily the area of Clark County (Las Vegas). There is almost no irrigated agriculture supported by the current 130,000 acre-foot diversion of Colorado River water, which is used for municipal and industrial purposes. The remainder of Nevada's 300,000 acre-foot allocation under the Colorado River Compact flows unused, or remains in storage. As a result there are no significant irrigation return flows to the Colorado River from Nevada.²³ The entire allocation of 300,000 acre-feet has been committed to future municipal and industrial uses, and the Colorado River will supply over 75 percent of the water used in the Las Vegas metropolitan area by 1985.

Of the currently measured 4 percent municipal and industrial basinwide contribution to salinity measured at Imperial Dam, 2.5 percent is identified as discharges from Las Vegas Wash.²⁴ Over half of this discharge is poor quality groundwater resulting from combinations of natural salt buildup and man-made discharges.²⁵ Salinity is a concern in the Las Vegas metropolitan area, not only because of

²³Nevada, Division of Water Resources and Nevada State Study Team, Alternative Multiobjective Plans Emphasizing Water Resource Use in Area V: Colorado Planning Region, Carson City: April 1974, p. B-3.

²⁴Ibid., The flows in Las Vegas Wash are largely groundwater return flows from lawn and park irrigation, treated M&I wastewater seepage, and some agricultural irrigation contaminated from historical salt waste deposits from World War II industrial plants. They are not direct M&I surface return flows. The responsibility for the correction of the groundwater return flows has been assumed by the federal government (Bureau of Reclamation) under PL 93-320.

²⁵R.W. Beck and Associates--Brown and Caldwell, Clark County Area-wide Salinity Control Investigation, Clark County, Nevada: February 12, 1976, p. 10.

the corrosive effects, excess soap requirements and taste factors, but because of the critical nature of the water supply. The Las Vegas area is close to running out of water of any quality, and reuse of supplies depends in part on the quality of the original water as well as on the subsequent degradation.

New Mexico Salinity

Water quality priorities in New Mexico identify sedimentation and salinity as both historic and contemporary primary contaminants throughout the state. A review of existing salinity control programs and policies is a high priority in the state's planning process for water quality management.²⁶ It is noted that certain waters of the state were recognized by the 16th century Spanish as extremely salty (i.e., Rio Salado), and have, if anything been improved by the water use technologies of modern society,²⁷ although still presenting water quality problems.

Surface water contamination by salinity is belived to be primarily natural and from nonpoint sources, making identification, monitoring and control extremely difficult. Illustrating the problem, irrigated agriculture amounted to less than 2 percent of land use in 1970, while rangeland (much under federal or Indian ownership) constituted 64 percent.²⁸

Salinity pollution of groundwater supplies is primarily a consequence of man's actions. New Mexico's semiarid climate provides only limited recharge to groundwater aquifers, so withdrawal of fresh water often allows saltwater intrusion from surrounding saline

²⁶New Mexico, Water Quality Control Commission, Continuing Planning Process for Water Quality Management, Santa Fe: March 1976, p. 14.

²⁷New Mexico, Water Quality Control Commission, Water Quality in New Mexico, Report for Submission to the Congress of the United States, Santa Fe: May 1975, p. 15.

²⁸Ibid., p. 16.

aquifers. Saltwater intrusion is particularly undesirable because groundwater constitutes one-half of New Mexico's water use.²⁹ Groundwater withdrawal occurs almost entirely outside the Colorado River Basin portion of New Mexico.

²⁹Ibid., p. 10.

Utah Salinity

Utah has identified natural point and nonpoint sources of salinity as significant problems in its portion of the Colorado River Basin.³⁰ Crystal Geyser alone contributes 3,000 tons of salt load per year to the Colorado River system. Also, soil conditions such as the extensive deposits of Mancos shale underlying agricultural land in Carbon and Emery Counties contribute substantial nonpoint source salinity.³¹ Percolation and runoff from public land are major contributors to salinity in Utah.

It is recognized that salinity will increase as irrigated agriculture increases. Although Utah makes extensive use of its share of Colorado River water, as apportioned by the 1922 compact, some water to which Utah is entitled is not yet used. In the Utah portion of the Colorado River Basin, 90 percent of the water diverted is used in agriculture.³² The water is used and reused in irrigated agriculture, since irrigation return flows constitute a significant portion of supplies to downstream users. The heavy demand for irrigation water thus creates a conflict between quality and quantity goals.

Utah supports the plan for salinity control presented by the Colorado River Basin Salinity Control Forum,³³ but does not intend to act in any manner which would infringe upon the quantity or the use of its allocation of Colorado River water.

³⁰Utah, Bureau of Water Quality, Water Quality Report, April 1975, p. 7.

³¹Ibid., p. 20.

³²Utah, Board of Water Resources, The State of Utah Water--1975, January 1976, p. 27.

³³Ibid., p. 33.

Wyoming Salinity

Southwestern Wyoming is drained by the Green River, a tributary of the Colorado. In 1973, Green River water, just before entering the Flaming Gorge Reservoir, averaged only 320 ppm of total dissolved solids (TDS).³⁴ This low concentration enhances the claim that Wyoming does not have a significant salinity problem. Thus far, only one area of saline return flow from irrigation, the Big Sandy, has been tentatively identified in the Colorado River Basin of Wyoming.

Wyoming's major source of water pollution, including salinity, is from natural runoff, with irrigation return flow the other identifiable source. Addressing pollution from these sources is a major part of the federally funded "208" areawide water quality planning process. Until the "208" studies are completed and programs implemented, the state is continuing to identify and quantify nonpoint sources of pollution.³⁵

Over 90 percent of the water diverted for use in the Green River Basin is to provide water for grazing rangeland and irrigated agriculture.³⁶ If irrigation rights were fully developed, along with potential municipal and industrial developments, the TDS concentrations in the Green River could rise to a range of from 360 to 480 ppm by the year 2020.³⁷ It is this potential increase in total dissolved solids which is considered the real salinity problem in Wyoming.

³⁴Wyoming, State Engineer's Office, The Wyoming Framework Water Plan, Cheyenne: May 1973, p. 200.

³⁵Wyoming, Department of Environmental Quality, 1975 Annual Report, Cheyenne: September 1975, pp. 48-49.

³⁶*Ibid.*, p. 204.

³⁷*Ibid.*, p. 209.

Present State Activities to Control Salinity

Each of the Colorado River Basin state governments is cooperating in the federal/basin-wide effort to establish and implement an effective salinity control program for the Colorado River. Additionally, each state is individually implementing its own water quality program and standards, including salinity standards as set forth by the Forum document,³⁸ adopted by each state, and approved by EPA.

Most of the states' activities are outgrowths of traditional state responsibilities: (a) to regulate water quality, as a part of the public health function; and (b) to regulate water rights and allocate water resources as part of the state engineer's function.

Person-years of state employees' effort spent in 1976 executing existing state policies and regulations touching upon water quality have been quantified in Table 3-1. The amount of effort spent in such activities by water rights/water resources allocation and water quality control personnel, as quantified, has been derived from agency accounting records wherever possible, or from agency best estimates when records have not provided the appropriate data.

There also have been several salinity control initiatives taken by individual states. Clark County, Nevada, has been directed by the State Legislature to assume responsibility for upgrading the quality of surface water into Las Vegas Wash, and has six staff

³⁸Colorado River Basin Salinity Control Forum, "Proposed Water Quality Standards for Salinity, Including Numeric Criteria and Plan of Implementation for Salinity Control; Colorado River System," June 1975.

TABLE 3-2

ESTIMATES OF FULL-TIME EQUIVALENT (FTE) PERSONNEL* ASSIGNED TO WATER RIGHTS/WATER RESOURCE ALLOCATION
OR WATER QUALITY CONTROL ACTIVITIES IN SEVEN COLORADO RIVER BASIN STATES, 1976

| AREA | Arizona | California | Colorado | Nevada | New Mexico | Utah | Wyoming |
|---|---------|------------|----------|--------|------------|------|---------|
| <hr/> | | | | | | | |
| Water Rights--Resource Allocation Personnel (FTE): | | | | | | | |
| Statewide | 33 | 75-110 | 229 | 37 | 120 | 66 | 73 |
| Colorado River Basin only | 33 | 0 | 70 | 7 | 12 | 21 | 17-18 |
| <hr/> | | | | | | | |
| Water Quality Control Personnel (FTE): | | | | | | | |
| Statewide | 23 | 600-700 | 44 | 25 | 34 | 36 | 48 |
| Colorado River Basin only | 23 | 2-3 | 3.5 | 10-11 | 2 | 5 | 10 |
| <hr/> | | | | | | | |
| Totals (FTE): | | | | | | | |
| Statewide | 56 | 675-810 | 273 | 62 | 154 | 102 | 121 |
| Colorado River Basin only | 56 | 2-3 | 73.5 | 17-18 | 14 | 26 | 27-28 |
| <hr/> | | | | | | | |

*The derivations of the FTE's listed are discussed in the attached notes.

NOTES TO TABLE 3-2

This table provides, on a state-by-state basis, full-time equivalent staffing information on state employees working in the areas of water rights/water resources allocation and of water quality control. The information is provided on a statewide basis and on a best-estimate basis for the Colorado River Basin portion of each state. Following are state-by-state notes describing pertinent components of their staffing figures.

Arizona

For purposes of water rights/water resources allocation, the entire state is considered part of the Colorado River Basin as only a small arid section near the Mexican border does not drain into the basin. The Arizona Water Commission does assign two persons to the Colorado mainstem, but the State Land Department specifically excludes the mainstem in its resources allocation. Twenty-two professionals, including hydrologists, dam safety inspectors and administrators, are employed by the Water Commission. The Land Department employs eleven professionals.

The Water Quality Control Division has 23 employees involved in wastewater, surface water quality and "208" planning.

California

In the area of water rights/water resources allocation, California considers the entire state to be so closely interrelated that the entire staff could be included. However, a best-estimate procedure determined that 50 to 60 persons, depending on circumstances, worked on statewide water rights, with less than one FTE in the Colorado River Basin because of the federal contracts in the area. Resources allocation has an even greater variance dependent on the availability of water. Statewide allocation personnel range from 25 to 50 persons. Two to six employees work in the Colorado River Basin, again depending on the availability of water. No one works directly in the Colorado River drainage area because all rights for Colorado River water are assigned.

Water Quality Control, again on a best-estimate basis, employs 600 to 700 persons statewide. Eighteen employees are assigned to the Colorado River Basin, three in the Colorado River drainage.

Colorado

Water resources allocation in Colorado employs 20 persons statewide, three in the Colorado River Basin. Water rights personnel

NOTES TO TABLE 3-2 (continued)

totals 209, including administrators, water records, and field people. Sixty-seven of these are assigned to the Colorado River Basin.

The Colorado Water Quality Division has 44 statewide employees, three and one-half of whom are concentrated in the Colorado River Basin.

Nevada

Water rights and distribution in Nevada employs a permanent staff of 37, with seven devoting effort to the Colorado River Basin.

Efforts toward water quality are a joint activity, of the Environmental Protection Services and the Department of Fish and Game. Twenty-five persons work statewide, with ten or eleven in the Colorado River Basin.

New Mexico

One hundred and twenty persons work statewide in water rights including technical studies and compact administration, with 12 devoting their time to the Colorado River Basin.

The Water Quality Division of the Environmental Improvement Agency employs 15 professionals, four sewerage plant engineers, and 50 field officers contributing 30 percent of their time directly on water quality (for a FTE of 34). Six of these employees devote approximately 30 percent of their time to the Colorado River Basin (for a FTE of two).

Utah

Water rights/resource allocation employs 66 people statewide in Utah. Of these, 21 devote the substantial majority of their time to the Colorado River Basin.

Twenty-eight persons are employed in pollution control and water quality liaison activities, along with eight involved in safe drinking water. Five persons of the 36 devote their time to the Colorado River Basin.

Wyoming

The State employs 52 field workers, eight ground water specialists, eight surface water specialists, and five staff members

NOTES TO TABLE 3-2 (continued)

for the Board of Control in the area of water rights/resource allocation. Seventeen or eighteen of these persons work in the Colorado River Basin.

The Water Quality Division employs 30 persons, the Department of Health and Social Services employs six district sanitarians, and the Land Quality Division has 12 employees involved in solution mining. In the Colorado River Basin, ten water quality, land quality sanitarians and "208" personnel are directly involved in quality control.

members directly involved. Three or four persons employed by the City of Las Vegas are also participating in the effort. The State of California has instituted state-financed programs to determine the technical and political feasibility of reusing wastewater. Geothermal desalting research in the Imperial Valley was primarily funded by the United States Bureau of Reclamation with some state assistance, but the research funding has recently been eliminated. Such activities are in addition to cooperative interstate and standard water quality efforts by California.

Role of Colorado River Basin Salinity Control Forum and Advisory Council

During 1966 and 1967, representatives of the seven state governments of the Colorado River Basin met in a series of conferences to discuss the relationship of proposed water quality standards to future development of each state's apportionment of water under the Colorado River Compact. The representatives styled themselves as "The State Conferees in the Matter of Pollution of the Interstate Waters of the Colorado River and Its Tributaries." In January 1967 the State Conferees agreed on guidelines for formulating water quality standards.³⁹ After subsequent conference sessions, the State Conferees published in February 1972 a resolution that the salinity control program for the Colorado River be

³⁹Appendix B of the Colorado River Basin Salinity Control Forum, "Proposed Water Quality Standards for Salinity Including Numeric Criteria and Plan of Implementation for Salinity Control," June 1975.

accelerated and that salinity be dealt with on a basinwide basis.⁴⁰

In a later (April 1972) conference, the State Conferees published further conclusions and recommendations.⁴¹

In response to the needs identified in the earlier conferences, the State Conferees met on November 9, 1973 and created a new organization, the "Colorado River Basin Salinity Control Forum." The Forum, consisting of representatives of the seven basin states, was formed in response to Section 103 of PL 92-500, which required that the states establish a mechanism for interstate cooperation in setting numerical criteria for salinity on the Colorado River.

The Forum membership is made up of representatives appointed by the governor of each of the states; typically including representatives of water resource and water quality agencies. Forum members from each of the states have worked with the Environmental Protection Agency in developing uniform salinity standards for the Colorado River system. The Forum report, "Water Quality Standards for Salinity Including Numeric Criteria and Plan of Implementation of Salinity Control, Colorado River Systems," was published in June, 1975, and distributed for review to interested parties. Regional and state public hearings were held on the report and each basin state subsequently adopted the standards and criteria into their water quality plans, or water quality laws. These salinity standards were approved by EPA during November 1976.

⁴⁰Appendix C, Ibid.

⁴¹Ibid.

The Forum is currently preparing draft baseline values for salinity, monitoring progress of salinity control projects, giving congressional testimony on behalf of project funding, and providing the seven basin states with an overview of progress and problems in salinity control. The Forum has also assumed an informal "watchdog" role in assuring implementation of all aspects of the salinity control plan.

The Colorado River Basin Salinity Control Advisory Council was created on June 24, 1974, by Section 204 of PL 93-320, to provide advice on progress, plans and other salinity control activities. The Council serves as a liaison between the basin states and the Departments of Interior and Agriculture, and the Environmental Protection Agency, and advises and makes recommendations to the Secretary of Interior and the Administrator of the Environmental Protection Agency.

The first meeting of the Advisory Council was held on March 23, 1976. Membership of the Council is essentially that of the Forum plus one additional member from each of five basin states. To date they have prepared fiscal year 1978 recommendations for federal activities, and have been keeping close watch over the salinity control projects of the Bureau of Reclamation, the Soil Conservation Service, the Bureau of Land Management, and the Agricultural Research Service.

Federal Government Activity

The U.S. Government is engaged in numerous administrative, engineering, planning and control activities related to reducing

or limiting Colorado River salinity. The responsibilities of the six agencies involved are described briefly below.

Environmental Protection Agency. The Administrator of the EPA has the obligation to administer the provision of PL 92-500, Amendments to the Federal Water Pollution Control Act. This includes, among other endeavors, the NPDES permits, the areawide "208" planning studies, and the mechanism which established the Colorado River Basin Salinity Control Forum. As the agency responsible for administering PL 92-500, the EPA maintains close liaison with the Forum, especially in regard to salinity standards and NPDES permits, and at the same time liaison with those federal agencies engaged in structural activities for the control of salinity through the inter-agency salinity coordinating committee.

United States Bureau of Reclamation, Department of the Interior. The Secretary of the Interior is directed, by PL 93-320, Colorado River Basin Salinity Control Act, "to proceed with a program of works of improvement for the enforcement and protection of the quality of water available in the Colorado River."

The USBR is the agency responsible for implementation of the structural (physical) actions directed in Title I and Title II of PL 93-320. The USBR cooperates and coordinates with other agencies whenever the required action combines structural with other activities.

Acting under Title I of PL 93-320, the USBR is constructing an international desalting plant near Yuma, Arizona, to comply with Minute 242 of the International Boundary and Water Commission, United

States and Mexico. The desalinization complex includes, besides the physical plant, lining of the unlined portion of the Coachella Canal, retirement of irrigated lands in the Wellton-Mohawk Division, and pumping of groundwater from the border aquifer.

In response to Title II of PL 93-320, the Colorado River Water Quality Improvement Program (CRWQIP) was instituted to investigate the feasibility of salinity control projects. The USBR has contributed wildlife impact, economic projections and other support studies and research to the CRWQIP. Title II authorized the construction, operation and maintenance of four salinity control units: Paradox Valley, Grand Valley, Crystal Geyser, and Las Vegas Wash. Paradox Valley and Crystal Geyser are natural salinity sources requiring structural action.⁴² Grand Valley and Las Vegas Wash are sources of combined natural and man-made salinity and require a combination of structural and management actions which involve EPA, SCS (Soil Conservation Service) and ARS (Agricultural Research Service) in the recommended solutions. Other areas are under study by the CRWQIP as possible sites for future salinity control projects.

Soil Conservation Service, USDA. The Soil Conservation Service of the U.S. Department of Agriculture is assigned responsibility for nonstructural activities to control salinity on agricultural lands. The SCS is completing the on-farm inventory of present irrigation

⁴² Although Crystal Geyser actually is a privately owned abandoned oil test well, it is considered as a "natural" source because it is located in an area of already existing eruptive activity. Plugging the well is likely to cause a natural eruption elsewhere in the vicinity.

practices, needed system improvements and other conservation needs for the Grand Valley unit authorized in PL 93-320. Cost-benefit and sedimentation reports have been completed. Draft plans of study have been developed for the Big Sandy, Colorado River Indian Reservation, Lower Gunnison Basin, Uinta Basin, Virgin River, Price-San Rafael Rivers, and Little Colorado River Basin units. The SCS is working closely with the ARS, BLM and USBR to implement structural as well as management activities, and to obtain funding for on-farm improvements.

Agricultural Research Service, USDA. The Department of Agriculture's ARS is participating in the Grand Valley unit study to determine the effects of irrigation on salinity. The study includes the effects of different types of irrigation systems and practices, seepage quantities and constituents, deep percolation measurements, and soil intake characteristics. The ARS is advising the other agencies on practices which will reduce salinity from irrigation sources along the Colorado River.

Bureau of Land Management, USDI. The Bureau of Land Management, U.S. Department of the Interior, is responsible for controlling salinity on federal national resource lands. The BLM, frequently in cooperation with the United States Geological Survey (USGS), Department of the Interior, is gathering information on geology, soils and vegetation and their apparent effects on water quality. The effects of grazing, vegetation manipulation and other such activities on water quality are being observed. This is part of BLM's continuing

effort to identify national resource lands which yield high salt loads to the Colorado River. Information on such point and non-point sources is and will be used to determine the feasibility and costs of controlling salinity input sources.

CHAPTER IV

ANALYSIS OF SUGGESTED STATE AND LOCAL MANAGEMENT ACTIONS

Selection Criteria

Early in the study the investigators developed a list of over 30 possible state and local management actions that appeared likely to reduce salinity loading in the Colorado River Basin. This list served as a structure for interviews, as well as a basis for review of statutes, rules and regulations, and technical documents. During the course of the study the actions were discussed and amended on the bases of technical feasibility, cost, legality, need, effectiveness in salinity control, scope of applicability, and political and social implications. The final list, after some consolidation, contained 33 possible actions.

Upon completion of the first phase of the study (legal analysis, interviews, document review), the investigators met with the advisory board and discussed each of the 33 actions according to the following criteria:

Legal aspects of the action. The envisaged action should either be specifically authorized by statute, or by a reasonable interpretation of a statute, or is believed permitted in the absence of specific statutory language.

Cost acceptability of the action. The action recommendation would fall within acceptable budget limitations of the agency responsible for its implementation, and would provide a cost-effective means of achieving the desired results.

Effectiveness of the action. The envisaged action needs to be effective. An effective action would be one which can reasonably be expected to induce a measurable (i.e., more than trivial) reduction in salt loading.

Political acceptability of the action. Ideally, any action which would overcome implementation obstacles should be generally acceptable to all parties involved (federal, state, and local governments, and special interest groups, such as environmentalists, Indians, farmers, etc.), and particularly to those most greatly affected. However, most suggested actions greatly affect the perceived self-interest of one or more parties involved, thus requiring an extensive educational process to achieve general political acceptability. Few if any actions that are wholly noncontroversial are also likely to make a significant improvement in the salinity problem.

Equity of the action. It is necessary that the envisaged action appear equitable to knowledgeable observers. Obvious deviations from fair treatment would jeopardize successful implementation.

Understanding the action. The envisaged action needs to be communicable. Effective administration of public programs and policies requires that the provisions and requirements involved be readily communicable to all parties concerned--for example, to governmental agencies, members of regulatory commissions, industries, and the public at large.

Administration of the action. The envisaged action should be able to be carried out without requiring excessive administrative inputs by the governmental unit involved. (Administrative inputs are a special class of costs.)

Monitoring of the action. The envisaged action should be able to be implemented with readily available management information. In particular, how can action performance be monitored; what are the information requirements for evaluating progress?

Organizational structure to implement the action. What sort of organization is needed to carry out the action? Does it exist? Can it administratively be brought into being? Where an action is to be carried out by an existing governmental agency, is the quality of management up to the task?

Application of Selection Criteria

The remainder of this chapter discusses the use of the selection criteria to identify those management actions which:

- are proposed for implementation, to reduce Colorado River salinity;
- are feasible and already underway, and no new intervention is necessary or practical;
- are infeasible in the Colorado River Basin.

Of the original 33 actions, 12 (i.e., numbers 1 through 12 below) have been proposed as recommendations for state action. Some of these are partially or fully underway in several of the states, thus providing guidance for implementation elsewhere. These actions are legal, or at least not prohibited by law. They appear technically, economically and politically possible to implement; and they appear effective in controlling, to some degree, certain causes of salinity. These actions are listed in the following section (beginning on the next page) and are fully discussed as proposed actions in Chapter V.

After investigation, another nine (i.e., numbers 13 through 21) of the possible management actions were determined to be already underway in the Colorado River Basin. It was judged that the increased application of these actions would occur naturally, with little if any need for additional intervention by state or local governments. Such actions range from the plugging of oil and gas wells to regulation of industrial discharges into the river system, and are fully discussed later in this chapter.

Seven of the 33 actions (i.e., numbers 22 through 28) have been determined infeasible in the Colorado River Basin following application of these criteria, for various reasons of illegality, ineffectiveness in controlling salinity, excessive costs and difficulty of implementation, political conflicts greater than estimated benefits, or because such action was simply unnecessary. These include such possible actions as controlling phreatophytes along streams and irrigation canals or treating irrigation return flow for salinity. These actions are listed at the end of this chapter and are discussed in Appendix C.

The remainder of the original 33 actions (i.e., numbers 28 through 33) have been determined to be out-of-scope for this study. These actions may be effective in reducing salinity but are considered by both EPA and Denver Research Institute as being outside the jurisdiction of this research project. The out-of-scope actions are briefly discussed below, beginning on page 92.

Actions Proposed for Implementation in the Colorado River Basin

The following list of management actions, proposed to be taken by state and local agencies, meet most or all of the criteria discussed above. The actions are believed feasible in some or all of the seven states of the Colorado River Basin. In the next chapter (V) of the report, each of the actions is discussed fully as to its feasibility in each state, and accompanying matrices will show, on a state by state comparative basis, the authority for the action, its current status, and its potential feasibility.

1. Regulate irrigation water use so that the water rights holder reduces excess use and implements waste control measures. This may be done by:
 - (a) Direct action by the agency administering water rights, to limit or control amounts of water diverted if waste occurs; or
 - (b) Imposing sanctions by the State Engineer, irrigation district or other appropriate agency, on water users using excessive amounts of water.
2. Through the federally funded 208 wastewater planning programs, establish salinity as a priority item to be dealt with and develop a series of local and/or state corrective actions.
3. Because of the need for an integrated approach to salinity control programs, utilize an existing state agency (or establish such an agency) to coordinate and promote salinity control actions by different state institutions.
4. Require minimum standards for water well construction, and require plugging of abandoned water wells and exploratory drill holes to avoid contamination of groundwater strata.
5. To reduce salinity from agriculture, use irrigation return flow in nonagricultural areas; e.g., for power plant cooling. Utilize energy facility siting procedures to encourage the use of low quality waters where the water requirements of such facilities could be met utilizing saline and other low quality waters.

6. Through land use controls, prohibit (or limit) irrigated agriculture on lands with high natural salt content in soils and subsoils, and select new lands for irrigation having soils and subsoils that will contribute reduced salt loads to irrigation return flow.
7. Through state economic incentives, promote conversion of land used for irrigated agriculture to other uses when highly saline return flows cannot be prevented, controlled, or treated and encourage the modification of vegetation on rangeland (e.g., convert sagebrush to grassland) to reduce natural salinity from storm runoff.
8. Establish special use charges for irrigation water provided from reclamation projects to cause more efficient usage and to encourage waste control measures. Use excess funds derived to finance waste control capital improvements on farms and in the conveyance system.
9. By use of state economic incentives, promote conversion of marginal agricultural water to other uses, or increase irrigation efficiency, to reduce or eliminate salinity resulting from irrigation return flows.
10. Administratively modify leases of state lands (at time of lease or renewal) to prohibit agricultural practices which cause erosion or excess runoff of saline water, and to improve the land to reduce runoff by: prohibiting agriculture or grazing on certain soil types, restricting grazing intensity, and modifying vegetation of rangeland to reduce salinity from runoff.
11. To reduce salinity from municipal sources, regulate salt loading appliances such as water softeners.
12. To reduce salinity from industrial sources, require reuse of wastewater to reduce industrial water demand.

Actions Underway in the Colorado River Basin; No New Intervention
Necessary or Practical

The following management actions (numbers 13 to 21), although feasible, already are underway in each, or some, of the Colorado River Basin states. No new intervention by state or local governments is believed necessary or practical. The statement of each action is followed by a brief summary of its current status in the Colorado River Basin. The nine action statements and summaries are each followed by matrices showing the comparative authority and current status of action implementation in each of the seven states.

Note to Readers:

When examining the matrix following each action, the one word summary at the bottom of each "Authority" cell, indicates the scope of the authority in the following manner:

Specific - statute gives specific authorization for action.

Nonspecific - statute gives authorization for a class of actions, permitting this action, but does not refer to it.

General - no statute bars action, nor refers to this class of actions or topics. Very general authority exists.

Prohibited - statute prohibits.

13. *Implement state programs for enforcement of recently adopted water quality standards for salinity.*

All of the basin states have adopted the Colorado River Salinity Control Forum document which sets general water quality standards for salinity and recommends that river salinity be controlled so it will not exceed 1972 levels. None of the states has set specific "baseline" values that measure 1972 salinity in terms of mg/l. The states are awaiting the setting of baseline values by the Forum, and the reaction of the Environmental Protection Agency to those values. Generally, the states are awaiting completion of their 208 water quality planning studies and salinity monitoring programs before enacting or implementing full state programs (beyond NPDES implementation) enforcing salinity standards for water quality. The states believe that implementation of enforcement programs before adequate planning and monitoring occur would be impractical and undesirable.

A recent (April 1977) announcement by the Environmental Defense Fund (EDF), a private environmental activist organization, states that the EDF will bring a lawsuit to force the Environmental Protection Agency to immediately set new salinity standards for the Colorado River, force the states to meet deadlines on implementing actions, and set up enforceable limits on salinity. This suit, if successful, could appreciably affect salinity control programs now being developed by the states.

This action does not have a complementary matrix because it spans the whole of state and local programs.

14. *Improve irrigation efficiency by scheduling amount and timing of water application.*

In all seven states, authority exists for soil conservation districts to undertake demonstration programs of water scheduling. Experimental work is underway in Arizona, California, Colorado, and Utah, usually with federal participation. The irrigation management (IMS) programs are not mandatory in any state, and the state spokesmen feel strongly that programs should remain voluntary and cooperative. Nevertheless, in four of the states (Nevada, New Mexico, Utah and Wyoming) and perhaps in California also, regulation of water application could probably be accomplished under present statutes. Recommendations that state and local agencies implement regulations to control waste of water are discussed under Action 1 in Chapter V.

| ACTION | | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|---|----------------|--|---|---|---|---|---|--|
| 14. Improve irrigation efficiency by scheduling amount and timing of water application. | AUTHORITY | <p>ARS 45-2054 gives soil conservation districts authority to conduct demonstration projects and to cooperate with landowners, etc. to promote programs on cultivation methods. Prior approval by irrigation districts is required.</p> <p><i>Nonspecific</i></p> | <p>PRC 9259 authorizes soil conservation districts to conduct demonstration projects with landowners' consent. PRC 9261 authorizes districts to develop soil and water conservation plans. PRC 9264 authorizes districts to establish standards of cropping and tillage operations as a condition of spending funds on these lands.</p> <p><i>Nonspecific</i></p> | <p>CRS 35-70-108 authorizes soil conservation districts to conduct demonstration projects and cooperate with landowners on water conservation practices.</p> <p><i>Nonspecific</i></p> | <p>NRS 548.350 authorizes conservation districts to construct demonstration projects. 548.355 gives power to control methods of cultivation to these districts.</p> <p><i>Nonspecific</i></p> | <p>NMSA 75-22-12 authorizes irrigation districts to establish equitable rules and regulations for the distribution and use of water among landowners in the district.</p> <p><i>Specific</i></p> | <p>UCA 62-1-8 authorizes soil conservation districts to demonstrate soil conservation programs and to conserve water. UCA 73-7-11 authorizes irrigation districts to establish equitable rules and regulations for the use of water. UCA 73-9-13 authorizes water conservancy districts to allot water to lands, in amounts not to exceed the amount which can be used beneficially.</p> <p><i>Specific</i></p> | <p>WSA 11-245 (c) authorizes conservation districts to conduct demonstration projects, with landowners' consent, to conserve water. WRS 41-285 authorizes irrigation districts to make rules and regulations for the use of water upon lands of the district.</p> <p><i>Specific</i></p> |
| | CURRENT STATUS | <p>Some beginning IMS work is underway but much improvement is needed, particularly on Indian reservations, e.g., Lower Colorado Indian Reservation, where state has no authority. (A coordinated federal effort has begun.) Irrigation return flow is not a major source of Colorado River salinity in Arizona since relatively little return flow reaches the Colorado main stem. (About 9% of salt loading from Arizona.)</p> | <p>The major source of saline return flow from within California is in the Palo Verde Irrigation Project. Under state law (Porter-Cologne), permits are required on all agricultural lands. Palo Verde Irrigation District, in cooperation with USBR, is studying ways to improve irrigation scheduling.</p> | <p>Colorado Water Conservation Board is experimenting with sensor irrigation in the Grand Valley. However, irrigation efficiency isn't the complete answer due to soil properties (manco shale). State of Colorado bears cost of gates and clocking devices but farmer must pay for land levelling and ditch lining, which are expensive.</p> | <p>There is not much automated irrigation; farms are mainly row crops and alfalfa, on relatively small plots.</p> | <p>Until New Mexico uses its compact allotment there is little economic incentive for greater efficiency. The Navajo Irrigation Project, just coming on line, has been designed for sprinkler irrigation with latest water management techniques, including sensors, to reduce salinity of return flow.</p> | <p>Improvements are being made as a result of farm economics. State Engineer's powers to require efficiency of water use are not strong enough to force specific irrigation practices.</p> | <p>There is little economic incentive to improve efficiency in Wyoming. Farmers tend to use their entire water allotment. Return flow salinity is perceived as a declining problem in Wyoming since many years of irrigation have leached out most of salt. Irrigated agriculture is viewed as a very minor part of the salinity problem in Wyoming; natural salinity is major. Greater water storage capacity would result in more efficient irrigation techniques.</p> |

15. *Promote conservation plans and cooperative agreements with individual farm units, to encourage soil conservation, reduce erosion, promote irrigation efficiency, etc., through improved farm operating practices.*

All seven states authorize conservation districts to do this, and all currently help implement ASCS¹ and similar programs. Local officials establish priorities for federal funding and specify within limits the percentage of federal funding which can go (as grants) to farmers making various types of on-farm improvements. By changing priorities, local district officials can change the emphasis of federal programs to those having a greater impact on salinity. Thus, state involvement in these federal programs is already quite effective. However, since the amount of funding of such programs usually falls well short of amounts requested, there is considerable opportunity for state and local initiatives to expand or augment the programs. These initiatives are discussed under Action 9 in Chapter V.

¹Programs of the Agricultural Stabilization and Conservation Service, U.S. Department of Agriculture, conducted in cooperation with local and state organizations.

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|---|---|---|--|--|---|--|---|
| 15. Promote conservation plans and cooperative agreements with individual farm units, to encourage soil conservation, reduce erosion, promote irrigation efficiency, etc., through improved farm operating practices. | <p>Three statutes empower special districts to improve farm practices: ARS 45-2054 for natural resource (soil) conservation districts; ARS 45-935 for agricultural improvement districts; and ARS 45-1578 for irrigation districts. ARS 45-2054 authorizes development and publication of comprehensive soil conservation plans.</p> <p><i>Specific</i></p> | <p>PRC 9000 authorizes soil conservation districts to conserve soil and water by control of runoff, improving farm irrigation, storing and distribution of water with consent of landowner. PRC 9257 authorizes cooperative agreements with farmers.</p> <p><i>Specific</i></p> | <p>CRS 35-70-108 gives authority to soil conservation districts to implement plans for treatment, care and operation of land. Section 109, which gave land use authority, was ruled unconstitutional.</p> <p><i>Specific</i></p> | <p>NRS 548.375 gives conservation districts authority to develop comprehensive plans for conservation of resources, including specification of engineering operations, methods of cultivation, etc.</p> <p><i>Specific</i></p> | <p>NMSA 45-5-59 authorizes soil and water conservation districts to conduct research and (with landowner permission) demonstration projects to reduce erosion and conserve water, and to prepare farm conservation plans and contract with landowners to implement such plans. NMSA 45-5-22 authorizes creation of watershed districts as subdivisions of soil and water conservation districts.</p> <p><i>Specific</i></p> | <p>UCA 65-1-82 authorizes State Land Board to bring action to limit grazing on privately owned watershed land to protect property. UCA 62-1-8 authorizes soil conservation districts to conduct research, and projects (with landowner approval, on private lands) to conserve and utilize water, and to develop comprehensive plans for the conservation of soil and water, including specification of methods of cultivation.</p> <p><i>Specific</i></p> | <p>WSA 41-1.42 authorizes water development program to loan money at low interest to water districts and individual farmers for on-farm improvements. WSA 11-245 authorizes conservation districts to preserve lands, prevent erosion, and maintain water quality through construction of improvements, development of conservation plans, etc. WSA 11-246 allows conservation districts to adopt ordinances governing use of lands with 75% approval in referendum.</p> <p><i>Specific</i></p> |
| | <p>The Salt River Project has administered a successful IMS program since 1965, involving irrigation scheduling, land levelling, canal lining, etc. SCS works with local conservation districts. Highest priority programs are in range management, including re-seeding of vegetation. There is a plan to be having.</p> | <p>State and local irrigation districts leave to federal government the financial incentives to make on-farm improvements. Palo Verde Irrigation District is studying ways to improve irrigation systems.</p> | <p>SCS priority areas are: establishing vegetative cover, terracing, streambank stabilization, and measures (including structures) to control erosion and water runoff.</p> | <p>SCS works with local districts to promote on-farm improvements. In Colorado River Basin, highest priority improvements are those to conserve water, e.g., land levelling, and to prevent soil erosion.</p> | <p>Navajo lands are eroded from overgrazing but, for political reasons (and limitation of state authority) grazing regulations are not enforced in New Mexico. There is resistance to controls over agricultural practices. However, there is growing talk about new legislation to let state control erosion on Indian lands.</p> <p>(continued)</p> | <p>Highest priority SCS actions involve reducing sediment load entering water courses from farm and rangelands; accelerating conservation measures on privately owned land for erosion control, sediment reduction and water retention; and reorganizing irrigation systems to promote water use efficiency.</p> | <p>Conservation plans are the responsibility of the USDA Soil Conservation Service (federal) and the Soil Conservation Districts (state) coordinated through the Wyoming Conservation Commission. Participation is voluntary and about half the operators in Wyoming have a conservation</p> <p>(continued)</p> |

15. (continued)

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
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| <p>15. Promote conservation plans and cooperative agreements with individual farm units, to encourage soil conservation, reduce erosion, promote irrigation efficiency, etc., through improved farm operating practices.</p> | CURRENT STATUS (continued) | | | | <p>Natural Resource Conservation Commission is beginning 208 planning, considering actions to limit soil erosion.</p> | | <p>plan. In 208 planning it has been suggested that if conservation plans become mandatory, this would be strongly resisted. SCS priority areas are correcting soil erosion and water pollution through water management and runoff control measures.</p> |
| | | | | | | | |

16. *Encourage use of sprinkler and trickle water application systems.*

All seven states give conservation or irrigation districts responsibility for encouraging more efficient irrigation systems, and most also authorize districts to purchase and resell machinery and supplies to water users. Sprinklers are used in all seven states of the basin. Sprinkler systems have high capital costs, but water application efficiency is also high. Where water is scarce and/or expensive, and where labor costs (of ditch maintenance) are high, sprinklers are more likely to be used. The trend to sprinklers could be accelerated through additional state and local programs which demonstrate their economic advantages, but demonstration programs are unlikely to be effective when economic advantages are not present.

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
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| 16. Encourage use of sprinkler and trickle water application systems. | <p>ARS 45-2054 gives soil conservation districts authority to conduct demonstration projects and to cooperate with landowners, etc. to promote programs on cultivation methods. Prior approval by irrigation districts is required.</p> <p><i>Specific</i></p> | <p>PRC 9259 authorizes soil conservation districts to conduct demonstration projects with landowners' consent.</p> <p>PRC 9261 authorizes districts to develop soil and water conservation plans.</p> <p>PRC 9264 authorizes districts to establish standards of cropping and tillage operations as a condition of spending funds on these lands.</p> <p><i>Specific</i></p> | <p>CRS 35-70-108 authorizes soil conservation districts to conduct demonstration projects and to cooperate with landowners on water conservation projects.</p> <p><i>Specific</i></p> | <p>NRS 548.350 authorizes conservation districts to construct demonstration projects.</p> <p>548.355 gives power to control methods of cultivation to these districts.</p> <p><i>Specific</i></p> | <p>NMSA 45-5-59 authorizes soil and water conservation districts to conduct research and (with landowner permission) demonstration projects to reduce erosion and conserve water, and to prepare farm conservation plans and contract with landowners to implement such plans.</p> <p>NMSA 45-5-22 authorizes creation of watershed districts as subdivisions of soil and water conservation districts.</p> <p><i>Specific</i></p> | <p>UCA 62-1-8 authorizes soil conservation districts to conduct demonstration projects and to cooperate with landowners on water conservation projects.</p> <p>UCA 73-7-11 authorizes irrigation districts to establish equitable rules and regulations for the use of water.</p> <p>UCA 73-9-13 authorizes water conservancy districts to allot water to lands, in amounts not to exceed the amount which can be used beneficially.</p> <p><i>Specific</i></p> | <p>WSA 11-245 (c) authorizes conservation districts to conduct demonstration projects, with landowners' consent, to conserve water.</p> <p>WSA 41-285 authorizes irrigation districts to make rules and regulations for the use of water upon lands of the district.</p> <p><i>Specific</i></p> |
| AUTHORITY | | | | | | | |
| CURRENT STATUS | <p>Although state has no authority on Colorado River Indian Reservation, many farmers who lease this land use sprinkler irrigation to maximize efficiency of scarce water.</p> | <p>Department of Water Resources encourages increase in use of sprinkler systems, now used in 17 percent of state's irrigated agriculture but not in Colorado Basin where gravity systems predominate.</p> <p>Low water costs in Imperial Valley (\$3/af) make the investment in sprinklers economically impractical.</p> <p>However, sprinklers have other advantages, e.g., reduce labor, help seed germination, and their use is increasing.</p> | <p>Southwestern Colorado has a promising experimental sprinkler system. There is a cooperative program involving CWCB, ARS, USGS, USBR, SCS, ERS, ditch companies and farmers in Grand Valley. The problem is in demonstrating enough financial savings to induce farmers to make the investment.</p> <p>State Engineer's Office fears salt buildup in Grand Valley if sprinkler irrigation is used.</p> | <p>In the Colorado River Basin, sprinkler irrigation is the primary irrigation method. There is little saline return flow to the Colorado from Nevada irrigated agriculture.</p> | <p>Sprinklers are encouraged in Navajo Irrigation Project, but this only helps when excess water leaches out salts and brines from land; most irrigated land in New Mexico is not very saline.</p> | <p>Division of Water Resources has revolving fund to construct water development and conservation projects for irrigation companies, conservancy districts, and other water-using organizations. Numerous sprinkler irrigation projects have been funded in the last 30 years.</p> <p>Utah State University is conducting research in sprinkler and trickle irrigation. In areas of saline soils, sprinkler irrigation is not always practical--flood irrigation is necessary to leach out salt from land.</p> | <p>State Dept. of Agriculture is not actively promoting. One objection is that reductions in return flow would cause low river flows in dry months, and heavy flows in wet months.</p> <p>Present use of flood irrigation tends to level flows, by using soil moisture as a buffer.</p> <p>Another objection is fear of salt buildup if less water is used. Nevertheless, use of sprinklers is growing as a labor saving device. DEPAD is making numerous loans for sprinkler irrigation systems.</p> |

17. *Make improvements in irrigation water conveyance systems to reduce water loss and seepage, e.g., install pipes or impermeable linings in canal-to-farm conveyance systems and in on-farm laterals and ditches.*

All seven states give authority to irrigation districts (and similar districts, such as soil conservation districts) to construct, improve or rehabilitate water conveyance systems. Utah specifically authorizes the State Engineer to require improvements in irrigation water systems to prevent water waste. However, the other states leave the initiative to the local districts to make improvements, which come about for several reasons: to conserve water where it is more scarce and expensive; to reduce labor costs, where unlined canals become blocked with weed growth; or through the influence of federal or state conservation education programs. Generally, improvements are made because of economic benefits, so there does not appear to be a significant need to accelerate direct action by state or local agencies. However, state encouragement of needed local improvements could be expanded through a loan or grant program.

