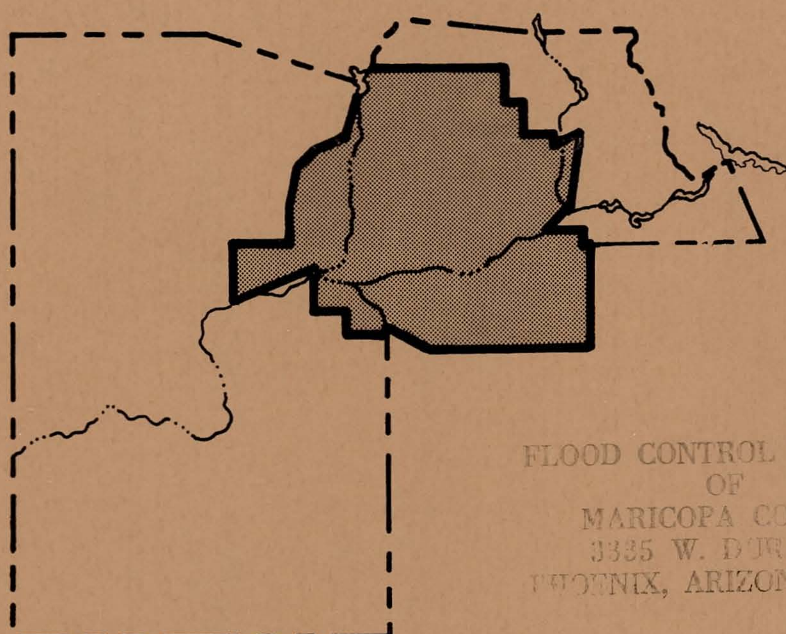
U.S. ENVIRONMENTAL PROTECTION AGENCY

FINAL ENVIRONMENTAL IMPACT STATEMENT



MARICOPA ASSOCIATION OF GOVERNMENTS
POINT SOURCE METRO PHOENIX 208
WASTEWATER MANAGEMENT PLAN

JULY 1979

EPA-IX-AZ-MARICOPA-MAG 208-79

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IX

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MARICOPA ASSOCIATION OF GOVERNMENTS
POINT SOURCE METRO PHOENIX
208 WASTEWATER MANAGEMENT PLAN

JULY 1979

Approved by:

Frank M. Covington

for Paul De Falco, Jr.
Regional Administrator
U.S. Environmental Protection Agency
Region IX

SUMMARY

STATEMENT TYPE: Final Environmental Impact Statement
PREPARED BY: U.S. Environmental Protection Agency
Region IX
215 Fremont Street
San Francisco, CA 94105

1. TYPE OF ACTION: Administrative

2. BRIEF DESCRIPTION OF PROPOSAL: This Final Environmental Impact Statement describes the impacts associated with EPA's proposal to approve the Point Source Metro Plan developed by the Maricopa Association of Governments (MAG) for the metropolitan area of Phoenix, Arizona. It is issued in accordance with a Notice of Intent released by EPA on May 6, 1976, and responds to comments received on the Draft Environmental Impact Statement issued December 4, 1978.

The Point Source Metro Plan is part of the MAG 208 Water Quality Management Plan (WQMP) for Maricopa County. The WQMP was developed in accordance with Section 208 of the Clean Water Act of 1977, with guidance and financial assistance from EPA. It is intended to solve and prevent water quality problems and to help provide water of suitable quality for drinking, recreation, support of plants and wildlife, agriculture, irrigation, and commercial and industrial uses.

The Point Source Metro Plan consists of two key elements. The first is a plan for a series of facilities which are to be built or improved to provide treatment of municipal wastewater and appropriate reuse of the treated effluent. The second part is what is called the management system. MAG has assigned responsibility for carrying out the facilities part of the plan to MAG's Regional Council and other local agencies. MAG has overall responsibility for planning and implementation of the plan. Local Sub-Regional Operating Groups and cities have responsibility for financing the construction and operation of facilities and for enforcing rules to prevent damage to the facilities and pollution of ground and surface waters.

The Point Source Metro Plan proposed to EPA by MAG was one of four alternatives assessed in EPA's Draft Environmental Statement. The plan was developed through an extensive public involvement program, including review and evaluation by five 208 advisory groups. On November 1, 1978, the MAG Regional Council tentatively selected this plan (Alternative 2) as the preferred point source metro element of the 208 plan. On January 17, 1979, MAG adopted the entire 208 plan, including the point source metro element.

EPA proposes to approve the Point Source Metro Plan because it satisfies the requirements of the Clean Water Act, and there are no adverse impacts of sufficient magnitude to outweigh the benefits derived. In approving this element of the plan, EPA would be agreeing to accept it as part of MAG's overall strategy for water quality management. This would include a commitment to make funds available to designated agencies in the area for design and construction of wastewater facilities. EPA makes 75 percent grants under Section 201 of the Clean Water Act for this purpose, subject to the availability of funds through the State's priority system. MAG estimates the total cost of construction which EPA might assist in funding at $160 million.

