

Central Arizona Salinity Study

Phase I Report

December 2003

The study partners: City of Glendale, City of Mesa, City of Phoenix, City of Scottsdale, City of Tempe, Arizona-American Water Company, City of Chandler, City of Goodyear, City of Peoria, City of Surprise, City of Tucson, Town of Buckeye, Town of Gilbert, Queen Creek Water Company, Brown and Caldwell, and the Bureau of Reclamation.

Contents

Chapter		Page
	Executive Summary.....	ES-1
1	Introduction.....	1-1
2	Salt Balance in Central Arizona.....	2-1
3	Effects of Salinity in Central Arizona.....	3-1
4	Economic Assessment Model.....	4-1
5	Future Trends Analysis.....	5-1
6	Strategic Conclusions.....	6-1
7	References.....	7-1

Table

2-1	Estimated Annual Salt Balance in the Phoenix Metropolitan Area.....	2-4
2-2	Generalized Salt Balance in the Tucson AMA, 2000 and 2015.....	2-8
2-3	Generalized Salt Balance in the Principal Subbasins of the Pinal AMA.....	2-9
2-4	Generalized Salt Balance in the Harquahala Basin.....	2-10
2-5	Generalized Salt Balance in the Gila Bend Basin.....	2-11
3-1	Typical TDS Components of Central Arizona Source Waters.....	3-1
4-1	Costs of Increased Salinity in CAP Water.....	4-3
5-1	MAG Projections of Population Growth in Phoenix Metro Area.....	5-1
5-2	Year 2000 Estimated Annual Salt Flux for the Phoenix Metro Area.....	5-2
5-3	Year 2040 Estimated Annual Salt Flux for the Phoenix Metro Area.....	5-4
5-4	Estimated Annual Salt Flux for the Phoenix Metro Area at Buildout.....	5-5

Figure

1-1	Central Arizona Salinity Study (CASS) Study Area	1-4
2-1	Salt Balance in the Phoenix Metro Area (Typical Year)	2-3
2-2	Where the Salts Accumulate	2-5
2-3	Salt Balance in the Tucson Active Management Area (2000).....	2-7
3-1	Source-Water TDS at Water Treatment Plants and Effluent TDS at 91 st Avenue Wastewater Treatment Plant.....	3-6
3-2	Agriculture and Salt Concentration.....	3-8
3-3	Infrared Image of Phoenix Metropolitan Area.....	3-10
3-4	Groundwater Recharge Locations in Central Arizona.....	3-12
4-1	Annual Costs Due to Changes in Salinity of CAP Water (Colorado River)	4-3
4-2	Annual Costs Due to Changes in Salinity of SRP Water (Salt and Verde Rivers)	4-4
4-3	Annual Costs Due to Changes in Salinity of SRP and CAP Waters	4-5
5-1	Year 2015 Salt Balance in the Tucson Active Management Area.....	5-8

Appendices

- A. Salinity and Total Dissolved Solids
- B. Colorado, Salt, Verde, and Gila Rivers
- C. Hydrologic Report on the Phoenix AMA
- D. Hydrologic Report on the Gila Bend Basin
- E. Hydrologic Report on the Tucson AMA
- F. Hydrologic Report on the Harquahala Basin
- G. Hydrologic Report on the Pinal AMA
- H. Salinity in the Salt River Valley, Arizona: An Historical Perspective
- I. CAP, SRP, AND SCIIP
- J. Economic Impact Model
- K. Human Health Impacts from Salinity in Drinking Water
- L. Reported Impacts of High-Salinity Water on Golf Courses in Central Arizona
- M. Impact of High and Variable TDS on Central Arizona Industry
- N. Artificial Brine in the Salt River Valley
- O. Municipal TDS Research
- P. Accumulation and Management of Salt in South-Central Arizona
- Q. Soil Salinity Levels on the Gila River Indian Community
- R. Evaluation of Fertilizer Use and Associated Salt Contribution to CAP Area
- S. Trends in Membrane Technology
- T. Local Research Efforts

Acronyms and Abbreviations

ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
af	acre-feet
af/yr	acre-feet per year
AMA	Active Management Area
BLM	Bureau of Land Management
BID	Buckeye Irrigation District
CAGR	Central Arizona Groundwater Replenishment District
CAP	Central Arizona Project
CASS	Central Arizona Salinity Study
CAWCD	Central Arizona Water Conservation District
cfs	cubic feet per second
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
Forum	Colorado River Basin Salinity Control Forum
FY	fiscal year
GDP	Gross Domestic Product
gpcd	gallons per capita per day
GRIC	Gila River Indian Community
GRUSP	Granite Reef Underground Storage Project
GSF	Groundwater Savings Facility
MAG	Maricopa Association of Governments
MDWID	Metropolitan Domestic Water Improvement District
MCL	maximum contaminant level
mg/L	milligrams per liter
model	salinity economic model
msl	mean sea level
MWD	Maricopa Water District (Arizona)
MWD	Metropolitan Water District (California)
O&M	Operation and Maintenance

PL	Public Law
RID	Roosevelt Irrigation District
RO	Reverse Osmosis
SCIIP	San Carlos Irrigation Improvement Project
SDWA	Safe Drinking Water Act
SROG	Sub-Regional Operating Group
SRP	Salt River Project
SRPMIC	Salt River Pima-Maricopa Indian Community
TC	CASS Technical Committee
TDS	total dissolved solids
USBR	U.S. Bureau of Reclamation
USDA	U.S. Department of Agriculture
USF	Underground Storage Facility
USGS	U.S. Geological Survey