State financial incentives for improving on-farm irrigation practices are more fully discussed in Action 9, Chapter V, as a proposed action for each state.

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
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| 17. Make improvements in irrigation water conveyance systems to reduce water loss and seepage, e.g., install pipes or impermeable linings in canal-to-farm conveyance systems and in on-farm laterals and ditches. | ARS 45-935 permits agric. improvement districts to enlarge or extend irrigation works; ARS 45-1911 authorizes formation of irrigation water delivery districts; ARS 45-2054 gives powers of this sort to natural resource (soil) conservation districts. <i>Specific</i> | PRC 9257 authorizes soil conservation districts to make improvements on lands (with the owners' consent) in furtherance of water conservation and distribution. PRC 9850 authorizes improvement districts within soil conservation districts. WC 22075 authorizes irrigation districts to do any act necessary to furnish sufficient water in the district for any beneficial use. <i>Specific</i> | CRS 7-44-103 authorizes Water Users' associations to develop irrigation works. CRS 35-70-103 creates soil conservation board to plan conservation projects. CRS 35-70-108 authorizes soil conservation districts to conduct demonstration projects and construct facilities to stop soil erosion, etc. CRS 37-41-101 and 37-42-101 authorize irrigation districts to be formed and to construct irrigation works. CRS 37-45-118 authorizes water conservancy districts to undertake larger water irrigation projects than irrigation districts. <i>Specific</i> | NRS 539-273 authorizes irrigation districts to construct irrigation works. NRS 541.140 authorizes water conservancy districts to construct water facilities, and 541.145 gives power to enforce regulations for operation of irrigation projects. NRS 542.070 authorizes watershed protection districts to construct facilities to conserve water for beneficial use. <i>Specific</i> | NMSA 75-28-4 authorizes conservancy districts to make improvements to irrigation systems, and to regulate and prescribe the location of land improvements. <i>Specific</i> | UCA 73-5-9 empowers the state engineer to require improvements in irrigation water systems to prevent water waste, at the landowner's expense. UCA 73-7-11 authorizes irrigation districts to construct improvements and to establish equitable rules and regulations for the distribution and use of water. UCA 73-9-13 gives similar authority to water conservancy districts. <i>Specific</i> | WSA 11-245 authorizes conservation districts to prevent erosion and maintain water quality through construction of improvements. WSA 41-285 authorizes irrigation districts to construct canals, ditches, etc. WSA 41-330 gives irrigation districts power to improve irrigation works. <i>Specific</i> |
| | <i>CURRENT STATUS</i> The major need here is on the Colorado River Indian Reservation. The major non-Indian irrigation is on the Wellton-Mohawk which impacts Mexico but not the Colorado River main stem. For Wellton-Mohawk water, desalting is planned. | The Colorado River Irrigation Districts (notably Imperial and Coachella Valley Districts) have aggressively promoted canal lining, seepage recovery systems, etc., to a high degree of efficiency. Continued lining of canals and laterals could save as much as 250,000 a.f./yr. Better irrigation management by ditch tenders also would reduce water losses. | Colorado Water Conservation Board is conducting research and demonstration projects in improvements, including automated farm irrigation which requires leveling and lining of ditches. The state does not subsidize the leveling and lining process, so progress requires convincing farmers to invest in these improvements. The State Engineer's Office cannot (and does not) require canal lining. | There is serious consideration to giving farmers a tax break if they line ditches and make water saving improvements. This would be a reduction in <u>ad valorem</u> taxes on their farms. Under SCS programs, concrete lining of canals is a high priority item. | New Mexico encourages improvements, through the SCS and ASCS, in canal lining and more efficient irrigation methods. The state gives financial incentives (grants plus low interest loans from Interstate Stream Commission) to ditch companies to line canals. Companies must pay only 5 to 15% of total cost and can borrow this at 2-1/2% interest. | Division of Water Resources administers reimbursable funding program to supplement USDA-ASCS and Four Corners program of grants for on-farm improvements. About 400 projects have been funded since 1947. Hundreds of miles of canals have been lined. | SCS promotes such improvements under priorities set by local conservation districts. Water Division of DEPAD makes loans for on-farm improvements to supplement federal cost saving. State of Wyoming has regulatory power through the conservation Commission and Dept. of Agriculture to change water conveyance systems, but power has not been used. |

18. *Enforce salinity standards for municipal treatment plant discharge.*

All of the basin states exercise some control over wastewater treatment facilities; each of these states has adopted the Forum standards on salinity; and all seven are under the NPDES permit system, with or without their own enforcement programs.

The states believe that the NPDES permits will be an adequate tool for the enforcement of salinity standards for municipal treatment plant discharge whenever those standards are set. They feel that any additional control needed could be exercised under already existing state authority concerning municipal wastewater facilities.

Arizona exercises control over treatment plants (ARS 36-1856.9,.10) in conjunction with its permit system (ARS 36-1859), with Phoenix already monitoring under NPDES permit for salinity. Compliance monitoring is not a high priority for the rest of the state as a result of limited water quality personnel and funding. Public health hazards have a higher priority than salinity for water quality action, especially since Phoenix is challenging the NPDES system in court.

Wastewater treatment facilities are regulated in California (WC 13626) in conjunction with the power to set standards (WC 179) and the adoption of the Forum Document. The Water Quality Control Board has adopted enforcement criteria subject to EPA action, and the City of Needles has been under Water Quality Control Board salinity standards for at least 15 years.

The Department of Health in Colorado has authority to set standards for and approve construction of wastewater treatment facilities

(CRS 25-1-107.e, r), while the Water Quality Control Division gives technical advice, technical service, and issues discharge permits (CRS 25-8-308.b, CRS 25-8-501). There are no salinity standards in wastewater facility design criteria. The compliance monitoring program is being used to make a study of discharge components. And the feeling is that there is no practical way to prevent, control or treat municipal salinity, at least without investing in high cost tertiary treatment.

Nevada has authority to examine and approve treatment plants (NRS 445.214 [3]) and to require compliance with effluent standards before any discharge permit is issued (NRS 445.231 [C]). They are now writing regulations for NPDES permits with the Forum Document standards comprising a portion of their efforts.

New Mexico's Environmental Improvement Board sets regulations for wastewater disposal (NMSA 12-12-11. A[3]) and the Water Quality Control Commission requires filing of plans and specifications for wastewater treatment plants. However, EPA has not set applicable salinity standards, although informational monitoring is underway.

Utah exercises full control over wastewater facilities (UCA 26-15-5.C) in the plans, construction, and operation and maintenance areas, and requires permits to build, modify or operate such a plant (UCA 73-14-5.a). They are ready to begin "polished secondary" treatment for public health purposes, but EPA has refused to fund the incremental cost of the higher treatment requirements. Utah includes salinity control as a part of the NPDES permit requirements.

The Department of Environmental Quality in Wyoming may, but does not currently, issue permits for the construction or operation of wastewater facilities (WSA 35-502.18) along with the permits for discharge, certification of operation and maintenance competency, and certification of compliance with construction standards (WSA 35-502.19). The Forum standards are being enforced insofar as they can be.

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
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| 18. Enforce salinity standards for municipal treatment plant discharge. | ARS 36-1856.9, .10 Control over treatment plants in conjunction with ARS 36-1859 permit system are powers of the Dept. of Health Services and the Water Quality Control Council. <i>Nonspecific</i> | WC 13626 Regulates wastewater treatment plants in conjunction with WC 179 powers to set standards for water quality as part of the obligation of the Water Resources Control Board. <i>Nonspecific</i> | The Dept. of Health has the authority to set standards and approve wastewater treatment plant plans, CRS-25-1-107.e,r. The Water Quality Control Division gives technical advice and service and issues discharge permits. CRS 25-8-308.b, CRS 25-8-501. <i>Nonspecific</i> | The right given by NRS 445.214 (3) to examine and okay treatment plants, and 445.231 (c) to demand compliance with effluent standards before a permit is issued, are functions of the Environmental Protection Services. <i>Specific</i> | NMSA 12-12-11.A (3) The Environmental Improvement Board sets regulations on liquid waste, and the Water Quality Control Commission requires filing of plans and specification for wastewater treatment plants. <i>Nonspecific</i> | UCA 26-15-5 (c) Plans, construction, operation and management of treatment plants, and 73-14-5 (a) permits to build, modify or operate the same are all under the control of the Board of Health. <i>Specific</i> | WSA 35-502.18 (ii) The Dept. of Environmental Quality may issue permits to construct or operate wastewater facilities, and 35-502.19 permits for discharge, O&M competency and certifying compliance with construction standards. <i>Specific</i> |
| | Have adopted Forum document but have few monitoring funds--not high priority. Phoenix is monitoring under NPDES permit but challenging the permit system in court. | The Water Quality Control Board has adopted enforcement criteria subject to EPA action. Needles has enforced salinity standards for at least 15 years. | No salinity mentioned in design criteria, and tertiary treatment would have high cost. Do have compliance monitoring which is being used for a study of discharges. There is no practical way to prevent, control or treat municipal salinity. | Are writing regulations for NPDES permits and have adopted Forum document. The real need is for separation of effluent waters. No enforcement in the communities. | Adopted Forum standards. EPA hasn't set standards, but informational monitoring is underway, and effluent limitations have been established with the NPDES program. | EPA won't fund incremental costs of "polished secondary" treatment. Utah includes salinity enforcement as a part of the NPDES permit requirements. | Adopted Forum standards and have compliance monitoring. The standards are being enforced insofar as they can be. |

19. *Enforce salinity limits for industrial discharge into municipal sewer systems.*

The statutory authority and current status of action in each basin state must, for proper consideration of this action, be viewed in conjunction with the authorities and activities applicable to the enforcement of salinity standards for municipal treatment plant discharge. The powers present for that action should be complementary to the more general authorities for control of industrial discharge.

The states believe that the industrial discharge standards set forth in the Forum Document will be met by the NPDES permits in conjunction with existing regulation of industrial discharge. If further action is necessary, municipal treatment plants could be required, under their permits, to take action against industrial discharges into their systems.

Arizona states that industrial discharges must meet quality standards and must be properly permitted (ARS 36-1858, 1859), and the Department of Health can issue orders prohibiting or abating discharges, and controlling disposal systems (ARS 36-1856). However, the state does not have NPDES authority and does have a policy to avoid controls in order to encourage development. Also, salinity regulations have not yet been promulgated.

California also requires quality considerations and reporting of discharges (WC 13260, 13263), and has requirements for point source discharges. Industrial wastes are under NPDES permit and the geothermal industry is under an absolute discharge prohibition. Los Angeles is using a variable fee schedule to encourage reuse and in-house treatment of industrial wastes.

Colorado has a permit system applicable to industry (CRS 25-80 501) with a zero discharge program for power plants, which generally have their own recycling systems. In addition, the cities would be asked to act if an industrial problem occurred, although there are few salt loading industries.

Similarly, Nevada has a permit program with enforcement authority (NRS 445.221, 224, 231), which requires consistency with treatment plans, rules, regulations, effluent and pretreatment standards. Industrial discharge is limited by ponding in a program which has been accepted and is enforced.

In New Mexico regulations are written to avoid problems as they arise (NMSA 75-89-4) and are drawn to work in conjunction with the discharge permits (NMSA 75-39-4.e.). The state is incorporating regulations to prohibit the conveyance of fly ash and is encouraging zero discharge from new power plants. All municipalities have industrial waste ordinances, but salinity is not as yet a controlled parameter.

Utah has standards for waste discharges UCA 26-15-5.5 [b]) with industrial discharges under control since 1953. A construction permit is required for any municipal or industrial wastewater treatment works. Industrial salt discharges by industry to the Colorado River must be justified under the Forum policy of February 28, 1977. No funding is given to municipal wastewater treatment plants unless Utah state standards are met.

Control over wastewater discharge in Wyoming has been maintained through the use of permits (WSA 35-502.18 (v)). Since the 1950's there has been no allowable discharge of salt in industrial effluent, and pond seepage is controlled in terms of salt load. Zero discharge from industrial sources is encouraged wherever downstream flow is not suitable for use in water supply. Industrial wastewater impact on municipal treatment plant systems is the prime factor considered.

| ACTION | | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
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| | | ARS 36-1858, 1859 Discharge must meet quality standards and have permit. ARS 36-1856 gives the Dept. of Health power to issue orders prohibiting or abating discharges, and controlling disposal systems. | WC 13260, 13263 Reporting (permit) of discharges must account for water quality, with no vested interest allowed in Water Resource Control Board permitted discharges. | CRS 25-8-501 Discharge permits are the tool of the Water Quality Control Division. | NRS 445.221, .224, .231 The Environmental Protection Services issue point-source discharge permits consistent with treatment plans, rules and regulations, and effluent and pretreatment standards. | NMSA 75-39-4.d. Regulations to prevent or abate pollution in any specific area or watershed by what the Water Quality Control Commission considers practical with 75-39-4.e discharge permits. | UCA '6-15-5 (5[b]) Standards for trade waste discharges can be set by the Board of Health. | WSA 35-502.18 (i) Control over public water supply through permits over any discharge of pollution or wastes is a power of the Dept. of Environmental Quality. |
| 19. Enforce salinity limits for industrial discharge into municipal sewer systems. | AUTHORITY | <i>Nonspecific</i> | <i>Nonspecific</i> | <i>Nonspecific</i> | <i>Specific</i> | <i>Nonspecific</i> | <i>Nonspecific</i> | <i>Nonspecific</i> |
| | CURRENT STATUS | No NPDES authority; policy is to avoid controls and encourage development. | State does have requirements for point-source discharges. These wastes are under NPDES permit. Los Angeles is using variable charges to encourage reuse and in-house treatment. Geothermal industry is under an absolute discharge prohibition. | State requires zero discharge from power plants. Majority have recycling systems. The cities would be asked to act if an industrial problem occurred, but there are not too many salt-generating industries. | Industrial discharge is limited by ponding, and this has been accepted and is enforced. | Are prohibiting conveyance of fly ash, and encourage zero discharge in new power plants. All municipalities have industrial waste ordinances meeting EPA minimums, but there are no numerical salinity standards. | Industrial discharge controlled since 1953. Standards are specifically included and no funding is given to municipal plants unless discharge is controlled. | Zero discharge is encouraged. No industrial salt discharge since '50s, and no pond seepage allowed for salt loaded holdings. The impact on municipal treatment plant systems is the prime factor. |

20. *Require in-house treatment of manufacturing wastewater.*

The states believe that the NPDES permits, in conjunction with existing state authority over wastewater treatment (e.g., requiring pretreatment of wastewater if standards are not met), provides adequate control over industrial discharges.

The degree of treatment for each type of waste can be prescribed in Arizona (ARS 36-1857.A [14]), and officials have the authority to move against point sources. Treatment is required in some instances; for example, some copper mines must treat before reusing or releasing wastewater. California also relies on its permit system (WC 13260, 13263) to approve the method of disposal of wastewater, preferably on-site. In-house treatment per se is not required.

Colorado has permit authority (CRS 25-8-501) and cease and desist power (CRS 25-8-307) to protect water quality. Requirement for pretreatment if standards are not met is a standard concept applied on a case-by-case basis. The approach is to tell industry the results needed and let them determine the method; for example, the sugar industry is making use of internal pollution controls, to assure that their effluent meets desired quality standards.

In Nevada the Environmental Protection Service's permits for point source discharge require that wastewater treatment standards be met, and permits can be withheld until there is compliance with pretreatment standards. Mine effluent is under permit, and there is a penalty rate structure based on composition in addition to volume of effluent. Although there is no statewide action on in-house treatment, it is anticipated in the future as a conservation measure.

New Mexico sets pretreatment standards (NMSA 75-39-4) and requires some industries to pretreat before discharging into sewage plants. Where federal law takes precedence the NPDES permit requires in-house treatment.

Utah has a statutory policy requiring treatment of wastewater to allow for further beneficial use (UCA 73-14-1). Case-by-case standards are being used in requiring in-house treatment of industrial wastewater. This program is not fully implemented, but in the meantime cities must require industry to treat its discharge.

In Wyoming the permit authority (WSA 35-502.18 [i]) along with the ability to promulgate rules and regulations (WSA 35-502.12, a[e]) backs the discharge permit requirement for the pretreatment of industrial wastewater.

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
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| 20. Require in-house treatment of manufacturing wastewater. | ARS 36-1857 (A[14]) Degree of treatment for each type of waste can be prescribed by the Water Quality Control Council. <i>Nonspecific</i> | As above (Action 19) WC 13260, 13263 Reporting of discharges must account for water quality. <i>Nonspecific</i> | CRS 25-8-307 Cease and desist power if quality is abused, and CRS 25-8-501 discharges permits are the authorities of the Water Quality Control Division. <i>Nonspecific</i> | NRS 445.221, .224 Permit for point-source must meet wastewater treatment plans, and the Environmental Protection Services can withhold permit until pretreatment standards are complied with. <i>Specific</i> | NMSA 75-39-4.d Pretreatment standards can be set by the Water Quality Control Commission. <i>Nonspecific</i> | UCA 73-14-1 Policy to allow no waste without treatment to allow more beneficial use is the mandate to the Board of Health. <i>Nonspecific</i> | WSA 35-502.12(a) Environmental Quality Council has power to promulgate rules and regulations upon recommendation of the administration and advisory board. And Action 19, above, permits. <i>General</i> |
| 88 | <i>CURRENT STATUS</i> Has authority to move against point-sources. Treatment is required in some instances; for example, some copper mines must treat water before reusing or releasing. | Requirements for approval of method of disposal of wastewater, and are looking to on-site disposal. Do not require in-house treatment per se. Also see Action 19 above. | Pretreatment required if standards not met. This is a standard concept with a case by case approach to tell industry the results needed and let them determine the method used. For example, sugar plants use internal pollution controls. | Mine effluent is under permit. There is a penalty rate structure based on composition rather than volume of effluent. No statewide activity, but is down the road as a conservation measure. | Allowed by statute. Some industries must pretreat before discharge into sewage plants. The NPDES permit requires in-house treatment, where federal control occurs. | Using case by case standards. The program is not fully implemented but the cities must make industry pretreat certain discharges for city to obtain state aid. | The issuance of a discharge permit requires pretreatment. |

21. *Require plugging of oil and gas wells.*

Each of the basin states has an active Oil and Gas Commission responsible for the proper drilling, maintenance and plugging of oil and gas wells. The commissions' enforcement of regulations appears to adequately control the discharge of saline water from oil and gas wells into surface waters or into surrounding aquifers. (In contrast, state action to control water wells and exploratory drill holes, e.g., for seismic exploration, often is insufficient. Action 4 covers this topic.)

The actual wording on the respective statutes of the seven basin states is very similar and certainly the intent is the same. In Arizona, the Oil and Gas Commission requires the drilling, casing and plugging of wells in a manner to prevent pollution of fresh water by oil, gas, or saltwater (ARS 27-516). Similarly, in California the Division of Oil and Gas supervises the drilling, operation, maintenance, and abandonment of wells in order to prevent damage to life, health, property and natural resources (Pub.R. 3106). There is an additional statute requiring a notice of intent on plugging (Pub.R. 3203).

In Colorado, the Oil and Gas Commission has authority to require plugging of seismic holes or exploratory wells to prevent pollution of fresh water by saltwater (CRS 34-60-106). Nevada's statute is worded very closely to the Colorado law. The Commission has jurisdiction to require the plugging of wells to prevent the pollution of fresh water supplies by saltwater (NRS 522.040).

New Mexico's Oil and Gas Commission is authorized to regulate the disposition of water produced or used in drilling or producing oil and gas in order to protect against contamination of fresh water supplies designated by the State Engineer (NMSA 65-3-11 [15]). Both the Utah and Wyoming statutes are worded in a similar manner. UCA 40-6-5(c) in Utah and WSA 30-219(C), supplemented by WSA 35-502. 22:1, in Wyoming essentially state that the appropriate state agency has the authority to plug oil and gas wells to prevent the pollution of fresh water by saltwater.

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|--|--|---|--|--|--|--|---|
| 21. Require plugging of abandoned oil wells. | ARS 27-516 The Commission shall require the drilling, casing and plugging of wells in a manner to prevent pollution of fresh water supplies by oil, gas or <u>salt-water</u> . <i>Specific</i> | WC 3106 Supervisor shall supervise the drilling, operation, maintenance, and abandonment of wells as to prevent damage to life, health, property and natural resources. WC 3203 Concerns notice of intent on plugging. <i>Specific</i> | CRS 34-60-106 C. The commission has authority to require plugging of seismic holes or exploratory wells to prevent pollution of fresh water by saltwater. <i>Specific</i> | NRS 522.040 The commission has jurisdiction to require the plugging of wells to prevent the pollution of fresh water supplies by saltwater. <i>Specific</i> | NMSA 65-3-11 (i5) The commission is authorized to regulate the disposition of water produced or used in drilling or producing oil and gas in order to protect against contamination of fresh water supplies designated by the State Engineer. <i>Specific</i> | UCA 40-6-5 (C.) Board has authority to require the plugging of wells to prevent pollution of fresh water supplies by saltwater. <i>Specific</i> | WSA 30-219 C. The commission has the authority to plug oil and gas wells to prevent the pollution of fresh water by saltwater. <i>Specific</i> |
| | Monitor drilling to prevent escape of brine; require bond to insure capping of abandoned wells; holding ponds must be lined when ground is permeable. | Complies with statutory regulations covering plugging of abandoned oil and gas wells. Utilizes state funds to plug those wells where an operator can no longer be identified. | Strongly complies with rules on plugging of abandoned wells. | Enforces the plugging of wells. | Enforces plugging of abandoned oil and gas wells. Required posting of bond by operator. Pending legislation in 1977 to provide state funds for plugging old, abandoned wells where no operator can be identified. | Plugs oil and gas wells and requires permit for drilling. | State has requirements for Owner's Well Plugging and Repair bonds on all wells. |

Actions Not Feasible in the Colorado River Basin

The following suggested actions have been investigated and judged against the selection criteria listed in the first section of this chapter. They have been found infeasible. Appendix C contains a discussion of the reasons for infeasibility, and includes matrices describing authority for the actions in case future changes in circumstances might cause the actions to become feasible.

22. Establish an interstate salinity compact to develop uniform programs for controlling discharges and enforcing in-stream salinity standards.
23. Control phreatophytes along streams and irrigation canals to reduce quantity of water lost through transpiration.
24. Establish maintenance of adequate (or minimum) stream flow as a beneficial use to promote water quality goals. Stream flow maintenance may also benefit fisheries.
25. Establish a division of the Attorney General's Office, assigned the specific function of enforcing the "beneficial use" limit of water rights. Such enforcement would be directed to eliminating water wastage and promoting efficient water use.
26. To reduce salinity from agriculture, control types of fertilizer used to avoid excess salinity in return flow.
27. Treat irrigation return flow for salinity, through ion exchange or solar distillation processes.
28. To reduce salinity from municipal sources, require reuse of wastewater to reduce municipal water demand.

Actions Determined to be Out-of-Scope to This Study

Although they may meet most or all of the selection criteria, five of the suggested actions were determined by both Denver Research Institute and EPA to be out-of-scope to this study, for reasons

discussed below. Three are structural actions which are intended to reduce the amount of salinity from natural sources:

29. plug salt springs
30. divert highly saline natural waters or abandoned mine drainages into desalinization facilities (desalting plants, evaporation ponds, collectors for special controlled uses such as power plant cooling, deep well injections, etc.)
31. channelize and line streams, or route streams away from highly saline areas.

These actions were determined to be out-of-scope since responsibility for dealing with natural salinity has been assumed, wholly or in large part, by the federal government. This study is limited to state and local government actions.

Action 32, to reduce the volume of water exports from the Colorado River Basin and thus provide more water to dilute the salt load, was determined to be out-of-scope because it involves highly controversial political issues and is an action which could not be implemented without fundamental changes in state water law or state constitutions.

Action 33, augmenting stream flow either through precipitation modification or through large-scale water imports into the Colorado River Basin, was determined to be out-of-scope for a combination of reasons: there are significant political and legal barriers; and the actions are now and are expected to continue to be initiated largely by the federal government rather than by state and local governments.

CHAPTER V

MANAGEMENT ACTIONS PROPOSED FOR IMPLEMENTATION

This chapter describes and discusses the 12 management actions proposed for implementation in the various states of the Colorado River Basin. Some of the 12 actions are not proposed for adoption in certain of the states, although all are proposed for most states in the basin.

Each of the 12 actions is described in a background section common to all states. The subsequent state-by-state discussion of each action describes the agency which would have responsibility for implementation, the legal authority, and the current status of the action. In addition, each of the possible salinity actions has been rated as to feasibility in three areas: legal, political, and administrative. *Legal feasibility* means that the action falls within the statutory authorities and powers of the state. *Political feasibility* means that groups which express themselves in the political process, through such techniques as lobbying and influence in policy decisions (including decisions by state legislatures) would find the action generally acceptable. *Administrative feasibility* means that the action could be taken with a minimum of change in the appropriate agency. An example of administrative feasibility of an action might be the ability to take the action with no additional appropriations.

The ratings as to potential feasibility of each action are summarized in a simple matrix form, as follows:

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | | | |
| Political | | | |
| Administrative | | | |

Two other ratings in addition to "feasible" have been developed: "questionable" and "major obstacles." "Questionable" means that obstacles exist that threaten full implementation of the action. For example:

- Legal--clear statutory authority is lacking, although the action appears to have general or nonspecific authority. Perhaps new case law will be necessary to clarify the legality of the action.
- Political--certain important parties-at-interest are likely to be opposed to the action, although it is unclear how severe their hostility will be, or how effectively their objections can be overcome through compromise.
- Administrative--the implementation of the action will put financial and/or procedural burdens on the agency which would be responsible for its administration, or would require a major change from past practice or precedent.

An evaluation of "questionable" means that additional effort, e.g., in changing attitudes or clarifying authority or policy, will be necessary for the action to be implemented, at least fully, but that this may be accomplished in time.

"Major Obstacles" means that severe barriers to implementation of the action are apparent. For example:

- Legal--no direct statutory authority is apparent, although the action is not specifically barred by statute. A test of the action would probably

lead to a legal trial, and a favorable verdict (or new legislation) would be required before the action could be implemented generally.

- Political--the action would be severely resisted by important parties-at-interest, so the action could probably be implemented only in part, or applied only in the more critical cases that cause salinity. To be implemented more widely, a forceful state policy initiative or a definite mandate (e.g., by referendum) would be required.
- Administrative--the action varies greatly from past practice or conflicts with state policy, or would require a major increase in funding and personnel.

An evaluation of "major obstacles" means that the resistance to this action might be so intense that significant delays in full implementation would occur--although a partial implementation might be possible.

Following the discussion of the recommended actions, a final section of this chapter analyzes the overall political feasibility of adopting and implementing each of them. This section includes an identification of the *parties-at-interest*, that is, the organizations or identifiable groups of persons who share a common interest and who are significantly affected, for better or worse, by the adoption of a salinity control policy. Nearly all of the actions will encounter opposition from one or another special interest groups. Depending on the severity of negative impact upon these *parties-at-interest*, and upon how directly they are affected, political opposition will be encountered by those attempting to implement each action. Such opposition will, in the end, determine the ultimate feasibility of the action.

1. *Regulate irrigation water use so that the water rights holder reduces excess use and implements waste control measures. This may be done by:*
 - (a) *Direct action by the agency administering water rights, to limit or control amounts of water diverted if waste occurs; or*
 - (b) *Imposing sanctions by the State Engineer, irrigation district or other appropriate agency, on water users using excessive amounts of water.*

Background of the action. This dual-approach action is proposed as a means of reducing the excess application of water in irrigated agriculture, in the belief that such excess water use causes excess pickup of salts from some soils and carries these salts in return flow into the surface waters. This action, likely to be the most controversial of the 12 recommended actions, presumes that state government administrative initiatives can cause irrigators to reduce their excess application of water to crops.

Two approaches are proposed: (a) direct action by the State Engineer's Office (or other agency that administers water rights) to shut a headgate or otherwise limit or control water diversion if waste of water occurs; and (b) imposing sanctions, i.e., fines or other penalties for water waste. The feasibility of each approach is rather questionable and will be further explored.

Direct administrative control. Western water law states that the "basis, measure, and limit" of a water right is the beneficial use amount (in California, "reasonable" is the term instead of "beneficial"). The statutory wording further specifies that "waste is the antithesis of beneficial use." Nevertheless, in many cases water rights have been adjudicated in amounts which exceed those needed for crop growth. (That is, excess to the amounts needed for growth of any

of the crops normally grown in the locality; because choice of crop modifies water quantity requirements, it is hard to define a quantity of water necessary for "normal beneficial use.") This proposed action provides that state authorities responsible for the administration of water rights control water diversions more strictly than is done at present, limiting the amount of irrigation water to no more than the minimum needed to achieve existing consumptive use, plus a necessary leaching fraction (i.e., the salt pickup essential to plant growth). Although this action appears on the surface to do no more than to call for stricter enforcement of present water law, in practice it would represent an administrative modification of the extent of a water right, as currently regulated and enforced. In other words, the state would administratively modify the quantity of water stated in an existing, adjudicated water right, based on a new determination of the limit of beneficial use to which the water would be put. This action would probably be viewed by most affected irrigators as an action akin to a confiscation of a portion of a property right without compensation.

Administratively, the action would require a large increase in the number of personnel administering water rights, who would need to observe water use by farmers, judge the "beneficial use amount" according to new criteria, and enforce this by closing headgates or perhaps by controlling the quantity or timing of water releases requested by irrigators.

Such action, of course, need not be carried out to perfection to achieve significant reductions in water waste (and accompanying

excess salt pickup). Although enforcement varies widely among and within states, presumably water rights administration personnel already would act to control extreme cases of water waste. With an evolutionary approach involving gradual increases in personnel, training in new enforcement standards, and an accompanying public information program designed to enlist irrigator cooperation, it seems possible that within a few years substantial savings in water use could be achieved.

Sanctions. The use of sanctions or police power of the state (including state authorized irrigation and conservancy districts) to reduce excess water applications is rare except in extreme cases. The normal variation of skill among farmers engaged in irrigated agriculture and the uncertainties of weather make some excess water applications inevitable. Furthermore, the decentralized nature of irrigated agriculture and the relatively small staff of state water management personnel makes enforcement of existing laws against water waste extremely difficult.

However, sanctions are applied in some localities, e.g., the Imperial Irrigation District of California which applies a pricing penalty to the delivery of irrigation water that results in excessive volumes of tailwater. Since 97 percent of man-made salinity is caused by irrigated agriculture, it appears that no sincere effort to reduce salinity can possibly be effective unless the administrative regulation of irrigation water by the states undergoes a significant increase in diligence. This increase will certainly arouse hostility among many irrigators, the intensity of the hostility being proportional to the degree of enforcement.

The impact on salinity depends to a great degree on the use made of the water which would be saved from excess application through the implementation of Action #1. Although conservation of water is generally recognized in the West as a desirable result, it may not result in a salinity decrease. In fact, if the saved water is used to bring new land into agricultural production, salinity may increase.

Another factor directly affecting the impact of Action #1 on salinity is the nature of the soil in various geographic regions. If the excess water application occurs in an area of Mancos shale, for example, or other saline, easily leached soil, a reduction in water application should cause a reduction in the area's salinity contribution. However, reducing excess irrigation in other agricultural areas which do not have saline soils (or are in salt balance) will result in little or no improvement in the salinity problem.

ARIZONA--Action #1

Authority. In Arizona the applicable water resources statute authorizes the state land department, acting through a water district superintendent, to: "As far as practicable, divide, regulate and control the use of waters in his district by closing headgates to prevent the waste of water or its use in excess of the volume to which the owner of the right is lawfully entitled" (ARS 45-106). ARS 45-101 states, "Beneficial use shall be the basis, measure, and limit to the use of water." Taken together, these statutes appear to give authority to the water district superintendent to directly limit water diversions in excess of beneficial use amounts; however, ARS 45-106.C permits a person injured by such action to apply to superior court for injunctive relief.

ARS 45-109 states that a person who willfully wastes water to the detriment of another is guilty of a misdemeanor, and authorizes the water superintendent or his assistants to arrest violators and file complaints. ARS 13-1012 establishes sanctions for water waste.

Current status. The Salt River Project has implemented an extensive water management system which accomplishes the goal of this action, at least in part. It is important to note that salinity control is not the prime objective of these measures, although any reduction in salinity is a welcomed benefit.

Potential feasibility. The widespread awareness of water limitations in Arizona would probably give public support to some administrative actions to control excess water use that could reasonably be considered "waste." However, as elsewhere in the West, a rapid

departure from past administrative practice would encounter resistance from irrigators, and would require additional administrative personnel which would increase costs. Nevertheless, if the enforcement of the action were limited at first to the most clear-cut cases of excessive water use and implemented only gradually, the action appears generally feasible.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|-----------------------|
| Legal | X | | |
| Political | | X | |
| Administrative | | X | |

An attempt to implement enforcement extensively would encounter major obstacles.

CALIFORNIA--Action #1

Authority. The California Water Code (WC 100) states that the general welfare requires that waste or unreasonable use of water be prevented, and that the right to use water does not extend to waste or unreasonable use. WC 275 authorizes the state to prevent unreasonable use or waste of water. WC 1240 defines non-beneficial uses, and gives the California Water Resources Control Board the power to limit diversions by appropriative (not riparian) users to "reasonable" uses; however, the Board has not implemented this power so "reasonable" use is not clearly defined. Additionally, general authority to control water use to reduce waste can be found in WC 1257 which authorizes the State Water Resources Control Board to subject appropriations of water "to such terms and conditions as in its judgment will best develop, conserve, and utilize in the public interest, the water sought to be appropriated." WC 22078 gives to irrigation districts the power to control water for the beneficial use of the district or its inhabitants or the owners of rights to waters therein. This power includes (WC 22280) the power to collect charges for delivery of water for irrigation in excess of a specified quantity per unit of land.

However, state-level administrative action to encourage efficiency in water use may be inhibited by a California case holding that an irrigator need not take "extraordinary precautions" to prevent

waste if the irrigator is in conformance with the "customs of the community."¹

Current status. Sanctions on excess water use are being enforced by the Imperial Irrigation District. Voluntary controls on excess water use are frequently implemented for other benefits than strict conservation, such as labor savings or better production. The U.S. Bureau of Reclamation has a trial project aimed at reduction of salinity through scheduling of water delivery and application in the Palo Verde Valley. Further, the California Department of Water Resources is planning to " . . . vigorously pursue a program of identification of water waste and work with other agencies toward elimination of such waste. Legislation will be sought to provide added legal and institutional means for accomplishing water conservation."²

Potential feasibility. The major irrigation districts in the Colorado River Basin of California already are taking some action to reduce excess water use. Since that region is considered close to a salt balance, the benefit to salinity from further reduction of water use is questionable. A reduction in the amount of tailwater would increase the concentration of salts in drainage water³ but would not necessarily reduce salt loading significantly.

¹Joerger vs. Pacific Gas and Electric Co. (207 Cal. 8, 273, p. 1017 [1929]. See also George E. Radosevich and Gaylord V. Skogerboe, Achieving Irrigation Return Flow Quality Control Through Improved Legal Systems. Fort Collins: Resources Administration and Development, Inc., April, 1977, p. VI-25 (draft).

²Department of Water Resources, Water Conservation in California, Sacramento, 1976, p. 54.

³Ibid, p. 87.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | X | | |
| Political | X | | |
| Administrative | X | | |

Although potentially feasible for adoption, Action #1 is not applicable in California because it would have little or no effect on Colorado River salinity.

COLORADO--Action #1

Authority. Colorado Statute CRS 37-92-502(2) states:

Each division engineer shall order the total or partial discontinuance of any diversion in his division to the extent the water being diverted is not necessary for application to a beneficial use; and he shall also order the total or partial discontinuance of any diversion in his division to the extent the water being diverted is required by persons entitled to use water under water rights having senior priorities, but no such discontinuance shall be ordered unless the diversion is causing or will cause material injury to such water rights having senior priorities.

A broad interpretation of this portion of the statute could give the State Engineer the authority to accomplish the described action.

Enforcement of orders by the State Engineer under CRS 37-92-502 can be achieved by injunction, with the violator paying court costs and attorney's fees (CRS 37-92-503), or by a civil action for damages. CRS 37-92-504 allows a party, injured by violation of a State Engineer's order, to collect triple damages plus court costs and attorney's fees.

Current status. No such actions to limit unnecessary water applications are being taken by the Colorado State Engineer's Office. The position of this office is that there is no authority to enforce sanctions against any overapplication of water except for clearly gross waste, e.g., water flowing down a highway and roadside ditch, and that a change in statute would be required for such action to be taken. Projects which involve the scheduled application of water and different irrigation methods are taking place in Colorado's Grand Valley on a cooperative basis. However, in some parts of the Grand

Valley there is some evidence of excess water use beyond that needed for agricultural purposes.

Potential feasibility. It is generally accepted that some excess applications of irrigation water occur in Colorado. However, administrative action to order such diversions stopped would be a distinct departure from past and present practice. The administering agency questions its legal ability to do so without new statutory direction. Even if legality were assured, there would be obvious problems of administration (i.e., additional costs for personnel of division engineers' staffs) and of political resistance by irrigators. Both of these problems would be reduced if enforcement were implemented gradually, beginning with the most clear-cut cases of excessive water use. With this qualification, the action appears generally feasible whereas extensive enforcement would be infeasible.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|---------------------------|
| Legal | X | | |
| Political | X | | |
| Administrative | | X | |

NEVADA--Action #1

Authority. Nevada statutes grant the State Engineer the power to limit appropriation of water to that which is "reasonably required" for beneficial use. Regulations causing this may also be issued (NRS 533.060-.070). Irrigation Districts are granted authority to establish rules and regulations for distribution and use of water (NRS 539.233).

Current status. Agricultural uses are not a prime contributor to salinity. Nevada uses only a small amount of irrigation water from tributaries and none from the Colorado River Mainstem. In fact, because of the lack of water in Nevada, it appears that the "economics of need" do or will force efficient use and maximum reuse of all available water.

Potential feasibility. Action naturally underway from market forces. No further intervention believed appropriate or necessary.

NEW MEXICO--Action #1

Authority. The New Mexico State Engineer is required to permit the amount of water diverted to be based on beneficial use and in accordance with good agricultural practice and to result in the most effective use of water to prevent waste (NMSA 75-7-4 and 75-5-17).* The practical effectiveness of this statute in controlling water waste is yet to be clearly established.

Current status. Actions taken at present are those necessary to prevent the most obvious water waste.

Potential feasibility. It is doubtful that the statute cited above can be construed to change prevailing agricultural practice in an area--but it may be used to cause conformance to efficient water usage practices for those who fall below the norm. If applied in this limited way, the action appears generally feasible. Enhanced enforcement will require additional expenditures for personnel of the State Engineer's Office, but these costs would be limited if enforcement were gradually increased and applied to the exceptional cases of excess water use.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|---------------------------|
| Legal | X | | |
| Political | | X | |
| Administrative | | X | |

*NMSA 75-12-6, -8, and -9 prohibit the waste of artesian waters; however, these sections have limited applicability to the San Juan Basin of New Mexico.

UTAH--Action #1

Authority. UCA 73-5-3 authorizes the State Engineer to divide irrigation water "among the several appropriators entitled thereto in accordance with the right of each respectively, and shall regulate and control . . . the use of such water by such closing or partial closing of the headgates . . . or other means of diversion as will prevent the waste of water or its use in excess of the quantity to which any appropriator is lawfully entitled." The appropriation of water in Utah "must be for some useful and beneficial purpose" (UCA 73-3-1). Excess flow and wastewater are discussed in Smithfield West Bench Irr. Co. vs. Union Central Life Ins. Co., 105 U. 468, 142 P. 2d 866; appeal 113. U. 356, 195 P. 2d 249.

Current status. Administrative action or sanctions are not currently taken to control excess water use, if such is within the defined water right.

Potential feasibility. Administrative action to control diversions in excess of "beneficial use" would be a distinct departure from past and present practice and, if extensively implemented, would encounter extremely difficult barriers of political resistance and administrative costs. However, if enforcement were implemented gradually, beginning with the most clear-cut cases of excessive water use, the action appears marginally feasible.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | X | | |
| Political | | X | |
| Administrative | | X | |

WYOMING--Action #1

Authority. In Wyoming, WS 41-2 establishes that "Beneficial use shall be the basis, the measure and limit of the right to use water at all times, not exceeding the statutory limit . . ." That limit is defined in WS 41-181 as one cubic foot per second for each 70 acres of land; the limit applies to all rights adjudicated under State laws but not under territorial decrees. Each appropriator is entitled to divert a quantity of water reasonably necessary for his acreage, within the limits of his decree.⁴

WS 41-64 authorizes water commissioners to shut headgates and otherwise to regulate the distribution of water among the various users "where rights have been adjudicated, in accordance with existing decrees." Moreover, administrative officers have the authority to further limit water use to prevent waste.⁵

Water conservancy districts, however, are given some discretionary power in allocating water under district control. WS 41-91(f) authorizes district boards to allot water to lands within the district, "which allotment of water shall not exceed the maximum amount of water that the board determines could be beneficially used on such lands." There is no provision in WS 41-91 to assess higher rates for excess water use; rates must be "equitable" although they may differ on the basis of land classification.

⁴Quinn vs. John Whitaker Ranch Co., 54 Wyo. 367, 92 P. (2nd) 568.

⁵Parshall vs. Cowper, 22 Wyo. 385, 143 P. 302.

Current status. There is no current implementation of Action #1 in Wyoming.

Potential feasibility. In view of the limited authority in the law, Action #1 is not considered feasible in Wyoming.