The 208 plan has been prepared by MAG with grant funds and guidance from EPA and with assistance from the U.S. Army Corps of Engineers and the Maricopa County Planning Department. EPA has had substantial involvement in the development of the plan and the preparation of this document, but the decisions have been made by MAG, subject to approval by the Governor of Arizona and EPA.

3. SUMMARY OF ENVIRONMENTAL IMPACTS: The proposal is a plan to improve and protect water quality in the Phoenix area; hence, most of the impacts of the plan are beneficial. Provision of physical and institutional means for upgrading and operating the areawide wastewater treatment system will result in higher quality wastewater discharges. As a result of the plan, surface water quality standards will be met, effluent will be reused to a greater degree, and planned-for growth will be accommodated by the provision of wastewater treatment. This growth, however, will result in some adverse impacts to the environment, principally because of low-density urban expansion.

In preparing the plan, MAG projected an increase in population in the study area from 1.2 million in 1975 to 2.3 million in the year 2000. Land use projections for the same period call for the conversion of substantial amounts of natural and agricultural land to urban uses. Associated with these changes are impacts on air quality, water quality, and resource consumption. These are addressed in the EIS.

Although the plan was developed primarily to improve the environment, some adverse impacts could occur without mitigation.

Construction and operation of wastewater treatment facilities could cause noise, dust, odors, and increases in the number of mosquitoes and other insects near the facilities. Reuse of effluent with high loadings of nitrogen could increase nitrate content of ground water underlying some reuse sites. Construction of new facilities and interceptors will result in the loss of some natural land area and could lead to localized dislocation of planned development near one facility (north Gilbert). With mitigation, adverse effects of the facilities would be significantly reduced or eliminated. EPA will ensure that mitigation is developed and implemented on all EPA-funded projects.

Before any facilities are built, further assessment of local impacts will take place and information will be made available to the public by MAG and the responsible cities. In addition, EPA will notify the public before issuing any grants to design or construct facilities.

4. SUMMARY OF MAJOR ALTERNATIVES: The alternatives assessed in the Draft Environmental Impact Statement consisted of four plans to treat wastewater regionally. These plans, or project alternatives, were compared against the No Action Alternative, which assumed that no addition to or expansion of municipal wastewater treatment facilities would take place and that all flows not sewered would be treated by individual septic tank systems or small, privately owned package plants. In the thirteen environmental categories used in the Draft EIS, the project alternatives were superior to the No Action Alternative. Among the project alternatives few differences were drawn.

The project alternatives offered varying degrees of regionalization of wastewater treatment, with Alternative 1 being most centralized and Alternative 4 least centralized. Alternative 2 was selected as the preferred plan by MAG and the 208 advisory groups, primarily on technical criteria.

5. COMMENTS RECEIVED:

Federal Agencies and Offices

Advisory Council on Historic Preservation
Federal Energy Regulatory Commission
U.S. Department of the Interior, Fish and Wildlife Service
U.S. Department of Agriculture, Soil Conservation Service
U.S. Department of Transportation, Federal Highway Administration

State Agencies and Offices

Arizona Department of Transportation
Arizona Game and Fish Department
Arizona State Land Department
Arizona Water Commission
Arizona Department of Economic Security
Arizona Oil and Gas Conservation Commission
Arizona State Parks Board
Arizona Agriculture and Horticulture Commission
Arizona Department of Health Services,
Bureau of Water Quality Control

Regional and Local Agencies and Offices

Central Arizona Association of Governments
Maricopa Association of Governments
District IV Council of Governments
City of Tempe
Gila River Indian Community

Private Institutions and Individuals

Arizona Public Service Company
John S. Schaper
David E. Creighton
Orme Lewis, Jr.
Thomas S. Rothweiler
Adron W. Reichert
Gilbert T. Venable

6. DISTRIBUTION OF FINAL STATEMENT: This Final Statement is being distributed to all those who commented on the Draft Statement and also to a selected list of recipients of the Draft Statement. All recipients of the Draft Statement are being notified of the availability of the Final Statement. The names of those being sent the Final Statement, in addition to the above list of commenters, may be found in the attachment to this summary, pp. vii-ix.

7. EPA SCHEDULE: EPA expects the Final Statement to be made available officially on July 27, 1979. EPA will take no action on this plan for at least 30 days following the publication of the statement. When the MAG 208 Plan has been certified by the Governor of Arizona, EPA will take final action, which may include imposition of conditions.

ATTACHMENT

ADDITIONAL AGENCIES, INDIVIDUALS, AND LIBRARIES RECEIVING COPIES OF THE FINAL STATEMENT:

Agencies and Individuals

Council on Environmental Quality
Washington, D.C.

Federal Housing Administration
Phoenix, Arizona

U.S. Department of Agriculture
Coordinator of Environmental Quality Activities

U.S. Department of Defense
Deputy Asst. Secretary of Defense
Environmental Quality
Washington, D.C.