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|--|---|---|--|---|---|---|--|
| <p>1. Regulate irrigation water use so that the water rights holder reduces excess use and implements waste control measures. This may be done by:</p> <p>(a) Direct action by the agency administering water rights, to limit or control amounts of water diverted if waste occurs; or</p> <p>(b) Imposing sanctions by the State Engineer, irrigation district or other appropriate agency, on water users using excessive amounts of water.</p> | <p>ARS 45-101 states that "Beneficial use shall be the basis, measure and limit to the use of water." ARS 45-106 authorizes the state land department's water district superintendent to close headgates to prevent waste of water or excess use of lawful entitlement. Section C of 45-106 permits a person injured by a waste control action to apply to superior court for injunctive relief. ARS 45-109 states that a person who willfully wastes water to the detriment of another is guilty of a misdemeanor and authorizes water superintendent to make arrests and file complaints. ARS 13-1012 establishes sanctions for water waste.</p> <p><i>Specific</i></p> | <p>WC 100 states that the right to use water does not extend to waste or unreasonable use, and WC 275 authorizes the state to prevent water waste. WC 1240 gives the Water Resources Control Board the power to limit diversions by appropriative users in excess of reasonable use. WC 22078 gives irrigation districts the power to control water for beneficial use and WC 22280 gives the power to collect charges for delivery of irrigation water in excess of a specified quantity.</p> <p><i>Specific</i></p> | <p>CRS 37-92-502(2) authorizes the State Engineer's division engineer to order a total or partial halt to diversions of water not necessary for beneficial use. CRS 37-92-503 gives the State Engineer injunctive powers, or the right to the injured party to take civil action for damages. CRS 37-92-504 allows an injured party to collect triple damages plus court costs and attorney's fees.</p> <p><i>Specific</i></p> | <p>NRS 533.060-070 gives the State Engineer power to limit water appropriations to that reasonably required for beneficial use. NRS 539.233 gives Irrigation Districts authority to set rules and regulations for distribution and use of water.</p> <p><i>Specific</i></p> | <p>NMSA 75-5-17 and 75-7-4 requires the State Engineer to allow diversion based on beneficial use and in accordance with good agricultural practice in order to obtain the most effective use of water and to prevent waste.</p> <p><i>Specific</i></p> | <p>UCA 73-3-1 states that water must be appropriated for some useful and beneficial purpose. UCA 73-5-3 authorizes the State Engineer to divide the water according to the appropriator's right and to regulate the use by full or partial closing of headgates or other means to prevent waste or excess use of water appropriated.</p> <p><i>Specific</i></p> | <p>WS 41-2 establishes beneficial use as the basis, measure and limit of the right to use water not exceeding the statutory limit of (defined at 41-181) one cubic foot per second for each 70 acres of land under State laws, but not under territorial decree.</p> <p>WS 41-64 allows water commissioners to shut headgates and otherwise regulate distribution of water in accordance with existing decrees. Administrative officers can further limit use to prevent waste. WS 41-91(f) allows water conservancy district boards to allot water within the district not exceeding board determined beneficial use. Rates must be "equitable," with no provision for higher rates for excess use.</p> <p><i>Specific/Prohibited</i></p> |
| CURRENT STATUS | <p>The Salt River Project has implemented an extensive water management system which partially accomplishes the goal of this action.</p> | <p>The Imperial Irrigation District is enforcing sanctions on excess water use. The USBR is operating a trial irrigation management service in the Palo Verde Valley. The project is aimed at reducing (continued)</p> | <p>No such actions are being taken by the State Engineer's Office, which feels there is no authority for enforcing sanctions except for clearly gross waste. The Grand Valley has some cooperative (continued)</p> | <p>Because of lack of water in Nevada "economics of need" do or will force efficient use of all available water.</p> | <p>Actions being taken are those necessary to prevent the most obvious waste.</p> | <p>No actions are being taken to control excess water use.</p> | <p>There is no implementation of this action in Wyoming.</p> |

| ACTION | | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|---|-----------------------|--|---|---|---|--|--|---|
| 1. Regulate irrigation water use so that the water rights holder reduces excess use and implements waste control measures. This may be done by: (a) Direct action by the agency administering water rights, to limit or control amounts of water diverted if waste occurs; or (b) Imposing sanctions by the State Engineer, irrigation district or other appropriate agency, on water users using excessive amounts of water. | CURRENT STATUS | | salinity through better timing of water delivery and application. The Department of Water resources is planning a program of identification and elimination of water waste, and will seek supportive legislation. | irrigation management projects underway, but there is some evidence of water use merely to secure an existing right beyond that needed for agricultural purposes. | | | | |
| 411 | POTENTIAL FEASIBILITY | Public support as a result of widespread awareness of water limitations is probable for some action. Irrigators would resist a rapid departure from current practice; and additional administrative personnel would increase costs. Gradual enforcement aimed at the most obvious waste is the most feasible approach. | The major irrigation districts are taking action to reduce excess water use. The region is considered close to salt balance so that salinity benefits are minimal. | The administering agency questions its legal authority to implement this action. Such action would be a departure from past and present practice. Even with assured legality, additional personnel costs and irrigator resistance reduce feasibility. Gradual action against the most obvious waste would improve the chances for implementation. | This action is naturally underway due to market forces. No further intervention is necessary. | Gradual enforcement against the most obvious waste is feasible if used to cause conformance to the accepted efficient water use practices. | Implementation of this action would be a distinct departure from past and present administrative practice, and would encounter political assistance as well as increased personnel costs. Gradual action against the most obvious waste appears marginally feasible. | In view of the limited legal authority, this action is not considered feasible. |

2. Through the federally funded 208 wastewater planning programs (PL 92-500), establish salinity as a priority item to be dealt with and develop a series of local and/or state corrective actions.

This proposed action is essentially one whereby other proposed actions may be coordinated with the 208 planning process. For this reason, a discussion of Action #2, including background and potential feasibility, will be included after the other recommended actions have been described and discussed. Chapter VI of this report discusses Action #2 for all of the Colorado River Basin states as a unit.

3. *Because of the need for an integrated approach to salinity control programs, utilize an existing state agency (or establish such an agency) to coordinate and promote salinity control actions by different state institutions.*

Background of the action. This action would require executive action by the governor to establish salinity control as a priority goal to be pursued in a coordinated manner by all appropriate state agencies. The action is based upon the belief that if salinity control is to be achieved in the Colorado River Basin states, it must be given a high priority and central coordination by state governments.

The key to this approach appears to rest with the members of the Forum, whose specialized knowledge of salinity and influence with the governors (who normally appoint them*) might generate a new, coordinated state level effort to control salinity. At the initiative of the Forum members in a state, the following steps might take place:

1. The governor determines that control of salinity in the Colorado River Basin is a priority of his administration.
2. The governor designates an agency or person responsible for coordinating state efforts to achieve improvement in salinity control. This might take the form of
 - creation of an interdepartmental task force
 - assigning new duties to an existing agency
 - creating a staff position to the governor (or assigning new duties to an existing staff person).
3. The responsible party, agency or group catalogs state agencies and past decisions which have an impact on salinity.

*In Nevada, Forum representatives are designated by the State Environmental Commission.

4. The responsible party, agency or group develops a series of policies, administrative actions, and/or coordinating procedures to assure that the salinity control priority is achieved. This could include recommending state statutes which could be passed to assist in salinity control.

Once established, the agency might function as a salinity ombudsman, with various roles of mediation of interagency disputes which have impact on salinity, attendance at cabinet meetings, requiring departmental reports on progress toward salinity control, and encouraging state legislation which assists in reducing the state's salinity contribution.

ARIZONA--Action #3

Agency responsible and legal authority. The executive powers and administrative duties of the Arizona governor give him sufficient authority to carry out this action. Should this action be established outside the existing executive branch staff, any additional funding would be subject to legislative appropriation.

Current status. No central coordinating policy or work group on salinity control now exists in Arizona.

Potential feasibility. Almost all of the State of Arizona lies within the Colorado River Basin. Further, there are a number of agencies and projects which have a direct or indirect impact on salinity. These agencies and projects include but are not limited to the following:

- Wellton-Mohawk Project
- Central Arizona Project
- Numerous 208 Areawide Water Quality Planning Projects of the state 208 coordinator
- Attorney General's Office
- Bureau of Water Quality Control
- Arizona Water Commission

This partial listing of involved parties illustrates the logic and feasibility of establishing a salinity ombudsman in Arizona.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | X | | |
| Political | X | | |
| Administrative | X | | |

CALIFORNIA--Action #3

Agency responsible and legal authority. The executive and administrative powers of the California governor give him sufficient authority to carry out Action #3. If salinity coordination responsibility were to be established outside the existing executive branch staff, any additional funding would be subject to legislative appropriation.

Current status. No central coordinating policy or work group exclusive to salinity control now exists in California. However, the State Water Resources Control Board does provide coordinated leadership to Statewide water quality programs. The Colorado River Board of California plays a major role in coordinating and stimulating salinity control actions in the Colorado River system.

Potential feasibility. This approach has limited potential in California, because the Colorado River is highly saline when it reaches California. Thus salinity control already has a high priority within the state. Almost all state and local officials contacted were aware of the salinity problem and solutions being implemented by various units of government. Further, California is the only state in the Colorado River Basin that combines water quality and water quantity functions within the same agency, the State Water Resources Control Board.

For these reasons, designation of a salinity ombudsman for California's portion of the Colorado River Basin would add little if any strength to the existing salinity control effort. The action is therefore not recommended for California.

COLORADO--Action #3

Agency responsible and legal authority. The executive and administrative powers of the Colorado governor give him sufficient authority to carry out Action #3. If salinity coordination responsibility were to be established outside the existing executive branch staff, any additional funding would be subject to legislative appropriation.

Current status. No central coordinating policy or work group on salinity control now exists in Colorado, although many of the administrative functions that impact on salinity are assigned to the Department of Natural Resources. Members of the governor's staff have expressed concern over Colorado's contribution to the salinity of the Colorado River. Both the Colorado Water Conservation Board and the Colorado Water Quality Control Commission are involved in salinity control actions.

Potential feasibility. There is no indication that making salinity control a priority of Colorado's governor will achieve a reduction in Colorado's contribution to the salinity loading of the Colorado River. Yet, even though a direct benefit cannot be established, the action is not negated. Compared to other possible salinity actions, creation of a coordinative mechanism is broadly feasible.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|---------------------------|
| Legal | X | | |
| Political | X | | |
| Administrative | X | | |

Special task forces, groups, and even an ombudsman have been created to solve various problems facing Colorado. In Colorado's case, where the state is a contributor to salinity but bears few of the consequences of its contributions, this action could result in long-term improvements.

NEVADA--Action #3

Agency responsible and legal authority. The executive and administrative powers of the Nevada governor give him sufficient authority to carry out Action #3. If salinity coordination responsibility were to be established outside the existing executive branch staff, any additional funding would be subject to legislative appropriation.

Current status. A state policy on salinity control does not exist in Nevada. However, the areawide 208 plan for the Colorado River Basin focuses on salinity control as its prime objective.

Potential feasibility. The potential of this action in Nevada is difficult to assess. The governor has not designated a salinity coordinating group nor a policy for Nevada's portion of the Colorado River Basin. However, the areawide 208 water quality study, because of its prime focus on salinity control, serves much the same purpose of coordination. Therefore, this action is not recommended for Nevada at this time. When the 208 process is completed, this approach should be reevaluated.

NEW MEXICO--Action #3

Agency responsible and legal authority. The executive and administrative powers of the New Mexico governor give him sufficient authority to carry out Action #3. If salinity coordination responsibility were to be established outside the existing executive branch staff, any additional funding would be subject to legislative appropriation.

Current status. No central coordinating policy or work group exclusively focused on salinity control now exists in New Mexico. However, the Water Quality Control Commission has responsibility for both water pollution control and Section 208 planning programs.

Potential feasibility. The New Mexico Water Quality Control Commission (WQCC) has the most potential for serving as a salinity ombudsman. The Commission consists of the following state agencies:

- State Engineer/Interstate Stream Commission
- Environmental Improvement Agency
- Oil Conservation Commission
- Department of Agriculture
- Natural Resource Conservation Commission
- Bureau of Mines and Mineral Resources
- Parks and Recreation Commission
- Game and Fish Department

In addition to wide representation of various state agencies on the Water Quality Control Commission, the Commission is an ongoing operation focused on water quality. For these reasons, an executive order by governor, assigning priority to salinity control and designating the WQCC as the coordinating agency, has considerable potential in

assuring development of a state policy to control salinity in the Colorado River Basin.

Because of the existing framework for this action, the feasibility of taking it is rated relatively high.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | X | | |
| Political | X | | |
| Administrative | X | | |

administrative powers of the Utah governor give him sufficient authority to carry out Action #3. If salinity control responsibility were to be established outside the existing executive branch staff, any additional funding would be subject to legislative appropriation.

Current status. Salinity control planning in Utah is carried out by Utah's representation on the Forum, by the Division of Health and Division of Water Resources that jointly coordinate state salinity policy, and by the Water Pollution Committee that exercises policy functions on salinity and other forms of pollution.

Potential feasibility. There is no indication that making salinity control a priority of Utah's governor will achieve a reduction in Utah's contribution to the salinity loading of the Colorado River. Yet, even though a direct benefit cannot be established, this action is not infeasible. In Utah's case, this action could result in long-term improvements. Further, as shown below, it should be a relatively easy action to implement.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|-----------------------|
| Legal | X | | |
| Political | X | | |
| Administrative | X | | |

WYOMING--Action #3

Agency responsible and legal authority. The executive and administrative powers of the Wyoming governor give him sufficient authority to carry out Action #3. If salinity coordination responsibility were to be established outside the existing executive branch staff, any additional funding would be subject to legislative appropriation.

Current status. No central coordinating policy of work group on salinity control now exists in Wyoming.

Potential feasibility. There is no indication that making salinity control a priority of Wyoming's governor will achieve a reduction in Wyoming's contribution to the salinity loading of the Colorado River. Yet, because a direct benefit cannot be established does not prove this action ineffective.

The ideal agency to undertake this action in Wyoming is the Governor's Interdepartmental Water Conference, chaired by the State Engineer. The members of the Interdepartmental Water Conference are:

- State Planning Coordinator (Governor's Office)
- State Engineer
- Attorney General's Office
- State Department of Agriculture
- Department of Environmental Quality
- Department of Economic Planning and Development
- Industrial Siting Administration
- Geological Survey of Wyoming
- Game and Fish Department
- Wyoming Recreation Commission

- Wyoming Highway Department
- State Land Use Commission (Land Use Administration)
- University of Wyoming

The existence of the Governor's Interdepartmental Water Conference helps make this action feasible for implementation.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | X | | |
| Political | X | | |
| Administrative | X | | |

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|--|--|--|---|---|--|--|--|
| 3. Because of the need for an integrated approach to salinity control programs, utilize an existing state agency (or establish such an agency) to coordinate and promote salinity control actions by different state institutions. | Authority for this action is implicit in the executive and administrative powers of the governor. | Authority for this action is implicit in the executive and administrative powers of the governor. | Authority for this action is implicit in the executive and administrative powers of the governor. | Authority for this action is implicit in the executive and administrative powers of the governor. | Authority for this action is implicit in the executive and administrative powers of the governor. | Authority for this action is implicit in the executive and administrative powers of the governor. | Authority for this action is implicit in the executive and administrative powers of the governor. |
| | No specific state office, work group, or policy related to salinity control exists. | No specific state office, work group, or policy related to salinity control exists. | No specific state office, work group, or policy related to salinity control exists. | No specific state office, work group, or policy related to salinity control exists. | No specific state office, work group, or policy related to salinity control exists. | No specific state office related to salinity control exists, but policy functions are shared among forum representatives, Div. of Health, Div. of Water Resources, and Water Pollution Committee. | No specific state office, work group, or policy related to salinity control exists. |
| | Almost all of Arizona is in Colorado River Basin with many agencies affecting salinity either directly or indirectly. A state ombudsman or coordinator for salinity control should prove of value. | Action has limited potential in California. State and various officials are both concerned and seem coordinated on salinity matters. | This action has good potential for positive long-term impact in Colorado. As there is no concentrated, long-term effort on salinity control, a state policy should prove helpful at the very least. | Action has low potential presently because of focus of areawide 208 process on Nevada's contribution of salinity to the Colorado River. | New Mexico's Water Quality Control Commission has broad membership of state agencies. The Commission is the logical agency for an executive order to develop a state policy on salinity in the Colorado River. | This action has good potential for positive long-term impact in Utah. Coordination of state officials and direction toward an over-all state policy on salinity should, at the least, be beneficial. | This action has good potential for Wyoming. The logical agency to undertake this action is the Governor's Inter-departmental Water Conference. |

4. *Require minimum standards for water well construction, and require plugging of abandoned water wells and exploratory drill holes to avoid contamination of groundwater strata.*

Background of the action. This action has not been substantially investigated in terms of salinity control. However, it is known that saltwater or brine may be encountered during the drilling of a water well or an exploratory drill hole (e.g., for mineral exploration or seismic investigation), making rapid plugging desirable. Without proper well construction, there exists a potential for mixing of waters between strata with subsequent contamination if flow occurs from saltwater to fresh water strata. Ultimately, the saline contamination can spread to streams flowing into the Colorado River. While the severity of salinity pollution from water wells and exploratory drill holes has not been estimated, the adoption of standards and regulations for construction and plugging would reduce a threat of added potential aquifer and surface water pollution.

ARIZONA--Action #4

Agency responsible and legal authority. The State Land Department, Water Rights Division, has the responsibility over the drilling of water wells in critical groundwater areas and for preventing the waste of groundwater. Permits for drilling are required only in the designated critical areas (ARS 45-308) although informational filings, concerning the character and construction of wells, are required for all new wells (ARS 45-317).

The statutory prohibition against waste of groundwater (ARS 45-319.A) doesn't appear to differentiate between withdrawals from ordinary and from critical groundwater areas. In order to prevent such waste, the State Land Department shall: "(1) Require all flowing wells to be capped or equipped with valves so that the flow of water can be completely stopped when not in use," and "(2) Require both flowing and nonflowing wells to be so constructed and maintained as to prevent waste of groundwater through leaky casing, lack of casings, pipes, fittings, valves or pumps, either above or below the surface." This section seems to provide adequate aquifer protection for operating wells. The Oil and Gas Conservation Commission provides the same protection from drill holes in requiring that water-bearing formations be sealed off before a hole can be abandoned.

Current status. Historically, Arizona concern with groundwater has been directed towards its availability and ownership. In much of the state, groundwater withdrawals are being made at twice

the rate of replenishment. Additionally, ownership is appurtenant to the land under which the water percolates. Because the water is owned with the land this further complicates the preservation of groundwater basins in terms of both quantity and quality since so much of the water is private property.

The 1948 Arizona Groundwater Code did enable the Land Department to designate critical groundwater areas. Such areas can be designated in terms of quality or quantity or both. This means that permits must be obtained for the drilling of new domestic wells and that no new irrigation wells may be drilled. The critical designation does not prohibit the development of wells for purposes other than irrigation.

Despite the constraints against much action in the area of groundwater wells, the critical designation has aided the salinity problem in the Joseph City area. Saline water on the north is being held back by good water, now protected from over-withdrawal.

The State Land Department has instituted an Automatic Groundwater Data System to make available up-to-date technical information on groundwater wells. These data are being used to develop groundwater resource management programs, and will be used to compute increases or drops in the groundwater table. Other computing capabilities are being studied.

Even though the Water Rights Division of the State Land Department has some of the tools for controlling water well contamination of the groundwater strata, the quality of groundwater varies so much throughout the state (from about 230 mg/l to over 100,000

mg/l TDS) that the Department feels new legislation is needed to give the state better control over the water.¹

Potential feasibility. Salinity, along with sedimentation, is considered the major water quality problem in Arizona. In order to fully implement water well control, new legislation is needed. However, better enforcement of the anti-waste statute could be provided administratively through an increase in Water Rights Division manpower. Such costs would be balanced by full enforcement of the existing law, and by some additional control over the identified salinity problem.

The standards for proper water well construction have been defined in ARS 45-317, the terms for receiving a permit for drilling a groundwater well in a critical area. The anti-waste section further prescribes controls over flowing wells. Ten critical groundwater areas were designated by 1975, at least one in terms of salinity control. Further designation of critical areas will enlarge control over groundwater used for irrigation purposes, without legislation and without overwhelming costs.

The Water Rights Division has suggested that clean drinking water requirements might be used to exercise additional control over groundwater wells. The general authority given to the Department of Health Services in ARS 36-601.A.9, declaring the pollution or contamination of domestic waters to be dangerous to public health,

¹Arizona, State Land Department, Annual Report, 1974-1975, Phoenix, 1975, p. 24.

could be joined with the Water Quality Control Council's ability to set water quality standards (ARS 36-1857) to achieve control over water wells used by municipalities. While no specific authority is given in this area, the general needs to protect public health and water quality levels might be called upon.

Thus, feasibility would appear to be questionable, at least to some extent, in all areas:

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | | X | |
| Political | | X | |
| Administrative | | X | |

In general, it appears that control over irrigation wells and drill holes can be intensified and expanded. There also seems to be a possibility, dictated by water availability, for the expansion of control over groundwater wells used by municipalities. To date, however, the only control over industrial wells is the actual quality of the water pumped as it relates to the particular industrial process. Any control is limited by the available statutory authority and by funded manpower. Water rights, availability, and reserves are serious political problems in Arizona, and control over water quality is additionally limited by the sensitive water policy climate.

CALIFORNIA--Action #4

Agency responsible and legal authority. The California Water Code prescribes a multi-step responsibility for control of water wells, or any well which affects water quality either through direct surface flow or through infiltration of groundwater strata. The State Department of Water Resources, pursuant to WC 231, recommends minimum standards for well construction and for the proper sealing of abandoned wells to the Regional Water Quality Control Boards (WC 13800). These recommendations, after regional consideration (WC 13801), shall be reported to the affected cities and counties for consideration and adoption (WC 13802, 13803). If the city or county fails to act within 120 days, the Regional Water Quality Control Boards may adopt and guarantee enforcement of the standards (WC 13805).

Current status. In 1968 California was constructing or rehabilitating approximately 10,000 water wells a year, with a fair number being abandoned each year.² It is reasonable to assume that at least the same rate of construction/abandonment prevails today. Because of the adoption of water well standards and the concurrent enforcement mechanisms, the major groundwater problems in the state are those of depletion, and in the Colorado River Basin specifically, of recharge quality. Additionally, much of the CRB groundwater is of poor natural quality.³

²California, Department of Water Resources, Bulletin No. 74: Water Well Standards: State of California, Sacramento: State of California, 1968, p. 1.

³California, Regional Water Quality Control Board, Water Quality Control Plan Report: East Colorado River Basin [7B], Sacramento: State of California, 1975, p. II-14-19.

Potential feasibility. The state and interested parties have recognized that water wells can contribute to groundwater degradation. A control program has been implemented in California which, with full implementation, will protect groundwater and groundwater strata from salinity contamination resulting from wells. However, this action has little or no potential for salinity control within the Colorado River Basin portion of California, for two reasons. First, the groundwater is at least as saline as the Colorado River and is thus not subject to degradation by mixing with deep percolating irrigation water. Secondly, as none of the tributary groundwater basins are artesian systems, improperly constructed wells would not result in outflow of highly saline waters to the Colorado River.

COLORADO--Action #4

Agency responsible and legal authority. In Colorado responsibility for water wells is divided. For most of the state, the State Engineer has authority to issue permits for construction of wells (CRS 37-90-137), to prevent the waste of well water, and to abate or prohibit the destruction of other ground or surface water by a water well (CRS 37-90-138). The State Engineer also has the power to ensure the proper construction, repair, and abandonment of such wells (CRS 37-91-101 to 112). However, the state has designated a number of groundwater basins. The responsibility for water wells in the designated areas rests with the Ground Water Commission (CRS 37-90-106). In conjunction with the State Engineer the Commission controls the construction of water wells in those areas (CRS 37-90-110).

The state has shown special concern in the area of disposal wells. The Water Quality Control Commission has adopted "Rules and Regulations for Subsurface Disposal Systems," but the enforcement authority is not clearly designated.

The Oil and Gas Conservation Commission, in "Rules and Regulations," No. 331, requires that any exploratory hole be plugged in a manner preventing the migration of substances from one stratum to another.

Current status. Groundwater is an important source of water supplies throughout Colorado. In the Colorado River Basin it is an important source of agricultural (on-farm) domestic water, although inadequate to meet large-scale requirements. Most of the area's groundwater has a generally higher concentration of dissolved solids

than the available surface water.⁴ Throughout the state shallow aquifers have become polluted as usage increases.

To protect groundwater supplies the Water Quality Control Commission is attempting to institute a groundwater monitoring program. The program would include an inventory of existing wells, potential sources of pollution and an evaluation of existing quality. Thus far insufficient funds are available for a quality protection program.⁵

Potential feasibility. For the time being the major activity of the state will be in the controls over construction of wells in designated areas, over wells for subsurface disposal, and over drill holes. Until more technical information on quality problems becomes available, the state feels it is taking appropriate action. The State Engineer would probably benefit from increased manpower, and from a policy or statutory direction to plug all contaminating water wells.

Thus, the major problems in Colorado fall in the areas of personnel and a possible need for more authority.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|-----------------------|
| Legal | | X | |
| Political | X | | |
| Administrative | | X | |

⁴ U.S. Department of Interior, Bureau of Reclamation, Water for Tomorrow: Colorado State Water Plan, Phase I, February 1974. pp. 3.16, 3.17.

⁵ Colorado, Water Quality Control Division, FY 1975: Report to the Water Quality Control Commission, Denver, 1975.

NEVADA--Action #4

Agency responsible and legal authority. Since 1913 Nevada has vested groundwater responsibility in the Office of the State Engineer. This includes full authority over water wells, from appropriation (NRS 533.325 to 533.435) to the repairing or sealing of defective wells (NRS 534.060). All water wells must be drilled by licensed drillers who keep logs of the geologic formation the well penetrates (NRS 534.170). In addition there is a legislative intent that wells be constructed and maintained in a manner to prevent waste or pollution of underground water (NRS 534.020).

Current status. As is common throughout the Colorado River Basin states, groundwater is a valuable source of water supplies to residents of Nevada. Saline groundwater is a particular problem in the Las Vegas Wash; and while not attributable to wells, illustrates the severe problems which can be caused by contaminated groundwater if seepage pollutes surface water or return flows.

Potential feasibility. The State of Nevada is particularly aware of its groundwater resources and has vested extensive authority in the State Engineer. However, there is little specificity in the rules, regulations and statutes regarding abandoned wells, and they appear to be silent on the subject of exploratory wells and drill holes. The State Engineer would probably benefit from increased manpower and improved legislative policy direction, but the costs for such improvements have not been estimated.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | | X | |
| Political | X | | |
| Administrative | | X | |

Because of the apparent statutory silence in two important areas, this action is of dubious feasibility in Nevada.

NEW MEXICO--Action #4

Agency responsible and legal authority. The New Mexico State Engineer has full authority over water wells. He issues permits to drill wells, along with concurrent rules and regulations (NMSA 75-11-13). In addition it is his responsibility to issue and enforce rules and regulations concerning the construction, capping and plugging of wells, and to prevent waste of groundwater above or below the surface (NMSA 75-12-4 through 8).

Current status. To explain and enforce the statutory obligations concerning groundwater, the State Engineer has issued "Rules and Regulations Governing Drilling of Wells and Appropriation and Use of Ground Water in New Mexico" (1966). These rules include standards and specifications on well construction, casing, cementing, repair and plugging (4-13 through 4-19.1). In addition, New Mexico's State Engineer has provided rules and regulations for test or exploratory wells which might encounter groundwater or affect the strata (4-20 through 4-22).

Potential feasibility. These comprehensive rules and regulations concerning water and exploratory wells are being enforced. Therefore, no further action, other than a possible increase in personnel, is recommended in New Mexico.

Agency responsible and legal authority. Utah assigns responsibility for water wells to the Office of the State Engineer (UCA 73-2-1). He is authorized to "plug, repair, or to otherwise control artesian wells which are wasting public water . . .," and to plug abandoned wells at state expense (UCA 73-2-21). The State Engineer also exercises control over well drillers (UCA 73-3-22), and issues permits to drill subject to compliance with the published rules and regulations (UCA 73-2-25). The Division of Oil, Gas and Mining requires the plugging of exploratory drill holes in Rule C-12, authorized by URS 40-6.

Current status. The state recognizes the importance of groundwater quality, aquifer protection, and the need for determining recharge rates. To this effect the State Engineer has an ongoing program which tests and licenses well drillers, plots the location of new wells, and repairs or seals wasting wells.⁶ The Division of Oil, Gas and Mining also has an active enforcement program.

Potential feasibility. There is widespread recognition in Utah of the potential effects of abandoned wells of any type. Such wells are sought out on a regular basis as an integral part of the ongoing water, oil and gas well control program. The only possible need for additional action in Utah might be an increase in personnel funding to more thoroughly control new wells, and to more vigorously seek out abandoned wells. However, no specific action is recommended for Utah.

⁶Utah, Department of National Resources, Division of Water Rights, "Thirty-ninth Biennial Report: 1972-1974." Salt Lake City, 1974, p. 6.

WYOMING--Action #4

Agency responsible and legal authority. The Wyoming State Engineer has the general authority to implement the state's policy over underground water, including requiring reports from well drillers. This authority extends to establishing standards for well construction, requiring capping of flowing wells, preventing above or below ground waste, and abating or sealing any well polluting underground water (WSA 41-126). WSA 35-502.22:1 authorizes the Administrator of the Division of Land Quality to enforce the sealing, capping or plugging of drill holes.

Current status. As in all of the Colorado River Basin states, Wyoming recognizes the need to preserve and protect its groundwater resources. Although insufficient technical data are available on supplies, aquifer make-up and recharge rates, the state is enforcing "Minimum Water Well Construction Standards," and is designating "control" basins as information becomes available. There is a bill concerning groundwater production before the current legislature, and exploratory wells were controlled by statute this year (1977). The State Engineer is also trying to get statutory authority to license water well and pump installation contractors.

Potential feasibility. There seems to be sufficient authority to control contamination from both working water wells and abandoned water wells. The State Engineer would probably benefit from increased manpower.

The collection of technical data concerning groundwater seems to be imperative, and will require an undetermined amount of study funding.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | X | | |
| Political | X | | |
| Administrative | | X | |

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|--|---|--|---|---|--|---|--|
| 4. Require minimum standards for water well construction, and require plugging of abandoned water wells and exploratory drill holes, to avoid contamination of groundwater strata. | ARS 45-3 State Land Department can designate critical groundwater areas. ARS 45-317 Conditions for well construction to obtain permit to drill. ARS 45-319.A Waste of groundwater prohibited. Wells must be capped or equipped with shut-off valves. No leaky casing, or lack of casings, pipes, fittings, valves or pumps to allow waste. Drill holes must be plugged as determined by the Oil and Gas Conservation Commission. <i>Specific</i> | WC 231, 13800, 13801, 13802, 13803, 13804 The Water Code requires the Dept. of Water Resources to set standards and transmit them to the Regional Water Quality Control Boards for examination. The Regional Boards then submit the standards to the affected cities and counties. If the city or county does not act in 120 days, the Regional Board may enact the standards. <i>Specific</i> | CRS 37-90-137, 138 CRS 37-91-101 to 112 The State Engineer issues permits for construction, and prohibits waste of or contamination by groundwater. He also ensures proper construction, repair and abandonment of flowing wells. CRS 37-90-106, 110 The Groundwater Commission controls and regulates wells in designated basins, including construction. The Water Quality Control Commission regulates subsurface disposal wells. Drill holes must be plugged re: Oil and Gas Commission rules. <i>Specific</i> | NRS 533.325 to 533.435 State Engineer has authority over groundwater; from appropriation, designating basins, to wells. NRS 534.060 Can demand or enact repairs on defective wells. NRS 534.170 Well drillers must be licensed and keep log of geologic information. NRS 534.020 Waste of groundwater or pollution is prohibited. <i>Specific</i> | NMSA 75-11-13 NMSA 75-12-4 through 8 The State Engineer has full authority over water wells. He issues permits to drill, rules and regulations for construction and plugging, and is empowered to prevent waste above or below the surface. The rules and regulations include groundwater wells, artesian wells, and exploratory wells. <i>Specific</i> | UCA 73-2-1, 73-2-21 The State Engineer has control over all water, including wells, and has authority to plug or repair artesian wells wasting water, and to plug abandoned wells. UCA 73-3-22, UCA 73-3-25 The State Engineer issues licenses for well drillers and permits, subject to rules and regulations, for the drilling of water wells. The Division of Oil, Gas & Mining controls exploratory wells under UCA 40-6. <i>Specific</i> | WSA 41-126 The State Engineer requires reports from well drillers, establishes standards for construction, requires capping of flowing wells, prevents water waste above or below ground, and can abate any condition or seal any well polluting underground water. WSA 35-502.22:1 authorizes Land Quality administration to seal, cap or plug drill holes. <i>Specific</i> |
| | IRrigation wells controlled or not allowed in critical groundwater areas. Anti-waste statute enforced to the degree believed possible. Critical groundwater areas are being designated when necessary. | Standards have been issued and are being implemented regionally as conditions permit. | Regulations are being enforced. Funds being sought for monitoring program. | Statutes and "Rules and Regulations for Drilling Wells" are being enforced. | Statutes and the "Rules and Regulations Governing Drilling of Wells . . ." are being enforced. | Statutes and rules and regulations are being enforced. | Statutes and rules and regulations are being enforced. |
| | Expansion of critical areas possible. More manpower possible to improve enforcement. Water Quality Control could take a hand in protecting municipalities as to water quality. May need enforcement in area of exploratory wells. | Action is underway, no further intervention is necessary in the Colorado River Basin. | Action is generally underway. More technical data are needed before determination of necessity for more action, including area of exploratory wells. More enforcement personnel are needed. | Action is underway. May need more specific rules and regulations regarding abandoned wells. Need some specificity concerning exploratory wells, and stronger enforcement. | Action is underway. May need more enforcement personnel, but no intervention is recommended. | Action is underway. May need more funding for enforcement. However, no intervention is recommended. | Need for manpower. Need to accumulate sufficient technical data to determine control areas, better well standards, etc. |

5. *To reduce salinity from agriculture, use irrigation return flow in nonagricultural areas; e.g., for power plant cooling. Utilize energy facility siting procedures to encourage the location of energy facilities in areas where the water requirements of such facilities could be met utilizing saline and other low quality waters.*¹

Background of the action. Depending on local conditions, power plant siting regulations could be used to reduce the salinity level of the Colorado River in that such regulations could require power plants (as well as coal gasification and liquifaction plants, etc.) to locate near sources of saline water. There are, obviously, numerous locational factors which influence energy facility siting decisions.² To reduce the salinity loading characteristics of the Colorado River Basin, proximity to and availability of saline water needs to be considered as a locational factor. Other locational factors being roughly equal, it would be appropriate to locate energy facilities in such a way as to utilize available sources of saline water.

Once established, saline water would be used to meet the water needs of the energy facility. This would keep such water from

¹Although analogous to the proposed action in providing for the consumptive beneficial use of low quality waters, coal slurry pipelines utilizing such waters are not included. The proposed implementation of a coal slurry system was determined not to meet the selection criteria listed in Chapter IV, because the structural and legal obstacles which would have to be overcome (e.g., statutes prohibiting export of water from a state, basin of origin doctrines, appurtenancy doctrines and other restrictions on the transferability of water rights) caused the action to be considered infeasible, at least at the present time.

²See generally: Norman Wengert and Robert M. Lawrence, Regional Factors in Siting and Planning Energy Facilities in the Eleven Western States, Fort Collins: Report to the Western Interstate Nuclear Board, November 1976.

entering the stream system, and would substitute for the use of higher quality water which otherwise would be removed from the stream system.

The prospect of large-scale energy development has motivated some Colorado River Basin states to develop energy planning and energy research policies. The fact that such policies in the states of the study region consider environmental, economic and social aspects of energy development indicates that the development of facilities to utilize saline waters is, at the very least, a promising possibility.

ARIZONA--Action #5

Authority. Plans for proposed energy facilities in Arizona must be submitted to the Power Plant and Transmission Line Siting Committee (ARS 40-360.02). This committee was established under and is responsible to the Arizona Corporation Commission. In its consideration of a proposed energy facility site, the siting committee is required to consider numerous factors including the total environment of the area affected, the technical practicability of the proposed facility, and other factors which may arise under either state or federal law (ARS 40-360.06.A).

The Arizona Power Authority, however, has the responsibility to develop comprehensive plans for electric power under its jurisdiction (ARS 30-123.A). Specifically, the Power Authority is to work toward the inauguration, construction and operation of new projects (ARS 30-122.A). The Power Authority is administered by the Arizona Power Commission.

Finally, the State Fuel and Energy Office, which was established by executive order, has the responsibility for considering the effects of energy development on agricultural production. The Fuel and Energy Office has broad authority to conduct investigations into total social and economic costs of energy development in Arizona.³

Current status. The Power Plant and Transmission Line Siting Committee functions primarily in response to the needs of the energy companies. If neither the siting committee nor the

³Arizona, Office of the Governor, Executive Order 75-1.

Arizona Corporation Commission approves an application within two months of its submission, construction can begin without such approval.⁴ The energy companies presenting applications to the siting committee choose the sites to be presented. The intended sites (as well as alternatives) are selected by the energy developers. The siting committee functions primarily with a "veto" power over private sector decision-making. Since all preliminary work is done by the energy companies, actual involvement of the siting committee in planning leading to an application for approval of a specific site is minimal.⁵

Functioning of the committee is further hampered by the fact that the committee does not have its own staff.⁶ Staff responsibilities are shared by the state agencies whose representatives comprise the committee. Finally, decisions of the committee can be altered by the Arizona Corporation Commission.⁷ In practice, the absence of both staff resources and real (i.e., enforceable) authority have negated much of the impact that the committee could have had regarding power plant siting in Arizona.⁸

⁴Wengert and Lawrence, Regional Factors in Siting, p. II-25.

⁵Ibid., p. II-28.

⁶Ibid., p. II-25.

⁷Ibid., p. II-26.

⁸Ibid., p. II-29.

Potential feasibility. Both the Arizona Corporation Commission and the Power Plant and Transmission Line Siting Committee can modify applications regarding proposed sites.⁹ In considering such applications, water is seen as a key variable.

The siting committee, however, has limited authority. Questions have been raised as to whether the siting committee can enforce the decisions and stipulations that the committee has made regarding a specific siting application.¹⁰ This lack of authority is shared by the corporation commission with regard to Indian lands. Neither agency appears to have enforceable authority regarding the siting of energy facilities on Indian lands.

The feasibility of the proposed action is brought into question by the strict appurtenancy of water to specific lands that arises under Arizona water law.¹¹ Water rights can be transferred for use other than for irrigation if the water can no longer be economically or beneficially used on the original lands. The procedure is much more restrictive than in those states which do not have a strict appurtenancy doctrine.¹²

The feasibility of the proposal may also be inhibited by the general rule that downstream junior appropriators can rely on

⁹Ibid., p. II-26.

¹⁰Stanford Western Energy Policy Study, Power Plant Siting in the Southwest: A Context for Decisions, Stanford University: Graduate School of Business, October 12, 1976, pp. 23-24.

¹¹George E. Radosevich and Gaylord V. Skogerboe, Irrigation Return Flow Quality Control Through Improved Legal Systems, Fort Collins: Resources Development and Administration, Inc., April 1977 (draft report), p. VI-8.

¹²Ibid., p. VI-22.

return flows as a source of their water rights.¹³ In Arizona, the rule seems to be that a downstream junior appropriator cannot compel an upstream user to continue wasteful practices.¹⁴ It is open to question whether this precedent applies to altered uses which alter downstream return flow patterns. The rights of senior appropriators to enjoin changes in use, and to be compensated for damage resulting from such changes, is an established aspect of the property right concept of western water law.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | | X | |
| Political | | X | |
| Administrative | | X | |

In the final analysis, the Arizona Power Plant and Transmission Line Siting Committee has limited authority to implement the proposed action. Both the siting committee and the corporation commission, moreover, have been seen as being both pro-development and a "promoter of growth."¹⁵ If true, policies which could significantly increase costs to the energy industry are unlikely to be adopted.¹⁶

¹³Ibid., p. VI-34.

¹⁴Ibid.

¹⁵Wengert and Lawrence, Regional Factors in Siting, pp. II-27, 28.

¹⁶Stanford Western Energy Policy Study, Power Plant Siting, p. 24.

CALIFORNIA--Action #5

Authority. The State Energy Resources Conservation and Development Commission (the Energy Commission) has jurisdiction over the location of energy facilities in California (Pub. R. Code 25000). Exceptions to this grant of jurisdiction concern the location of power plants in coastal zones and air quality requirements of proposed facilities. When coastal zone proposals are made, the Coastal Zone Conservation Commission must agree to the proposed site. Air pollution requirements are a function of the Air Pollution Control Districts. The Energy Commission is required by law to consider alternate sites to those proposed by energy development concerns as power plant sites (Pub. R. Code 25512). The Commission is also empowered to develop those rules and regulations which it perceives as being necessary (Pub. R. Code 25218 [e]).

Finally, the Commission has the authority to conduct siting studies concerning specific sites, formulate energy development policies and investigate other topics of particular statewide importance (Pub. R. Code 25216[c]). In general, it would appear that the State Energy Resources Conservation and Development Commission has ample authority to implement the proposed salinity control measure.

Current status. The Energy Commission was established in January 1975. Its general authority extends to include forecasting energy needs and demands, evaluation and certification of proposed sites and designs, evaluation and promotion of new generation and conservation techniques, implementation of conservation measures and preparation of a biennial report to the governor and legislature on state

policy needs. At present, however, the newness of the Energy Commission and its lack of experience under relevant enabling legislation prevents a thorough analysis of Energy Commission operations.¹⁷ In fact, the first siting case came before the Energy Commission in August 1976.¹⁸ The newness of both the Energy Commission and the siting processes being developed have been seen as constituting "one of the largest sources of uncertainty to California utilities attempting to make long-range plans."¹⁹

Concerning implementation of the proposed action, the Energy Commission has developed a list of 77 screening factors which are to be considered in evaluating sites for proposed energy facilities. Number 58 of the list is "Areas of Substantial Waste Water Availability."²⁰ The significance of the availability of wastewater is an issue which the Energy Commission seems to view as being one of regional or local importance.²¹

In discussing the importance of the availability of wastewater as a locational factor in energy facility siting, the Energy Commission referred to "The California Water Plan--Outlook in 1974." This report, prepared by the Department of Water Resources, stressed the promising

¹⁷Wengert and Lawrence, Regional Factors in Siting, p. II-10.

¹⁸Ibid.

¹⁹Stanford Western Energy Policy Study, Power Plant Siting, p. 18.

²⁰Facility Siting Division, California Energy Commission, Biennial Report, Power Plant Siting Report, November 1976, p. II-9.

²¹Ibid.

potential of the use of wastewater for use by energy facilities.

The Energy Commission commented:

Because of the increasing demands being placed on freshwater sources in California, more attention is being focused on the use of wastewater wherever appropriate. According to the Department of Water Resources, reclamation of wastewater for power plant cooling constitutes one of the most promising potential sources of water, especially in areas where it is now being disposed of into the ocean. A conservative estimate is that reclamation projects will probably provide about one million acre-feet of "new" water in California by 1990. Coincidentally anticipated power plant needs for cooling water in 1991 have been estimated of 1.1 million acre-feet.²²

The Palo Verde Valley and the Yuma Valley are the only two areas of California where return flows reenter the Colorado River. The proposed Sundesert nuclear power plant is designed to utilize irrigation return flow from the Palo Verde drain as a source of cooling water. If this is done, the consumptive water needs of the plant (17,000 acre-feet per year) would reduce the salinity level of the Colorado River by 6-8 ppm. This water is to be obtained from the Metropolitan Water District of Southern California.²³ A second unit, the 17,000 acre-feet of water requirement of which will be met by retiring 3,000 acres of poor quality agricultural lands, is currently being developed.

²²Ibid., p. II-19. The priority of water use for cooling is: (1) ocean water, (2) wastewater, and (3) low quality irrigation return flows. Since power plants must be located away from fault zones (e.g., near the coast where both ocean water and wastewater from existing population centers are available) the priority of use shifts to low quality irrigation return flows.

²³Interview with John H. Lauten, General Manager, Metropolitan Water District of Southern California, Los Angeles, California, November 29, 1976.

Potential feasibility. The potential feasibility for effectively implementing the proposed action is a function of three factors: (1) the availability of an adequate supply of water through exchange agreements with water contractors; (2) the relationship of the Energy Commission to other state agencies and the federal government; and (3) California water law.

In the Colorado River Basin portion of California, because the state's full apportionment of water has been contracted, the feasibility of siting power plants so as to use agricultural drainage water is dependent on obtaining an adequate water supply through exchange agreements with water contractors. The June 1975 policy of the State Water Resources Control Board on the use and disposal of inland waters used for power plant cooling influences the location of power plants. In the case of the Sundesert nuclear power plant, for example, the necessary water was made available through an exchange agreement with the Metropolitan Water District of Southern California.

The relationship of the Energy Commission to other state agencies is an issue which may affect the potential feasibility of the proposed action. At present, the jurisdictional relationship of the Energy Commission to other state agencies has not been fully determined. Beginning in 1975, the state Air Resources Board has been involved in power plant siting decisions. This involvement has resulted from the establishment of air quality standards which may not allow certain industries in specific areas. These quality standards are so stringent, some have argued, that it would be impossible for a coal-fired power plant to locate anywhere near load

centers existing in southern California.²⁵ This is of critical importance in that the Supreme Court of California has held that Air Pollution Control Districts, under the general state supervision of the Air Resources Board, can prohibit the construction of a power plant even though the state Public Utilities Commission had granted a permit.²⁶

Both the Coastal Zone Conservation Commission and the State Water Resources Control Board are also involved in power plant siting decisions. Policies of these two agencies may encourage the inland location of power plants designed to utilize wastewater to meet operating water requirements. Numerous jurisdictional questions, however, may have to be resolved before the Energy Commission would be able to implement the proposed action. Uncertainties regarding the authority of different state agencies must be clarified either through legislative revision or through judicial intervention.

A final issue bearing on the potential feasibility of the proposed action in California is state water law. California appears to be a "limited attachment" state regarding the appurtenancy of a water right to specific lands.²⁷ This would seem to allow water rights to be transferred to different lands and uses providing that

²⁵Ibid., p. 22.

²⁶Ibid., p. 21. See specifically Orange County APCD v. PUC, 4 Cal. 3d. 945, 484 P. 2d 1361 (1971).

²⁷Radosevich and Skogerboe, Achieving Irrigation Return Flow Quality Control, p. VI-22.

proper "measures and adjustments" are made to prevent the impairment of the rights of other water right holders.²⁸

The transferability of a water right may, however, be restricted by both a county of origin doctrine and the Watershed Protection Act of 1933. Under these doctrines, the inhabitants of a county or basin have the authority "to reclaim water in the future if needed from noncounty or basin uses."²⁹ The rights of senior water appropriators to receive the full measure of their water rights is a well established doctrine in western water law. As regards reliance on the irrigation return flows, courts have generally held that junior appropriators can rely on such return flows and may protect their rights in such sources.³⁰ Such restrictions on transferability may affect the implementation of the proposed action.

The Metropolitan Water District Act (§ 131), however, allows the District to sell water outside its boundaries and to exchange water (specifically brackish wastewater and irrigation return flows) to encourage the use of low quality water in power plant cooling. This authority is the basis for the exchange between the Metropolitan Water District and San Diego Gas and Electric which will meet the water needs of the Sundesert nuclear power plant.³¹

²⁸ Ibid

²⁹ Ibid., p. VI-33.

³⁰ Ibid., p. VI-34.

³¹ Interview with John H. Lauten, loc. cit.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | | X | |
| Political | | X | |
| Administrative | X | | |

COLORADO--Action #5

Authority. Colorado has not enacted energy facility siting legislation. At present, permits for the construction of new facilities are issued by several different state and county agencies. These permits are discussed more fully in the following section.

Current status. At least eight different state and county agencies have been identified as being in the approval process prior to the construction of energy facilities. The Public Utilities Commission must issue a certificate of public convenience and necessity prior to either the construction of new facilities or the extension of existing facilities. The Air Pollution Control Commission, as a part of the Department of Health, must issue a permit for any new air contamination source. The Water Quality Control Commission, also in the Department of Health, administers a permit system to regulate the discharge of pollutants into state waters. The State Engineer's Office, a part of the Department of Natural Resources, approves all dams required by industrial facilities if they store over 1,000 acre-feet of water or require a dam higher than ten feet. If the proposed facility is designed to utilize groundwater, the Ground Water Commission, also a part of the Department of Natural Resources, must issue a pumping permit. Water courts in the different water divisions of the state must, via an adjudicatory process, allocate surface waters for use in the proposed facility.³²

The State Land Use Commission becomes involved in the process if specific issues are referred to it by a political subdivision of

³²Wengert and Lawrence, Regional Factors in Siting, pp. II-74-76.

the state (e.g., local governments, municipalities, counties, etc.). Such a referral is based on a determination by the local subdivision that the proposed facility falls within an area of state interest. Also on a local level, the various Boards of County Commissioners have authority regarding numerous energy facility siting considerations (e.g., zoning, solid waste disposal, etc.).³³

Potential feasibility. There are relatively few areas in Colorado where saline waters and fuel resources (e.g., coal or oil shale) exist near each other so the practicality of the action is limited.

It is apparent from the fragmented, multiple-permit process existent in Colorado that initial siting decisions are made in the private sector prior to public evaluation of the proposal. This type of system is not conducive to implementation of the proposed action in that public officials retain only "veto" authority. Though such authority could be used to encourage specific energy facility sites, all initial planning remains a function of private energy corporations.

Current emphasis on local decision-making would also inhibit implementation of the action. In a recent action, county officials were not willing to identify a proposed power plant site as an area of state interest.³⁴ Consequently, the State Land Use Commission did not take any action on the proposal. According to local officials, county-level rezoning and "special use" permit requirements were adequate to control power plant siting and construction.³⁵ This type of attitude, which seems to perceive energy facility siting as being

³³Ibid.

³⁴Richard J. Schneider, "Delay in Starting Pawnee Plant is Rejected," Rocky Mountain News, April 9, 1977, p. 32.

³⁵Ibid.

primarily local in nature, would also not be conducive to implementation of the proposed action.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | X | | |
| Political | | | X |
| Administrative | | | X |

NEVADA--Action #5

Authority. Authority regarding energy policy planning and facility siting is divided in Nevada between the state Energy Resources Advisory Board and the Public Service Commission. The Energy Resources Advisory Board is charged with the responsibility of developing both a state energy policy (NRS 523.070[1]), and long-range plans to minimize the environmental impacts of energy development (NRS 523.070[4]). The Advisory Board is directed to cooperate with other state planning agencies regarding the development of the state's energy resources (NRS 523.080).

Prior to the construction of an energy facility, "e.g., . . . any plant or equipment within this state used directly or indirectly for the generation and transmission of electrical energy . . ." (NRS 704.855[2]), a permit must be obtained from the Public Service Commission (NRS 704.840). Applications must include alternate sites for the proposed facility and an analysis of the environmental advantages and disadvantages of both the proposed site and alternate sites (NRS 704.870[1][d]).

Permits issued by the Public Service Commission may be conditioned "as the commission may deem appropriate" (NRS 704.890[1]). The State Environmental Commission is required to review all applications presented to the Public Service Commission regarding proposed energy facilities (NRS 704.875).

Current status. The Public Service Commission cannot grant an application for approval of a specific facility site without first determining that the proposed facility is actually needed, that

adverse environmental impacts have been minimized, that the proposed facility is in conformity with state and local laws, and that construction of the facility is in the public interest.³⁶ It is of interest to note that the Public Service Commission, pursuant to the granting of a permit, can require a utility to produce for Nevada "an amount of electrical energy equal to or less than the amount exported, as the Commission may prescribe" (NRS 704.892[2]).

Unfortunately, certain energy facilities are exempt from the permit procedure of the Public Service Commission. Facilities for which permits were applied for prior to July 1, 1971, are exempt, as are facilities for which permits were granted prior to that date (NRS 704.865[3][a] and [b]). Furthermore, facilities for which a utility ". . . has incurred indebtedness to finance all or part of the cost" of construction are also exempt (NRS 704.865[3][6]). Depending on the policies developed by the Public Service Commission, this "debt incurred" exemption may well cover a majority of present and future energy facilities.

Nevada currently uses sewage effluent for electric power plant cooling. Permits issued by the State Engineer provide for increased usage in the future, thereby reducing salt contributions and saline return flows to Lake Mead via Las Vegas Wash.

Potential feasibility. The Public Service Commission has the requisite authority to implement the proposed action. This would be especially true were the proposal incorporated into the state energy plan being developed by the state Energy Resources Advisory Board. Implementation of the proposed action is, therefore, a function of the internal policies of the Public Service Commission. The only foreseeable hinderance is the broad exemption for energy

³⁶Wengert and Lawrence, Regional Factors in Siting, p. II-71.

facilities for which the utility has incurred a debt. Such exemptions may inhibit implementation of the proposal.

The potential feasibility of the proposed action may also be inhibited by the nature of western water law. Before the action could be implemented, questions concerning the transferability of a water right (e.g., basin of origin doctrines, appurtenancy, etc.) and potential injury to downstream users (both junior and senior) must be answered.

Nevada has a strict rule inhibiting the transfer of a water right.³⁷ Such a strict appurtenancy doctrine, which ties water rights to specific lands,³⁸ would substantially interfere with implementation of the proposed action in that low quality water could not be transferred to energy facility locations.

The property right nature of a water right and the right of downstream senior appropriators to recover if this right is interrupted is well established. Regarding the rights of junior appropriators, courts have ruled that "junior appropriators may rely upon . . . return flows" and may protect their rights to this water source.³⁹ These rights may inhibit implementation of the proposed action by allowing existing appropriators to restrict (via injunctive relief) changes in water use patterns adversely affecting them. Since any

³⁷Radosevich and Skogerboe, Achieving Irrigation Return Flow Quality Control, p. VI-22.

³⁸Ibid.

³⁹Ibid., p. VI-34.

change in existing use patterns will affect downstream users, the potential feasibility of the proposal may be substantially diminished.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | | | X |
| Political | | X | |
| Administrative | X | | |

NEW MEXICO--Action #5

Authority. Two state agencies have specific responsibilities concerning the siting of energy facilities in New Mexico. Both the state Energy Resources Board and the Public Utilities Commission are directly involved in siting decisions. Numerous other state agencies may be involved indirectly depending on the nature of the specific siting application (e.g., State Engineer for a water use permit, Water Quality Control Commission, Environmental Improvement Agency concerning air quality standards, Coal Surfacemining Commission for general mining plans).⁴⁰

The Public Utilities Commission (PUC) has the authority to supervise the location of energy facilities. In general, the PUC must approve proposed energy facilities unless they are in conflict with either air or water pollution control standards. The PUC has the authority to override local authorities in issuing permits for energy facility construction (NMS 65-7-1.2ff).

The state Energy Resources Board is authorized to establish goals and priorities for state funded energy research and development (NMS 65-12-7[H]) and to work in conjunction with other state agencies in developing state energy policies (NMS 65-12-7[I]). The Board is empowered to determine state siting policies (NMS 65-13-8[A][3]) and may use state funds to construct specific facilities (NMS 65-13-8[B][3]).

It is possible, although uncertain, that the Energy Resources Board and the Public Utilities Commission, if operating together, would have

⁴⁰Energy Resources Board, State of New Mexico, A State Energy Plan for New Mexico, Santa Fe, January 1977, p. 39.

adequate authority to implement the proposed action. At present, the jurisdictional limits of the authority of different state agencies is under study in New Mexico. The authority of the aforementioned state agencies to implement the proposal may be altered when one of the "possible solutions" proposed by the Energy Resources Board is adopted.⁴¹

Current status. The energy resources available in New Mexico have gained substantial importance in recent years because of an increased national awareness of energy needs. It has been alleged that New Mexico views itself in a position somewhat similar to the OPEC nations in that it is a small state whose energy resources are coveted by larger political entities.⁴²

At present, the multiplicity of jurisdictional claims affecting energy facility siting appears to be limiting the effectiveness of both the Public Utilities Commission and the state Energy Resources Board. The current system appears to be ". . . replete with jurisdictional gaps and diffused by fragmented and repetitive permit requirements."⁴³

It has been suggested that New Mexico's energy resources requirements will be met by removing water from irrigated agriculture. At present, it appears that energy interests are attempting to purchase existing agricultural water rights.⁴⁴ Those water rights granted

⁴¹Ibid., p. 40-43.

⁴²Wengert and Lawrence, Regional Factors in Siting, p. II-61.

⁴³Energy Resources Board, A State Energy Plan, p. 39.

⁴⁴Interview with Eileen Grevey, Federal-State Liaison Board, Energy Resources Board, Santa Fe, New Mexico, July 21, 1976.

New Mexico under the Compact have not, however, been fully developed. At present, New Mexico is using only one-fourth to one-half of its 730,000 acre-feet allocation under the Compact.⁴⁵ It would not appear that agricultural water would need to be diverted until these unallocated waters are developed. After that time, however, the impact of return flows and other low quality water sources could encourage the implementation of the proposed action.

It has been suggested that the water needs of energy development could be met through a water/energy exchange agreement between New Mexico and California. Under this proposal, New Mexico would divert a portion of California's water allocation in return for a commitment to supply California with the energy produced. The political feasibility of such a suggestion is open to question, however, and it does not appear to be an immediately viable possibility. Finally, it must be noted that the Governor's Energy Impact Task Force is considering the impacts of energy development on the salinity level of the Colorado River.

Potential feasibility. The potential feasibility of implementing the proposed action in New Mexico appears to be a function of both existing and proposed institutional structures relating to energy facility siting. As previously discussed, numerous state agencies have a "piece of the action." The Public Utilities Commission, for example, cannot

⁴⁵ Interview with Steve Reynolds, State Engineer, Santa Fe, New Mexico, September 9, 1976.

establish more stringent air and water quality standards than those promulgated by the Environmental Improvement Agency.⁴⁶

There do not appear to be restrictions (e.g., appurtenancy, basin of origin doctrine) on the transferability of water rights in New Mexico other than the traditional requirement not to impair the water rights of downstream users.⁴⁷ Such impairment would seem to include an interruption of the use of downstream junior appropriators of existing irrigation return flows.⁴⁸ This, when combined with the fact that a water right is conditioned by requirements of both beneficial use and good agricultural practices,⁴⁹ could inhibit implementation of the proposed action. An appropriator may not be able to transfer a water right of such an amount that a downstream user, regardless of junior or senior appropriator status, would be injured. If excess waters are a result of poor agricultural practices, the appropriator may not have a water right to transfer. In either situation, the potential feasibility of the proposed action may be substantially inhibited.

There is uncertainty that the proposed action could be implemented under the existing institutional authority of the State of New Mexico. There are proposals, however, to revise

⁴⁶Wengert and Lawrence, Regional Factors in Siting, pp. II-60 to II-61.

⁴⁷Radosevich and Skogerboe, Achieving Irrigation Return Flow Quality Control, pp. VI-21 to VI-22, VI-33 to VI-34.

⁴⁸Ibid., p. VI-34.

⁴⁹Ibid., p. VI-8.

the facility siting procedures in order to develop a "one-stop" (single permit) siting authority.⁵⁰ If such a procedure were developed, implementation of the proposed action could be more easily facilitated.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|-----------------------|
| Legal | X | | |
| Political | X | | |
| Administrative | X | | |

If Action 5 is, or becomes, legally feasible in New Mexico, there remain questions as to its economic feasibility. Transport of saline waters to energy facilities, or the alternative of relocating facilities near such waters, both may involve additional expense. Use of saline waters also will involve additional treatment costs.

⁵⁰Energy Resources Board, A State Energy Plan, p. 43.

UTAH--Action #5

Authority: Prior to 1977, Utah did not have power plant siting legislation. Because of the lack of a comprehensive siting policy, power plant siting decisions were largely made by energy developers. The State's role was primarily one of a "veto" authority in that a number of permits from different State agencies were required before construction could begin.

Section 63-53 of the Utah Code established the Energy Conservation and Development Council, which officially began operation April 1, 1977. The Council primarily prepares recommendations on State energy policy for consideration by other agencies. Among the statutory functions and duties of the Council are:

(d) To develop criteria for consideration by state agencies in the formulation of rules and regulations and standards and in the granting or disallowing of permits for energy resources development projects;

(f) Examine the feasibility and desirability of establishing energy corridors and energy transmission corridors and, if such corridors are feasible, to make recommendations and assist state agencies and local governments in the establishment of these corridors;

(j) To develop and recommend energy policy to the governor and to the legislature.

In Utah, three State agencies in addition to the Energy Council are directly involved in siting: the Water Pollution Committee (Division of Health), the Air Conservation Committee (Division of Health), and the Utah Public Service Commission.⁵¹ If an energy company has rights to adequate water to meet performance requirements, at least three permits are required; one from the Water Pollution Committee (for wastewater

⁵¹Wengert and Lawrence, Regional Factors in Siting, p. II-72.

facilities), one from the Air Conservation Committee and one from the Utah Public Service Commission.⁵² Advanced approval of plans also must be obtained for drinking water facilities and solid waste disposal.

Current Status: Although the Energy Conservation and Development Council is new, other state agencies consider it likely to be an effective organization, and expect that its recommendations will be supported by other State officials.

It has been suggested that Utah encourages development of the State's energy resources.⁵³ Thus, it would seem, as in other states, that restrictions and policies which would heavily burden the public utilities industry would not be acceptable as long as environmental impacts are adequately addressed. Some transfers of low quality water for energy development, specifically for use by Utah Power and Light, have been accomplished.⁵⁴

Potential Feasibility: Water, both quantity and quality, is but one factor in the power plant siting decision. Although the Energy Conservation and Development Council could conceivably recommend a location or water supply system based on minimizing salinity impacts, it is doubtful that this would be the controlling consideration. In Utah, water quality considerations and the economics of agriculture and power plant cooling make it more likely that power companies would purchase water rights from agriculture,

⁵²Stanford Western Energy Policy Study, Power Plant Siting, p. 27.

⁵³Interview with Dan Lawrence, Utah Division of Water Resources, Salt Lake City, Utah, July 15, 1976

⁵⁴Ibid.

rather than use agricultural return flows. At many sites, this will also reduce the leaching of salt from irrigation of marginal land.

The feasibility of the action could be restricted by certain water law doctrines in Utah. While there do not appear to be specific restrictions on the transferability of a water right, it has been held that downstream junior appropriators can rely on irrigation return flows.⁵⁵ The court specifically held that such appropriators could protect their rights in such sources of water.⁵⁶ In the Colorado River Basin in Utah, however, such re-use conflicts would not be common.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | | X | |
| Political | X | | |
| Administrative | X | | |

⁵⁵Radosevich and Skogerboe, Achieving Irrigation Return Flow Quality Control, p. VI-34

⁵⁶Ibid., See specifically East Bench Irrigation Co. v. Desert Irrigation Co., 2 Utah 2d. 1970, 271 p. 2d 449 (1954).

Authority. Passage of the Wyoming Industrial Development and Siting Act in March 1975, created a state Industrial Siting Administration with an Industrial Siting Council appointed by the governor. Under the enabling legislation, industrial facilities are defined as including energy generating facilities (WS 35-502.76[6]). Prior to the construction of an energy facility, a permit must be obtained from the Industrial Siting Council. This permit must contain a specification of the location of the facility. This location is to be determined by the applicant after taking environmental and water factors, as well as the compatibility of the proposed site with land use plans, into consideration (WS 35-502.81). Studies regarding specific sites must include water resource impacts and cooling system requirements (WS 35-502.84). Finally, research regarding the impact of a proposed energy facility must be coordinated with other state agencies (WS 35-502.84). The Act applies only to 100 megawatt (or larger) conversion plants, synthetic natural gas plants producing more than 100 million cu. ft. per day, liquid hydrocarbon plants with a 50 million bbls/day capacity, of industrial plant developments exceeding 50 million dollars cost.

Passage of the Industrial Development and Siting Act has not resulted in the establishment of a "one-stop" permit process which industry spokesmen had advocated as a way of coordinating the number of different permits required. Because of this omission, an integrated approach to the consideration of power plant siting criteria, which may have encouraged the implementation of the proposed action, has not been developed.

Under the existing multi-permit system, the Public Service Commission must issue a Certificate of Public Convenience and Necessity. Air, water and other environmental pollution control permits must be

issued by the Department of Environmental Quality.⁵⁸ Both the Public Service Commission and the Department of Environmental Quality are exempt from agency review requirements for applications presented to the Industrial Siting Council.⁵⁹ The PSC and the DEQ conduct their own review procedures regarding specific applications made to them.

Current status. The existing permit system has been subject to numerous criticisms. The procedures of different permit-granting agencies have resulted in numerous jurisdictional ambiguities and varying timetables concerning specific applications.⁶⁰ The Industrial Siting Council has established a two-step permit process. The first step consists of the applicant showing why a certain site was selected, that all applicable laws have been complied with, and that there are no serious environmental or socioeconomic impacts. The Council can approve this application (with recommendations or changes) or proceed to the second step of the process. This occurs only if the applicant fails to satisfy step one requirements. This process has been the subject of some criticism.⁶¹

Currently, effective implementation of the proposed action could be frustrated by the fragmented, multi-jurisdictional nature of the siting and permit process in Wyoming. The Missouri Basin Power Project, for example, required approval from 23 different state

⁵⁸Wengert and Lawrence, Regional Factors in Siting, p. II-53.

⁵⁹Ibid.

⁶⁰Sue Kearns and Steve Hoke, Examination of Wyoming's Regulatory Permitting Process and Possible Alternatives, Cheyenne: Office of the State Planning Coordinator, August 1976, pp. 3-4.

⁶¹Ibid.

agencies in Wyoming.⁶² This type of process, as it currently exists, could preclude implementation of the proposed action unless one of the existing agencies chose to implement the proposal.

Potential feasibility. The potential feasibility of the proposed action could be limited by the nature of the permit process and by Wyoming water law. While different proposals have been developed to alter the existing, multi-permit process,⁶³ it is doubtful that future siting decisions will affect the Colorado River in that industrial and power plant sitings will more than likely occur in the eastern portion of the state.⁶⁴ At present the Industrial Siting Commission is too new to have developed policies regarding specific siting issues.⁶⁵

Wyoming has a strict appurtenancy doctrine regarding water rights.⁶⁶ This would inhibit, if not prevent, the transfer of a water right. Such a transfer would be necessary were the proposal to be implemented. There are, however, numerous statutory exemptions to this rule which may allow for implementation of the proposal.⁶⁷

⁶²Ibid., p. 1. See specifically Appendix, Item No. VI.

⁶³Ibid., pp. 9-48.

⁶⁴Interview with Dr. Blaine Dinger, Director, Industrial Siting Commission, Cheyenne, Wyoming, June 30, 1976.

⁶⁵Ibid.

⁶⁶Radosevich and Skogerboe, Achieving Irrigation Return Flow Quality Control, p. VI-8.

⁶⁷Ibid., p. VI-22.

The courts, generally, have held that junior appropriators have a right to existing irrigation return flows.⁶⁸ The Wyoming Supreme Court has ruled that an individual can capture and reuse wastewater on that individual's property.⁶⁹ However, such captured wastewater cannot be transferred to other uses on different lands unless a new appropriation is obtained.

In the final analysis, existing institutional and legal structures in Wyoming could severely restrict the feasibility of the proposed action.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | | X | |
| Political | | X | |
| Administrative | | X | |

⁶⁸Ibid., p. VI-34.

⁶⁹Ibid. See specifically Binning v. Miller, 55 Wyo. 451, 102 P. 2d. 54 (1940).

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|---|--|---|----------------------|---|--|----------------------|---|
| 5. Use irrigation return flow in nonagricultural areas; e.g., for power plant cooling. Modify power plant siting regulations to encourage location of power plants near saline water sources. | 30-122(A) Arizona Power Authority to work toward inauguration, construction and operation of new projects. 30-123(A) Authority to develop plans for electric power under its jurisdiction. 40-360.02 Plans for electric facilities must be submitted to the Power Plant and Transmission Line Siting Committee. 40-360.06(A)(6) Total environment of the area, (7) the technical practicality and (9) additional factors to be considered in certificate of environmental compatibility. Executive Order 75-1 State Fuel and Energy Office to consider effects on agricultural production. 41-506(c) Scientific and Technological Advisory Committee to advise Office of Economic Planning and Development regarding impact of technology on economic development. <i>Specific</i> | Pub. R. 800 Power plants to be located to enhance public benefits. State to study new methods of power plant siting to enhance public benefit. Pub. R. 801 Resource Agency to conduct such studies. Pub. R. 25000 Commission has exclusive authority for power plant siting. Pub. R. 25512 Commission to consider alternative sites. Pub. R. 25216 (c) State Energy Resources Conservation and Development Commission to research energy development, siting, and other topics of particular statewide importance. Pub. R. 25218 (e) Commission to adopt rules and regulations necessary. <i>Specific</i> | No specific statute. | 523.070 State energy resources advisory board to (1) develop a state energy policy and (4) develop long-range plans to reduce environmental impacts. 523.080 State energy resources advisory board to work with other planning agencies. 704.840 Permit from Public Service Commission required prior to construction of utility. 704.870 (1)(d) Application for permit to include alternate sites and analysis of advantages and disadvantages of all sites. 704.875 State Environmental Commission to review all applications. 704.890(1) Permit may be conditioned by the Public Service Commission. <i>Specific</i> | 65-12-7(H) State Energy Resources Board to establish goals and priorities for state funded research and development; (I) shall work with other agencies. 65-13-8(A)(3) Board to determine state siting policies and (B) (3) may use funds to construct facilities. 65-7-1.2ff Public Utilities Commission to supervise location of energy facilities. PUC must approve facilities unless in conflict with air and water pollution standards. PUC may override local zoning decisions. <i>Specific</i> | No specific statute. | 35-502.76(6) Industrial facility includes energy generating facilities. 35-502.81 Permit to locate to consider environmental factors and water supply as well as compatibility of facility with land use plans. Permits to be issued by the State Office of Industrial Siting Administration. 35-502.84 Studies for siting decisions to include water resource and impact and cooling system requirements. Research to be coordinated with other state agencies. <i>Specific</i> |

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|---|---|---|--|---|--|--|---|
| 5. Use irrigation return flow in nonagricultural areas; e.g., for power plant cooling. Modify power plant siting regulations to encourage location of power plants near saline water sources. | Power plant and Transmission Line Siting Committee approves a site (or an alternative) as the sites and alternatives are determined by the utility company. The committee does not pick out any specific site. All preliminary work is done by the utility company. | Stated priority for water for power plants is (1) ocean, (2) waste, (3) poor quality water. Because of seismic activity, ocean sites are inadvisable. Energy Commission developing policies to encourage use of saline water. Several plants will use such water from the Palo Verde drain for cooling. Energy Commission too new for adequate evaluation of functioning. | No state agency involved in developing such water development policies. Possibility exists that Councils of Government may develop such policies within specific regions. Numerous agencies must issue permits for specific projects. | Public Service Commission will not grant a permit about findings of need, environmental impact and minimization methods, conformity with state and local laws, and facility in public interest. Currently using effluent for power plant cooling. | Water for energy development to come from irrigated agriculture. Energy people buying out agricultural water. Governor's Energy Impact Task Force to consider salinity impacts. | Environmental Coordination Committee may be developing power plant siting recommendations. Air Conservation Commission and Utah Public Service Commission must issue permit prior to construction. | Industrial siting Commission is too new to have developed specific policies and authority. Water/siting issues to be decided by Board of Control of the State Engineer's Office. Industrial Siting Commission would follow the recommendations of the State Engineer. Multiplicity of permits prevents an integrated approach to planning. |
| | Feasibility dependent on willingness of the Power Plant and Transmission Line Siting Committee to implement the proposal. At present, the Committee only acts with a "veto" authority. Though it can modify an application as submitted, the Committee generally does not deviate from the desires of the utilities industry. The lack of both staff and the ability to enforce its decisions may inhibit Power Plant and Transmission Line Siting Committee recommendations. Strong leadership by the Arizona Corporation Commission (continued) | The Energy Commission has adequate authority to implement the proposed action. Existing political difficulties may, however, inhibit such action. The newness of the Energy Commission makes an accurate projection of its actual potential nearly impossible. Numerous jurisdictional questions may have to be resolved prior to implementation of the proposed action. Also, California water law doctrines seem to be in conflict and may have to be resolved prior to implementation. California approach is a good model for the other basin states in that it specific- (continued) | Colorado does not have a specific siting statute. Numerous different state and local political entities have some authority over the location of energy facilities. This authority, however, is primarily a "veto" power which may be exercised through the denial of applications for requisite permits. This procedure, though somewhat cumbersome, could be used to encourage the location of energy facilities at specific sites. Implementation of the proposed action is a function of the (continued) | Public Utility Commission has adequate authority to implement the proposed action. The Commission, following its directive to consider total social costs in evaluating power plant siting proposals, must determine that the facility is in the public interest. This authority, when combined with the authority to amend specific siting applications, would appear more than adequate to implement the proposed action. | Potential feasibility is a function of both existing and proposed institutional structures. Lines of authority and jurisdictional limits have yet to be adequately defined. Restrictions on the transferability of a water right do not seem to be a major obstacle. Existing proposals to revise the power plant siting process to institute a "one-stop" (single permit) procedure could enhance the feasibility of the proposed action if the action were endorsed by the newly empowered agency. Questionable as to physical and economic feasibility. | Utah does not have specific power plant siting legislation. Because of this, different state agencies exercise different authorities, primarily veto authority regarding applications for required permits. This, when combined with the pro-development approach Utah seems to have taken toward its energy resources, could substantially inhibit the implementation of the proposed action. | At present, the newness of the Industrial Siting Commission has resulted in uncertainty regarding its scope of authority. Jurisdictional ambiguities concerning other state agencies exist. Furthermore, most proposed energy facilities will be built in the eastern part of the state which falls outside the Colorado River Basin. Finally, the strict appurtenancy doctrine in Wyoming could substantially restrict the transferability of a water right. |

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|---|--|--|---------------------------------|--------|------------|------|---------|
| 5. Use irrigation return flow in nonagricultural areas; e.g., for power plant cooling. Modify power plant siting regulations to encourage location of power plants near saline water sources. | might lead to implementation of the proposal. The ACC, however, does not appear willing to obstruct the desires of the public utilities. | ly includes consideration of the availability of low quality water in making power plant siting decisions. | policies of different agencies. | | | | |

POTENTIAL FEASIBILITY (continued)

6. *Through land use controls, prohibit (or limit) irrigated agriculture on lands with high natural salt content in soils and subsoils, and select new lands for irrigation having soils and subsoils that will contribute reduced salt loads to irrigation return flow.*

Background of the action. An inherent conflict regarding land use controls exists between historic property right concepts and emerging needs for both orderly development and protection of surface resources. Most recent land use legislation in the states of the study region has been mandated by federal programs requiring planning functions for both land and water resources.

All of the Colorado River Basin states have passed land use legislation. Only six of these states, however, still have such legislation in effect as a 1974 referendum in Utah repealed its land use law.

Under the existing land use laws of the states in the study region, numerous different agencies appear to have sufficient authority to implement actions designed to reduce the salinity loading of the Colorado River Basin. Several states mandate state control of "areas of state interest." Such areas include environmental concern areas, hazard areas, etc. If specific soil types, the irrigation of which would cause continued increases in the salinity load of the river, should be classified as areas of state interest their use could be regulated.

State land use laws which prohibit new agricultural use, and encourage the cessation of existing irrigated agriculture on lands

having a high natural salt content would decrease the amount of salinity resulting from the irrigation of such lands. For this to be done in states desiring to maintain agricultural production, land use regulations should encourage new development of agriculture on lands having lower natural salt loads. This would, of course, be dependent on the availability of such lands within the states of the study region.

The primary problem with this type of action is that it may not be politically feasible to implement, at least on currently irrigated farmland. An implementation strategy, however, which would phase out irrigated agriculture on lands with high natural salt levels over a multi-year period may be an acceptable means of implementing the proposed action. This strategy would consider irrigated agriculture in prohibited areas (e.g., areas where salt levels in soils exceed specific levels) a nonconforming use. These nonconforming uses would be curtailed over a time period adequate in length to allow amortization of the costs of the facilities being removed from production. Such a strategy may require that specific landowners be compensated for loss of land values.

ARIZONA--Action #6

Authority. Land use planning authority in Arizona is divided among several state agencies. Initially, the Office of Environmental Planning is required to maintain data on the implementation of the state comprehensive land use plan (ARS 37-163[A]). This land use plan is to be developed by the Environmental Planning Commission (ARS 37-162) which is also the clearinghouse for all state environmental problems (Executive Order No. 75-2, February 14, 1975). The Office of Environmental Planning is charged with the responsibility of coordinating the plan and programs of all state departments and agencies in order to implement the state land use plan (ARS 37-163[A][13][2]).

The authority of the State Land Commissioner extends to include a determination of those lands useful for grazing (ARS 37-211[A][2]) and for other agricultural purposes (ARS 37-211[A][3]). The Commissioner is required to classify lands for specific uses (ARS 37-212[B]) and may alter existing classifications if such alterations are in the best interests of the state (ARS 37-212[C]).

Finally, the state Office of Planning and Development is authorized to conduct economic planning and research for the state (ARS 41-501[B]). When considered together, it would appear that there is ample authority within existing state agencies to implement the proposed action.

Current status. At present, the Office of Economic Planning and Development is developing a coordination plan to deal with existing

or proposed land use controls.¹ Were the proposed action included as a policy goal in the development of these mechanisms, it would appear that current approaches to land use control could be used to implement the proposal.

However, the relatively small amounts of state lands and quantities of return flows may not warrant extensive state activity. Only 30 percent of the land area falling within Arizona is under state jurisdiction. The remaining 70 percent is under the jurisdiction of either the federal government or one of several Indian tribes. Furthermore, most of the acreage used for irrigated agriculture is irrigated with groundwater. These pumping procedures do not result in an irrigation return flow.²

The relatively small amount of irrigation return flow reaching the Colorado River makes it unlikely that land use action to restrain irrigated agriculture would be appropriate in Arizona. Furthermore, the current planning process regarding land use in the state seems to be heavily influenced by agricultural interests, who traditionally take a "don't bother us" attitude toward land use controls.

Potential feasibility. In the final analysis, the minimal quantities of irrigation return flows generated on the limited areas of land falling under the jurisdiction of the State of Arizona would seem to inhibit implementation of the proposal. The aforementioned

¹Interview with Dennis Davis, Office of Economic Planning and Development, Phoenix, Arizona, October 7, 1976.

²Interview with Fritz Ryan, Arizona State Land Department, Phoenix, Arizona, October 6, 1976.

domination of the planning process by agricultural interests would probably further limit the potential feasibility of the proposed action. It would appear that the future feasibility of the proposal depends on the judgment of state officials as to its need and effectiveness and their ability to implement it as a goal of land use planning.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | | X | |
| Political | | X | |
| Administrative | | X | |

CALIFORNIA--Action #6

Authority. Land use planning in California is decentralized with both state and local agencies sharing responsibility. On the state level, the Office of Planning and Research is authorized to prepare and maintain a comprehensive long-range plan for growth and development (Gov. Code 65040). This state development plan is to include consideration of land use, agricultural production, and environmental protection (Gov. Code 65015.4). The Office of Planning and Research does not, however, have any regulatory authority over land use (Gov. Code 65035). Because of this, it is doubtful that this agency could successfully implement the proposed action. It could, however, recommend the proposal to local and regional planning agencies which might lead to its implementation.

Different local and regional governmental units can be designated to handle land use planning in the different areas of the state. The plans developed by these agencies are to include all land the use of which may have an effect on the planning process (Gov. Code 65300). The general plans prepared under this authority are to include the conservation of natural resources. Specifically, consideration of soil types, and plans to prevent erosion and to protect watersheds must be contained in the plan (Gov. Code 65303 [1]). It would appear that whatever local or regional planning agency is designated to prepare the land use plan would have sufficient authority to include the proposed action.

District and regional planning efforts have been specifically authorized. Area planning is possible with the cooperation of the different governmental units affected (Gov. Code 65600). District plans are to include an analysis of trends in both population and economic growth. This analysis should lead to recommendations on future land uses (Gov. Code 66107).

Soil erosion districts have also been authorized to conduct a statewide program of runoff control (Pub. R. Code 9001). Toward this end, public funding has also been authorized (Pub. R. Code 2002[6]). These soil erosion districts may also have adequate authority to implement the proposed action.

Current status. Most of current land use planning activities of relevance are occurring at local and regional levels. These local planning activities are monitored by the State Water Resources Control Board (SWRCB).

Local planning agencies, acting under the guidelines of state level agencies, are developing comprehensive land use plans. At present, it does not appear that a great number of these plans include control of salinity. Many do, however, deal with the problem of soil erosion and sediment control. This mechanism may be one means of implementing the proposed action.

Potential feasibility. Implementation of the proposed action in California without the development of state level policy guidelines for local planning entities would seem to be nearly impossible. The nature of local and regional differences are substantial enough for a single planning approach to be unworkable. The plans which have been developed exhibit a marked degree of variability. It is most unlikely that a comprehensive approach to salinity control vis-a-vis land use will develop, in the absence of a strong state policy.

Of more fundamental concern, however, is the limited potential of Action #6 to reduce salinity in the Colorado River. All of California's share of Colorado River water has been allocated and is in use, so land use planning (unless it were done retroactively) could have no impact on river salinity. Even so, most of the land in the Colorado River Basin portion of Colorado is in salt balance. Only some 12,000 acres, which are relatively newly developed and are being leached, contribute salt to the Colorado River.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | X | | |
| Political | | X | |
| Administrative | | | X |

COLORADO--Action #6

Authority. Land use planning functions are divided among numerous state level authorities in Colorado. Primary land use planning authority vests with the State Land Use Commission which is to develop a comprehensive land use planning program for the state (CRS 24-65-104[1][a]). Once natural hazard areas have been defined by the Land Use Commission, use of such areas must be designed to minimize impacts on public health and property (CRS 24-65.1-202[2]). This would be of particular importance if lands high in salt content were to be defined as constituting a natural hazard. Natural resources of state importance, when located in natural hazard areas, must be administered by the appropriate state agency (including the Soil Conservation Board) in conjunction with local governments (CRS 24-65.1-202[3]). Were lands having high salt levels classified by local governments as areas of state interest (CRS 24-65.1-401) the use and development of such lands could occur only under a special permit (CRS 24-65.1501[1][a]) and must comply with guidelines established either by the local government or by the Land Use Commission (CRS 24-65.1-501[3]).

Other state authority concerning land use planning is shared by the Division of State Planning and the Coordinator of Environmental Problems. The Division of State Planning is authorized to prepare long-range state planning objectives (CRS 24-37-202[1][a]) and to review the planning efforts of all other state agencies (CRS 24-37-202[1][c]). The Coordinator of Environmental Problems, in the Office of the governor, is to consider and make recommendations on the wise use of

the state's resources (CRS 24-41-101[2][a])). The authority of both these entities could be applied to the utilization of land use controls to remove highly saline soils from irrigated agriculture.

Current status. The role of the Land Use Commission concerning the proposed action is severely restricted by the fact that salinity is not mentioned in the enabling legislation.³ Because of the political unpopularity of the Land Use Commission with some elements of the state's citizenry, the Commission tends to read its statutory role quite narrowly. As a result, those issues which are not directly covered by the enabling legislation are not usually addressed.

There have been informal staff discussions between the Land Use Commission and other state agencies, specifically the Department of Agriculture, concerning the possibility of a joint undertaking to confront the problems of agricultural salinity.⁴ Unfortunately, the Land Use Commission, as it is currently structured, lacks the staff and support resources to adequately confront the issue of agricultural salinity.⁵

Future potential. The potential for implementation of the proposed action in Colorado is quite limited. State officials do not consider it likely that any substantial new private irrigation developments which are subject to state controls, will be made in Colorado. Prospective federal developments, which will be primarily for supplemental water rather than new land acreage, are subject to rigid salinity controls. The structure of state land use planning allows substantial local autonomy except with regard to specific types and uses of lands (natural hazard areas, areas of state interest). Lands having a high salt content, however, are not

³Interview with Jim Oki, Land Use Commission, Denver, Colorado, June 22, 1976.

⁴Ibid.

⁵Ibid.

included in the enabling legislation creating the Land Use Commission and, without a determination of state interest which the Land Use Commission appears hesitant to make, would appear to remain under the land use controls of local governments.

The scope of the enabling legislation for the Land Use Commission would also appear to inhibit the potential feasibility of the proposal. It appears unlikely that the legislation creating and empowering the Land Use Commission can be "stretched" to include salinity resulting from agricultural activities on soils with high salt levels.⁶ The authorization contained in the enabling legislation would be "an unlikely entry point" for Land Use Commission involvement in the control of land use involving highly saline soils.⁷

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | | X | |
| Political | | X | |
| Administrative | | X | |

⁶ Ibid.

⁷ Ibid.

NEVADA--Action #6

Authority. Authority over land use in Nevada is divided between the Division of State Lands and the Regional Planning Commission with primary authority vesting with the Division as the designated land use planning agency of the state (NRS 321.700). The Administrator of the Division of State Lands is authorized to identify areas of critical environmental concern (NRS 321.720[3]), to determine the suitability of land for agriculture (NRS 321.720[4][b]), and to prepare a study determining the suitability of soils for different types of uses (NRS 321.720[5]). The Administrator, also authorized to coordinate all state and local land use planning activities (NRS 321.720[12]), is primarily concerned with land use planning as it applies to state-owned lands.

In areas of critical environmental concern, the Administrator of the Division of State Lands can develop a specific land use plan for private lands which establishes both minimum standards and use criteria (NRS 321.770). The Administrator has limited authority to recommend such criteria for areas which have not been designated critical environmental areas.

The Regional Planning Commissions have the authority to develop master plans for the protection of watersheds falling within their respective regions (NRS 278.160[1][b]). (However, no such agency utilizing this authority exists in Southern Nevada.) These land use plans are to include an inventory and classification of land use types and existing uses plus a determination of the most desirable use of the land (NRS 278.160[1][e]). It is required by statute that land

use plans be in conformity with the physical limitations of the land (NRS 278.250). Land use planning may either preserve existing agricultural uses or promote the conversion of agricultural land to urban use (NRS 278.655[2][d]).

Finally, the governor is empowered to impose a land use plan in the absence of local action (NRS 278.645). It would appear that there is adequate authority to implement the proposed action.

Current status. Despite ample legislative authority, there is little coordination between state, regional and local planning.⁸ The Division of State Lands does not control the use of private lands unless such lands have been designated critical environmental areas. The effectiveness of the proposal would be seriously inhibited by this because there are no state lands remaining in the Colorado River Basin.