U.S. Department of Housing and Urban Development
Environmental Clearance Office
San Francisco, California

U.S. Department of the Interior
Office of Environmental Project Review

U.S. Department of the Interior
Bureau of Reclamation
Arizona Projects Office
Phoenix, Arizona

U.S. Department of the Interior
Bureau of Land Management
Phoenix, Arizona

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation

U.S. Environmental Protection Agency
-Office of Environmental Review
-Office of Legislation
-Office of Public Affairs
-Office of Water Programs Operation
-Public Information Reference Unit
-Freedom of Information Center
Washington, D.C.

U.S. Environmental Protection Agency
Region IX, Library
San Francisco, California

U.S. Environmental Protection Agency
Los Angeles Contact Office
Los Angeles, California

Col. Gwynn Teague
District Engineer
Los Angeles District
U.S. Army Corps of Engineers

Environmental Branch
Los Angeles District
U.S. Army Corps of Engineers

W. W. Worthington
Chief, Phoenix Urban Study
U.S. Army Corps of Engineers

Arizona Dept. of Health Services
Bureau of Air Quality Control
Phoenix, Arizona

National Wildlife Federation
Washington, D.C.

Arizona Wildlife Federation
Phoenix, Arizona

Clinton Pattea
Tribal Chairman
Fort McDowell Indian Community

Gerald Antone
Tribal Chairman
Salt River Indian Community

Charles Salem
Mayor of Goodyear, Arizona

Ernie Kleinschmidt
Town Manager
Town of Goodyear, Arizona

Don Skouser
City Manager
Chandler, Arizona

David Mansfield
City Manager
Tolleson, Arizona

Kenneth McDonald
City Manager
Tempe, Arizona

Charles Miller
Maricopa County Manager

Carlos Palma
City Manager
Avondale, Arizona

J. A. Petrie
City Manager
Mesa, Arizona

Maggie Reese
Town Manager
El Mirage, Arizona

Ed Wohlenburg
Town Manager
Gilbert, Arizona

Stan Van de Putte
City Manager
Glendale, Arizona

Jerry Pastor
Town Manager
Guadalupe, Arizona

Harold Yingling
Town Manager
Surprise, Arizona

Oscar Butt
Town Manager
Paradise Valley, Arizona

Frank Aleshire
City Manager
Scottsdale, Arizona

Marvin Andrews
City Manager
Phoenix, Arizona

Mary B. Cayton
Town Clerk
Youngtown, Arizona

Bill Vaughn
Town Manager
Peoria, Arizona

James R. Perry
Chairman
Citizen Advisory Group

Robert Brunton
Development Services Manager
Phoenix, Arizona

John J. DeBolske, Executive Director
Maricopa Association of Governments

Herb Donald
Maricopa County Flood Control District

Wilbur Wiegold
Buckeye Irrigation District

Reid Teeples
Salt River Project

Libraries

Mesa Public Library
Mesa, Arizona

Peoria Public Library
Peoria, Arizona

Scottsdale Public Library
Scottsdale, Arizona

Tempe Public Library
Tempe, Arizona

Maricopa County Community College District Library
Phoenix, Arizona

Glendale Community College Library
Glendale, Arizona

Scottsdale Library, North Branch
Scottsdale, Arizona

Tolleson Public Library
Tolleson, Arizona

Scottsdale Community College Library
Scottsdale, Arizona

Buckeye Public Library
Buckeye, Arizona

Salt River Tribal Library
Scottsdale, Arizona

Sun City Public Library
Sun City, Arizona

Maricopa Technical Community College Library
Phoenix, Arizona

Mesa Community College Library
Mesa, Arizona

Chandler Public Library
Chandler, Arizona

Avondale Public Library
Avondale, Arizona

Library
Center for Environmental Study
Arizona State University
Tempe, Arizona

Library Archives and Public Records
State Capitol
Phoenix, Arizona

Guadalupe Town Library
Guadalupe, Arizona

Phoenix City Library
Phoenix, Arizona

University of Arizona Library
Tucson, Arizona

Government Documents
Hayden Library
Arizona State University
Library
Tempe, Arizona

Gilbert Public Library
Gilbert, Arizona

Kaka Media Center Library
Sells, Arizona

Mohave-Apache Community
Library
Fountain Hills, Arizona

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Chapter 1
Introduction

1.0 INTRODUCTION

1.1 ACTION COVERED

Under provisions of the National Environmental Policy Act (NEPA), an environmental impact statement (EIS) must be prepared by any Federal agency responsible for a major action which may have a significant effect on the human environment. The proposed action covered in this EIS is approval of a plan to manage point source water pollution in metropolitan Phoenix, Arizona ("point source metro plan"). The plan consists of a number of existing and proposed wastewater treatment plants, collectors, and effluent reuses in the Phoenix area, and an areawide wastewater management system.