There has been a request, however, to declare the Las Vegas Wash a critical environmental area. This has not been done. Such a determination is a mandatory prerequisite to bring such lands under the control of the Division of State Lands. As with several of the states in the study region, land use controls appear to be too politically sensitive for substantial state-level involvement.

Potential feasibility. Despite the fact that existing state authority may be rendered ineffective under existing institutional structures for political reasons, there was a recent attempt, later abandoned, to facilitate implementation of the proposed action. The Nevada

⁸ Interview with Bruce Arkell, State Planning Coordinator, Carson City, Nevada, August 23, 1976.

Environmental Protection Services, part of the Division of Health, in 1976 sought authority from the legislature to develop a conservation plan for the entire state.⁹ The model for this study would have been the Tahoe Regional Planning Agency (TRPA) planning process.¹⁰ The TRPA process began with an analysis of both the capacity of lands within TRPA authority and proper land management techniques.¹¹ If the Environmental Protection Services is someday authorized to develop a state conservation plan along the lines of the TRPA planning process, then the possibility of implementing the proposed action would be greatly enhanced. Though the conservation plan as proposed would not be a determinative land use plan,¹² it could be an important first step in the implementation of the proposal.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | | X | |
| Political | | | X |
| Administrative | | X | |

⁹Interview with Ernest Gregory, Director, Environmental Protection Services, Division of Health, Carson City, Nevada, August 23, 1976.

¹⁰Ibid.

¹¹Ibid.

¹²Ibid.

NEW MEXICO--Action #6

Authority. There are numerous state agencies involved with land use planning in New Mexico. With regard to state lands, the Commissioner of Public Lands is to determine the nature and quality of state lands and classify them regarding their suitability for specific uses (NMS 7-6-1). Regarding private land uses, the Land Use Advisory Council is authorized to consider the development of a permanent land use plan (NMS 4-20-1[2][A][3]) and to formulate a proposed timetable for its implementation (NMS 4-20-1[2][A][2]).

Authority to develop long-range plans for the development of the state's resources falls with the State Planning Office (NMS 4-20-1). The Planning Office is directed to formulate resource development plans which must include both agricultural and water impacts of resource development (NMS 4-20-3[1]).

Authority vests with the Environmental Improvement Board to enforce rules and regulations regarding environmental management (NMS 12-12-9[E]). The Environmental Improvement Agency, under the direction of the Environmental Improvement Board, is responsible for nuisance abatement within the state (NMS 12-12-10). This could be especially important if saline agricultural return flows were to be classified as a state nuisance, although such classification is unlikely.

Finally, the Regional Planning Commissions are empowered to make recommendations concerning general land use plans (NMS 14-57-5[A][2]) and both current and impending land use problems (NMS 14-57-5[A][5]). It would appear that several state agencies have ample authority to conduct land use planning, although land use control authority is more limited.

Current status. Despite ample legislative authority, there is little actual land use control by the state. The newness of the administrative machinery as well as political opposition have combined to hamper the effectiveness of state level land use planning.

The Natural Resource Conservation Commission, which is the administration and coordination office of the 49 Natural Resource Conservation Districts in the state, is currently involved in a project to utilize remote sensing technology to survey soil types and develop sediment control programs.¹³ These studies, which are a part of the 208 planning processes, were begun in the southeastern part of the state. They may be expanded to cover other portions of the state.¹⁴

Potential feasibility. The outcome of the Natural Resources Conservation Commission studies may determine the potential feasibility of the proposed action. If the sediment control programs developed include land use controls, then implementation of the proposal would be greatly facilitated.

At present, the newness of the land use system has rendered it less effective than it might become in future years. As the system evolves, and jurisdictional lines are established, the potential for implementing the proposal would be enhanced. The issue of land use, and the role of state government in determining appropriate

¹³Interview with Margaret Thibodeau, Administrator, New Mexico Natural Resource Conservation Commission, Santa Fe, New Mexico, September 10, 1976.

¹⁴Ibid.

uses for the state's resources, is currently of substantial importance in New Mexico because of the state's energy resources. This may be a motivating factor which will encourage delineation of appropriate land use planning authority. Such a delineation may also facilitate implementation of the proposed action.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | X | | |
| Political | | X | |
| Administrative | | X | |

UTAH--Action #6

Authority. The Utah Land Use Act, passed in 1974, was repealed by public referendum in 1975. Because of this repeal, there is no state level land use planning agency in Utah.

The authority that does exist over land use and land use planning is based at the county level. County Planning Commissions may develop a master plan for the county and may adopt zoning regulations for unincorporated land in the county (UCA 17-27-9). The master plan as developed may consider agricultural land use efficiency and the most economical use of county land (UCA 17-27-5). The County Planning Commission may also propose regulations to foster land "development and utilization" and to encourage agricultural production (UCA 17-27-13).

Current status. Because of the lack of authority resulting from the repeal of the Utah Land Use Act, the State has no authority in the area of privately owned land use. It is doubtful whether local efforts can reflect the need for a comprehensive scheme essential to the implementation of the proposed action.

The administrators of the different state agencies comprise a State Planning Advisory Committee which has focused its efforts on three areas: (1) human services; (2) economic and physical development; (3) regulatory groups.¹⁵ The Environmental Coordinating Committee of the Planning Advisory Committee has discussed different aspects of salinity control. There is also a Policy Coordination Unit,

¹⁵ Interview with Jack Ockey, State Planning Coordinator's Office, Salt Lake City, Utah, December 16, 1976 (telephone).

primarily under the direction of the Economic and Physical Development subdivision of the Planning Advisory Committee, which will formulate specific policy responses.¹⁶

The functioning of the State Planning Advisory Committee is still in an embryonic stage. The Committee plans to seek a revision of its authority from the next session of the legislature.¹⁷

Potential feasibility. Because of the absence of state level land use planning programs, all land use planning activities occur at the discretion of county officials. This type of policy is not conducive to implementation of the proposal.

Whether the proposed action could be implemented through the State Planning Advisory Committee remains to be seen. If the authority of the Committee is expanded in an upcoming legislative session, and the expansion includes the authority to implement the proposed action, then the potential feasibility of the proposal could be substantially enhanced. Under existing procedures, however, it is unlikely that the proposal can be implemented on anything other than a piecemeal, localized basis.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|---------------------------|
| Legal | | | X |
| Political | | | X |
| Administrative | | | X |

¹⁶ Ibid.

¹⁷ Ibid.

Authority. Authority over the use of land in Wyoming is divided among numerous state agencies. Initially, the Wyoming Conservation and Land Use Study Commission is authorized to recommend future land use controls (WS 9-160.46[ii]) and necessary state legislation to conform to national requirements concerning land use (WS 9-160.46[vi]).

General authority for control over the physical and economic resources of the state is vested with the Department of Economic Planning and Development (DEPAD) (WS 9-160.19). DEPAD has the authority to conduct investigations regarding the resources of the state (WS 9-160.29[a][iii]) which may include private activities which have an effect on the public interest (WS 9-160.29[a][iv]). DEPAD may assist in the development of specific projects by providing legislatively authorized financial assistance (WS 9-160.29[b][iii]) and has the authority to acquire property through the exercise of eminent domain authority and other means (WS 9-160.29[b][ix]). DEPAD has general authority to exercise all necessary powers to carry out the purposes of the act.

The Division of Industrial Development of DEPAD has the authority to study soil types, different soil type potentials and related subjects (WS 9-160.32[b]). Finally, the State Planning Coordinator's Office is to coordinate the activities of all state agencies both within state government and with the federal government (WS 9-144.3).

Current status. There is a general feeling in DEPAD that salinity in the Green River (the only portion of the Colorado River Basin falling within Wyoming) is not the result of irrigated agriculture. Much of the Green River Basin is not irrigated, although there is appreciable irrigation on Black's Fork River, tributary to the Green, and some on the Little Snake River, tributary to the Yampa. There are proposals, however, to increase that amount of land irrigated in the Green River Basin through the use of sprinkler irrigation. This may encourage land use planning in the area because of the effects of changes in historic land uses.

The Conservation and Land Use Study Commission does not have regulatory authority.¹⁸ Its primary function is to advise local communities. As was apparent in several other states, Wyoming is using a "bottom up" approach to planning with local and county officials having the greatest authority over land use planning.¹⁹

Potential feasibility. Any system which allows local and county officials to determine land use policies, in the absence of strong state leadership, will have difficulty implementing the proposed action. The result of such implementation will be piecemeal and localized in effect. The limited amounts of salinity contributed to the Colorado River from the Green River Basin, however, obviate the need for strong land use controls.

¹⁸Interview with Dr. James Ahl, Director, State Land Use Commission, Cheyenne, Wyoming, July 1, 1976.

¹⁹Ibid.

Local planning has been hindered by a conflict between city and county officials in a specific geographic area.²⁰ Though this may be corrected by application of the Joint Powers Act adopted in 1975, it is still too early to determine the effectiveness of the measure. Even if the salinity load of the Green River warranted stringent land use controls (which it does not appear to do), the newness of the land use system could make an effective response by state, county and local officials very difficult.²¹

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | | X | |
| Political | | | X |
| <u>Administrative</u> | | | X |

²⁰Ibid.

²¹Ibid.

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|--|--|---|---|--|---|---|--|
| 6. Through land use controls, prohibit (or limit) irrigated agriculture on lands with high natural salt content in soils and subsoils, and select new lands for irrigation, having soils and subsoils that will contribute reduced salt loads to irrigation return flow. | 37-162 Environmental Planning Commission to prepare a state land use plan. 37-163(A) Office of Environmental Planning shall keep data on the comprehensive land use plan. (13)(2) Office will coordinate the plans and programs of all state departments, agencies and instrumentalities. Executive Order No. 75-2 (Feb. 14, 1975) makes the commission the clearinghouse for Arizona environmental problems. 37-211(A) State Land Commissioner to investigate lands to determine (2) usefulness for grazing and (3) lands susceptible for agriculture. 37-212(B) State Land Commissioner to classify lands (1) for agricultural purposes. (C) may reclassify land in best interest of the state. 41-501(B) Office of Planning and Development to do economic planning and research. | Gov. Code 16080 Environmental Quality Study Council to (6) identify major environmental problems and (d) identify problems of existing efforts. Gov. Code 65040 Office of Planning and Research to prepare and maintain comprehensive long-range plans for growth and development. Gov. Code 65015.4 State development plan to include land use, environmental factors and agriculture. Gov. Code 65035 Office of Planning and Research does not have regulatory control over land use. Gov. Code 65300 Planning agency to include land which may affect the planning process. Gov. Code 65303(1) General plan to include conservation of natural resources, including soils, and also (5) prevention of erosion and (6) protection of watersheds. Gov. Code 65600 Area planning possible with cooperation of governmental units. Gov. Code 66107 District plan to (c) include recommendations on land use and trends in population and (continued) | 24-37-202(1) Division of State Planning to (a) prepare long-range state objectives and (c) review the planning efforts of state agencies. 24-41-101 (2)(a) Coordinator of Environmental Problems to consider and make recommendations on the wise use of land resources. 24-65-104 (1)(a) State Land Use Commission to develop a land use planning program. 24-65.1-202 (2) Land Use Commission may administer natural hazard areas. All developments must be designed to minimize impacts on public health and property. 24-65.1-202 (3) Once determined, natural resources of state importance to be administered by state agency (including Soil Conservation Board) in conjunction with local government. 24-65.1-401 Local governments may determine areas of state interest. 24-65.1-501(1)(a) Person conducting activity in area of state interest must obtain a permit, (3) development must then (continued) | 278.160 (1)(b) Master plan developed by Regional Planning Commissions to protect erosion of watershed. 278.645 Governor may impose land use plan in the absence of local action. 278.160 (1)(e) Land use plan to include inventory and classification of land types and uses, plus most desirable use. 278.655 (2)(d) Physical planning to preserve farm land or promote change of agricultural land to urban land. 278.250 Land use plans to be in character with the physical limitations of the land. 321.700 Division of State Lands to be land use planning agency. 321.720 Administrator of Division of State Lands to (3) identify areas of critical environmental concern and (4)(b) determine suitability of land for agriculture (b) also (5) prepare suitability of soil type study and (12) coordinate all state and local programs. 321.770 In areas of critical environmental concern, (continued) | 4-20-1 (2)(A) Land Use Advisory Council to (2) formulate time-table to implement land use plan and (3) consider developing a permanent land use plan. 4-20-2 State Planning Office to develop long-range plans for the development of the state resources. 4-20-3 (1) Planning Office to develop resource development plans, including agriculture, and indicate benefits from agriculture, including water. 7-6-1 Commissioner of Public Lands to maintain data on nature and quality of state lands. May classify lands regarding minerals contained. 12-12-9 (E) Environmental Improvement Board to enforce rules and regulations regarding environmental management. 12-12-10 Environmental Agency to be responsible for nuisance abatement. 14-57-5 Regional Planning Commissions (A)(2) to recommend general land use plan and (5) recommendations concerning current and impending problems. (continued) | Utah Land Use Act, Laws 1974, ch. 30 (63.28-1) was repealed by public referendum. 17-27-5 County master plan may consider agricultural land efficient and economic use of land. 17-27-9 County Planning Commission may adopt zoning regulations for unincorporated land. 17-27-13 Regulations to foster land "development and utilization and foster state's agriculture. General | 9-144.3 State Planning Coordinator to coordinate such activities of all state agencies and with the federal government. 9-160.19 Dept. of Economic Planning and Development to plan the development of the physical and economic resources of the state. (DEPAD) 9-160.29 DEPAD may make investigations re. the resources of the state (a) (iii) which may include private works affecting the public interest and (a)(iv) may assist such projects financially, (b)(iii) may acquire property by eminent domain and other means. (6)(ix) Other powers needed to carry out the act. 9-160.32 Director of Division of Industrial Development (DEPAD) to (b) study soil types, potentials and uses (and related subjects). 9-160.46 Wyoming Conservation and Land Use Study Commission to (ii) recommend future land use controls and (vi) recommend (continued) |

| ACTION | | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|--|-----------------------|--|--|---|--|---|---|--|
| 6. Through land use controls, prohibit (or limit) irrigated agriculture on lands with high natural salt content in soils and subsoils, and select new lands for irrigation, having soils and subsoils that will contribute reduced salt loads to irrigation return flow. | AUTHORITY (cont.) | | economic growth. Pub. R. 9001 State-wide program to control runoff and soil erosion districts authorized. Pub. R. 2002 (6) Public funds for implementing runoff control. <i>Nonspecific</i> | comply with guidelines established by the local government or the Land Use Commission. <i>Nonspecific</i> | administrator can determine a land use plan with criteria and standards. <i>Nonspecific</i> | | | state legislation to conform to national legislation. <i>Nonspecific</i> |
| | CURRENT STATUS | The Office of Economic Planning and Development is developing planning coordination regarding land use plans. However, agricultural interests may cause problems concerning control of nonpoint pollution sources. | State Water Resources Control Board (SWRCB)--Division of Planning and Research--has bulk of activity occurring at local and regional levels with SWRCB approval. Further, developing fresh water plan will include areas of biological importance. | Land Use Commission's role may be limited because salinity not mentioned in legislation creating land use commission. There is staff discussion of an agricultural-land use link. Land Use Commission doesn't have staff or resources to handle issues of agricultural salinity. | State Planning Coordinator sees little real coordination of state, regional and local planning. State Land and Local Use Planning does not administer lands in Colorado River Basin unless owned by another state agency (are none). Land Use too politically sensitive to be effective--there is a request, however, to declare the Las Vegas Wash a critical environmental area. | The Natural Resources Conservation Commission is using Technology Application Center to use satellites to survey soil types and, in coordination with 208 committee, to develop sediment source control program. The newness of and opposition to land use planning procedures have rendered existing authority relatively ineffective. | A 1974 public referendum repealed the Utah Land Use law. State Land Board retained no authority in this area. Soil Conservation Service feels that salinity problem is primarily natural and industrial, not agricultural. | Feeling in the Department of Economic Planning and Development is that irrigated agriculture not responsible for salinity on the Green River. LUC does not have any regulation function. Local communities doing land use planning--"bottom up" approach. |
| | POTENTIAL FEASIBILITY | Apparent dominance of agricultural interests in the planning process could inhibit implementation of the proposal. The land use planning process being developed by the Office of Economic Planning and Development could allow for implementation of the proposed action depending on its final form. The (continued) | The potential feasibility of the proposed action is severely limited by the regional nature of land use planning in California. (continued) | The limited authority granted the Land Use Commission under its enabling legislation could restrict the feasibility of the proposal. Political pressures may also render the Land Use Commission incapable of involvement in issues which are not covered in the legislation. The lack of staff and support resources (continued) | Land use issues may be too politically sensitive to allow extensive state-level involvement. Potential feasibility cannot adequately be determined at present because the proposed state conservation plan has not yet been approved by the legislature. This plan, if approved, would be the most readily available (continued) | The newness of land use planning programs and political opposition to land use controls have combined to reduce the effectiveness of existing institutions. Natural Resources Conservation Commission studies of soil types and sediment control methods, as well as the current emphasis on state (continued) | Repeal of the state land use act has left implementation of the proposal at the discretion of local and county officials. The State Planning Advisory Committee is still at an embryonic stage in its development. If it granted additional authority by an upcoming session of the state (continued) | Salinity loading from irrigated agriculture in the Green River sub-basin (the Wyoming portion) of the Colorado River Basin is extremely limited. Despite the fact that the land use planning system in Wyoming is very new and locally oriented, it is doubtful whether strict land use controls would (continued) |

| ACTION | | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|--|-------------------------------|---|---|--|--|---|--|---|
| 6. Through land use controls, prohibit (or limit) irrigated agriculture on lands with high natural salt content in soils and subsoils, and select new lands for irrigation, having soils and subsoils that will contribute reduced salt loads to irrigation return flow. | POTENTIAL FEASIBILITY (cont.) | relative weight of agricultural interests, however, may limit the effectiveness of developing any land use planning procedures. | Under the current structure, it is unlikely that local and regional political subdivisions would burden themselves with the types of land use controls which the proposal would require unless there were strong state incentives to encourage such controls, especially since the impact on salinity would be minimal. | may also inhibit implementation of the proposal. | vehicle for implementation of the proposed action. | energy development, could result in a stronger emphasis on state level land use controls. At present, however, the potential feasibility of the proposed action is limited. | legislature, then the proposed action might be capable of implementation. At present, however implementation could, at best, be limited to piecemeal, localized efforts. | reduce the salinity loading characteristics of the Green River because of the limited amount of irrigated acreage involved. If irrigation expands, however, and attention focuses on the need to control land use in the developing area, then the feasibility of implementing the proposal could be substantially increased. |
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7. *Through state economic incentives, promote conversion of land used for irrigated agriculture to other uses when highly saline return flows cannot be prevented, controlled or treated and encourage the modification of vegetation on rangeland (e.g., convert sagebrush to grassland) to reduce natural salinity from storm runoff.*

Background of the action. Action #7 proposes the use of state economic incentives to stimulate changes in land use to reduce salinity. The proposed action contrasts with Action #6, which proposes to reach the same goals through the use of governmental sanctions: land use restrictions, zoning prohibitions, and similar regulatory actions.

Three forms of economic incentive have been identified, although there probably are others that could be used:

- (a) Direct economic incentives, such as reductions in state income taxes or local property tax exemptions to landowners who voluntarily change land uses from those causing a high degree of salinity to other uses. A more direct incentive, of course, is an offer to purchase land for conversion to a new use causing less salinity. While it is conceivable that a state government might itself purchase land, it is more likely to act as a catalyst to promote sales of land to private interests such as industry or energy developers. This could be done in connection with a state business or industrial development agency which normally encourages and assists industrial firms to locate in the state.

- (b) A state grant or loan fund to landowners to encourage changes in land use, e.g., from irrigated agriculture to less intensive agriculture (perhaps dryland farming or grazing), or to persons purchasing irrigated land for conversion to a new use (such as residential development, industrial use, etc.).
- (c) An incentive payment to landowners to encourage modification of vegetation that would reduce natural saline runoff. Mechanical uprooting or chemical treatment of sagebrush, followed by planting of native grasses, would be rewarded by a cash payment or a tax reduction.

Because of the unpopularity of legal sanctions by government, particularly among farmers and ranchers whose freedom to use their land is threatened, the use of economic incentives appears to offer a far more acceptable way to bring about salinity reductions. Questions of authority to encroach on property rights are bypassed, and actions are taken voluntarily, with the economic costs shared among all state residents.

Nevertheless, there are evident concerns over the role of the state in bringing about salinity reduction through actions which negatively affect the agricultural sector, and the processing, transportation and supply sectors dependent on them.

There also is likely to be state hesitation to fully fund a grant or incentive payment program when analogous federal programs (e.g., ASCS, RC&D) pay 50 to 75 percent of the cost. Before doing so,

the Colorado River Basin states are likely to explore, through their Congressional delegations, the possibility of a federally supported program.

ARIZONA--Action #7

Authority. No specific authority exists in Arizona statutes for state economic incentives to promote changes in land use. State authority to prepare and monitor a comprehensive land use plan is discussed under Action #6.

Current status. The Arizona Water Commission has plans which incorporate the retirement of agricultural land. The purpose is not to reduce salinity but to accommodate municipal and industrial water demand. No activity exists to encourage vegetation modification.

Potential feasibility. The relatively small quantities of irrigation return flows generated on private lands in Arizona make implementation of the action unlikely. However, it may be done as a by-product of Arizona Water Commission actions to reallocate irrigation water to M&I uses. The strong influence of agricultural interests in Arizona make this action more likely than the use of sanctions (Action #6).

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|-----------------------|
| Legal | | X | |
| Political | X | | |
| Administrative | | | X |

CALIFORNIA--Action #7

Authority. Little specific authority exists in California statutes for state economic incentives to promote changes in land use. Conceivably such actions could be carried out under statutory authority to prevent erosion and protect watersheds (Gov. Code 65303[5], [6]) and to aid and encourage soil conservation activities (PRC 9063).

Current status. There is no current activity involving economic incentives to promote land use changes affecting salinity.

Potential feasibility. Implementation of land use controls (Action #6) is believed to be dependent on the willingness of state officials to require local planning agencies to do so. Economic incentives are in many ways more politically acceptable than sanctions, and they possibly may be implemented in preference to administrative controls. However, the lack of a strong state planning policy concerning salinity, caused in part by substantially different conditions existing among regions of the state, makes implementation of this action relatively unlikely in California.

Because only about 12,000 acres of the Palo Verde Valley now contribute salt to the river and these are approaching salt balance, and no further Colorado River water is available for allocation to new lands, there is little or no potential for salt reduction.

COLORADO--Action #7

Authority. Colorado statutes give no authority for the state to use economic incentives to promote changes in land use, although land use planning is authorized as discussed in Action #6.

Current status. Colorado has no program underway or planned to use economic incentives to promote changes in land use to reduce salinity. State policy gives high priority to the preservation of agricultural land, and a recent agreement between Colorado and the Secretary of the Interior gives Colorado some power to prohibit the transfer of water from irrigated land to energy development.

Potential feasibility. Preservation of agricultural land is likely to continue to be a goal of state government policy in Colorado, but substantial energy development is anticipated in the Colorado River Basin, and industrial development outside the front range also is a state goal. Conversion of some irrigated agricultural land which contributes heavily to salinity might be encouraged in siting of industrial and energy developments. However, it is unlikely that the state would finance economic incentives to reduce salinity in the Colorado River Basin when even higher salinity levels in the Arkansas River are considered to be tolerable.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|---------------------------|
| Legal | | X | |
| Political | | | X |
| Administrative | | | X |

NEVADA--Action #7

Authority. Although no specific Nevada statutes authorize state economic incentives to promote land use changes, there is considerable authority to develop land use plans to preserve watersheds and to promote the conversion of agricultural land to urban use (see Action #6).

Current status. No state activity exists concerning land use changes to reduce salinity.

Potential feasibility. Although speculative, it appears possible that a state program encouraging land use changes, perhaps using tax incentives to do so, could be started in Nevada to help implement a conservation plan. However, even without a specific program, agricultural use in the Colorado River Basin is forecast to decline as demand for municipal and industrial water increases and land economics cause a conversion from agriculture to other uses.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|---------------------------|
| Legal | | X | |
| Political | | X | |
| Administrative | | | X |

NEW MEXICO--Action #7

Authority. There is substantial authority, as described in Action #6, for land use planning in New Mexico. Also NMSA 75-34-28 establishes a state grant and loan fund and authorizes loans to community ditch organizations and to irrigation and conservancy districts for construction and rehabilitation of irrigation systems and for the improvement of irrigated land. No specific authority exists, however, for grants or loans to promote land use conversion, or for vegetation modification.

Current status. No state economic incentives are currently used to promote land use conversion. However, in the southern part of New Mexico, irrigation districts are buying lands to protect the more productive lands from intrusion of saline groundwaters. This action is not deemed necessary in the Colorado River Basin.

Potential feasibility. As Action #6 discusses, the state role in controlling or influencing land use is not yet clearly established. If New Mexico determines that changes in land use are necessary to control salinity (which does not now seem likely), it may be possible to encourage such changes by establishing another state grant and loan fund. If salinity control measures also coincide with erosion control measures (as on heavily grazed pasture land), there is a reasonable possibility that corrective action may be taken under the existing grant and loan program. An example could be a program of replacing sagebrush with native grasses, with state cost sharing.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | | X | |
| Political | | | X |
| Administrative | | X | |

UTAH--Action #7

Authority. No land use statute now exists in Utah, and all land use planning activities are conducted at the county level. A state revolving fund, authorized by UCA 73-10-1, exists to construct projects to promote efficiency of water use. UCA 73-10-23 assigns administrative responsibility for the fund to the Division of Water Resources.

Current status. The Utah Division of Water Resources is encouraging industry to purchase water rights of marginal agricultural lands. This activity has the effect of reducing salinity as well as improving the economic return from limited water resources. Aside from state encouragement, however, there are no state economic incentives promoting such conversions.

Potential feasibility. In the absence of state land use controls, and their evident unpopularity, Utah is probably doing nearly as much as it can to promote conversion of land uses through encouraging industrial purchases of marginal agricultural land and water rights. Should more incentive appear necessary, the Division of Water Resources could possibly utilize its revolving fund to help finance land purchases for resale to industrial and energy developers, but no specific authority to do so is now apparent.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|---------------------------|
| Legal | | X | |
| Political | | X | |
| Administrative | | X | |

WYOMING--Action #7

Authority. Wyoming Statute 9-160.29[b] authorizes the Department of Economic Planning and Development (DEPAD) to recommend that the legislature provide financial assistance for the development of specific projects and to acquire property through purchase or exercise of eminent domain. (See Action No. #6 for more details.) Normally, however, a project repayment plan is expected before appropriation is made, so conversion from irrigation to a profitable land use would be desirable.

Current status. Although sufficient authority exists for DEPAD to take the recommended action, DEPAD is not doing so because of a conviction that salinity in the Green River (Wyoming's tributary of the Colorado) is not caused by irrigated agriculture.

Potential feasibility. If it became evident that Wyoming could significantly reduce salinity through land use changes, the use of economic incentives is the only feasible approach. State sanctions would be extremely unpopular. Lacking sufficient evidence of salinity caused by irrigated agriculture, DEPAD will not take action to convert saline lands to nonagricultural use. A proposal¹ to reduce salinity of natural runoff by replacing rangeland sagebrush with grasses would seem to lend itself to state economic incentives. However, most land in western Wyoming is in federal ownership, so a state economic incentive would be of limited effectiveness.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|-----------------------|
| Legal | X | | |
| Political | | | X |
| Administrative | | X | |

¹Interview with Larry J. Bourret, Commissioner of Agriculture Cheyenne, June 30, 1976.

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|--|---|---|---|---|---|--|--|
| 7. Through state economic incentives, promote conversion of land used for irrigated agriculture to other uses when highly saline return flows cannot be prevented, controlled, or treated and encourage the modification of vegetation on rangeland (e.g., convert sagebrush to grassland) to reduce natural salinity from storm runoff: (a) Promote conversion of land to nonagricultural uses. (b) Establish state grant or loan fund. (c) Encourage vegetation modification. | (a) Promote conversion of land to nonagricultural uses. No specific statutory authority. See Action #6. <i>Nonspecific</i> (b) Establish state grant or loan fund. No statutory authority. <i>Specific</i> (c) Encourage vegetation modification. No statutory authority. | (a) Promote conversion of land to nonagricultural uses. No specific statutory authority. See Action #6. <i>Nonspecific</i> (b) Establish state grant or loan fund. No statutory authority. PRC 9063 directs Soil Conservation Commission to "aid and encourage, but not conduct, soil conservation activities." (c) Encourage vegetation modification. Gov. Code 65303(5), (6) General plan to prevent erosion and protect watersheds. <i>General</i> | (a) Promote conversion of land to nonagricultural uses. No specific statutory authority. See Action #6. <i>Nonspecific</i> (b) Establish state grant or loan fund. CRS 35-70-103 authorizes soil conservation board to give grants and loans to districts. (Note: current annual funding is only \$89,000, to be used for administrative expenses of 83 districts.) <i>General</i> (c) Encourage vegetation modification. No statutory authority. | (a) Promote conversion of land to nonagricultural uses. No specific statutory authority. See Action #6. <i>Nonspecific</i> (b) Establish state grant or loan fund. No statutory authority. <i>Specific</i> (c) Encourage vegetation modification. NRS 548. 355 Conservation districts have authority to regulate vegetation. <i>Specific</i> | (a) Promote conversion of land to nonagricultural uses. This action is being implemented by some irrigation districts under general authority of NMSA 75-22-12. No specific statutory authority. See Action #6. <i>Nonspecific</i> (b) Establish state grant or loan fund. NMSA 75-34-28 authorizes State Engineer to make loans to community ditch organizations, irrigation, and water conservation districts for constructing, improving and rehabilitating irrigation systems. <i>Specific</i> (c) Encourage vegetation modification. No statutory authority. | (a) Promote conversion of land to nonagricultural uses. No specific statutory authority. See Action #6. <i>Nonspecific</i> (b) Establish state grant or loan fund. UCA 73-10-1 creates revolving fund to construct projects to promote efficiency of water use. Fund is administered by Board of Water Resources, under UCA 73-10-23. <i>Specific</i> (c) Encourage vegetation modification. No statutory authority. | (a) Promote conversion of land to nonagricultural uses. No specific statutory authority. See Action #6. <i>Nonspecific</i> (b) Establish state grant or loan fund. WSA 41-1.42 authorizes state financing (loans) for the construction of water conservation projects to abate pollution and promote beneficial use of water. <i>Specific</i> (c) Encourage vegetation modification. WSA 9-853 (IX) Land Use Commission can identify areas of state concern. <i>Nonspecific</i> |

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|--|---|---|---|--|---|---|--|
| 7. Through state economic incentives, promote conversion of land used for irrigated agriculture to other uses when highly saline return flows cannot be prevented, controlled, or treated and encourage the modification of vegetation on rangeland (e.g., convert sagebrush to grassland) to reduce natural salinity from storm runoff: (a) Promote conversion of land to nonagricultural uses. (b) Establish state grant or loan fund. (c) Encourage vegetation modification. | (a) Promote conversion of land to nonagricultural uses. Plans under the auspices of the Arizona Water Commission incorporate the retirement of agricultural land and the usage of water "saved" for industrial and municipal. (b) Establish state grant or loan fund. No grant or loan fund; no tax incentive. (c) Encourage vegetation modification. No activity on state or private land. | (a) Promote conversion of land to nonagricultural uses. No activities in this area by water resources officials. (b) Establish state grant or loan fund. No grant or loan fund; no tax incentive. ASCS program funds about 40-50% of requests. (c) Encourage vegetation modification. No activity on state or private land. | (a) Promote conversion of land to nonagricultural uses. No programs in this area by water resources officials. (b) Establish state grant or loan fund. No grant or loan fund; no tax incentive. Legislature has in 1976 appropriated \$89,000 for administrative expenses of state's 83 soil conservation districts. (c) Encourage vegetation modification. No activity on state or private land. | (a) Promote conversion of land to nonagricultural uses. See Action #6. Agriculture return flows are negligible. Agricultural use in Nevada portion of Colorado Basin is forecast to decline because of municipal and industrial demand for water and land economics. (b) Establish state grant or loan fund. There is serious consideration to giving farmers a tax break if they line ditches and make water saving improvements. This would be a reduction in <u>ad valorem</u> taxes on their farms. State legislature is generally opposed to grant programs. (c) Encourage vegetation modification. No activity on state or private land. | (a) Promote conversion of land to nonagricultural uses. Being done in southern part of state through irrigation districts. Not deemed necessary on Colorado as most land is productive and not salinity producing. (b) Establish state grant or loan fund. N.M. Interstate Streams Commission has a grant and loan program to supplement ASCS, RC&D and Four Corners funds. State grant program (funded at \$150,000/yr) can provide up to 15% grant and can loan money at 2-1/2% interest to community ditch organizations to pay balance of cost. Loan fund is nearly \$2 million. (c) Encourage vegetation modification. No activity on state or private land. | (a) Promote conversion of land to nonagricultural uses. This is being done by the Division of Water Resources. Practice is to encourage industry to buy water rights of undesirable agricultural land. (b) Establish state grant or loan fund. State program exists to construct projects for watershed protection and canal lining, etc., with state costs reimbursed over multi-year period without interest. This program augments ASCS, RC&D and Four Corners programs. The program has advanced \$21 million to date, assisting \$40 million of project construction. (c) Encourage vegetation modification. No activity on state or private land. | (a) Promote conversion of land to nonagricultural uses. No activities in this area by water resources agencies. (b) Establish state grant or loan fund. DEPAD has low cost (4% to 5-1/2%) farm loan program of up to \$60 million. Loans, secured by land, are made for construction of reservoirs, canals, etc., and for sprinkler systems and wells. These loans supplement ASCS and RC&D grants. (c) Encourage vegetation modification. No activity on state or private land. |

CURRENT STATUS

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|--|---|---|--|---|---|--|--|
| 7. Through state economic incentives, promote conversion of land used for irrigated agriculture to other uses when highly saline return flows cannot be prevented, controlled, or treated and encourage the modification of vegetation on rangeland (e.g., convert sagebrush to grassland) to reduce natural salinity from storm runoff: (a) Promote conversion of land to nonagricultural uses. (b) Establish state grant or loan fund. (c) Encourage vegetation modification. | (a) Promote conversion of land to nonagricultural uses. Underway as a source of M&I water. Questionable if it can be accelerated as a salinity control measure. (b) Establish state grant or loan fund. Questionable if fund could be established for this purpose. (c) Encourage vegetation modification. Not likely due to limited amount of saline runoff entering Colorado River. | (a) Promote conversion of land to nonagricultural uses. Lack of uniform state-wide policy on salinity make action relatively unlikely. (b) Establish state grant or loan fund. Questionable if fund could be established for this purpose. (c) Encourage vegetation modification. Not likely due to statewide variations in salinity problem. | (a) Promote conversion of land to nonagricultural uses. Present state policy is contrary to this action. Salinity levels are higher in Arkansas River Basin, thus state action in CRB is unlikely. (b) Establish state grant or loan fund. Doubtful that fund could be established for this purpose. (c) Encourage vegetation modification. Questionable although saline runoff is believed significant in CRB. May be opposition from wildlife interests. | (a) Promote conversion of land to nonagricultural uses. Economics of water transfer to M&I uses are reducing land in irrigation. (b) Establish state grant or loan fund. Questionable. State legislature is generally opposed to grant programs. (c) Encourage vegetation modification. Possible under tax incentive program. | (a) Promote conversion of land to nonagricultural uses. Need to convert agricultural land as a salinity control measure is not clear. If it becomes so, action could be taken under state grant and loan program. (b) Establish state grant or loan fund. N.M. Interstate Streams Commission has a grant and loan program to supplement ASCS, RC&D and Four Corners funds. The fund could possibly be used to assist irrigation districts to buy marginal agricultural land for resale, to reallocate water to better lands. (c) Encourage vegetation modification. Not likely unless it can be tied into an erosion control program to reduce overgrazing. | (a) Promote conversion of land to nonagricultural uses. State is already acting to encourage transfer of land to industry. (b) Establish state grant or loan fund. State program exists to construct projects for watershed protection and canal lining, etc., with state costs reimbursed over multi-year period without interest. This program augments ASCS, RC&D and Four Corners programs. Possibly revolving fund could be used in future to accelerate transfers if necessary. (c) Encourage vegetation modification. Questionable. Possible under tax incentive program. | (a) Promote conversion of land to nonagricultural uses. Need to convert agricultural land as a salinity control measure is not clear. (b) Establish state grant or loan fund. DEPAD has low cost (4% to 5-1/2%) farm loan program of up to \$60 million. Loans, secured by land, are made for construction of reservoirs, canals, etc., and for sprinkler systems and wells. These loans supplement ASCS and RC&D grants. If need to convert agricultural land became evident, DEPAD could use loan funds to do so. (c) Encourage vegetation modification. Questionable; saline runoff is believed significant but much of the land is federal. May be opposition from wildlife interests. |

POTENTIAL FEASIBILITY

8. *Establish special use charges for irrigation water provided from reclamation projects to cause more efficient usage and to encourage waste control measures. Use excess funds derived to finance waste control capital improvements on farms and in the conveyance systems.*

Background of the action. This action has the underlying assumption that if the amount of irrigation water diverted and applied is kept to the minimum, salinity from agricultural sources will also be kept at a minimum. This action further assumes that higher costs per quantity of water used will cause the amount diverted to be kept at the minimum needed for the crop. In the Imperial Irrigation District of California this action (aimed at water conservation rather than salinity control) was in part responsible for a 6 percent decrease in annual water usage in 1976 from the previous year.

Initiation of this action would rest with the local irrigation and/or water conservation districts. The greatest results in terms of salinity reduction would be achieved in areas where irrigation return flows are a source of increased salinity, such as in areas of Mancos Shale.

In implementing Action #8, at least three different approaches might be utilized. The first approach is to establish special use charges that would raise the unit cost of irrigation water to a level that will reduce demand to the bare minimum necessary for crop production, yet not endanger the economic health of the farms served. Because of the variations in farm prices, costs and water needs of various crops, this level may be very difficult to calculate.

A second approach is to determine the amount of water needed in a given year for a given crop and retain current charges for that quantity

of water use. However, water usage above the pre-determined amount would incur special use charges to discourage the unneeded usage.

A third and perhaps simplest form of approach is that used in the Imperial Irrigation District--to measure the amount of tailwater and, if it exceeds 15 percent of the water delivered, a penalty charge is assessed. In the Imperial District example, the water cost triples.

The intent of this action is not to raise additional dollars for local water delivery districts; it is designed to reduce unnecessary water consumption. It is possible to design a water rate structure that would not change a district's total revenue from delivered water, but this would be particularly difficult to calculate in the first year of implementation. Any increased revenue from water deliveries could be spent on conveyance system improvements or on-farm improvements. Ideally, the farmer who reduces water use to the minimum needed for crop growth would not suffer any out of pocket loss overall and might even save money; only those who persist in over-application of water would pay more.

Questions have been raised concerning the legality of "pricing" water above the cost of delivery. Authoritative legal opinion states that special use charges can be established by irrigation districts and other water delivery districts on water from reclamation projects (although the Bureau of Reclamation itself cannot furnish water for more than its O&M cost, which is established by contract). However, special use charges would not be permitted on water appropriated under state law, if users were charged a price in excess of the cost of delivery.

This action would not be a popular one when undertaken by local irrigation districts. In California's Imperial Irrigation District, the reaction of farmers toward having their excess usage result in increased cost has not been positive. Local irrigation district personnel have been met with considerable hostility by the water user. Nonetheless, the irrigation district staff believes that the resulting reduction in water use has justified the unpopularity of the program, and the penalty charge policy will be continued.

It is possible that special use charges to conserve water may become widespread in the West, even though not intended primarily as a salinity control measure. The July 15, 1977 Federal Register published proposed issue papers relating to a comprehensive national water policy under study by the Carter administration. Some proposals would require implementation of irrigation water efficiency measures. Among the methods mentioned (page 36792) was the establishment of user charges on federally provided water to conserve limited water supplies and encourage their most economic use. Such a federal policy, although aimed primarily at water conservation, would have a side benefit in reduction of salinity in some areas of the Colorado River Basin. Public hearings on the proposed federal water policy began in July 1977.

ARIZONA--Action #8

Agency responsible and legal authority. In Arizona, the power to set the price of water is inherent within the powers and purpose of irrigation water delivery districts (ARS 45-1902) and for irrigation districts (ARS 45-1571 through 1595). The statutes are silent on the usage of water price as a means of limiting consumption.

Current status. No actions are currently being taken in Arizona to use water price as a means of salinity control.

Potential feasibility. Because of the relative lack of irrigation return flow and the forecast conversion of agricultural water usage to municipal and industrial uses, this action has limited potential for Arizona and is not rated for feasibility. Portions of the Colorado River main stem, the Little Colorado, and the Bill Williams River have some agricultural return flows. However, other limitations on water consumption, caused by increased municipal and industrial water usage, appear to be limiting "excess" consumption already. Further, control of return flow salinity from the Wellton-Mohawk Irrigation District is being addressed by Title I of PL 93-320.

CALIFORNIA--Action #8

Agency responsible and legal authority. The ability to set price is inherent within the powers of California irrigation districts (WC 22225).

Current status. In 1976 the Imperial Irrigation District instituted such a program to achieve water conservation. If the measured tailwater exceeds 15 percent of the water delivered to the irrigator, two times the cost per unit of water is added to the basic price.

The Imperial Irrigation District believes water pricing is an effective means of achieving irrigation efficiency. In the first full year of implementation (1976), a 6 percent reduction in total water delivered was achieved. Similar savings are expected in future years. However effective, this method is unpopular and difficult. Many farmers have expressed extreme displeasure in having to pay the additional charges, particularly to the field personnel who take the measurements of tailwater.

The Coachella Irrigation District uses other methods (which include a system of in-line storage reservoirs) to improve efficiency in water usage.

Potential feasibility. The Imperial Irrigation District's usage of price to limit water consumption is effective to achieve water conservation; the salinity problem is dealt with by other methods aimed at achieving a "salt balance" for irrigated agriculture in California. Therefore, the California usage of price serves as an

illustration of how salinity might be reduced from irrigated agriculture in other states. There is little or no potential for a reduction of salinity from the irrigated lands within the Colorado River Basin portion of California.

COLORADO--Action #8

Agency responsible and legal authority. Water conservancy districts are the prime agencies responsible for setting prices of water to the ultimate user. The Colorado River Conservation District (CRS 37-46) and the Southwestern Water Conservation District (CRS 37-47) are given adequate powers to establish the price of water, but own none. Further, irrigation districts (CRS-37-41 through CRS 37-43) are given sufficient powers to affix levies, rates and tolls. However, it is unclear, because of case law, whether price differentials can be established for unneeded usage.

Current status. No actions are being taken to cause water consumption to be limited through water pricing.