The point source metro plan was developed by the Maricopa Association of Governments (MAG) as the major element in the MAG 208 Water Quality Management Program. The program was conducted under the provisions of Section 208 of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) and the Clean Water Act of 1977 (PL 95-217), which amends PL 92-500. Section 208 of the Act specifies steps that communities are to take to develop and implement areawide water quality management plans (208 plans).

The Governor of the State of Arizona designated MAG as the 208 planning agency for Maricopa County. MAG was assisted in the preparation of the 208 plan by the U.S. Army Corps of Engineers, Los Angeles District, and by numerous consultants. The plan was reviewed by the three advisory groups to the 208 program--the Agricultural Advisory Group (AAG), Citizen Advisory Group (CAG), and Technical Advisory Group (TAG)--and by the MAG Management Committee and 208 Executive Committee. Ultimate decision-making responsibility for the 208 plan rests with MAG's Regional Council, subject to approval by the State and the U.S. Environmental Protection Agency (EPA). Funding was provided by MAG, EPA, and the U.S. Army Corps of Engineers.

It is the responsibility of EPA to oversee the planning efforts necessary to meet requirements of Section 208 and the overall goals of the Act. EPA has a review and approval function after the plan has been completed and the Governor of the State has certified it for approval. EPA must also approve the proposed designation of management agencies with responsibility for carrying out each portion of the plan. In addition, EPA administers a grant program under Section 201 of the Act for those areas that complete 208 plans and qualify for funding.

EPA, Region IX participated extensively in the development of the MAG 208 plan. EPA reviewed and approved MAG's original Work Plan on November 1, 1976, and on September 26, 1978, approved a Revised Work Plan prepared in response to EPA's request. EPA has also provided guidance on the meaning of laws and regulations, technical and management assistance, and constant assessments of the quality and suitability of MAG's work.

The 208 plan has been finalized by MAG and, upon certification by the Governor of Arizona, will be submitted to EPA for approval. EPA proposes to approve the plan with conditions. In approving the plan, EPA agrees to accept the provisions of the plan and MAG's designation of management agencies for carrying out the plan.

Approval also includes a commitment to make funds available to designated agencies in the area for the design and construction of wastewater treatment facilities. EPA makes 75 percent grants available under Section 201 of the Act for this purpose, subject to availability of funds through the State's priority system. MAG estimates the total cost of construction which EPA might assist in funding at $160 million. Facilities applying for grant funds will be evaluated by EPA on a case-by-case basis. For each project funded, EPA will either prepare an EIS or issue a declaration of no significant environmental impact following an environmental assessment.

1.2 EIS OBJECTIVES

The primary objective in preparing an EIS on a broad plan, such as the point source metro plan, is to provide coverage of impacts associated with the proposed action as a whole. More site-specific impacts of components of the plan will be assessed when detailed planning takes place. This process--called "tiering"--is encouraged by the Council on Environmental Quality in final NEPA regulations (40 CFR 1502.20 and 1508.28). By assessing impacts of a plan or program to provide a basis for more detailed coverage of impacts later on, tiering eliminates repetition and permits decision-makers to focus on impacts important to the decision at hand. It is expected that this EIS will provide a foundation for assessing impacts of wastewater treatment facilities in the metro Phoenix area when more detailed planning takes place.

The impacts emphasized in this EIS are areawide impacts, most of which are cumulative or secondary in nature. To determine cumulative areawide impacts, a preliminary assessment of local impacts of the facilities was performed in the Draft EIS (DEIS) and is summarized in matrix form in the Final EIS (FEIS). Although local impacts could not be assessed in detail because of the preliminary nature of facility planning, the EIS provides direction for the facility-specific environmental assessments that are to follow. These assessments will be made as part of detailed facility planning that will be performed by local agencies in the Phoenix area. In many cases, this EIS may provide sufficient coverage of impacts for EPA to issue a declaration of no significant environmental impact for a facility.

1.3 DEIS REVISION

The assessment in the DEIS focused on differentiating among the four alternative wastewater management plans to assist MAG and the 208 advisory groups in selecting a preferred alternative and EPA in determining the suitability of the plan. After the DEIS 45-day commenting period and the public hearing, the MAG Regional Council made a decision on January 17, 1979, to adopt a 208 plan which included Alternative 2 for the metro Phoenix area. The impacts of this alternative--or selected plan--are assessed in the FEIS.

By focusing on the selected plan, the FEIS is able to provide greater coverage of regional and secondary impacts. In particular, EPA was concerned that the FEIS provide more complete coverage of secondary impacts arising from the plan's support of regional growth. An expanded analysis of these impacts was developed for the FEIS and may be found in Section 4.3. In addition, revisions were made to respond to comments on the DEIS (see Chapter 5). EPA attempted to respond to comments on the DEIS as fully as possible.

Revisions were made using new NEPA regulations for preparation of environmental impact statements (40 CFR 1500-1508) as a guide. Although these regulations were not required for this EIS, they were used because of the logic of the recommended EIS organization, the emphasis on conciseness, and the general guidance provided in the regulations for preparing a document helpful to decision-makers. The resulting FEIS is a more concise and clearly focused document.

In revising the EIS, some information that appeared in the DEIS was condensed or eliminated. The comparative evaluation of the alternatives, which formed the major part of the Environmental Consequences chapter in the DEIS (Chapter 4), is summarized briefly in Section 2.3 of the FEIS. The evaluation of environmental effects of the individual facilities (DEIS Section 4.2) is also summarized in the FEIS (Figure 4-1).

Information eliminated from the document was mainly in the Environmental Setting chapter (Chapter 3) of the DEIS. In keeping with the new NEPA regulations, this chapter was considerably reduced in size. (See CFR 40 1502.15, Affected Environment, which indicates that descriptions of the environment "shall be no longer than is necessary to understand the effects of the alternatives.") Finally, the section in the DEIS on the No Action Alternative (Section 3.2) was not reprinted in the FEIS, but information from this section was used in condensed form in Section 4.3 (Impacts of Growth) in the FEIS.

1.4 EIS FORMAT

The FEIS was organized to highlight the issues and impacts associated with the selected plan. The four remaining chapters in the FEIS are as follows:

Chapter 2, Proposed Action and Alternatives, describes the need for and purpose of action, the proposed action, and the alternatives.

Chapter 3, Affected Environment, presents a concise description of the metro Phoenix area environment.

Chapter 4, Environmental Consequences, describes impacts of the selected plan, including mitigation measures, impacts of the plan's support of regional growth, unavoidable adverse impacts, irreversible and irretrievable commitments of resources, and short-term uses of the environment vs. long-term enhancement.

Chapter 5, Comments and Responses, includes comments received on the DEIS and responses prepared by EPA and MAG.

References, Glossary, and Appendices complete the FEIS.

1.5 AVAILABILITY OF SUPPORTING DOCUMENTS

Supporting documents from the MAG 208 Program are available at information depositories established by MAG in the metropolitan Phoenix area. Depositories include public libraries in the Phoenix area, the Hayden Library at Arizona State University, Tempe, and the State Capitol Library, Phoenix. A full list of libraries may be found on pp. ix-x. In addition, supporting documents are available at EPA, Region IX, offices in San Francisco, California; the U.S. Army Corps of Engineers, Los Angeles District, Los Angeles, California; the U.S. Army Corps of Engineers, Urban Study Office, Phoenix; the Maricopa Association of Governments, Phoenix; and the Maricopa County Planning Department, Phoenix.

Chapter 2
Proposed Action and Alternatives

2.0 PROPOSED ACTION AND ALTERNATIVES

The proposed action for this Final Environmental Impact Statement (FEIS) is EPA approval of the selected 208 wastewater management plan for metropolitan Phoenix. In this chapter, the selected plan and alternatives are described. The first section in the chapter presents the need for action and purpose of the plan. The second section describes the plan. The third section describes alternatives to the plan and the selection process.

2.1 NEED FOR AND PURPOSE OF ACTION

Preparation of a 208 plan for Maricopa County was mandated by Section 208 of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) and the Clean Water Act of 1977 (PL 95-217), which amends PL 92-500. Section 208 of the Act requires areas with water quality problems to develop areawide plans for protecting and improving water quality. By means of Section 208 areawide planning and Section 201 wastewater treatment facilities construction grants, communities are provided assistance in achieving the Act's overall goal of protecting, restoring, and maintaining water quality.

In 1975, Maricopa County was designated by the Governor of the State of Arizona as an area requiring preparation of a water quality plan under Section 208, and the Maricopa Association of Governments (MAG) was identified as the 208 planning agency. To develop the 208 plan for Maricopa County, the MAG 208 Water Quality Management Program (MAG 208 Program) identified the water quality problems specific to the area and devised a work plan consisting of three major technical elements: the point source study, the nonpoint source study, and the management study. The largest element was the point source study, which resulted in the development of a plan for collection, treatment, and reuse of wastewater in Maricopa County.

Point sources are stationary, readily identifiable sources of pollution, such as private or municipal waste treatment plants.[1] The point source study focused on the metropolitan Phoenix area, where 93 percent of the residents of Maricopa County live. The nonmetropolitan area of Maricopa County contains only two other communities that required study: Wickenburg and Gila Bend. Separate studies were conducted for these communities. The geographical division of Maricopa County into metro and nonmetro areas for the 208 study is shown on Figure 2-1.

The point source plan for metro Phoenix (point source metro plan) was developed to respond to the following problems:

1. The Phoenix area is expected to continue to grow rapidly over the next 20 years. This population will require a significantly enlarged wastewater treatment system to handle increased flow.