Potential feasibility. Although this action has potential to reduce the amount of agricultural water delivered, particularly in areas where agricultural return flows contribute substantially to salinity, it does not meet the criterion of being politically acceptable on the local level, as illustrated:

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|-----------------------|
| Legal | X | | |
| Political | | | X |
| Administrative | X | | |

Control of salinity (or at least a reduction thereof) is not considered to have a priority sufficient to cause the local water delivery agencies to undertake an unpopular means of water conservation. In other words, while this action is legally viable in Colorado, there is no motivating force to cause its use within the present institutional arrangements, and its costs and political opposition make it very unlikely to be implemented.

NEVADA--Action #8

This action is aimed primarily at agricultural usage. Agricultural return flows are not the focus of salinity control on the Colorado River in Nevada, hence this action has little or no application for this state.

NEW MEXICO--Action #8

Agency responsible and legal authority. Water conservation districts are given the power to sell water (NMSA 75-28-4). New Mexico irrigation districts are also given powers to charge for water (NMSA 75-22-29). However, the New Mexico statutes neither authorize nor prohibit utilizing price as a means to control consumption.

Current status. No actions are being taken to use water pricing to limit water use as a salinity control measure.

Potential feasibility. This action would have a small impact on salinity in New Mexico because agricultural return flows are not at present a major source of salinity for the Colorado River. Other measures to achieve efficient water usage have been incorporated into the Navajo Project. Should agricultural return flows develop into a salinity source requiring state control, this action might provide an effective control mechanism. However, the economic consequences might close small, marginal farms and the resulting reallocation of irrigation water might result in no change in salinity. Responsibility for initiation of the action would rest with the local irrigation and water conservation districts; the potential lack of popularity of this approach would make it difficult to achieve politically.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|---------------------------|
| Legal | | X | |
| Political | | | X |
| Administrative | X | | |

UTAH--Action #8

Agency responsible and legal authority. In Utah, water conservation districts are given the power to set water rates (UCA 73-9-14). Irrigation districts also are given the power to charge for water (UCA 73-9-13). The Utah statutes are silent on the use of water price as a means of limiting the quantity of water used.

Current status. No actions are being taken in Utah to use price as a means of reducing salinity from agriculture.

Potential feasibility. Although this action has potential to reduce the amount of agricultural water delivered, particularly in areas where agriculture return flows contribute substantially to salinity, it does not meet the criterion of being politically acceptable on the local level. Control of salinity (or at least a reduction thereof) is not considered to have a priority sufficient to cause the local water delivery agencies to undertake an unpopular means of water conservation.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|-----------------------|
| Legal | | X | |
| Political | | | X |
| Administrative | X | | |

As illustrated, although this action seems legally viable in Utah, there is no motivating force to cause its use within the present institutional arrangements.

WYOMING--Action #8

Agency responsible and legal authority. Wyoming water conservation districts (WSA 41-91) are given adequate authority to fix the price of water. Irrigation districts are also given powers to sell or lease water (WSA 41-330). The authority to set the price of water from Fontenelle Reservoir is given to the Wyoming Department of Economic Planning and Development (WSA 9-160.39). However, using price as a means of controlling water use is neither approved nor denied in the statutes.

Current status. No actions are being taken to limit water use by means of pricing, in order to achieve salinity control.

Potential feasibility. It is not clear whether Wyoming agricultural return flows are a major part of the state's contribution to the salinity of the Colorado River. This matter is currently under study by the Southwest Wyoming 208 planners. Should agricultural return flows be found to be a source requiring some salinity control action, water pricing is legally feasible in Wyoming. However, as initiation and implementation of this unpopular action rests with the local irrigation and water conservation districts, using water price as a salinity control measure would probably mean considerable political opposition, as illustrated below.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | X | | |
| Political | | | X |
| Administrative | X | | |

| ACTION | | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|---|-----------------------|---|--|---|---|--|---|--|
| <p>8. Establish special use charges for irrigation water provided from reclamation projects to cause more efficient usage and to encourage waste control measures. Use excess funds derived to finance waste control capital improvements on farms and in the conveyance system.</p> <p>228</p> | AUTHORITY | <p>ARS 45-1902 & ARS 45-1571 Power to set price of water is incidental to powers and purpose of irrigation water delivery districts and irrigation districts.</p> <p>General</p> | <p>WC 22225 Power to set price of water is incidental to powers of irrigation districts.</p> <p>General</p> | <p>CRS 37-46 and 37-47 gives powers to set water prices to conservancy districts on Colorado River. Irrigation districts are also given these powers in CRS 37-41 through 37-43.</p> <p>General</p> | <p>NRS 539.313 gives irrigation districts powers to set water prices. NRS 541.140 gives water conservancy districts the right of pricing water. This action does not apply in Nevada, within the Colorado River Basin.</p> <p>General</p> | <p>NMSA 75-28-4 gives water conservation districts power to sell water and similar powers are given irrigation districts (75-22-29).</p> <p>General</p> | <p>UCA 73-9-13(g) gives Utah water conservation districts authority to fix water rates. UCA 73-9-14 gives similar powers to Utah irrigation districts.</p> <p>General</p> | <p>WSA 41-91 Water conservation districts and irrigation districts (WSA 41-330) are given adequate authority to accomplish this action. WSA 9-160.39 DEPAD is given authority to set rates on water from Fontenelle Reservoir.</p> <p>General</p> |
| | CURRENT STATUS | <p>No present action by water resources agencies to use price as a means to encourage efficient usage and reduce salinity. The Salt River Project incorporates other water use efficiency measures.</p> | <p>The Imperial Irrigation District uses price as a means of achieving conservation. The Coachella Irrigation District incorporates other means of achieving water use efficiency.</p> | <p>No action by water delivery agencies to use price as a means to encourage efficient usage and to reduce salinity.</p> | <p>This action does not apply to Nevada because of very limited agricultural return flows in the Colorado River Basin.</p> | <p>No action by water resources agencies to use price as a means to encourage efficient usage. The Navajo Project utilizes other measures to achieve water use efficiency.</p> | <p>No action by water delivery agencies to use price as a means to encourage efficient usage and to reduce salinity.</p> | <p>No action by water resources agencies to use price as a means to encourage efficient usage and to reduce salinity.</p> |
| | POTENTIAL FEASIBILITY | <p>This action has little potential in Arizona due to the nature of the Arizona salinity problem.</p> | <p>This action has little salinity control potential for California.</p> | <p>This action has high potential for the Mancos Shale areas of Colorado. However, it has low political feasibility as there is no motivation for Colorado irrigation districts to implement an unpopular means of salinity control. Reported federal plans to achieve water conservation may cause this action to take place, however.</p> | <p>This action does not apply to Nevada because of very limited agricultural return flows in the Colorado River Basin.</p> | <p>It is doubtful that much could be gained in New Mexico by this action.</p> <p>Should salinity from irrigated agriculture become a problem, this action is possible but it has low political feasibility. Reported federal plans to achieve water conservation may cause this action to take place, however.</p> | <p>This action seems legally possible in Utah, but because local irrigation and conservancy districts are the implementing agencies, the action has low political feasibility. Reported federal plans to achieve water conservation may include price as one of the water efficiency methods.</p> | <p>The contribution of irrigated agriculture to Wyoming salinity is currently under study. Should the contribution be considerable, this action is legally possible, but would encounter political opposition. However, reported federal plans to achieve water conservation may include price as a method of eliminating wastage.</p> |

9. *By use of state economic incentives, promote conversion of marginal agricultural water to other uses, or increase irrigation efficiency, to reduce or eliminate salinity resulting from irrigation return flows.*

Background of the action. Recognizing the resistance of the agricultural sector to sanctions or administrative regulation of water use as a means of controlling salinity, this action proposes state economic incentives designed to stimulate voluntary actions by irrigators. There is some equity in the proposal, which avoids placing the major financial burden of salinity control on the agricultural irrigators and instead spreads the burden over all state residents by using state tax monies to finance improvements.

State grant or loan fund. One form of economic incentive would be to establish a state grant or loan fund to supplement federal programs of cost sharing to finance on-farm improvements promoting irrigation efficiency.

At present, besides the inherent financial incentive of greater productivity or efficiency of water use, farmers may apply for a subsidy for implementing certain on-farm improvements from the following federal government programs: USDA Agricultural Stabilization and Conservation Service (ASCS); Soil Conservation Service, Rural Conservation and Development (RC&D) Program; and the Four Corners Regional Commission, which provides funding in Arizona, Colorado, Nevada, New Mexico and Utah. Neither California nor Wyoming receives funding from a regional commission. The federal funding provided varies among states (some get no funding, although all Colorado River Basin states do) and among counties within a

single state. County variations are determined by ASCS county committees of local farmers, who specify the improvement activities which are highest priority in that county, and also specify the percentage of federal funding subsidy (in the range of 50 to 75 percent of total cost). The federal funding is insufficient for the number of legitimate requests, "and probably always will be" according to one spokesman.

To supplement the incentive supplied by federal funding, the states can provide their own programs of grants, low interest loans, loan guarantees (e.g., state guarantees of commercial loans), or tax incentives. The tax incentive would logically take the form of a multi-year forgiveness of ad valorem property tax on the improvement. Farmers already would obtain benefits from their improvement investment on state income taxes.

Before augmenting the federal programs with state-funded programs, the states are likely to work through their congressional delegations for increased federal funding for cost-shared programs.

No state now gives a property tax incentive, although it is under consideration in Nevada. Any such action would probably require new legislation.

Establish an agency to trade in water rights. An imaginative approach to salinity control has been proposed by Charles W. Howe and Douglas V. Orr of the Department of Economics of the University of

Colorado.¹ They propose to establish an agency to trade in water rights, buying lower value water rights from marginal agricultural lands, and excess water rights from farmers. The rights would be held and later sold for higher valued uses. The Howe-Orr proposal envisions an agency with a probable dual purpose of economic development and control of salinity. This agency should be able to acquire water rights or excess water from certain agricultural users and sell the rights to nonagricultural users or to agricultural lands with low salinity. As only willing seller-willing buyer transactions would occur, there would be no undue coercion on the land owner. The agency, of course, would require adequate appropriations, particularly in the early years.

In all Colorado River Basin states, there is no statutory authority to create such an agency. However, in all states there is an existing agency which has adequate powers to acquire water in the best interests of the state. No actions of this nature were noted in any of the states. In Utah, however, the Division of Water Resources is consistently encouraging industrial users to buy water rights from marginal agricultural lands.

Throughout the West, implementation of this action could be restricted by legal problems regarding transferability of water, statutes requiring basin-of-origin protection, need to protect the rights of junior appropriators, etc.

¹Howe, C.W., and D.V. Orr, "Effects of Agricultural Acreage Reduction on Water Availability and Salinity in the Upper Colorado River Basin," Water Resources Research, October 1974; and Howe, C.W. and D.V. Orr, "Economic Incentives for Salinity Reduction and Water Conservation in the Colorado River Basin," Salinity in Water Resources, Boulder, Colorado: Merriman Publishing Co., 1974, pp. 120-138.

ARIZONA--Action #9

Authority. There is no statutory authority for the establishment of a state grant or loan fund in Arizona.

There is likewise no specific statutory authority to establish an agency to trade in water rights, although the Arizona Water and Power Plan (ARS 45-2501 through 45-2521) agency has authority to plan and execute projects and to acquire water rights if it should choose to do so.

Current status. No action is underway in Arizona to implement either a state grant or loan fund, or an agency to trade in water rights.

Potential feasibility. The relatively small amount of saline irrigation return flow into the Colorado River from Arizona (except for Wellton-Mohawk) makes it unlikely that state funds would be used for Action #9.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|-----------------------|
| Legal | | X | |
| Political | | | X |
| Administrative | | | X |

CALIFORNIA--Action #9

Authority. California has no specific statutory authority for either part of this action. However, Pub. Res. Code 9063 directs the California Soil Conservation Commission to "aid and encourage, but not conduct, soil conservation activities," and the federal ASCS program funds about 40 to 50 percent of farmer requests. There is no state water rights control over allocations from the Colorado River; these are governed by Federal Government contracts with individual water districts.

Current status. No action is underway in California, either to provide state grants and loans, or to create an agency to trade in water rights.

Potential feasibility. The Colorado River Basin area of California appears to be accomplishing about as much as can be done to control salinity already, using ASCS funding and supporting other improvements as a means of gaining greater economic efficiency. Thus a state grant and loan fund does not promise significant improvements over this existing program unless a program acceleration can result.

| | | | Major |
|-------------------------------|-----------------|---------------------|-----------------|
| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Obstacle</u> |
| Legal | | X | |
| Political | | X | |
| Administrative | | X | |

COLORADO--Action #9

Authority. Colorado has statutory authority to make both loans and grants (CRS 35-70-103), but is not funded to do so. A small (\$89,000) appropriation was made by the 1976 Colorado legislature to pay some of the administrative expenses of the 83 soil conservation districts.

The Water Conservation Board has the duty of promoting the greatest degree of water conservation and utilization and can perfect water rights in the name of the Department of Natural Resources (CRS 37-60-102, 106).

Current status. Colorado has no activity underway to implement Action #9.

Potential feasibility. Irrigation improvements are being made slowly but steadily by irrigators through a combination of ASCS and other federal funding, and irrigator investment to improve efficiency of water use and to reduce labor costs. There has been no serious effort to promote a state loan or grant program, even given the state policy to encourage agriculture and conserve water, and legislative willingness to appropriate funds for such a program is believed to be small.

The concept of establishing a state agency to deal in water rights to help meet certain objectives of state water policy has some promise. The state is currently studying water policy options related to agriculture, industrial development, energy alternatives, etc. State initiatives in creating a water bank, in arranging sale

and leaseback of water, in buying water rights to promote beneficial forms of development, minimum stream flows, etc., are under discussion. Certain legal aspects are still questionable but some are believed likely to be resolved soon.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | | X | |
| Political | | X | |
| Administrative | | X | |

NEVADA--Action #9

Authority. Nevada has no authority to establish a grant or loan fund, although serious legislative consideration is being given to a reduction in *ad valorem* taxes of irrigated farms if ditches are lined or other water saving improvements are made.

There is no statutory authority in Nevada to create an agency to trade in water rights. However, NRS 538.171 authorizes the Administrator of the Division of Colorado River Resources to "receive, protect, safeguard and hold in trust for the State of Nevada all . . . water rights . . . to the waters of the Colorado River . . ."

Current status. The Division of Colorado River Resources controls allocation of Colorado River water, and there is no need for further control of water rights. The shortage of water in Nevada has resulted in careful control of the use and reuse of water, and in the development of extensive water saving improvements.

Future potential. Nevada has fully allocated its Colorado River water resources, thus protecting its rights to compact-allocated water. As the need for water grows, the Division of Colorado River Resources may be able to help meet urgent needs by intervening to purchase and resell water rights, thus reallocating available resources to higher priority and more efficient users. However, at present there appears to be no need for the state incentives described in Action #9.

NEW MEXICO--Action #9

Authority. New Mexico has a grant and loan program, from the irrigation works construction fund and other funding under the control of the Interstate Stream Commission. The grant program, currently funded at \$150,000/year by state appropriation, can provide grants of up to 15 percent of the cost of improvements constructed by community ditch (acequia) organizations, which can supplement 70 or 80 percent federal funding. A loan fund of approximately \$2 million can lend money to community ditch organizations at 2-1/2 percent interest to pay the balance of the cost. Funds can be used to increase irrigation efficiency, which may in turn (but not necessarily) reduce salinity.

The Interstate Stream Commission has the power "to develop, to conserve, to protect and to do any and all other things necessary to protect, conserve and develop the waters and stream systems of the state" (NMSA 75-34-3), which implies the power to acquire and perfect water rights.

Current status. The grant and loan program in New Mexico is effective in promoting water conservation measures. Since currently irrigated soils are not very saline, irrigated agriculture is not yet considered a major source of salinity in the Colorado River Basin portion of New Mexico. As remaining compact-allocated water is utilized, however, increased consumptive use will increase salt concentration in tributaries of the Colorado River. The State Engineer allocates water rights but does not trade in rights as Action #9 suggests.

Potential feasibility. Action #9 is generally feasible in New Mexico as a means of increasing irrigation efficiency, but since irrigated agriculture is not yet perceived as

a serious source of salinity in the CRB area of New Mexico, Action #9 is limited in its potential effectiveness. Some increase in funding of the grant and loan fund would of course permit an increase in its usefulness.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | X | | |
| Political | | X | |
| Administrative | | X | |

UTAH--Action #9

Authority. Utah, in 1947, created a revolving fund (UCA 73-10-1) administered by the Board of Water Resources to construct projects to promote efficiency of water use. The construction cost is repaid, without interest, over a period of years (varying from a few below five years to a maximum of 35, with most about 15-20 year periods). Most loans are made to mutual irrigation companies, with very few to individuals. In the 39 years of the program, the Utah legislature has appropriated \$12 million, of which \$9 million has been repaid and a total of \$21 million spent. Because the loans generally are used to supplement federal funding, some \$40 million in projects have been constructed with the aid of the program. Most improvements funded are watershed protection projects, including 40 dams, hundreds of miles of canal lining, pressure and sprinkler irrigation systems, plus municipal water supply projects for smaller towns.

The Board of Water Resources can acquire and perfect water rights for the development and utilization of state waters (UCA 73-10-4). There is an informal policy encouraging industrial users to buy marginal agricultural land water rights.

Current status. Utah has been accomplishing many of the intended goals of Action #9 in somewhat less formal ways. The revolving fund provides a considerable economic incentive to mutual irrigation companies to improve irrigation efficiency, although the fund rarely is used to assist individuals. Although the Division of Water Resources does not itself trade in water rights, it does informally

act as a catalyst to promote transfer of marginal agricultural water rights to industry.

Potential feasibility. Although some preliminary thought has been given to the concept of a water rights bank, there are apparent problems of political resistance to having a state agency enter the water rights market and "tamper" with private property rights. Until the legislature and state administration provide direction and funding, the implementation of a state water rights bank appears unlikely to be implemented.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | X | | |
| Political | | | X |
| Administrative | | X | |

WYOMING--Action #9

Authority. Wyoming has a statute (WSA 41-1.42) authorizing state farm loans (at 4 to 5-1/2 percent interest) of not to exceed \$60 million total. The Department of Economic Planning and Development (DEPAD) has broad authority to make loans to individuals, ditch companies or corporations, secured by real estate. Loans in excess of \$150,000 can be made only to assessment districts. Loans for canals and diversion works for agricultural purposes carry a 4 percent interest rate; those for sprinkler irrigation systems, other mechanical equipment or wells are 5-1/2 percent loans for a 15 year term.

DEPAD also has authority to acquire water rights and sell water to industrial concerns (9-160.30).

Current status. The state farm loan fund actively promotes on-farm improvements to promote increases in water use efficiency. Although DEPAD has authority to trade in water rights, it does not engage in trading that would convert agricultural water to other uses. This is largely because of a conviction that irrigated agriculture is not a major contributor to salinity in the Green River, whereas natural runoff from shallow shales in the desert country is perceived to be a major cause. There is believed to be little or no "marginal" irrigated agriculture on saline lands in Wyoming, as poor quality lands (e.g., Mancos shale) are left unirrigated.

Potential feasibility. Until conditions change or new evidence appears to indicate that irrigated agriculture is a significant contributor to salinity, DEPAD is unlikely to promote conversion of agricultural water rights as a salinity control measure.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | X | | |
| Political | | | X |
| Administrative | | | X |

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|---|---|---|--|--|---|---|--|
| 9. By use of state economic incentives, promote conversion of marginal agricultural water to other uses, or increase irrigation efficiency, to reduce or eliminate salinity resulting from irrigation return flows: (a) Establish state grant or loan fund. (b) Establish an agency to trade in water rights. | (a) Establish state grant or loan fund. No statutory authority. (b) Establish an agency to trade in water rights. No authority to create a new agency exists. ARS 45-512 gives the Arizona Water Commission the power to plan water usage, but execution seems specifically prohibited under current statutes (ARS 45-501). This action, to fall within present statutes, would have to be a part of the Arizona Water and Power Plan (ARS 45-2501 through 45-2521). The State Water and Power Plan has authority to plan and execute projects and acquire water rights. <i>General</i> | (a) Establish state grant or loan fund. No statutory authority. PRC 9063 directs Soil Conservation Commission to "aid and encourage, but not conduct, soil conservation activities." (b) Establish an agency to trade in water rights. No authority to create a new agency exists. <i>General</i> | (a) Establish state grant or loan fund. CRS 35-70-103 authorizes soil conservation board to give grants and loans to districts. (Note: current annual funding is only \$89,000, to be used for administrative expenses of 83 districts.) <i>General</i> (b) Establish an agency to trade in water rights. No authority to create a new agency exists. CRS 37-60-102 and -106 give authority to Water Conservation Board for promoting water conservation and utilization. The Board can perfect water rights in the name of the Department of Natural Resources. <i>General</i> | (a) Establish state grant or loan fund. No statutory authority. (b) Establish an agency to trade in water rights. No authority to create a new agency exists. NRS 538.171 gives authority to Administrator of Division of Colorado River Resources to hold water rights and safeguard the water of the river. <i>General</i> | (a) Establish state grant or loan fund. NMSA 75-34-28 authorizes State Engineer to make loans to community ditch organizations (interpreted to include soil and water conservation districts) for constructing, improving and rehabilitating irrigation systems. <i>Specific</i> (b) Establish an agency to trade in water rights. No authority to create a new agency exists. NMSA 75-34-3 gives the Interstate Streams Commission the power "to develop, to conserve, to protect and to do any and all other things necessary to protect, conserve and develop the waters and stream systems of the state." The power to acquire and perfect water rights is implied in this statute. <i>General</i> | (a) Establish state grant or loan fund. UCA 73-10-1 creates revolving fund to construct projects to promote efficiency of water use. Fund is administered by Board of Water Resources, under UCA 73-10-23. <i>Specific</i> (b) Establish an agency to trade in water rights. No authority to create a new agency exists. UCA 73-10-4 assigns responsibility to the Board and Division of Water Resources for development and utilization of waters of state. The Board can acquire and perfect water rights for these projects. <i>General</i> | (a) Establish state grant or loan fund. WSA 41-1.42 authorizes state financing (loans) for the construction of water conservation projects to abate pollution and promote beneficial use of water. <i>Specific</i> (b) Establish an agency to trade in water rights. No authority to create a new agency exists. WSA 9-160.30 authorizes Department of Economic Planning and Development (DEPAD) to plan and execute water development projects, including acquisition of water rights and sale of water to industrial concerns. <i>General</i> |

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|---|---|--|--|---|--|--|--|
| 9. By use of state economic incentives, promote conversion of marginal agricultural water to other uses, or increase irrigation efficiency, to reduce or eliminate salinity resulting from irrigation return flows: (a) Establish state grant or loan fund. (b) Establish an agency to trade in water rights. | (a) Establish state grant or loan fund. No grant or loan fund; no tax incentive. | (a) Establish state grant or loan fund. No grant or loan fund; no tax incentive. ASCS program funds about 40-50% of requests. | (a) Establish state grant or loan fund. No grant or loan fund; no tax incentive. Legislature has in 1976 appropriated \$89,000 for administrative expenses of state's 83 soil conservation districts. | (a) Establish state grant or loan fund. There is serious consideration to giving farmers a tax break if they line ditches and make water saving improvements. This would be a reduction in <u>ad valorem</u> taxes on their farms. State legislature is generally opposed to grant programs. | (a) Establish state grant or loan fund. N.M. Interstate Streams Commission has a grant and loan program to supplement ASCS, RC&D and Four Corners funds. State grant program (funded at \$150,000/yr) can provide up to 15% grant and can loan money at 2-1/2% interest to community ditch organizations to pay balance of cost. Loan fund is nearly \$2 million. | (a) Establish state grant or loan fund. State program exists to construct projects for watershed protection and canal lining, etc., with state costs reimbursed over multi-year period without interest. This program augments ASCS, RC&D and Four Corners programs. The program has advanced \$21 million to date, assisting \$40 million of project construction. | (a) Establish state grant or loan fund. DEPAD has low cost (4% to 5-1/2%) farm loan program of up to \$60 million. Loans, secured by land, are made for construction of reservoirs, canals, etc., and for sprinkler systems and wells. These loans supplement ASCS and RC&D grants. |
| 244 | CURRENT STATUS (b) Establish an agency to trade in water rights. No actions by water resources agencies. | (b) Establish an agency to trade in water rights. No actions by water resources agencies. | (b) Establish an agency to trade in water rights. No actions by water resources agencies. | (b) Establish an agency to trade in water rights. This action does not apply to Nevada as the water which is available is being used and reused. All water in Las Vegas Valley is used for municipal and industrial purposes, with minor exceptions. | (b) Establish an agency to trade in water rights. No actions by water resources agencies. | (b) Establish an agency to trade in water rights. No formal actions by water resources agencies. However, informally the Division of Water Resources has been encouraging industrial users to buy water rights of marginal agricultural lands. | (b) Establish an agency to trade in water rights. No actions by water resources agencies. |

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|---|--|---|---|--|---|---|--|
| 9. By use of state economic incentives, promote conversion of marginal agricultural water to other uses, or increase irrigation efficiency, to reduce or eliminate salinity resulting from irrigation return flows: (a) Establish state grant or loan fund. (b) Establish an agency to trade in water rights. | (a) Establish state grant or loan fund. Unlikely to be established as a salinity control measure since relatively little agricultural return flow reaches the Colorado River (except Wellton-Mohawk). (b) Establish an agency to trade in water rights. Unlikely to occur for salinity control reasons but may occur as a part of the implementation of the State Water and Power Plan by the Arizona Water Commission. | (a) Establish state grant or loan fund. Would not promise significant improvements in salinity in the CRB area. (b) Establish an agency to trade in water rights. Colorado River water allocations are governed by Federal contracts with individual water districts, not by state water rights. | (a) Establish state grant or loan fund. Little legislative willingness to do so is apparent. (b) Establish an agency to trade in water rights. State government is exploring water policy options and may take initiative in water rights area once legal barriers are overcome. | (a) Establish state grant or loan fund. Little need to so in CRB portion of Nevada. (b) Establish an agency to trade in water rights. Division of Colorado River Resources already carefully controls allocation of Colorado River water. | (a) Establish state grant or loan fund. Fund already functions effectively; some increase in funding would permit an expansion of activity. (b) Establish an agency to trade in water rights. Generally feasible to be done by Interstate Stream Commission but is limited in potential effectiveness because irrigation is not a major cause of salinity. | (a) Establish state grant or loan fund. Revolving fund now is in an effective incentive to mutual irrigation companies but rarely assists individuals. (b) Establish an agency to trade in water rights. Is legally and administratively feasible but not politically acceptable without direction by state executive and legislative funding. | (a) Establish state grant or loan fund. State farm loan fund already actively promotes increases in water use efficiency. (b) Establish an agency to trade in water rights. Is legally feasible but unlikely to be used as a salinity control measure without more evidence that irrigation is a major contributor to salinity. Saline lands are generally not irrigated. |

POTENTIAL FEASIBILITY

10. *Administratively modify leases of state lands (at time of lease or renewal) to prohibit agricultural practices which cause erosion or excess runoff of saline water, and to improve the land to reduce runoff by: prohibiting agriculture or grazing on certain soil types, restricting grazing intensity, and modifying vegetation on rangeland to reduce salinity from runoff.*¹

Background of the action. Most of the states of the Colorado River Basin derive substantial income from both the sale and the lease of state lands. These lands are leased for agricultural purposes, mineral development, timbering, grazing and a multitude of special uses. While most state lands are leased for grazing, there are substantial quantities of land being used as cropland and for irrigated agriculture. Provisions regarding the ownership of water used for irrigated agriculture on state lands vary from state to state.

There are several different actions which could be taken to reduce salinity loading resulting from the use of state lands. Grazing leases, for example, could be conditioned to prevent over-grazing in areas where such over-grazing would substantially disturb the topsoil. Subsequent rains and the resultant runoff from such lands return highly saline waters to the stream system.

If state lands were leased for irrigated agriculture, conditional leases requiring efficient agricultural practices would result

¹This does not include leases of state lands for mineral development purposes. The restoration of surface areas following surface mining also is likely to reduce saline flows into the Colorado. However, the proposed action does not encompass such restoration since special attention already is given to it through mined land restoration statutes.

in a reduction of irrigation return flows. This would result in a reduction of both the quantities of water required and the salinity level of the Colorado River. Such conditional agricultural leases could require specific methods of irrigation (sprinkler or trickle instead of flood or ditch-and-furrow). The production of specific crops could be encouraged by lease rates. Types of fertilizers and pesticides used on state lands could also be controlled in this manner.

The critical constraint on a system of conditional leases of state land is enforcement. The ability of state land agencies in the states of the Colorado River Basin to administer a system of conditional leases is essential to the overall success of such a program. Without the reality of enforcement, a conditional lease system may prove to be relatively ineffective.

Politically, the imposition of any new constraints in state land leases is likely to be resisted by the agricultural interests who consider state lease renewals almost as a property right and understandably object to lease provisions that increase their operating expenses.

ARIZONA--Action #10

Authority. The primary authority for the administration of Arizona state lands rests with the State Land Department. The State Land Commissioner is to determine those lands which are suitable for both grazing and agriculture (ARS 37-211.A). The Commissioner also has the authority to classify lands for specific purposes and to reclassify lands when such reclassifications are in the best interests of the state (ARS 37-212.B, C).

Leasing of state lands falls within the responsibilities of the State Land Department and the State Land Commissioner. The Commissioner, along with the authority to lease state lands, is authorized to make long range plans for the use of state lands (ARS 37-132.A.3 to 5). Furthermore, the State Land Department has the authority to acquire land for agricultural use. To further this acquisition, the Land Department is authorized to exercise eminent domain authority (ARS 37-372.A).

In terms of a comprehensive approach to state land use, the Office of Environmental Planning is authorized to maintain data on a state land use plan (ARS 37-163.A). The Office of Environmental Planning is also authorized to coordinate the plans and programs of all state departments, agencies and instrumentalities.

Current status. Only 30 percent of the land areas falling within the confines of the State of Arizona is in private, state or local government ownership. The remaining 70 percent falls under the jurisdiction either of the federal government or of one of several

Indian tribes. Most of the state lands which are leased are used for grazing, although there is limited irrigated agriculture. Only 13 percent of Arizona lands fall within the state land trust, i.e., are state-owned.

State lands are leased under the classifications determined by the State Land Commissioner. Failure to use the land for the purposes contained in the lease is usually grounds for state action to terminate the lease (R 12-5-109/121).² Leases can be specifically conditioned to require or prohibit certain activities, though this is not usually done. The primary condition regarding grazing lands is the establishment of animal unit month (AUM) carrying capacity. This carrying capacity is the basis upon which the rent for specific lands is determined (R 12-5-154.F). Requests to exceed the established carrying capacity must be made to the State Land Commissioner (R 12-5-154.K).

In terms of agricultural leases, acts which jeopardize the land or water rights of the state are grounds for terminating the lease.³ Improvements to agricultural lands (as well as to grazing lands) must be approved by the Commissioner prior to construction if the individual making the improvement is to be compensated for the improvement (R 12-5-124). Improvements would seem to include changes in

² Arizona, Department of State, "Official Compilation of Administrative Rules and Regulations: Chapter 5, Land Department," 1975.

³ Arizona State Land Department, Agricultural Lease, Supplemental Condition 18.

vegetation (R 12-5-02.2). Compensation for the eradication of "noxious growth" on grazing lands, which is considered an improvement, is to be amortized at a rate of 10 percent per annum (R 12-5-125.2). (There are also some vegetation modification activities underway by the Bureau of Land Management on federal lands within Arizona.) Vegetation changes on agricultural lands, however, may be difficult by virtue of the fact that prior approval from both the State Land Department and the Commissioner of Agriculture and Horticulture are required before plants protected by the Arizona native plant law can be removed.⁴

Finally, it should be noted that waste (of water and other resources) on state lands is not allowed.⁵ Should such waste occur, the lease may be terminated.

Potential feasibility. Because of the limited amount of land (13 percent) in the state land trust, major state efforts to modify vegetation may not be justified, unless similar efforts are made on federal and Indian lands. This would shift primary emphasis of the implementation of this proposed action to the condition of state grazing and agricultural leases. No lease may be modified during its term without the consent of both the state and the lessee. This would require most changes in leases to occur at the time of renewal. Since the leases usually run for ten years, this action could not be implemented very quickly.

⁴ Ibid., Special Condition.

⁵ Arizona State Land Department, Grazing Lease, Supplemental Condition B.

Leases which conflict with land classifications are usually terminated (R 12-5-131). Were the State Land Department to reclassify lands whose use for either agriculture or grazing would contribute to the salinity loading characteristics of the Colorado River Basin, subsequent leases under the new classification could speed up the process of implementation. New leases could then be issued in light of the reclassification. The critical variable in this situation is the willingness of the State Land Commissioner to reclassify lands in the face of seemingly inevitable political opposition.

In the final analysis, the most promising potential seems to rest with a conditioning of state land leases over time. Though this means of implementation would be slow (i.e., requiring ten years), it may result in both the least number of uncertainties and a minimum amount of opposition.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|---------------------------|
| Legal | X | | |
| Political | | X | |
| Administrative | | X | |

CALIFORNIA--Action #10

Authority. The California State Lands Commission has the authority to determine possible uses of state lands. These uses, which are expressed as land use classifications, may be the basis for similar classifications by other state agencies. In fact, the Commission has the authority to require other state agencies to make land use classifications (Pub.R. 6201).

The Commission possesses general authority to administer, sell, lease or dispose of public lands (Pub.R. 6216.a). Within this authority, other state agencies using state lands are subject to the rules developed by the Commission (Pub.R. 6221). The Commission also has the authority to apply these rules and regulations to individual leases of state lands.

Public land use plans, to be prepared by city, county and state planning agencies, are intended to include numerous environmental factors. Specifically, these plans are to focus on the conservation of natural resources including soils, the prevention of erosion, and protection of watersheds (Gov. 65303.1, 5, 6). This may be adequate authority to include partial implementation of the pro-

Current status. There is very little, if any, state land leased for either agricultural or grazing purposes in California that falls within the Colorado River Basin.⁶ Because of this, no current actions

⁶Telephone interview with Scott Atkins, Land Transportation Unit, State Lands Commission, December 9, and December 20, 1976.

of the State Lands Commission regarding leasing of state lands will have an impact on the salinity loading characteristics of the Colorado River.

Potential feasibility. Even though implementation of this action is not currently possible in California, certain procedures developed in the state may well serve as a model for other Colorado River Basin states. When considering leases of state lands, the State Lands Commission can deviate from existing rules in the public interest (Ca.Adm. 1907). When this occurs, the State Lands Division determines the impact of the Commission's deviation. If the impacts resulting from Commission discretionary approval of a proposed project are substantial, the California Environmental Quality Act (CEQA) comes into effect. Under CEQA guidelines, either an Environmental Data Statement (EDS) or an Environmental Impact Report (EIR) must be prepared (Ca.Adm. 2905.a,1). This type of procedure, which focuses on the environmental desirability of actions proposed in the public interest, would make implementation of conditional leases somewhat simpler and perhaps more effective.

COLORADO--Action #10

Authority. Leasing of state lands in Colorado falls within the authority of the State Board of Land Commissioners. The Commissioners are authorized to lease any portion of state lands (CRS 36-1-113). Furthermore, the Commissioners are authorized to consider the proposed use of the land in establishing conditions for such leases (CRS 36-1-118.1). The Commissioners are also directed to consider previous care and use of the land in promoting productivity when considering leases and lease renewal (CRS 36-1-118.2). The State Board of Land Commissioners has broad discretionary authority to administer state lands.

Current status. Very little state land, less than 12,000 acres, is leased for agricultural, i.e., farming, purposes in the counties falling within the Colorado River Basin. Substantially more acreage, in excess of 431,000 acres, is leased for grazing purposes.⁷

Although state land leases can be specifically conditioned to implement certain policies, this is not currently being done. Historically, the State Land Board has not actively carried out a policy of conditioning leases.⁸ The Board, in leasing state lands, does not follow a long-range plan involving future Colorado land use policies.

⁷ Colorado State Board of Land Commissioners, Summary Status Sheet, June 30, 1976.

⁸ Interview with Tommy Neal, State Board of Land Commissioners, October 15, 1976.

The Board of Land Commissioners can terminate leases if the terms of the lease are violated. In fact, warning letters concerning possible termination have been effective in correcting violations of existing leases and state policies, so that there has not been a lease termination within the past two years.⁹

Potential feasibility. The potential for effective implementation of the proposal in Colorado is limited by the fact that there is very little agricultural (other than grazing) land leased in the Colorado River Basin. Implementation of the action regarding grazing lands would be a possibility. Such implementation, however, would be hampered by both the lack of staff resources and the historic posture of the State Land Commissioners.¹⁰ The fact that rental rates are determined by carrying capacity on grazing lands and by productive capacity on agricultural lands would encourage the use of these factors in conditioning leases of state lands.

The major obstacle to the implementation of this type of action seems to be the traditional unwillingness of the State Land Commissioners to increase their authority over the leasing of state lands. Because of this, implementation of this action may have to be preceded by state executive direction to the State Land Commissioners to implement the proposal.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|-----------------------|
| Legal | X | | |
| Political | | X | |
| Administrative | | | X |

⁹ Ibid.

¹⁰ Ibid.

NEVADA--Action #10

Authority. Leasing of state lands in Nevada falls within the authority of the Administrator of the Division of State Lands (Nevada Revised Statutes [NRS] 322.010). The Administrator is authorized to identify areas of critical environmental concern (NRS 321.720[3]) and to determine the suitability of different soil types for specific land uses (NRS 321.720[5]). These determinations are to include a determination of the suitability of land for agriculture (NRS 321.720[4][b]).

The Division of State Lands is the land use planning agency of the state (NRS 321.700). Consistent with this authority is the authority of the Administrator to coordinate all state and local programs regarding the suitability of lands for specific land uses (NRS 321.720[12]). In terms of the feasibility of the proposed action, state land leases may be conditioned regarding the purpose of the lease (NRS 322.050[1]).

Authority concerning vegetation modification rests with the Conservation Districts. These Districts have the authority to regulate vegetation modification and changes in land use within the District (NRS 548.355). Such regulation, however, is subject to the permission of the Division of State Lands (if they are state-owned lands) or the occupier of the lands (NRS 548.355).

Current status. The Nevada legislature, in 1965, enacted a moratorium on the sale, lease, and exchange of state lands

(NRS 232.158). This moratorium is still in effect.¹¹ Because of this the Division of State Lands is not currently leasing state lands.

Potential feasibility. The proposed action is not feasible until such time as the legislature rescinds the leasing moratorium. It has been specifically recommended that "until and unless the legislature removed the moratorium it is recommended that no leases of any kind be entered into."¹² Even if the moratorium is lifted, the limited amount of land remaining under state jurisdiction (86 percent of the State of Nevada falls under the federal control of the Bureau of Land Management) may limit the effectiveness of the proposal.¹³

¹¹Memorandum from L. William Paul, Deputy Attorney General, to Addison A. Millard, Administrator, Division of State Lands, November 23, 1976.

¹²Ibid.

¹³Interview with Nijoshi Nishikawa, Deputy Registrar of Land, Division of State Lands, August 24, 1976.

NEW MEXICO--Action #10

Authority. The Commissioner of Public Lands is authorized to lease all lands owned by the State of New Mexico (New Mexico Statutes Annotated [NMSA] 7-8-28). The Commissioner may promulgate those regulations necessary for the administration of state lands. These rules extend to the consideration of water rights and the transfer of such rights to state lands (NMSA 7-8-19.2).

The Commissioner is directed to determine the carrying capacity of land in determining the annual rental rates for grazing lands (NMSA 7-8-30). Improvements to lands by the lessee without prior approval of the Commissioner are limited to \$10 per acre for land improvement and to \$1,000 total cost for irrigation systems (NMSA 7-8-53).

Finally, the Commissioner is to maintain data on the nature and quality of state lands. The potential usefulness of state lands for different uses (e.g., agriculture, timber, mineral development) is to be reflected in terms of different land classifications (NMSA 7-6-1).

Current status. The State Land Office, under the direction of the Commissioner of Public Lands, administers leases of state lands. Although leases can be conditioned to reflect certain state policy goals, development of lands leased is usually left to the individual lessee. The general feeling of the State Land Office is that only the individual knows his own economic capacity regarding the funding of improvements on leased lands.¹⁴

¹⁴Telephone interview with Dwain Glidewell, Range Management Specialist, State Land Office, Santa Fe, New Mexico, December 9, 1976.

The state owns in excess of 9 million acres of surface land. Most of this land is used for grazing. The carrying capacity of the land is determined using Soil Conservation Service soil types. Types 1-4 are acceptable for development in irrigated agriculture. Soil types appropriate to grazing lands are used to determine carrying capacity in terms of the types and quantities of forage produced.¹⁵

The Commissioner of Public Lands may remove land from leasing if it is in the best interest of the state.¹⁶ Leases may be conditioned to require specific horticultural or animal husbandry practices. If these conditions are violated, the Commissioner has the authority to cancel the lease.¹⁷ Furthermore, leases may be cancelled for a "violation of any of the terms, covenants or conditions of such lease or instrument."¹⁸ Furthermore, it would appear that the Commissioner can require changes in agricultural practices on leased state land. This authority specifically includes the cancellation of leases for abuses, such as overgrazing, although warnings usually are sufficient to rectify such abuses. Where overgrazing is eliminated, saline return flows would also be reduced.

Potential feasibility. It would appear that the Commissioner of Public Lands has sufficient authority to implement the proposed action. The quantities of state lands appear adequate to support the proposed

¹⁵ Ibid.

¹⁶ State of New Mexico, Commissioner of Public Lands, Rules and Regulations Pertaining to Grazing and Agriculture State Leases, December 22, 1971, Rule 2, p. 58.

¹⁷ Ibid, Rule 25, p. 69.

¹⁸ Ibid.

action. Because current leases already limit grazing to the estimated carrying capacity of the land, there is little likelihood that more stringent grazing conditions would have a significant effect on salinity. In theory, conditional leases which would result in more efficient use of state lands would result in reduced saline runoffs.

Unfortunately, the policy that leaves to the lessee the funding of improvements on state lands, and requires state approval of significant improvements, could inhibit any implementation of the proposal. For the proposal to be implemented, the Commissioner (or the Governor) would have to develop specific policies which would override the current focus on the financial capabilities of the individual lessee. Were this to occur, implementation of the proposal could occur rather rapidly as current leases of state land are only of five years duration.¹⁹

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|---------------------------|
| Legal | X | | |
| Political | | X | |
| Administrative | | | X |

¹⁹Ibid., Rule 9, p. 62.

UTAH--Action #10

Authority. Primary authority for the administration and leasing of Utah state lands falls with the Division of State Lands. This division is administered by the Board of State Lands (UCA 65-1-2.1) which determines state policy regarding the use of state lands (UCA 65-1-1, 65-1-14). The Director of the Division of State Lands administers the leasing of such lands under the direction of the Board of State Lands (UCA 65-1-3.1).