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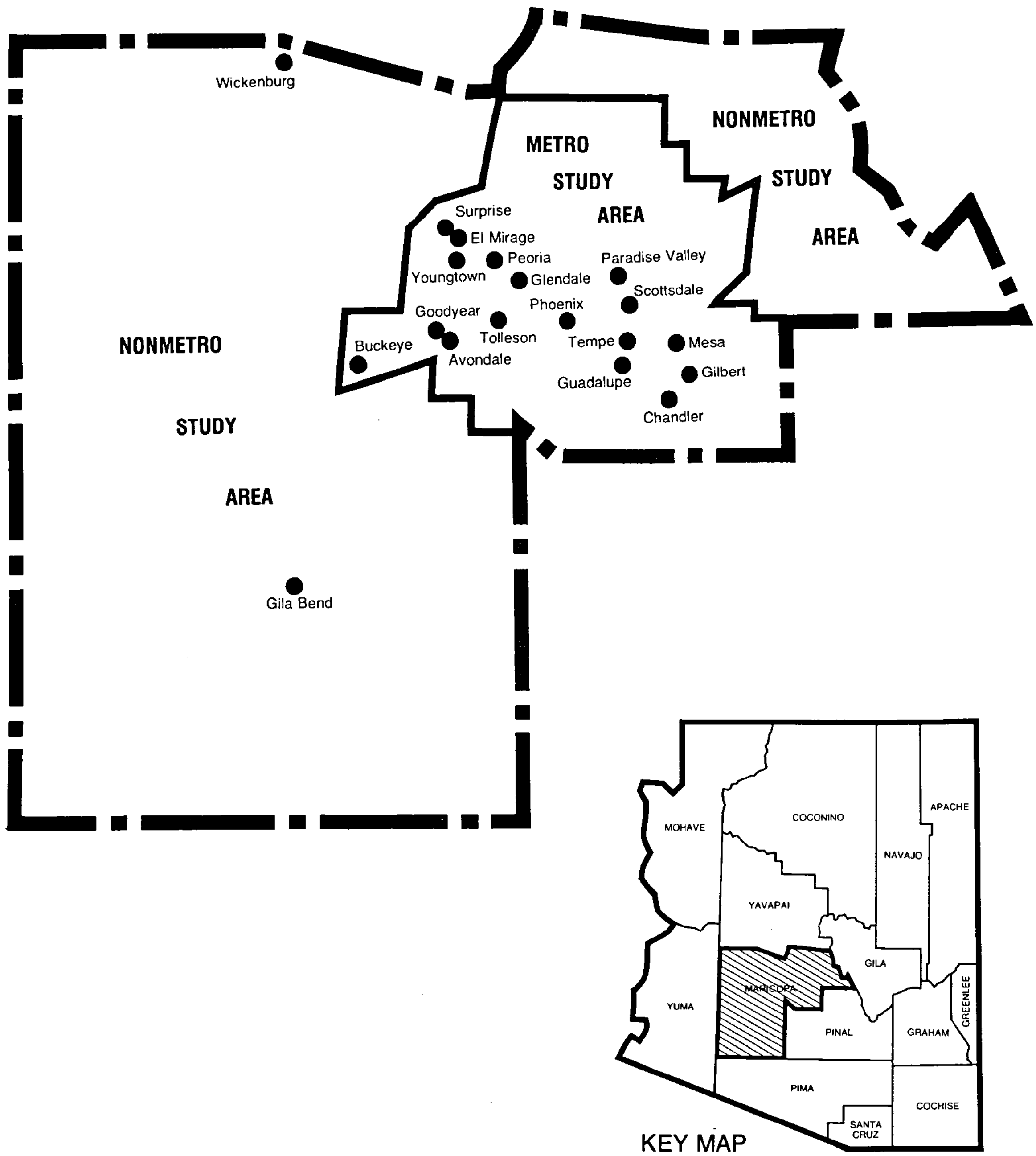
[1]A glossary of terms and abbreviations is provided at the end of this report.



MAG 208 STUDY AREA
Figure 2-1

2. Water quality problems in some parts of the area are caused by poor quality discharges from wastewater treatment plants.

3. Water resources are being depleted in the area, and reuse of wastewater could help conserve these resources.

4. The existing wastewater treatment system is operating near capacity, and most facilities are in need of upgrading to handle flows and improve water quality. Future growth will place additional stress on the system.

5. Wastewater treatment facilities are managed by local or multi-city entities. A regional wastewater management system is required to implement the 208 plan, because only such a system is capable of handling region-wide problems, particularly where coordination with other regional planning efforts is needed.

The plan that was developed responded to the problems by providing for wastewater treatment facilities that will handle the projected population growth and improve and protect water quality and by establishing an areawide wastewater management system. The problems that led to the development of this plan are discussed in greater detail in the following parts of this section.

2.1.1 POPULATION PROJECTIONS AND FUTURE FLOWS

Maricopa County is one of the fastest growing areas in the United States and one of the few metropolitan areas in the nation that has continued to grow in recent years. Projections from the Arizona Department of Economic Security (DES), the designated state planning agency, show that Maricopa County will continue to grow rapidly over the next twenty years, reaching a population of 2,297,000 by the year 2000. The DES issued revised projections in July 1978. These revised projections indicate a slightly larger population for the year 2000 and an earlier staging of population growth. Although these revised projections were not available in time to be used in preparation of the MAG 208 Plan, they will be used in future updates of the plan.