The Board of State Lands, acting in the best interests of the state, may condition leases and may adopt rules and regulations (UCA 65-1-44). Also under the direction of the Board of State Lands, the Division may lease farm lands acquired by the state via mortgage foreclosures and may establish conditions for the use of such lands (UCA 65-5-1). Authority to implement the proposed action would seem to fall within the statutory authority of the Board of State Lands.

Current status. There is so little land used for irrigated agriculture in Utah that leases of state land for agricultural purposes are considered a special use and are covered by the "Special Use Lease Application." There are almost no state lands used for agriculture falling within the Colorado River Basin portion of the state.²⁰

Under the provisions of the Special Use Lease, however, those lands that are used for irrigated agriculture are controlled. The Board of State Lands may cancel leases for failures to comply

²⁰Interview with Lowell Johnson, State of Utah, Division of State Lands, December 16, 1976.

with the Rules and Regulations of the Board of State Lands.²¹ These rules include provisions requiring the lessee to apply approved crop management practices to state lands leased.²² Individuals may convert grazing lands to agricultural lands, which is considered a higher use,²³ upon nine months notice to the State Land Board.²⁴

Most of lands held by the State of Utah are used for grazing purposes. Under the terms of the grazing lease, the State Land Board may determine the "number and kinds of livestock" to be grazed on state lands as well as the "number of days and seasons of the year" during which grazing is allowed.²⁵ Leases may be cancelled if the lessee violates any term or condition of the lease.

Of interest in the grazing lease is the provision that the "Lessee shall not cause waste by improper grazing use or otherwise, and shall comply with good conservation practices to safeguard and improve water and other surface resources, and shall comply with Lessor's requirements and requests respecting conservation practices."²⁶ Such "requirements and requests" by the State Land Board could include the provisions of the proposed action.

²¹Utah Board of State Lands, "Rules and Regulations Governing the Issuance of Special Use Leases," February 19, 1975, Rule 10(1).

²²Ibid., Rule 10(2)(c).

²³Ibid., Rule 2.

²⁴Ibid., Rule 10(2)(h).

²⁵State of Utah, State Land Board, Grazing Lease, Provision No. 1.

²⁶Ibid., Provision No. 6.

Potential feasibility. Implementation of the proposed action regarding lands used for irrigated agriculture may be inhibited by both the small amount of land used for such purposes and the length of Special Use leases. These leases may be granted for a period of up to 51 years. If the proposal is to be implemented at the time of renewal, the pace of implementation may be unacceptably slow.

There is greater potential for implementation of the proposed action regarding grazing lands. The aforementioned provision that the lessee of grazing lands must comply with the requirements and requests of the State Land Board, or risk forfeiture of the existing lease, would seem to allow for the implementation of the proposed action. In the final analysis, the potential for the implementation of the proposal appears to be a function of the attitude of the State Land Board toward conditional leases, stricter enforcement of existing rules and regulations, and the promulgation of requests and requirements concerning the leases of state lands for grazing purposes.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|-----------------------|
| Legal | X | | |
| Political | X | | |
| Administrative | X | | |

WYOMING--Action #10

Authority. Authority to lease state lands in Wyoming falls under the State Board of Land Commissioners (WSA 36-14). When considering a proposed lease, the Board of Land Commissioners can take possible future uses of the land into consideration (WSA 36-34). Leases issued by the Board of Land Commissioners may be terminated if the approved rental is not paid, if the lease was obtained by fraud, if the land is used for illegal purposes, or if the terms of the lease are violated.²⁷ The Commissioner of Public Lands serves as administrator for the State Board of Land Commissioners (WSA 36-34).

The State Board of Land Commissioners can require a change in the use of lands covered by specific leases (WSA 36-14). It was held that the Board of Land Commissioners did not abuse its discretionary authority when it favored one applicant for a lease of state lands over another on the basis of the use each applicant proposed.²⁸

The State Land Use Commission is charged with the responsibility of developing a state land use plan (WSA 9-853[vii]). The plan is to include an identification of areas of state concern (WSA 9-853[ix]). This authority may include the responsibility to consider the uses to which state lands are put.

The Department of Economic Planning and Development (DEPAD) has general authority to conduct investigations concerning the use

²⁷Wyoming, Office of the Commissioner of Public Lands, "Grazing and Agricultural Lease," August 6, 1970, Provision No. 9.

²⁸Howard v. Lindmier, 67 Wyo. 78, 214 P.2d. 737.

of the state's resources (WSA 9-960.29). This authority extends to private activities affecting the public interest (WSA 9-160.29 [a][iii]). DEPAD may offer financial assistance to specific projects (WSA 9-160.29[a][iv]) and has the authority to acquire property by eminent domain or other means (WSA 9-160.29[b][iii]). If the proposed action is defined as being in the best interests of the state of Wyoming, its implementation may fall within the authority of the Department of Economic Planning and Development.

Finally, the State Planning Coordinator has the authority to coordinate the activities of all state agencies. This authority extends to coordination of activities between state agencies and the federal government (WSA 9-144.3).

Current status. There are currently no state lands used for irrigated agriculture in the Colorado River Basin portion of Wyoming. Concerning leases of state land for grazing activities, the state can and does establish livestock carrying capacities. Leases may be revoked if these carrying capacities are not adhered to. Unfortunately, state standards are not as stringent as standards promulgated by the Bureau of Land Management for application on federal lands.²⁹

Changes of vegetation on grazing lands, through changes in forage crops or grubbing sagebrush, may be considered improvements to the land.³⁰ If so, improvements exceeding \$750 per section must

²⁹ Interview with Al Wagner, Board of Land Commissioners, State Land Office, December 16, 1976.

³⁰ Wyoming, "Policy, Rules and Regulations for Grazing and Agricultural Lands," October 3, 1968, Section I.1.k.

be approved by the State Board of Land Commissioners prior to construction or implementation.³¹

Potential feasibility. At present the State Land Office is developing a new state land lease form. This lease is being developed in order to provide water for use on state lands located within irrigation districts. At present, water moved onto state lands for irrigation becomes appurtenant to the lands. The development of a new lease form offers the opportunity for the provisions of the proposed action to be included. Were this to occur, the potential feasibility for implementing the action would obviously be greatly enhanced.

The new lease may be necessary because of proposals to begin limited irrigation on state lands falling within the Colorado River Basin. This irrigation, which would be primarily sprinkler irrigation on haylands, would be controlled by the new lease. If the new lease form contained the provisions of the proposed action, salinity resulting from both irrigated agriculture and grazing uses of state lands could be controlled by the State Board of Land Commissioners. At present, however, there is limited feasibility because of the lack of stringent state rules and regulations.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|---------------------------|
| Legal | | X | |
| Political | | X | |
| Administrative | | X | |

³¹ Ibid., Section II. 2.d.

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|---|---|---|---|--|---|---|---|
| 10. Administratively modify leases of state lands (at time of lease or renewal) to prohibit agricultural practices which cause erosion or excess runoff of saline water. This would include prohibition of agriculture or grazing on certain saline soils and restriction of grazing intensity. | <p>37-102(A) State Land Department administers all state lands.</p> <p>37-132(A)(3) State Land Commissioner shall make long-range plans for the use of state lands (5) lease land for agriculture.</p> <p>37-163(A) Office of Environmental Planning shall keep data on the comprehensive land use plan.</p> <p>(13)(2) Office will coordinate the plans and programs of all state departments, agencies and instrumentalities.</p> <p>37-211(A) State Land Commissioner to investigate lands to determine (2) usefulness for grazing and (3) lands susceptible for agriculture.</p> <p>37-212(B) State Land Commissioner to classify lands (1) for agricultural purposes. (C) may reclassify lands in best interest of the state.</p> <p>37-372(A) State Land Dept. may (1) acquire lands for agricultural use, (2) exercise eminent domain.</p> <p><i>Nonspecific</i></p> | <p>Gov. Code 65303(1) General plan to include conservation of natural resources, including soils, and also (5) prevention of erosion and (6) protection of watersheds.</p> <p>Pub. R. Code 6201 State Lands Commission to make determination of possible land uses; may also require other state agencies to make such classification.</p> <p>Pub. R. Code 6216 (a) Commission has authority to administer, sell, lease or dispose of public lands.</p> <p>Pub. R. Code 6221 State agencies using state lands subject to rules of Commission. Application for use must include "environmental documents prepared pursuant to the Commission's rules and regulations."</p> <p><i>Nonspecific</i></p> | <p>36-1-113 Commission authorized to lease any portion of state lands.</p> <p>36-1-118(1) State Board of Land Commissioners to consider use of land in making lease conditions.</p> <p>36-1-118(2) Care and use of land in promoting productivity to be considered in leases.</p> <p><i>Nonspecific</i></p> | <p>321.700 Division of State Lands to be land use planning agency.</p> <p>321.720 Administrator of Division of State Lands to (3) identify areas of critical environmental concern and (4) determine suitability of land for agriculture (b) also (5) prepare suitability of soil type study and (12) coordinate all state and local programs.</p> <p>322.010 Administrator of Division of State Lands authorized to lease state lands.</p> <p>322.050(1) State land leases may be conditioned as to purpose of the lease.</p> <p>548.355 Conservation districts have authority to regulate vegetation and changes in land use with permission of land occupant.</p> <p><i>Nonspecific</i></p> | <p>7-6-1 Commissioner of Public Lands to maintain data on nature and quality of state lands. May classify lands regarding minerals contained.</p> <p>7-8-28 Commissioner of Public Lands authorized to lease all lands owned by the state.</p> <p>7-8-30 Commissioner to determine carrying capacity of lands in determining annual rental rate.</p> <p>7-8-53 Improvements by lessee on state owned land limited to \$10 per acre for land improvements and \$1,000 for irrigation systems.</p> <p>7-8-19.2 Commissioner to set rules for apurtenant water rights.</p> <p><i>Nonspecific</i></p> | <p>65-1-1 Board of State Lands created as policymaking body of Division of State Lands.</p> <p>65-1-2.1 Board of State Lands directs the Division of State Lands.</p> <p>65-1-3.1 Director of Division of State Lands administers public lands.</p> <p>65-1-14 Board determines state policy re. state land.</p> <p>Board may also lease lands for the best interests of the state.</p> <p>65-1-44 Board may condition grazing leases and may adopt rules and regulations.</p> <p>65-5-1 Division of State Lands may lease with conditions, farm lands acquired by the state by mortgage.</p> <p><i>Nonspecific</i></p> | <p>9-144.3 State Planning Coordinator to coordinate such activities of all state agencies and with the federal government.</p> <p>9-160.29 DEPAD may make investigations re. the resources of the state (iii) which may include private works affecting the public interest and (iv) may assist such projects financially</p> <p>(b)(iii) may acquire property by eminent domain and other means (ix) other powers needed to carry out the act.</p> <p>9-853 (vii) State Land Use Commission to develop land use plan (ix) to identify areas of state concern.</p> <p>36-14 Board of Land Commissioners has authority to lease state lands.</p> <p>36-14 Board of Land Commissioners can force this change in a land use in contrast for lease.</p> <p>(Howard vs. Lindmier, 214 P2d 737.)</p> <p>36-34 Administered by the Commissioner of Public Lands. Commissioner of Public Lands may consider future use of land when reviewing an application to lease land.</p> <p><i>Nonspecific</i></p> |

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|---|---|---|--|---|--|---|--|
| 10. Administratively modify leases of state lands (at time of lease or renewal) to prohibit agricultural practices which cause erosion or excess runoff of saline water. This would include prohibition of agriculture or grazing on certain saline soils and restriction of grazing intensity. | State Land Department role limited--only 30% of state lands can be affected by state action--70% is federal or Indian land. Land classed by use. Most in grazing, some irrigated agriculture. Groundwater belongs to the surface owner, i.e., the state. Only groundwater used in irrigated agriculture. Leases can be conditioned. Carrying capacity for AUM's set by law. Most land in grazing. | Land Transactions Unit of the State Land Commission handles leases of state lands. Very little, if any, irrigated agricultural state lands in Colorado River Basin. Uses of state lands can be limited; would be included in provisions of the lease. | Board of Land Commissioners can terminate lease of state lands if policies violated. Previous land management has been too passive. Very little land leased in the Colorado River Basin. Most of state land in the basin is used for grazing. Some irrigated state land outside the basin. State owns any water developed for the land. Permits to drill must be in state's name. Water transferred to the land is thereafter tied to the land. Leases can be conditioned but are not. Lessee can grow anything. Water rate for irrigated land based on water needs of corn. Needs on dry land based on wheat. With these quantities of water, the individual can grow anything that will grow. All types of leases can be conditioned. State Land Board can take action to stop abuses, e.g., overgrazing on state lands. Warning letter effectively used; no lease cancellations have been made in two years. Checking limited by understaffing. | State Planning Coordinator sees little real coordination of state, regional and local planning. State Land and Local Use Planning does not administer lands in Colorado River Basin unless owned by another state agency (are none). Most state lands have been sold, only 3,000 acres left. What is left is not good land. There has been a moratorium on the sale and lease of state lands since 1965. New interest developing because of energy development possibilities. | The Natural Resources Conservation Commission is using Technology Application Center to use satellites to survey soil types and, in coordination with 208 committee, to develop sediment source control program. Leases issued by the State Land Office. Individual owns the water, both surface and subsurface. Has right to beneficial use during term of lease. Agricultural land lease development left to individual. Leases can be conditioned. Grazing limits determined by using S.C.S. soil types. Types are also used to determine if land can be put under irrigation. Field agents can also determine carrying capacity. State Land Office can require changes in agricultural practices on leased state land but has not done so to reduce salinity from overgrazing. | Main lease is for grazing lands. Agricultural use considered a special use. Only six (approx.) tracts of state land in irrigated agriculture. Individual brings water onto land via transfer or purchase of shares in an irrigation district. Lease can be conditioned. If individual agrees to drill well on leased land, water belongs to the state. Most land is used for grazing. | Lessee provides surface water for state land. New lease being developed to provide water for state lands in irrigation districts. If adjudicated during lease, water generally stays with land after lease. State does set carrying capacity and can revoke lease for abuse. Not as stringent as BLM. Different lease for grazing, croplands and special uses. Leases can be provisioned. State Land Board approves all leases. Land primarily used for grazing. |

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|---|---|--|---|---|---|---|--|
| 10. Administratively modify leases of state lands (at time of lease or renewal) to prohibit agricultural practices which cause erosion or excess runoff of saline water. This would include prohibition of agriculture or grazing on certain saline soils and restriction of grazing intensity. | In Arizona, 70 percent of the land is controlled by the federal government or Indian tribes. Only 13 percent of the state land area is in the state land trust. This may be too little land to justify some state actions. Some vegetation modification being conducted by the Bureau of Land Management. No leases can be modified during term without consent of both the State Land Commission and the lessee. Leases conflicting with reclassification of lands by Commission are cancelled. Re: agricultural leases--acts which jeopardize the land or water rights of the state are grounds for terminating the lease; removal of plants protected by the Arizona native plant law requires prior permission from the State Land Department and the Commission of Agriculture and Horticulture. Re: grazing leases--waste on land is grounds for terminating the lease; permission must be obtained to exceed grazing capacity; reimbursement for the cost of eradication of "noxious (continued) | There is little, if any state land leased for either agriculture or grazing purposes in the Colorado River Basin. It would appear that state land leasing policies would have no impact on Colorado River salinity. Provisions concerning the discretionary authority of the State Lands Commission in the California Administrative Code could serve as a model for other Basin states. | Surface leases allow for both agricultural and grazing uses. Rental rates are determined by the carrying capacity of grazing lands and the productive capacity of agricultural lands. Grazing leases can be terminated upon an application to convert the land to agricultural ("higher") use. Failure to use good soil conservation practices or overgrazing may result in termination of a lease on 10 days notice. The State Land Board may make exceptions to rules in unusual situations. Potential exists to conditionally lease grazing lands. Of counties totally or partially in the Colorado River Basin, 431,847 acres are leased for grazing while only 11,115 acres are leased for agriculture. The State Land Board must exercise a more active role as manager of state lands. | Very little land remains in state ownership. Those lands remaining are not good quality lands. The 1965 leasing moratorium is still in effect and, according to the Attorney General's Office, "until and unless the legislature removes the moratorium it is recommended that no leases of any kind be entered into." Until that time, there is no real potential in Nevada for this type of action. | Most of state lands are leased for grazing, though there are some agricultural leases. Both grazing carrying capacity and the suitability of land for irrigated agriculture are determined by Soil Conservation Service soil classifications. Rental is determined for grazing lands, in part by carrying capacity. The Commissioner of Public Lands is allowed discretion in conditioning leases and may cancel a lease if its "terms, covenants or conditions" are violated. Development under a lease is usually left to the individual, however, on the theory that only the individual knows his economic capabilities. Under such a theory, implementation of the proposed action would be uncertain. | Little state land is used for agriculture which requires a special use lease. Under such special use leases, the lessee must apply approved crop management practices. Under a grazing lease, the State Land Board can determine both the "number and kinds of livestock" and the "number of days and seasons of the year" when grazing is allowed. Grazing lessees must comply with good conservation practices and not cause waste by improper grazing. Lessee is also to "safeguard" water and other surface resources and comply with the states requirements concerning conservation practices. Leases may be cancelled if any "term or condition" is violated. Higher uses (commercial, industrial and residential) may preempt agricultural (special use) and grazing leases. Potential for implementation in Utah will be a function of the attitude of the State Land Board toward conditional leases, stricter enforcement of existing rules and regulations, and the (continued) | At present, there is no irrigated agricultural state land in the Colorado River Basin. Sprinkler systems on haylands have, however, been proposed. Both Grazing and Agricultural leases utilize the same basic lease form. Improvements to the land may include the costs of changing vegetation ("grubbing sagebrush"). Improvements in excess of \$750.00/section must be approved in advance by the State Land Office. Leases may be conditioned by the State Land Office and will be cancelled if the conditions of the lease are violated. State standards for grazing lands, however, are not as stringent as those developed by the Bureau of Land Management. Potential for implementation is dependent on the approach to resource conservation taken by the State Land Office. |

POTENTIAL FEASIBILITY

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|---|--|------------|----------|--------|------------|--|---------|
| 10. Administratively modify leases of state lands (at time of lease or renewal) to prohibit agricultural practices which cause erosion or excess runoff of saline water. This would include prohibition of agriculture or grazing on certain saline soils and restriction of grazing intensity. | growth" on grazing lands can be amortized at 10 percent per annum. Though there is little potential for direct state action, there exists the possibility for conditional leases depending on the attitude of the State Land Commission. | | | | | promulgation of requests and requirements. | |

(continued)

POTENTIAL FEASIBILITY

270

11. *To reduce salinity from municipal sources, regulate salt loading appliances such as water softeners.*

Background of the action. This action has been classified "feasible--but of limited applicability" because of the generally limited contribution of salt loading appliances to the salt load in the Colorado River. Home water softeners, used to reduce the mineral hardness of water supplies, are recharged periodically by an ion exchange process, using a concentrated solution of common table salt. After recharge, the used salt is discharged to the sewer system. Regulation can be accomplished in any of three ways: water can be centrally softened; regeneration of softening systems can be handled centrally by exchange of cylinders; or on-site regenerative salt use efficiency can be optimized. The first two options provide administrative control over salt loads, avoiding disposal that will return to the river; while salt use efficiency provides savings in salt costs as well as a reduction in (but not elimination of) salt loading.¹ Because of the relative hardness of the water,² water softeners are most used in Nevada and California among the basin states. In Arizona, because bottled water is commonly used instead of household water softeners and because municipal wastewater is consumed by downstream agriculture or by municipal irrigation of parks rather than returned to the Colorado River, state officials do not consider salt loading appliances to be a significant salinity problem.

¹R.W. Beck and Associates - Brown and Caldwell, Clark County Areawide Salinity Control Investigation, Las Vegas, 1976, p. 89.

²See p. 34, Chapter III.

Dr. Bert Keilin, of the Pacific Water Conditioning Association, Inc., states that water softeners, in all of the Colorado River Basin municipalities combined, contribute less than 1.7 ppm of a total loading (1972) of 879 ppm measured at Imperial Dam. He also states that it has been an industry practice to over-salt in the interests of reducing customer complaints and potential service calls; and that self-regulation in the industry is beginning to provide more efficient water softening and regeneration settings. It should also be noted that in extremely hard water areas, elimination of home water softening, without some alternative softening, would reduce salinity but increase other mineral loading because of the resulting increase in the use of soaps and detergents.³ The Clark County, Nevada, investigation of central softening fixes the average household cost of such a system at about 70¢ per month (i.e., \$2.50/month direct cost less \$1.80/month savings in soaps and detergents).⁴

The Colorado River Basin Salinity Control Forum found that the historical contribution of salt loads from municipal and industrial sources has been minor, averaging less than 1.5 percent of the total load in the Colorado at Imperial Dam. The only exception has been the concentrated returns from the Las Vegas, Nevada area.⁵ Because salt

³Ibid., p. 113

⁴R.W. Beck, et al., Clark County Investigation, p. 154.

⁵Colorado River Basin Salinity Control Forum, "Proposed Water Quality Standards for Salinity Including Numeric Criteria and Plans of Implementation for Salinity Control, Colorado River System," June 1975, p. 16.

loading appliances are not yet a significant source of salinity in most parts of the Colorado River Basin, Action #11 is presented as a potential action which cities, counties or even states have the ability to implement locally when the need arises.

ARIZONA--Action #11

Agency responsible and legal authority. In Arizona, needed action may appropriately be taken by cities and counties. Mr. Peter Gulatto, Assistant Attorney General, stated in an October 7, 1976 interview that the cities or the counties could control salt loading appliances under present law. The state also may enforce controls in the future, as the Arizona Department of Health, Water Quality Control Council, with the cooperation of Colorado River Salinity Control Forum, is formulating salinity control policies which may regulate such appliances. Under such circumstances the NPDES permit system will become the regulatory tool (ARS 36-1859). Other action could be taken under the general powers of the Department of Health to control water pollution (ARS 36-3852).

Current status. Arizona officials have not identified salt loading appliances as an actionable problem. In the potential problem area along the Colorado River mainstem the water is so mineralized that most of the population is drinking bottled water rather than using residential water softeners.⁶ Additionally, those same communities, in order to avoid applying for and complying with NPDES permits, are generally reusing their wastewater, in nonpotable uses such as park and golf course irrigation, with no returns to the river.

Potential feasibility. At the present time, state officials see no need for a salt loading appliance regulatory program in Arizona.

⁶ Interview with Bill Shafer, Water Quality Control Bureau, Phoenix, October 6, 1976.

Should the need arise, the governmental authority exists. However, the political costs of regulating in-home appliances are currently considered too great. Should the need for Action #11 become apparent, the feasibility in Arizona would be:

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | X | | |
| Political | | X | |
| Administrative | X | | |

CALIFORNIA--Action #11

Agency responsible and legal authority. The Regional Water Quality Control Boards have the primary responsibility for controlling water quality (WC 13001). However, cities and counties have the authority to promulgate and enforce regulations stricter than those mandated by the state (WC 13002). Thus, although the statutes are silent in regard to regulating salt loading appliances, authority to act is available.

Current Status. In its water quality control plan, the Colorado River Basin Region Board has recognized the potential problem by requesting local ordinances "prohibiting discharge of water softener regeneration brines" into municipal waste treatment systems.⁷ The Water Quality Control Board executive officer for this region has stated that he will allow softener plant discharge into the Salton Sea, and nowhere else.

The authority given to cities and counties has proven significant in that several California communities have totally prohibited discharge of water softener regeneration in an effort to meet state water quality control standards.⁸

Potential feasibility. The potential salt loading problems from water softening have been recognized in California.

⁷California, Regional Water Quality Control Board, Water Quality Control Plan Report: East Colorado River Basin [7B], Sacramento: State of California, 1975, p. I-5-21.

⁸R.W. Beck, et al., Clark County Investigation, p. 112.

For more than three years, discharge of water softening brine to surface or groundwater areas draining into the Colorado River has been prohibited. The Metropolitan Water District (MWD) of Southern California at one time centrally softened Colorado River water, although it instead now operates a facility which blends that water with higher quality California water. Central softening is again being considered by the MWD, with a direct household cost of \$0.80 to \$1.25 per month plus an undetermined concurrent savings in soaps and detergents.⁹

Because central softening has been used in California, its feasibility for the future is enhanced. Control of operation of home units is more difficult because of political and administrative problems.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|-----------------------|
| Legal | X | | |
| Political | X | | |
| Administrative | X | | |

California has acted and has the ability to act further should the need arise,

⁹Interview with Ernest Weber, Assistant Chief Engineer, Colorado River Board of California, Los Angeles, July 5, 1977.

COLORADO--Action #11

Agency responsible and legal authority. The Colorado Water Quality Control Commission has broad authority to achieve and maintain water quality (CRS 25-8-202). This authority can be used in conjunction with the discharge permit powers of the Water Quality Control Division (CRS 25-8-501).

Current status. Due to the high quality of water in the Colorado River Basin area of Colorado, very few home water softeners are used, and State water quality officials do not identify salt loading appliances as a problem in Colorado. They feel that home water softeners would present an impossible policing problem. However, the permit authority and possible pre-treatment requirements would provide adequate protection against any regeneration plant discharges.

Potential feasibility. There have been no plans for the application of the NPDES permit system to salt loading appliances. Should Colorado need to implement this action, only central softening and regeneration plant control would be considered, thus providing a favorable enforcement environment.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|---------------------------|
| Legal | X | | |
| Political | X | | |
| Administrative | X | | |

NEVADA--Action #11

Agency responsible and legal authority. In Nevada, county and local authorities are taking primary responsibility for control of water softeners. Clark County, Nevada is the one area of the Colorado River Basin in which serious study of salt contributions from water softening has been made. Although the state's Environmental Protection Services has any incidental powers necessary for achieving or maintaining water quality (NRS 445.214,[12]), most of the Clark County approach has been in terms of local ordinances and public education programs.

Current status. Within the metropolitan area of Las Vegas Valley (Clark County) water supply is critical and per capita use is greater than the national average.¹⁰ In addition, the state water plan calls for vigorous pursuit of salinity and water quality controls for the Colorado River Basin by both state and local agencies.¹¹

In response to the lack of water, problems in water quality, and federal and state mandates concerning salinity, the Clark County Commissioners contracted for the previously cited Clark County Area-wide Salinity Control Investigation. Much of the study centered on the salt load to the wastewater system contributed by home and commercial users of water softeners. Alternative plans ranged from no

¹⁰Nevada, Colorado River Commission of, "1966-1971 Report," Las Vegas, 1972, p.15.

¹¹Roland D. Westergard, State Engineer, "Special Summary Report, Nevada State Water Plan," Carson City: State Printing Office, 1974, p.14.

action to total prohibition of water conditioning waste additions to the system. Within this range were included limitations on the size of water conditioners, improvement of salt use efficiency, central softening of all public water or of Colorado River water, control of groundwater infiltration in the wastewater system, and partial demineralization of wastewater.¹²

Potential feasibility. The Beck et al. study recommends only a limited salinity control program, involving four components: (1) minimizing the amount of saline groundwater allowed to enter the wastewater systems; (2) registration of water softening equipment and a public education program to encourage residential users to optimize salt use efficiency; (3) a requirement for submission of technical reports stating that commercial water conditioning equipment complies with guidelines; and (4) that the cost-effectiveness of centrally softening Colorado River water be reevaluated in 1985-1990.¹³ Not only is this considered by Beck et al. as the most cost-feasible approach and the easiest to implement, but since the central softening of Colorado River water is delayed until it is expected to become cost-effective, there has been some public support for this alternative, including support by the water softening industry.¹⁴ The cost of this combination alternative within the study area would be approximately \$3.7 to \$4.9 million per year, providing a

¹²R. W. Beck, et al., Clark County Investigation, p. 145.

¹³Ibid., pp. 142, 150.

¹⁴Ibid., pp. H-2,3.

benefit-cost ratio exceeded only by the no action alternative.¹⁵ Central softening of Colorado River water has a slightly lower per household cost of \$2.50 per month which is further offset by a \$1.80 monthly savings in excess cleaning products. However, a delay in implementation until 1985-1990 followed by reevaluation, is recommended because of the high capital costs.¹⁶

At the time of writing (March 1977) Clark County is commencing hearings on methods for handling water softening equipment. The proposals would either provide ordinances or management plans to control commercial users, combined with an education program to reach home users of water softeners. Some control will be exercised, but the extent is not yet known.

As the plan is envisioned, the feasibility would be:

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | X | | |
| Political | | X | |
| Administrative | X | | |

¹⁵ Ibid., pp. 144, 149.

¹⁶ Ibid., p. 154.

NEW MEXICO--Action #11

Agency responsible and legal authority. The New Mexico Water Quality Control Commission is given responsibility for water quality control (NMSA 75-39-4). Although performance standards may be set, the Commission may not specify the method to be used to abate water pollution.

Current status. Although salt loading appliances are point-source contributors, they have not been identified by state water officials as a problem in New Mexico. Any potential problems are thought to be far in the future, with the possible exception of Albuquerque (which is not in the Colorado River Basin). It is felt that water quality regulations and the NPDES permit system would be able to handle any problems which might arise.

Potential feasibility. Because of the lack of any identifiable problem in New Mexico, combined with lack of authority of state officials to specify abatement methods, potential feasibility appears doubtful.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|---------------------------|
| Legal | | | X |
| Political | | X | |
| Administrative | | | X |

UTAH--Action #11

Agency responsible and legal authority. The Utah Division of Health is the designated water quality agency of the state, working through the Water Pollution Control Board. UCA 26-15-5 empowers the Board of Health to set minimum sanitary standards for the quality of water and the quality of effluent discharge. UCA 73-14-5 declares that pollution is a public nuisance controlled by discharge permits.

Current status. Utah has not obtained responsibility for issuing NPDES permits, but does work jointly with EPA in determining the conditions of each permit. The end result is a more stringent regulation than would be achieved by permits issued solely by IPA. Thus, while there is no evidence of brine in the sewer systems, should a problem from salt loading appliances arise it is felt that the NPDES permit system would control any discharge. At the present time no action in this area is contemplated.

Potential feasibility. Utah water quality officials are alert to the potential problem, thus increasing the feasibility of implementation should the need arise.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|---------------------------|
| Legal | X | | |
| Political | | X | |
| Administrative | X | | |

WYOMING--Action #11

Agency responsible and legal authority. The Wyoming Department of Environmental Quality, Water Quality Division is mandated to protect and enhance the State's water quality (WSA 35-502.2). To this end, no discharge of any pollution or wastes may be made into state waters without a permit (WSA 35-502.18).

Current status. Contamination from salt loading appliances has not been identified as a problem in Wyoming. It is anticipated that, should a problem arise, the NPDES permit system will adequately handle the situation. Discharge from the central softening plant serving Rock Springs and Green River has been fully contained for the past two years.

Potential feasibility. Wyoming is poised to act on any arising problems, thus increasing the feasibility of this action.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacle |
|-------------------------------|----------|--------------|-------------------|
| Legal | X | | |
| Political | X | | |
| Administrative | X | | |

| ACTION | | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|--|-----------------------|---|---|--|---|--|---|--|
| 11. To reduce salinity from municipal sources, regulate salt loading appliances such as water softeners. | AUTHORITY | ARS 36-1852 The Dept. of Health is the state water pollution control agency and is authorized to take all actions necessary. ARS 36-1859 Permit powers. <i>General</i> | WC 13002 No limit on city or county to have better or stricter regulations than state on water quality control or to stop water pollution. WC 13001 Regional Water Quality Control Boards have water quality authority. <i>General</i> | CRS 25-8-202 General authority to achieve water quality, combined with CRS 25-8-501 permit power, broadly enables the Water Quality Control Commission and Division to take action if needed. <i>General</i> | NRS 445.214 (12) Any incidental powers necessary for achieving or maintaining water quality are given to the Environmental Protection Services. County and municipal ordinances and educational programs may also be used. <i>General</i> | NMSA 75-39-4 gives authority to Water Quality Control Commission to control water pollution. NMSA 75-39-4.e authorizes Agency to issue discharge permits. <i>General</i> | UCA 26-15-5 Gives the Board of Health power to set minimum sanitary standards for the quality of water, and effluent and trade waste discharges. UCA 73-14.5 gives the Water Pollution Control Board power to issue discharge permits. <i>General</i> | WSA 35.502.18 Permits can be required by the Depart. of Environmental Health after consultation with the Advisory Board, and can be used in control of salt loading appliances. <i>General</i> |
| | CURRENT STATUS | Cities and counties have authority, but there is no problem along the Colorado. Cities are consumptively reusing water in nonpotable areas to avoid discharge permits. | Could take action if needed. Ventura County passed prohibition of home softeners which was never enforced and was later abandoned. No softener discharge is contemplated in the CRB. Policy is to discharge water softener regeneration wastes. | Not now regulated but could be regulated by permit if necessary. Softener regeneration plants can be handled but home softeners would present an impossible policing problem. Few softeners are in use. | Las Vegas is going to exercise some control on commercial users, with an education program for residential users. Results will be less than formerly anticipated. Hearings are being held, and there may be no formal control. | Not now regulated. There is no concern or mention under present regulations. And no problem is anticipated, although permits and regulations could handle any anticipated situation. | There is no evidence of brine in sewer systems and no action is contemplated. NPDES permits would handle problem if it occurred. | One central softening plant is now regulated. Permits for municipal plants could handle, should a problem occur, but none is currently foreseen. |
| | POTENTIAL FEASIBILITY | Cost is feasible, but politico-social implications may be great. Generally, no program is under consideration at this time. | Program is controversial and sometimes hard to enforce. But it is working in several areas and could be extended if reasonable cost-benefit is demonstrated. MWD may begin to centrally soften Colorado River Water once again. | Educational program will be undertaken. Regulation is currently bearing high political costs, and resulting program is unknown. Need definite problem before any action. | NPDES permit control is a reasonable, fairly easy to extend approach to the problem, should it occur. May pass some county ordinances in Clark County. | NPDES permit control is a reasonable approach to the problem, should it occur. No action contemplated in foreseeable future. | No action is contemplated at the present time. NPDES permit control is a reasonable, fairly easy to extend approach to the problem, should it occur. | NPDES permit control is a reasonable, fairly easy to extend approach to the problem, and is being planned for at least one potential industry polluter. |

12. *To reduce salinity from industrial sources, require reuse of wastewater to reduce industrial water demand.*

Background of the action. Water reuse is a fact of life in the seven Colorado River Basin states. It has been pointed out correctly that almost all Colorado River water is reused by downstream appropriators as it passes through the system. The 1896-1974 average virgin flow of the Colorado River, measured at Lee Ferry, is 14.9 maf (million acre-feet).¹ The estimated annual evaporation and natural stream loss is 1.9 maf² and deliveries to Mexico total 1.5 maf.³ Thus, without any other considerations, only 11.5 maf remain available for use in the U.S. portion of the Colorado River Basin. In 1970, withdrawals from the river totalled 17.2 maf.⁴ With 14.9 maf virgin flow there is an apparent shortage of 2.3 maf. Taking evaporation and the Mexican commitment into consideration the shortfall is 5.7 maf. Some of the shortfall is made up from mining groundwater,⁵ yet the magnitude of the shortfall is prima facie evidence that reuse is occurring in the Colorado River Basin, and that consumptive use does not equal withdrawals.

¹Colorado River Basin Salinity Control Forum, Proposed Water Quality Standards for Salinity Including Numeric Criteria and Plan of Implementation for Salinity Control, Denver: October 1975, p. 28.

²Ibid., p. 27.

³"Minute No. 242," Natural Resources Journal, Vol. 15, No. 1, January 1975, p. 2.

⁴National Water Commission, Water Policies for the Future, Washington, D.C.: Government Printing Office, June 1973, p. 9.

⁵Water Resources Council, The Nation's Water Resources, Washington, D.C.: Government Printing Office, 1968, pp. I-6-13-6, 6-14-5.

The existing de facto water reuse system is based primarily on agricultural, municipal and industrial return flows. To be effective, proposed changes in existing reuse patterns must overcome numerous legal barriers.

Courts have held that downstream users, junior as well as senior water right holders, can both rely on existing return flows and protect their interests in such sources.⁶

The general rule appears to be that irrigation return flows, as opposed to wastewaters, cannot be recaptured by individuals.⁷ The distinction between wastewaters and return flows is critical in that the capture and reuse of wastewater is allowed in several jurisdictions.⁸

As a general rule, junior appropriators can prohibit changes in use by senior appropriators which adversely affect the junior appropriator's right.⁹ This could prohibit private reuse of water which alters existing return flow patterns. Were the reuse program implemented by a public agency, downstream users may require compensation as changes in reuse patterns which adversely affect existing entitlements may constitute a "taking" of property.

⁶George E. Radosevich and Gaylord V. Skogerboe, Achieving Irrigation Return Flow Quality Control Through Improved Legal Systems, Fort Collins: Resources Development and Administration, Inc., April 1977 draft report, p. VI-34.

⁷Ibid.

⁸Ibid.

⁹Radosevich at VI-34.

In terms of quantities of water to be reused, there appears to be precedent that municipalities may reuse water which has been transported into the specific river basin.¹⁰ Reuse would appear to be possible if downstream flows, less traditional consumptive uses and quantities imported into the basin, are not adversely affected.¹¹ This conclusion would apply to both public and private reuse. Within these constraints, reuse would appear to be feasible.

This action, which has been classified "partially underway--extension feasible," addresses itself to more specific aspects of water reuse; especially to those which have arisen as a result of the no-salt return standards being applied to the river. A "Policy for Implementation of the Colorado River Salinity Standards Through the NPDES Permit Program" was adopted by the Colorado River Salinity Control Forum on February 28, 1977. The policy, which has been accepted by EPA, amplifies the standards for industrial and municipal sources of salinity. The goal for industry is "a no-salt return policy whenever practicable," and is the policy for all new industrial sources.

Some types of reuse included in this action are recycling of wastewater within an industrial plant, diversion of highly saline waters, from natural or agricultural sources, for certain industrial uses; and use of wastewater treatment plant effluent for industrial purposes. Not only will these forms of water reuse reduce industrial demands on high

¹⁰Pulaski Irrigating Ditch Co. v. Trinidad, 70 Colo. 565, 203 Poe. 681 (1922); Denver v. Fulton Irrigating Ditch Co., 179 Colo. 47, 506 P.2d. 144 (1972).

¹¹Such adverse effects would include timing of stream flows (when a seasonal use is altered to be used year round), change in total rate of flow, and change in quantities (and perhaps qualities) of return flows.

quality water supplies, they also will alleviate some problems in the NPDES permit system by eliminating some portion of undesirable discharges to the river. The action contemplates that water either would be reused to total consumption, or reused until it becomes unsuitable for further industrial use and then disposed of in an evaporation pond. Such reuse will make more efficient use of scarce water, and thus will help effectuate the Colorado River Salinity Control Forum's policy of no salt return to the river wherever practicable.

ARIZONA--Action #12

Agency responsible and legal authority. The only legal reference to water reuse is found in the statutory guideline that the Arizona Water Quality Control Council should adhere to the principle that reuse of water is a beneficial use (ARS 36-1854.B). Should industrial reuse of water become a requirement, the State Land Department's Water Division (which is responsible for controlling water allocation) would probably have to join the Water Quality Control Council in a reuse program.

Current status. Although Arizona has no formal reuse program, water reuse is a well-developed practice. Most municipal effluent is reused for agricultural or recreational (golf courses, etc.) irrigation,¹² while agricultural return flow is reused to consumption in much of the state.¹³ Much of the state's industrial development is in mining, which already recycles its sewage and process water.¹⁴ In addition, the 1976 water quality plan for the Colorado River Basin emphasizes reuse of treated wastewater through irrigation and industrial users.¹⁵

Arizona already practices reuse and encourages further application of reuse in industry, and in recreational and agricultural irrigation.

¹²Arizona, State of, Phase I, Arizona State Water Plan, Inventory of Resource and Uses, July 1975, p. 142.

¹³Reed Teeple, Salt River Project. Interview, October 7, 1976.

¹⁴Phase I, Arizona State Water Plan, op. cit., p. 96.

¹⁵Arizona Department of Health Services, by Earl V. Miller Engineers and Metcalf and Eddy, Inc./Engineers, Water Quality Management Plan; Colorado Main Stem River Basin, Arizona, 1976; pp. 2-11.

Power plant use of municipal effluent is currently under discussion; and the major problem is lack of available effluent, not whether or not to use it. Since reuse of water is considered beneficial and necessary, further encouragement is offered in that consumptive reuse avoids the need for industries to obtain discharge permits.

Potential feasibility. Arizona has a traditional and wide-spread water reuse program. Although not required by law, it is encouraged. The quality of such water is covered by the rules and regulations of the Water Quality Control Council. No further action seems necessary at this time.

Agency responsible and legal authority. The Department of Water Resources, in conjunction with the Water Quality Control Board, has responsibility for implementing the state policy to reclaim and reuse water (WC 13510 to 13540). Such reclamation is considered necessary as well as beneficial, and Chapter 7, Water Reclamation, provides state financial aid for projects (WC 13511, WC 13515).

Current status. Because of a growing shortage of water, California is close to requiring nonpotable reuse of water, and is sponsoring ongoing research into reclamation methods and applications of reclaimed water.¹⁶ Most water reuse is in the area of recreational and agricultural irrigation. However, Kaiser Steel Corporation has been reusing sanitary and process wastewater at its Fontana, California plant since 1942.¹⁷ During FY 1973 over 80,000 acre-feet of wastewater in Southern California was reused, primarily for "irrigation and industrial purposes, recreation lakes, and groundwater recharge."¹⁸ The state has additionally mandated that inland power plants use low quality water for cooling purposes.

Potential feasibility. In addition to exploring the public resistance involved in water reuse (which resistance is being over-

¹⁶California, Department of Water Resources, "Reclamation of Water from Wastes in Southern California," Sacramento: State of California, November 1975, Bulletin No. 80-5.

¹⁷Ibid., p. 8.

¹⁸Ibid., p. 27.

come by familiarity with reuse programs already underway),¹⁹ the state has explored the cost of water reclamation compared to developing other water supplied. Advanced wastewater treatment with chemical coagulation would cost \$318.00 per acre foot.²⁰ The costs of in-house industrial reuse have not been estimated, but it is assumed that such use would become more economically attractive as fresh water costs increase and discharge permits become more stringent.

It is considered that water reuse will provide an even greater share of supplemental water in Southern California although Colorado River allocations are already fully utilized. To this end, further study of technical problems is being pursued and markets for reclaimed water are being identified. No action is necessary.

¹⁹Ibid., p. 25. The cost will vary somewhat according to the quality of water treated, and its intended use.

²⁰Ibid., p. 22.

COLORADO--Action #12

Agency responsible and legal authority. The Water Quality Control Commission has general authority to develop and maintain a program for the prevention, control and abatement of water pollution, and for the protection of water quality (CRS 25-8-202[1]). While the water quality statutes contain no specific encouragement or prohibition of water reuse, this general authority could be, and has been, used in conjunction with the Commission's permit powers (CRS 25-8-501) to encourage and enable water reuse.