To determine future wastewater flows, population was allocated by MAG to Municipal Planning Areas (MPA) within the county, unit flows for wastewater treatment service areas were estimated, and a waste flow reduction plan was developed. Future population by MPA within the county is shown in Table 2-1. Unit flows used to develop future flow projections are shown in Table 2-2.

TABLE 2-1

PROJECTED POPULATION IN MARICOPA COUNTY, 1975-2000

Planning Area	1975	1980	1985	1990	1995	2000
Avondale	11,405	11,700	14,100	21,300	28,600	36,300
Buckeye	2,675[a]	3,000	3,800	5,100	6,500	8,000
Carefree-Cave Creek	2,170	2,800	4,045	5,800	8,300	9,000
Chandler	22,496	30,000	42,500	58,800	75,200	92,700
El Mirage	3,954	5,700	7,500	9,400	11,400	13,500
Fountain Hills	1,497	5,000	7,005	10,000	15,000	22,500
Gilbert	7,091	10,800	14,700	24,800	34,800	45,500
Glendale	71,292	80,000	97,700	115,800	134,400	154,800
Goodyear	3,187	3,750	5,260	9,800	14,250	19,000
Guadalupe	4,285	4,500	5,000	6,000	6,900	8,000
Litchfield Park	2,558	3,250	4,140	8,300	12,550	16,900
Luke AFB	4,900	4,900	5,000	5,000	5,000	5,000
Mesa	117,099	137,200	160,800	180,400	200,500	223,500
Paradise Valley	11,532	13,500	15,800	16,200	16,700	17,400
Peoria	13,302	19,800	23,400	37,900	52,300	67,700
Phoenix	699,006	741,000	802,200	875,900	952,100	1,042,100
Scottsdale	78,065	84,500	92,700	96,600	100,700	106,400
Sun City	37,500	40,192	47,817	48,310	48,439	48,755
Surprise	3,400	3,600	3,700	4,700	5,700	6,800

TABLE 2-1 (Cont.)

Planning Area	1975	1980	1985	1990	1995	2000
Tempe	94,063	126,800	162,700	168,600	175,100	184,000
Tolleson	3,778	4,100	4,700	9,400	14,100	19,000
Williams AFB	3,280	3,338	3,400	3,469	3,472	3,507
Youngtown	2,000	2,000	2,000	2,000	2,100	2,200
Maricopa County inside metro planning area	31,460	47,155	61,453	80,271	96,989	115,338
Subtotal, metro planning area	1,231,995	1,388,600	1,591,445	1,803,900	2,021,200	2,268,000
Gila Bend	2,300[a]	2,600	3,300	3,800	4,200	4,800
Wickenburg	2,908[a]	3,500	4,500	5,600	6,700	8,000
Maricopa County outside urban planning area	9,297	10,300	12,755	13,700	14,900	16,200
Subtotal, remainder of county	14,505	16,400	20,555	23,100	25,800	29,000
TOTAL	1,246,500	1,405,000	1,612,000	1,827,000	2,047,000	2,297,000

[a]Existing city limits only.

Source: Arizona Department of Economic Security, 1977a; Maricopa Association of Governments, 1978.

TABLE 2-2

UNIT FLOW PROJECTIONS

Service Area	Unit Flows[a]
Gila Bend	128
Glendale	110
Luke Air Force Base	1.5 mgd
Mesa	85
Phoenix (23rd Avenue plant)	105
Phoenix (91st Avenue plant)	100
Scottsdale	105
Sun City	70
Tempe--Commercial/industrial	1,760 g/ac/day
—Residential	65
Tolleson	110
Youngtown	70
All other areas	100

[a]In gallons per capita per day unless otherwise noted.

Unit flow projections were developed by community on the basis of historical trends, actual flow records, and resident census data for 1975. These unit flows were used as a basis for flow projections in the MAG 208 study.

A waste flow reduction study conducted by MAG determined that conservation efforts could result in a probable flow reduction of 4 percent for existing (1980) residents and 15 percent for new residents, assuming that they would occupy new homes built for water conservation. The net result is an overall reduction of almost 10 percent by the year 2000.

The future flows developed from the population projections, unit flows, and water conservation projections are shown in Table 2-3 by service area. In developing these future flows, MAG assumed that centralized wastewater treatment would be needed wherever population densities are expected to exceed 1.5 persons per acre. EPA requires that more detailed analysis be made of the most suitable treatment methods for low-density areas. Further studies by individual communities in the study area will define areas to be sewered on the basis of land use and zoning, soil conditions, ground water conditions, environmental inputs, management requirements, and costs.