Current status. Most industrial wastewater in Colorado is discharged into municipal collection systems, with pretreatment required whenever necessary to meet quality standards. However, many industrial concerns have installed nearly complete recycling systems,²¹ and such systems are encouraged by the state. Because of zero discharge requirements upon new industrial facilities, power plants are also looking to water reuse both to reduce their water needs and to minimize their problem of effluent disposal. A large number of the mining and milling operations have already installed water recycling systems.²²

Potential feasibility. Reuse or recycling is one way to help assure an adequate water supply, to avoid many of the problems associated

²¹Colorado Department of Health, Water Quality Control Division, "FY-1975 Report to the Water Quality Control Commission," Denver: October 1, 1975, p. 34.

²²Ibid., p. 35.

with discharge permits, and to alleviate the rising costs of fresh water supplies. The state would benefit by encouraging reuse, and supporting technological research to broaden industrial applications of recycled water. Supplies derived from wastewater should be included in future planning and as a part of the Colorado Water Policy now under development.

| <i>Potential Feasibility:</i> | Feasible | Questionable | Major Obstacles |
|-------------------------------|----------|--------------|--------------------|
| Legal | X | | |
| Political | X | | |
| Administrative | X | | |

NEVADA--Action #12

Agency responsible and legal authority. In Nevada, water is regulated administratively rather than by specific statute. However, secondary use of effluent does require the filing of a claim and receipt of a permit from the State Engineer (NRS 533.325 to 533.435). The State Engineer also has the duty to develop a comprehensive water resource plan for the state (NRS 532.165[1]). Thus, allocation and planning functions of the State Engineer are directed, with the mandate of Environmental Protection Services, to increase the use and value of water (NRS 445.244[3]). The State Engineer must ensure that appropriated water is put to beneficial use (NRS 533.060, 070). These duties provide a statutory framework for the administrative policy of water reuse now underway in Nevada.

Although Nevada has a constitutional limit (of only 1 percent of assessed valuation of the state) on public debt, there is one significant exception. The Nevada Constitution, Article 9, Section 3, exempts resource development (e.g., any water program) from this constitutional limit. This provision can be used to allow bond funding of water treatment and reuse programs by cities and counties, and this could permit upgrading of municipal wastewater effluent for potential industrial reuse.

Current status. Water reuse is a standard practice in Nevada, particularly in the Colorado River Basin where water supplies are finite. Reuse is expected to increase in the Las Vegas/Clark County area as raw supplies diminish since the only alternative is importation of water.

The state water plan, under all alternatives, assumes use of return water for municipal and industrial needs and for return flow credit to Lake Mead.²³

Potential feasibility. Nevada is already reusing water to current practical standards. It is anticipated that higher water costs will stimulate greater water savings, yet as the demand for water continues to grow and water costs rise, reuse will become more financially feasible and more necessary. No specific costs have been estimated other than the assumption that reuse will be more economical than importation. No further action seems necessary at this time.

²³Nevada, Division of Water Resources, Office of the State Engineer, and Nevada State Study Team, Alternative Multiobjective Plans Emphasizing Water Resource Use in Area V, Colorado Planning Region, Carson City: April 1974, p. 24.

NEW MEXICO--Action #12

Agency responsible and legal authority. The Water Quality Control Commission has a duty to maintain and enforce regulations to preserve and protect the water supply and to provide water pollution control, but may not specify methods (such as reuse) to prevent water pollution. (NMSA 75-39-4D). Other than this general authority, no agency has any specific authority in the area of water reuse; and the state does not have authority to issue NPDES permits.

Current status. There is very little industrial reuse or encouragement for such reuse in New Mexico. Some mining and milling operations in the state are recycling their wastewater because it is usually cheaper than pumping groundwater. The San Juan power plant is encouraged to be a no-return-flow facility, a situation which promotes the value of recycling.

Potential feasibility. The only financial benefits to industrial reuse examined in New Mexico have been by the mining industry, which found reuse to be more economical than pumping water. However, all of the major water-using facilities planned in the San Juan Basin contemplate reuse of cooling water as a water conservation and environmental protection measure. Implementation of Action 12 by the State would not have much additional effect. Until water supplies become scarce no action is likely by the state, although reuse by the power industry is technically feasible, and will become economically feasible as the NPDES permits have more effect. Even though New Mexico is currently using only about one-fourth to one-half of its Colorado River allotment, it appears important to study reuse of water in terms of future supplies.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|---------------------------|
| Legal | X | | |
| Political | | X | |
| Administrative | | X | |

UTAH--Action #12

Agency responsible and legal authority. The Bureau of Water Quality, Division of Health, has general authority to maintain and improve water quality (UCA 73-14-1). The State Engineer approves appropriations based on a determination of beneficial use (UCA 73-3-1). Water pollution control is considered important because water reuse is considered an important future supply,²⁴ and case law directs the State Engineer to allow recapture and reuse of wastewaters with beneficial use as the final measure.²⁵

Current status. Utah has no formal program for water reuse except for power plants. Because of the no salt return requirements for them, all power plants in the Colorado River Basin are recycling their cooling water. The state is also giving consideration for reuse experiments, as in the Cedar City area where effluent is being used for recreational irrigation. Several mines are using wastewater for spraying dust and for sediment control.

²⁴Utah, Bureau of Water Quality, Water Quality Report, April 1975, p. 6.

²⁵McNaughton v. Eaton, 121 U. 394, 242 P. 2d 570.

Potential feasibility. The current preferred method of state officials for supplying new industrial water is to retire marginal agricultural land, concurrently alleviating some of the return flow salinity. However, reuse is considered an important source of future water supplies and will take an increasingly active place in future water programs in Utah. In its continuing water plan the state must devote more attention to reuse as a future water supply, particularly in terms of industrial development. Industries wishing to recycle water would benefit from more state encouragement and support.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacles</u> |
|-------------------------------|-----------------|---------------------|----------------------------|
| Legal | X | | |
| Political | X | | |
| Administrative | X | | |

Agency responsible and legal authority. The Department of Environmental Quality has the duty to plan the development, use and reclamation of natural resources, including water (WSA 35-502.2). The State Engineer must appropriate water according to the principle of beneficial use, and the principle that water is attached to the land during the term of the permit (WSA 41-2).

Current status. The State Engineer contends that reuse of water is generally prohibited, since it normally would result in less water being available to downstream right holders and thus would conflict with the Wyoming Constitution and water laws.²⁷ At the very least a change in water right claim would have to be filled on the amount reused (WSA 41-4.1). In the past, industrial water users in the Colorado River Basin have largely been consumptive users and thus were not considered candidates for any further reuse action.²⁸ However, it was anticipated that "improvements of water uses will probably occur when they appeared justified for economic reasons."²⁹ There is no industrial reuse activity taking place in Wyoming at this time, although industrial facilities in the Green River Basin are constructing wastewater recirculation systems to decrease the quantity of fresh water needed, and reuse systems are under discussion for new facilities. The discharge of contaminated water is under NPDES permit control, and water which is subject to "zero discharge" regulation might be allowed to be put to beneficial use, if such use causes no return to the Green River.

²⁷ Wyoming, Office of the State Engineer, Annual Report of the State Engineer, 1975, Cheyenne: June 30, 1975, p. 5.

²⁸ Wyoming, State Engineer's Office Water Planning Program, The Wyoming Framework Water Plan, Cheyenne: May 1973, p. 200.

²⁹ Ibid., p. 208.

Potential feasibility. Although the Wyoming Constitution and water laws would seem to preclude any reuse activity, there is some case law which indicates otherwise. In essence, waste and seepage waters are private waters, not waters of the state, and thus not subject to appropriation.³⁰ Percolating waters developed artificially, as by excavation, are also private waters.³¹ So long as such water remains on the land from which it originates it can be put to any use the holder desires. This case law would seem to allow for on-site water reuse. Viewed in conjunction with the economics of water and appropriation for beneficial use, it appears water reuse in Wyoming will become feasible at some future point. The state should include, in its water plans and studies, reuse as a potential water source. Certain industry, such as power plants and some mines, should be encouraged to explore recycling as an alternative to discharge into holding ponds and as a long-term economy measure.

Because of the general assumption that state law prohibits reuse, this action is less feasible than in other states.

| <u>Potential Feasibility:</u> | <u>Feasible</u> | <u>Questionable</u> | <u>Major Obstacle</u> |
|-------------------------------|-----------------|---------------------|-----------------------|
| Legal | | X | |
| Political | | | X |
| Administrative | X | | |

³⁰ Bowen v. Big Horn Canal Ass'n (Wyo.), 307 P. (2d) 593; Binning v. Miller, 55 Wyo. 451, 102 P. (2d) 54.

³¹ Hunt v. Laramie, 26 Wyo. 160, 181 P. 137.

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|--|---|---|--|--|--|---|--|
| 12. To reduce salinity from industrial sources, require reuse of wastewater to reduce industrial water demand. | ARS 36-1854.B Statutory guideline that the Water Quality Control Council should adhere to the principle that reuse of water is a beneficial use. <i>Specific</i> | WC 13510 to 13540 Provides that the Department of Water Resources and the Water Quality Control Board must implement state policy to reclaim and reuse water. Financial aid for such projects is provided under WC 13511, WC 13515. <i>Specific</i> | CRS 25-8-202.1 The Water Quality Control Commission must develop and maintain a program for the prevention, control and abatement of water pollution, and to protect water quality. CRS 25-8-501 gives power to issue discharge permits. <i>General</i> | NRS 533.325 to 533.435 The State Engineer must issue permit for secondary use of effluent. He must also develop a comprehensive water resource plan. NRS 532.165(1). The Environmental Protection Services must increase the use and value of water, NRS 445.224(3), and the State Engineer ensures beneficial use, NRS 533.060, 533.070. The State Constitution exempts resource development from debt limitations, Art. 9, Sec. 3. <i>Specific</i> | NMSA 75-39-4. Water Quality Control Commission is required to preserve and protect the water supply, and to provide pollution control. <i>General</i> | UCA 73-14-1 The Bureau of Water Quality, Division of Health has a duty to maintain and improve water quality. The State Engineer must approve appropriations on the principle of beneficial use, UCA 73-3-1. Case law allows the recapture and reuse of wastewater put to beneficial use, McNaughton v. Eaton, 121 U.394, 242 P.2d 570. <i>General</i> | WSA 35-502.2 The Department of Environmental Quality has the duty to plan the development, use and reclamation of natural resources. The State Engineer must appropriate water according to preferred beneficial uses, WSA 41-2. Case law states on-site wastewater is private water, as is artificial percolating water: Bower v. Big Horn Canal Ass'n (Wyo.), 307 P.(2d) 593; Binning v. Miller, 55 Wyo. 451, 102 P. (2d) 54; Hunt v. Laramie, 26 Wyo. 160, 181 P. 137. <i>General</i> |
| | <i>CURRENT STATUS</i> Mining industry recycles sewage and process water. Agricultural and recreational reuse is standard practice. Industrial reuse is being developed whenever wastewater is available. | Close to requiring reuse. Sponsoring ongoing research. Kaiser Steel has been reusing since 1942. Most current reuse is for irrigation and recreation, but power plants must now use low quality water if it is available. | Many industries are recycling with state encouragement. Mining and milling operations are also recycling. Power plants are looking at reuse because of discharge permits. | Reuse is standard practice for all nonpotable uses in CRB. Potable reuse is expected to occur by 2000. | Mining and milling operations are recycling wastewater to reduce pumping costs. Drinking water may not be recycled water. | CRB power plants are recycling water. Cedar City is using effluent in recreational irrigation. | Some industries are building water recirculation facilities to reduce fresh water demands. Reuse is controlled by rights of downstream users (WSA 41-4.1) |
| | <i>POTENTIAL FEASIBILITY</i> Water reuse underway wherever practical and possible. No further state action needed at this time. | Reused water is expected to provide an even greater share of supplemental water. Costs will become more attractive as freshwater costs escalate. Rate structures could accelerate the process, but no action is needed at this time. | Reuse expected to increase as freshwater costs escalate or water supplies decrease. Need increased state encouragement for industrial reuse--in costs, technology and paperwork areas. Planning should include reuse as a water source. | Reuse will increase as technology improves and fresh water supplies diminish while escalating in cost. No state action is needed at this time. | State needs to develop a policy on reuse and encourage it where technically feasible. No action is being taken. But it should be, at the least, under serious study. Many water-using industries are planning reuse as a conservation measure. | Reuse continues to be under consideration. More attention is needed in projecting future water supplies and uses. Industry needs more state encouragement to recycle water. | Reuse is currently being excluded from consideration as a water source. It should be included in plans and studies underway or projected. Certain industries should be encouraged to explore their reuse potential. |

Impacts of Proposed Actions on Parties-at-Interest

One of the selection criteria for the management actions proposed in this report (see Chapter IV) related to political acceptability: "Any action which would overcome implementation obstacles should be generally acceptable to all parties involved . . . and particularly to those most greatly affected." This subsection discusses the relative acceptability of the proposed actions to various groups, affected to a greater or lesser degree by their implementation.

For each management action or policy proposed to control or alleviate salinity, there are several identifiable groups of persons whose common interests are affected or impacted. These have been termed *parties-at-interest* and have been categorized roughly as follows:¹

- Parties internal to the affected industry (or activity, or economic sector);
- Suppliers and customers of the affected industry, activity, or sector;
- Government, at different levels and in certain roles, e.g., taxpayer, regulator, or keeper of the social welfare;
- Affected bystander, e.g., those concerned with resources, fish or wildlife, recreation potential, or aesthetic effects.

The basic question used to identify *parties-at-interest* is:

What are the goals of identifiable social or cultural or locational groups which lead them to perceive problems

¹The term *parties-at-interest* and the concept of determining the impact of a given policy upon them were developed in John S. Gilmore, William M. Beaney, Paul I. Bortz, Mary K. Duff, and Thomas D. Nevens, Environmental Policy Analysis, Parts I and II, Denver: University of Denver Research Institute, 1971.

differently, to set different priorities for solving problems, or to respond differently to a particular Policy/Program?²

The 12 proposed state and local management actions that appear likely to control or reduce Colorado River salinity were subdivided into 21 discrete actions or subactions, shown across the horizontal axis of Figure 5-1, a policy analysis matrix. For these actions, the authors of this study have analyzed and identified 22 distinct *parties-at-interest*. These include affected industries or economic sectors (irrigators, cattlemen and sheepmen, power utilities); suppliers of the affected industry (irrigation equipment suppliers, well drillers, contractors); various local, state and federal government agencies; and affected bystanders (environmentalists, downstream water rights holders). The *parties-at-interest*, some of whom are affected by all proposed actions and some by only a few, are arrayed along the vertical axis of Figure 5-1. Not every party that conceivably could be affected has been shown, notably the customers of the affected industries. Although salinity control actions might result in increased costs to irrigators, electric utilities, etc., that would where possible be passed along in higher prices, the consumers of their products would not be significantly affected. Some secondary impacts also have been omitted, such as impacts on local processing industries dependent on products of irrigated agriculture, and on employees of these industries.

²Ibid., p. 93.

The authors of this report next analyzed the impacts* that application of each of the various proposed actions would have on the various *parties-at-interest*. By consensus judgment, these impacts have been identified and categorized as to positive or negative impact. A rough weighting of the degree of impact also has been made.

An inspection of Figure 5-1 reveals that certain *parties-at-interest* are favorably impacted by nearly every action recommended. This is true of water quality agencies and federal government agencies, both of which logically can be expected to favor the implementation of any state and local management action that will decrease river salinity. Environmentalists also tend to favor most salinity control actions, except for those which negatively impact wildlife habitat (e.g., modifying natural vegetation on rangeland) or which appear likely to promote power plant or energy development. Construction firms logically will favor many of the actions which potentially may involve new structures; only land use actions prohibiting development will negatively impact construction firms.

One very important constituency in the Colorado Basin--irrigated agriculture--is threatened or potentially impacted unfavorably by several proposed actions. Since nearly all (97 percent of) man-made salinity has a source in irrigated agriculture, it is inevitable that

*In earlier DRI research on environmental policy analysis, John S. Gilmore, et al., defined impact as a change from the present state of things or from the way things are clearly evolving. Any impact may be either positive or negative depending on the interests, values or goals of different *parties-at-interest*. They may fall on individuals, economic entities, social or political institutions, or cultural characteristics.

| Actions to Control Salinity | Legend: | | | | | | | | | | | | | | | | | | |
|--|--|---|--------------------------------------|---|---------------------------------------|---|---|--|---|---|--|---|--|---|---|--|---|--|---|
| | ++ | + | + | + | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Very favorable impact | Favorable impact | Mixed good & bad impacts | Unfavorable impact | Very unfavorable impact | No significant impact | | | | | | | | | | | | | |
| | Sanction by state agency if waste occurs | Direct action to control quantity of water diverted if waste occurs | Salinity as priority in 208 planning | Intrastate coordination of salinity control actions | Standards for water well construction | Require plugging of abandoned water wells | Require plugging of exploratory wells and drill holes | Use irrigation return flow for power plant cooling, etc. | Site energy facilities near sources of saline water | Use land use controls to prohibit irrigated agriculture on saline lands | Economic incentives to promote conversion of irrigated saline land to other uses | Economic incentives to modify vegetation on rangeland | Special use charges for irrigation water to promote more efficient use | Economic incentives to promote conversion of agricultural water to other uses | Economic incentives to increase irrigation efficiency | Modify state land leases to prevent erosion or excess runoff | On state land prohibit agriculture or grazing on certain soil types | On state land restrict grazing intensity | On state land modify rangeland vegetation |
| PARTIES-AT-INTEREST | | | | | | | | | | | | | | | | | | | |
| Irrigators (surface water right owner) | - | - | - | - | - | - | - | - | - | - | ++ | - | - | + | + | - | - | | |
| Irrigators (groundwater) | - | - | - | - | - | + | + | | | - | + | | - | + | + | - | - | | |
| Irrigation/conservation districts | - | - | - | - | - | + | | | | - | + | | - | + | + | | | | |
| Water resource/allocation agencies | - | - | + | + | + | + | + | + | + | + | + | | - | + | + | + | + | | + |
| Water quality agencies (public health) | + | + | + | + | + | + | + | + | + | + | + | | + | + | + | + | + | + | + |
| Downstream surface water rights holders | + | + | + | + | + | + | + | - | | + | + | + | + | + | + | | + | | + |
| Federal agencies (EPA, USBR, SCS, ARS, USGS) | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Local/county government | | | | | | | | | + | - | + | | | + | | | - | | + |
| State government | - | + | + | + | + | | | + | + | - | - | - | | - | - | + | + | + | + |
| Environmentalists | ++ | ++ | ++ | + | ++ | + | ++ | + | + | + | + | - | + | + | + | + | + | + | + |
| Irrigation equipment suppliers | + | + | | | | + | + | + | | - | - | | ++ | | ++ | | | | |
| Municipal water supply agencies | + | | + | | | + | + | + | | | | | | + | | | | | + |
| Wastewater treatment agencies | | | | | | | | | + | | | | | + | | | | | + |
| Power utilities | | | | | | | | - | - | | | | | + | | | | | - |
| Planners (land use, 208) | + | + | + | + | | | | | + | + | + | + | | | | + | + | + | + |
| Well drillers | | | | | - | | | | | | | | | | | | | | |
| Land developers | | | | | | | | | | | + | | | | | | | | |
| Construction firms | + | + | + | | | + | + | + | | - | + | + | + | | + | | | | |
| Cattlemen/sheepmen | | | - | | | | | | | | + | + | + | | | - | - | - | ++ |
| Municipal/commercial water users | | | | | | | | | | | | | | | + | | | | - |
| Industry (mining, etc.) | + | + | - | | | - | - | - | - | | + | | | | | | | | - |
| Water Softening Industry | | | - | | | | | | | | | | | | | | | - | - |

Figure 5-1: Matrix of Impacts on Parties-at-Interest

most proposed corrective actions will interfere with or add costs to the operations of the agricultural sector. Other actions, such as the federal 208 program, are judged as having a negative impact because of the change envisaged by some of the impacted parties. This does not preclude achievement of positive attitudes or the eventual welcoming of federal participation, but it does mean that considerable educational effort providing reassurance will be necessary before achieving positive attitudes and cooperation from some of the parties-at-interest.

Generally, the only actions which are not judged as negative by irrigators are those involving economic incentives rather than sanctions. In other words, the irrigated agricultural sector does not appear likely to accept new salinity control policies except by a voluntary choice in response to an economic reward, presumably provided by state government. Authority exists for numerous actions involving sanctions or regulations by state and local governments, but the feasibility of such actions depends on the willingness of the states to face agricultural opposition. This seems to vary among states, depending on their policies of supporting agriculture vs. industrial and energy development, and also on the states' perceptions of the seriousness of the salinity problem.

CHAPTER VI
ROLE OF 208 WASTEWATER PLANNING PROGRAMS IN
CONTROLLING SALINITY

Throughout the Colorado River Basin federally funded 208 wastewater planning programs (Section 208 of PL 92-500) are underway. A few of the 208 programs are in the last stages of completion but most of the programs are in process, so this report might prove of assistance. Because these planning programs are aimed at control of wastewater quality, they present a unique opportunity for obtaining a local perspective on salinity control.

For these reasons, the following salinity control action was seen as viable:

2. Through the federally funded 208 wastewater planning programs (PL 92-500), establish salinity as a priority item to be dealt with and develop a series of local and/or state corrective actions.

Background of the action. Federally funded 208 programs constitute an umbrella under which specific state and local actions to improve wastewater quality may be taken.

The 208 wastewater management planning process is a federally funded activity carried out by states and local governments (frequently regional councils of government). The initial two-year program (federally funded) now underway throughout the United States is designed to identify water quality problems, plan the preventive or corrective steps necessary and designate the local 208 management agency (usually cities, counties and special districts) responsible to carry out the plan.

Although the 208 planning process is to continue after the first two years, the initial planning is to be followed by implementation of the water quality actions recommended in the initial plan. Once the 208 plan is approved by state governments and the Environmental Protection Agency, the designated areawide 208 management agencies which have legal and administrative jurisdiction will be expected to carry out the plan. In most cases, the 208 management agencies will be units of local government. These local units will be required to indicate their willingness to assume the 208 roles outlined for them.

Any 208 recommendations which deal with reduction of salinity must have a management agency designated responsibility for carrying out the action. However, there may not be a local government with either legal jurisdiction or motivation, or both, to implement any 208-identified salinity control measures. For example, if salinity from irrigated agriculture is identified as a problem requiring 208 management actions, there may not be any local agencies with adequate authority to take action to control agricultural salinity.

However, the 208 designated agency is not necessarily limited to units of local government--state and federal government units may also be designated. Using the same example of irrigated agriculture, a state agency with adequate legal jurisdiction to implement control actions might exist. In this case the 208 plan would both define the salinity control action and designate the state agency responsible for carrying out the action.

One direct means of causing local jurisdiction to implement 208 actions is by influencing the NPDES permit system. If a 208 plan requires that a local agency take management action designed to reduce salinity, the NPDES permit may specify the agency's assumption of responsibility for implementing the action as a condition of the permit. This would force salinity control measures to be taken within a specified period of time.

Another means of insuring implementation of 208 water quality recommendations is through the authority to approve or disapprove federal wastewater treatment construction grants. If, for example, a local area does not comply with the 208 water quality recommendations, it is possible that no federal grants would be received and the local area would have to pay 100 percent of the cost of wastewater treatment plant improvements. The Environmental Protection Agency is, as yet, unclear on how this policy might be pursued, particularly if the grant applicant is not also the jurisdiction directly responsible for carrying out the 208 salinity control action.

In summary, while 208 planning programs themselves do not have authority to undertake salinity control measures, they are designed to define the extent of a water quality problem, determine the necessary corrective actions and identify those local agencies which have sufficient authority to take the needed actions. In other words, specific salinity control measures and management techniques can be an outgrowth of the 208 process if salinity is determined to be a problem within the area of a 208 study.

Potential salinity management actions. The following pages give a general indication of this report's evaluation of the applicability of salinity control actions to the 208 process. The appropriateness of each individual action to a particular 208 depends, of course, on the local area's need for salinity control and the nature of the source of this pollution. For example, regulation of water softeners is very applicable to 208 recommendations and ultimate control where salinity is a problem. However, the contribution of these appliances may make no difference in the salinity of the Colorado River if the planning area is Vail, Colorado, where they are not used.

A final word of caution is in order. The following discussion of the actions is general. It should not serve as the final word or approach to a salinity problem for the 208's. Instead, the discussion is meant to give some approaches which might assist each particular 208 in formulating specific management actions which are effective in salinity control.

Management Action

208 Potential

1. Regulate irrigation water use so that the water rights holder reduces excess use and implements waste control measures. This may be done by:
 - (a) Direction action by the agency administering water rights, to limit or control amounts of water diverted if waste occurs; or
 - (b) Imposing sanctions by the State Engineer, irrigation district or other appropriate agency, on water users using excessive amounts of water.

This action is classified as having 208 potential to identify as needed for salinity control. However, implementation of the action would probably rest with state agencies or local districts rather than the local 208 management entities. The highest probable impact of 208 activities would be to identify and document the local need for this action to control salinity.

-
2. Through the federally funded 208 wastewater planning programs, establish salinity as a priority item to be dealt with and develop a series of local and/or state corrective actions.

This action is detailed in the preceding and following discussions.

-
3. Because of the need for an integrated approach to salinity control programs, utilize an existing state agency (or establish such an agency) to coordinate and promote salinity control actions by different state institutions.

Areawide 208's can identify the need and build the justification for this action as a salinity control measure. However, because of the nature of the action, this must be taken by the state.

-
4. Require minimum standards for water well construction, and require plugging of abandoned water wells and exploratory drill holes, to avoid contamination of groundwater strata.

This action might be taken through local regulation by cities, counties, and other local political agencies where the salinity problem warrents. However, in most states, regulation of well construction is a state matter and the more likely role of the 208 would be to identify the need for more state enforcement and improvements in existing legislation and assist in the development of the regulations.

-
5. To reduce salinity from agriculture, use irrigation return flow in nonagricultural areas; e.g., for power plant cooling. Utilize energy facility siting procedures to encourage the use of low quality waters where the water requirements of such facilities could be met utilizing saline and other low quality waters.

This action might be encouraged by the local 208 management agencies which have the power of zoning and land use decisions. In determining the local zoning for future energy facility sites, highly saline irrigation return flows and their potential for nonagricultural use might become one of the factors in the local land use decisions.

Management Action (continued)

208 Potential (continued)

6. Through land use controls, prohibit (or limit) irrigated agriculture on lands with high natural salt content in soils and subsoils, and select new lands for irrigation having soils and subsoils that will contribute reduced salt loads to irrigation return flow.

Although this action may be legally possible for 208 management agencies to take through local land use controls, in most cases it will be politically questionable. Controlling agriculture by land use and zoning is not a popular approach. However, where salinity from agriculture is a problem, the 208 study can at least document the need for this action.

7. Through state economic incentives, promote conversion of land used for irrigated agriculture to other uses when highly saline return flows cannot be prevented, controlled, or treated and encourage the modification of vegetation on rangeland (e.g., convert sagebrush to grassland) to reduce natural salinity from storm runoff.

This action is directed toward state agencies. 208 planning activities can assist by identifying and documenting the need for this action.

- 314 8. Establish special use charges for irrigation water provided from reclamation projects to cause more efficient usage and to encourage waste control measures. Use excess funds derived to finance waste control capital improvements on farms and in the conveyance system.

For pricing as a means of salinity control to be effective, local irrigation districts must be the implementing agent. This will probably be an unwanted task of the districts and should the 208 agencies recommend this approach to salinity control, it will be met with resistance. Where this action can help reduce salinity, the local 208 projects should make the recommendation. Without local irrigation districts and irrigators falling under specific NPDES permits, the effectiveness of the recommendation will be limited--but it still should be made.

9. By use of state economic incentives, promote conversion of marginal agricultural water to other uses, or increase irrigation efficiency, to reduce or eliminate salinity resulting from irrigation return flows.

The role 208's can have in this action is to identify the need and help build justification for the state to undertake this action. A second, equally important role of 208's is that of working with the local irrigation districts, SCS, and others, in determining the best management options for a given area in increasing irrigation efficiency.

Management Action (continued)

10. Administratively modify leases of state lands (at time of lease or renewal) to prohibit agricultural practices which cause erosion or excess runoff of saline water, and to improve the land to reduce runoff by: prohibiting agriculture or grazing on certain soil types, restricting grazing intensity, and modifying vegetation of rangeland to reduce salinity from runoff.
-

11. To reduce salinity from municipal sources, regulate salt loading appliances such as water softeners.

315

12. To reduce salinity from industrial sources, require reuse of wastewater to reduce industrial water demand.
-

208 Potential (continued)

The role of 208 programs in this action is to identify the need and build justification for the state to take this approach where warranted.

Of all the salinity actions in this report, the 208 process can have the greatest direct impact where this action is needed. Areawide 208 programs can identify the need for this action, determine the nature of the regulations, and assign responsibility to the appropriate management agency. However, with only a few exceptions, such as Las Vegas, Nevada, the contribution of salinity from municipal salt loading appliances is currently so low that this action may not be warranted at this time.

208's have the charge to identify where this type of action is needed. Further, a direct assignment of 208 management authority and implementation responsibility can be accomplished.

APPENDIX A

LIST OF PERSONS INTERVIEWED

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APPENDIX B

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APPENDIX C

ACTIONS INVESTIGATED AND FOUND NOT FEASIBLE

The seven actions (numbered 22 through 28) which appear in this appendix were part of a DRI-prepared list of 33 state and local management actions proposed by various sources that appeared likely to reduce salinity loading in the Colorado River Basin. These actions have been investigated and, on the basis of the criteria defined in Chapter IV, have been found infeasible for implementation in the Colorado River Basin. We are describing these actions in order to explain our reasoning as to their infeasibility. The matrix on authority for each action is included for future reference in case conditions in any state should change and the action thus should become feasible.

22. *Establish an interstate salinity compact to develop uniform programs for controlling discharges and enforcing in-stream salinity standards.*

The possibility of a new interstate compact dealing with salinity was brought up and discussed at an early meeting of this study's Advisory Board. However, investigation determined that such action would require not only new federal legislation, but also favorable legislative action in each of the Colorado River Basin states. The process is nearly impossible to implement and new legislation is required (in violation of a basic study criterion) thus the proposed action is infeasible.

In addition, water officials in each state have reacted with uniformly negative comments about the compact approach. It is a broadly based feeling that the Colorado River Salinity Control Forum is meeting the needs of interstate cooperation in the best possible and most practicable manner. No matrix is included for this action.

23. *Control phreatophytes along streams and irrigation canals to reduce quantity of water lost through transpiration.*

This action calls for the physical removal of water-consuming plants along streams, rivers, and man-made water conveyance systems. Although phreatophyte removal would not affect salt loading, such removal would leave more freshwater in streams to dilute salinity. The action can be fairly costly, particularly if done on a large scale. Its proposal was met with resistance by state game and fish officials because of the destruction of the animal and fish habitat and a breaking of the ecological chain. Environmental interests oppose this action for the same reasons, so the action is politically difficult to implement, if not infeasible.

Phreatophyte removal on federal land faces the requirement that such habitat destruction must be mitigated, e.g., by creating compensating habitat elsewhere, which renders federal action costly and relatively ineffective in saving water, although this mitigation requirement does not apply to state and local actions on non-federal lands.

| ACTION | | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|---|-----------|--|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| 23. Control phreatophytes along streams and irrigation canals to reduce quantity of water lost through transpiration. | | ARS 17-231 C. Coordinate with Arizona water commission with respect to matters involving water development and use, restoration, and pollution abatement injurious to wildlife. | No specific statute cited. | No specific statute cited. | No specific statute cited. | No specific statute cited. | No specific statute cited. | No specific statute cited. |
| C-4 | AUTHORITY | General | | | | | | |

24. *Establish maintenance of adequate (or minimum) stream flow as a beneficial use to promote water quality goals. Stream flow maintenance may also benefit fisheries.*

This action was proposed on the assumption that a policy of minimum stream flow, although primarily intended to maintain fish life, would limit the extent of water diversion and thus assure some additional dilution of salinity. It would not, however, affect salt loading.

Without authority to maintain a minimum flow rate in a waterway, the state fish and game commissions realize they are seriously hampered in protecting any fish that inhabit the waterway. Indirectly, therefore, if all water becomes appropriated, the flow is reduced and the concentration of salts in the remaining water is increased.

Three basin states (Arizona, California and Colorado) have some authority permitting minimum flows. However, there is no consistent set of standards throughout the seven states that relates the status of fish and wildlife to the other competing uses of water. Minimum stream flow legislation has obvious advantages from an environmental viewpoint and it is possible that the states' authority to maintain minimum stream flows may be extended to preserve fish, wildlife and riparian vegetation. However, it appears that such action could be extended only through new state legislation, not through state or local administrative action. Because a basic criterion for actions proposed in this report is that the action be feasible under existing state law, this action is classified as infeasible.

Other activities of the fish and game commission of the compact states do not directly relate to the salinity problem. In fact, in several instances, high salinity levels are perceived to be beneficial to fish. These higher salinity levels apparently control aquatic disease organisms that otherwise would reduce fish populations and inhibit species growth.

It appears, in summary, that new minimum stream flow legislation may indirectly benefit salinity levels, by avoiding greater concentration of salts. However, other activities and authority of the state fish and wildlife commissions are unlikely to have a significant impact on salinity control. Their impact will likely continue to be at the marginal level.

| ACTION | | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|--|-----|---|--|--|-------------------|-------------------|-------------------|-------------------|
| 24. Establish maintenance of adequate (or minimum) stream flow as a beneficial use to promote water quality goals. Stream flow maintenance may also benefit fisheries. | C-7 | ARS 45-2501 The legislature declares that the development of an adequate supply of water for fish, wildlife and a variety of other purposes is vital for the well being of Arizona citizens. <i>General</i> | F&G 5937 The owner of any dam shall allow sufficient water at all times to pass through a fishway to keep in good condition any fish that may be planted or exist below the dam. WC 1243 The use of water for recreation and preservation and enhancement of fish and wildlife is a beneficial use. The board shall take into account the impact on fish and wildlife of its actions relating to water available for appropriation. <i>General</i> | CRS 37-92-102 (3) Does not specifically address minimum stream flow. However, does give Colo. Water Conservation Board authority to appropriate and acquire such waters of natural streams as may be required to preserve the natural environment to a reasonable degree. <i>General</i> | No statute cited. | No statute cited. | No statute cited. | No statute cited. |

AUTHORITY

25. *Establish a division of the Attorney General's Office, assigned the specific function of enforcing "beneficial use" limit of water rights.*

This action was proposed on the hypothesis that legal action to enforce the "beneficial use" limit of water rights, i.e., reduce waste from over-application of water, might be enhanced through a specific assignment of responsibility to a new organizational subdivision of the state Attorney General's Office. However, investigation has shown that the initiative for enforcement should continue to come from the operating agency (e.g., State Engineer's Office) charged with responsibility for administering water allocations. The operating agency will request legal assistance if necessary.

Each state has assigned at least one assistant attorney general to water matters, or has provided a legal staff for the agencies involved. Action #25 is unnecessary, and would lead to duplication of administrative authority between the responsible agency and the Attorney General's Office.

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|--|--|---|--|---|---|--|---|
| 25. Establish a division of the office of attorney general assigned the specific function of enforcing the "beneficial use" limit of water rights. Such enforcement would be directed to eliminating water wastage and promoting efficient water use. C-9 | 41-192(4)(1) Attorney general is legal advisor and renders legal services to all state departments. (B)(1) Attorney general may organize the Dept. of Law into special divisions. (E) No state agency, other than water commission and industrial commission shall retain counsel. 41-192.01 Arizona Power Authority may also employ counsel. May institute proceedings even in face of opposition of state agencies. <u>State Land Dept. v. McFate</u> (348 P2d 912). <i>Specific</i> | Gov. Code 12511 Attorney general has charge of all legal matters of state <u>except</u> Board of Regents and those agencies authorized to employ attorneys. Code 12600(b) Attorney general directed to protect natural resources of the state. Code 12606 Attorney general can intervene in any action concerning pollution or adverse environmental effects. Code 12612(a) Attorney general may intervene in any administrative, licensing or other proceeding. <i>Specific</i> | 24-31-101(1)(A) Attorney general to be legal counsel to all state departments. (3) May appoint assistants and deputies when necessary. <i>Nonspecific</i> | 232.080 Attorney general counsel to dept. of conservation and natural resources. 445.314 Attorney general counsel to state environmental commission and dept. of human resources--will assist in enforcement when requested. <i>Nonspecific</i> | 4-3-4 Attorney general may employ assistant with consent of the governor. Other agencies may not hire attorneys unless authorized by law. 4-3-5 May appoint deputy attorney generals when necessary. <i>Nonspecific</i> | 67-5-1, 2 General support to state departments. <i>General</i> | 9-125(a) Attorney general to represent the state in suits and to assist the various departments of state government. 9-132 Attorney general may appoint assistants as necessary and may (9-134) assign such assistants to different departments. <i>General</i> |

26. *To reduce salinity from agriculture, control types of fertilizer used, to avoid excess salinity in return flow.*

The authority for states to control the types of fertilizer used on farms, as a salinity control measure, is almost nonexistent, requiring a labored interpretation of "hazardous" or "undesirable" substances. Moreover, the consensus throughout the basin is that fertilizer is a minimal contributor to salinity. Where there is evidence of heavy fertilizer use, as in the Palo Verde Valley, the Palo Verde Irrigation District is encouraging more efficient use. In many areas of the Colorado River Basin, farm economics severely limit the amount of fertilizer applied.

Generally, this action is considered ineffective, difficult to administer and monitor, and, in many states, illegal.

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|--|---|--|---|---|--|--|-------------------------|
| 26. Control types of fertilizer used, to avoid excess salinity in return flow. | ARS 3-278 Gives power to Commission of Agriculture and Horticulture to control fertilizer materials containing "undesirable substances." <i>Nonspecific</i> | FAC 14004.5 Includes as restricted materials those causing hazards to subsequent crops through persistent soil residues. FAC 14006 permits regulation of use of restricted material. FAC Chapter 5, specifically dealing with fertilizing materials, has no reference to salinity. <i>Nonspecific</i> | CRS 35-1-104 Authorizes Dept. of Agriculture to enforce state laws concerning "the inspection of commercial fertilizers," but this does not give authority to control use of saline fertilizers. <i>General</i> | NRS 588.010 Authorizes Dept. of Agriculture to test commercial fertilizers. NRS 548.430 (5) authorizes conservation districts to adopt regulations "for such other means, measures, operations and programs as may assist conservation of renewable natural resources and prevent or control . . . sedimentation in the conservation districts." <i>General</i> | NMSA 45-13-26 Authorizes the N.M. Dept. of Agriculture to stop sale of any commercial fertilizer in violation of the N.M. Fertilizer Act, but no provisions deal with saline fertilizers. <i>General</i> | UCA 4-19-22 Authorizes the Utah Dept. of Agriculture to stop sale of any fertilizer in violation of the Utah Commercial Fertilizer Act, but no provisions deal with saline fertilizers. <i>General</i> | No statutory authority. |

C-11

AUTHORITY

27. *Treat irrigation return flow for salinity, through ion-exchange or solar distillation processes.*

Except for adoption of the Forum standards which do not specifically give authority for water treatment, four of the basin states lack statutory authority in agricultural and special conservancy district statutes to treat irrigation return flow for salinity. In California, Utah and Wyoming, authority to treat or purify water appears to be present. Nevertheless, there is no serious consideration being given to state or local treatment of irrigation return flow for salinity, anywhere in the Colorado River Basin. Most authorities consider such action impractical from the viewpoint of cost and energy use. Where salinity treatment is considered, it is as a research program (as in New Mexico) or as an action to be taken by the federal government for political treaty reasons (as at Yuma, on the Wellton-Mohawk Canal) rather than economic reasons. California and the U.S. Bureau of Reclamation have studied desalinization, but of geothermal water rather than agricultural return flow.

If desalinization of saline or brackish water comes about, it may be done sometime in the future as a last resort technique to increase fresh water supplies for municipal or industrial use. Nevada, in its long range planning for water for the Las Vegas Valley, is considering among other potential strategies the desalting of ocean water to exchange for California rights to Colorado River water. At such an extreme point, desalinization of any saline water would be practical, including irrigation return flow if a right to it can be obtained.

| ACTION | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
|--|---|--|---|--|--|--|--|
| 27. Treat irrigation return flow for salinity, through ion exchange or solar distillation processes. | ARS R9-21-103 Adopts Forum standards on salinity control. No specific treatment authority is given. <i>No authority</i> | WC 22078 Authorizes irrigation districts may treat and purify any water for the beneficial use of the district. <i>Specific</i> | CRS 25-8-506 (1) Return flow not controlled by state; federal regulations govern. <i>No authority</i> | No authority in agricultural statutes. | No authority in agricultural statutes. | UCA 73-10-4 Authorizes the Board of Water Resources to construct conservation projects which will conserve and utilize water resources to benefit citizens of Utah. <i>General</i> | WSA 41-1.42 Creates water development program providing state financing and construction of facilities to abate water pollution. <i>Specific</i> |

28. *Require reuse of wastewater to reduce municipal water demand.*

This action was suggested on the assumption that municipal wastewater reuse would reduce the demand for freshwater and thus leave greater quantities of freshwater available to dilute saline river flows. However, salinity benefits here are questionable, at best, as each time the water is run through the municipal system, it will pick up salts and it ultimately will have to be returned to the river system, since there is no likelihood of a "no return flow" policy for municipal wastewater. The probable ineffectiveness of Action #28 in reducing salt loading causes it to be classified as infeasible.

There are other barriers, as well. Potable reuse of municipal wastewater is likely to occur about 1990, but the known processes are costly, still have not reliably overcome health hazards, and face likely public resistance to their implementation unless careful preparations are made beforehand.

In the Colorado River Basin states, statutes in the water resources area were silent on the subject of municipal reuse. The Denver Water Department has for some years been a leader in wastewater reuse research; reuse is expected to be necessary in Nevada before 1995; and California has an active exploratory program into all aspects of reuse; but elsewhere in the basin there is little evidence of encouragement of municipal reuse as a policy.

| ACTION | AUTHORITY | | | | | | |
|---|--|--|--|--|--|--|--|
| | ARIZONA | CALIFORNIA | COLORADO | NEVADA | NEW MEXICO | UTAH | WYOMING |
| 28. Require reuse of wastewater to reduce municipal water demand. | No authority in statutes on water resources conservation and allocation. | No authority in statutes on water resources conservation and allocation. | No authority in statutes on water resources conservation and allocation. Colorado court decisions have allowed reuse only of water imported from another drainage basin. | No authority in statutes on water resources conservation and allocation. | No authority in statutes on water resources conservation and allocation. | No authority in statutes on water resources conservation and allocation. | No authority in statutes on water resources conservation and allocation. |

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