2.1.2 WATER QUALITY PROBLEMS

Streams in the Phoenix area are usually dry, except during and after storms. However, flow in the Salt and Gila Rivers immediately downstream from the 91st Avenue and 23rd Avenue treatment plants in Phoenix is perennial, consisting predominantly of effluent from the plants. Currently, the plants operating at rated capacity produce approximately 115 million gallons per day (mgd), or 130,000 acre-feet per year (af/yr), of effluent.

Discharges from smaller treatment plants also contribute to flows in the area's streams. The Tolleson treatment plant occasionally discharges portions of its effluent to a canal leading to the Salt River. The Buckeye treatment plant discharges to the Arlington Canal, which drains to the Gila River. The Avondale treatment plant discharges to the Agua Fria River. The Chandler plant discharges to the Gila Drain. These discharges are considerably smaller in quantity than the discharges from the 23rd Avenue and 91st Avenue plants.

The effluent discharged from the 23rd Avenue and 91st Avenue plants dominates the flow in the Salt River from 23rd Avenue to the confluence of the Salt and Gila Rivers approximately 15 miles

TABLE 2-3

PROJECTED AVERAGE WASTEWATER FLOWS BY SERVICE AREA IN MARICOPA COUNTY, 1980-2000[a]

Service Areas	Projected Average Flows (mgd)				
	1980	1985	1990	1995	2000
Metro service areas:					
Avondale	0.7	0.9	1.5	2.1	2.8
Buckeye	0.3	0.4	0.5	0.6	0.7
Carefree-Cave Creek	0.3	0.4	0.5	0.7	0.8
Chandler	3.0	4.0	5.4	6.8	8.2
El Mirage	0.4	0.5	0.5	0.5	0.6
Fountain Hills	0.5	0.7	0.9	1.3	2.0
Gilbert	1.0	1.3	2.2	3.1	4.0
Glendale	8.6	10.0	11.5	12.9	14.5
Goodyear	0.3	0.4	0.8	1.1	1.4
Guadalupe	0.5	0.5	0.6	0.6	0.7
Litchfield Park	0.3	0.3	0.6	0.9	1.3
Luke AFB	1.5	1.5	1.5	1.5	1.4
Mesa	13.9	15.7	17.2	18.9	20.7
Paradise Valley	1.4	1.5	1.5	1.5	1.7
Peoria	1.8	2.0	3.1	4.2	5.4
Phoenix	75.9	80.4	86.0	91.7	98.7
Scottsdale	8.9	9.5	9.8	10.0	10.5
Sun City	2.8	3.2	3.2	3.2	3.2
Sun City West	0.4	0.9	1.5	2.0	2.6
Sun Lakes	0.2	0.3	0.4	0.5	0.7
Surprise	0.4	0.4	0.5	0.5	0.6
Tempe	12.7	15.9	17.5	19.2	21.1
Tolleson	0.5	0.5	0.9	1.4	1.8
Williams AFB	1.0	1.0	1.0	1.0	1.0
Youngtown	0.1	0.1	0.1	0.1	0.1
Subtotal	137.4	152.3	169.2	186.3	206.5
Nonmetro service areas:					
Gila Bend	0.3	0.4	0.4	0.5	0.5
Wickenburg	0.4	0.5	0.6	0.7	0.8
Subtotal	0.7	0.9	1.0	1.2	1.3
Total	138.1	153.2	170.2	187.5	207.8

[a]Flows were projected assuming that centralized wastewater treatment would be needed wherever population densities are expected to exceed 1.5 persons per acre.

downstream. The greatest flow is in the stretch of the river from 91st Avenue downstream 7 miles to the Buckeye Heading, where the Buckeye Irrigation Company diverts a portion of the flow for irrigation of crops within the Buckeye Irrigation District.

The water quality in the stretch of the Salt River immediately downstream from the 91st Avenue plant is not good. Fecal coliform counts are very high, averaging 3×10^5 per 100 ml in 1977. Also in 1977 total dissolved solids averaged 1,075 milligrams per liter (mg/l), nitrate (as N) 27.4 mg/l, and suspended solids 32.2 mg/l (U.S. Department of Agriculture, Water Conservation Laboratory, 1977). Access to the river is easily gained, posing potential health hazards. When flooding occurs, this effluent-dominated flow mixes with floodwaters and, though reduced in concentration, may reach residential and business areas.

The problem of discharges not meeting NPDES permit requirements and State surface water quality standards has been complicated by litigation and changing standards. The City of Phoenix has engaged the U.S. Environmental Protection Agency (EPA) in litigation over NPDES permit requirements for the 91st Avenue and 23rd Avenue plants. A recent Consent Decree (May 1979) grants the facilities a waiver until December 1980 to meet discharge requirements. The requirements have been set at 30 mg/l (on a 30-day average) for biochemical oxygen demand (BOD) and suspended solids, and 1,000 units per 100 ml for fecal coliform. (See Section 2.1.4 for a discussion of the needs of the treatment plants to meet requirements.)

Under existing State of Arizona surface water quality regulations, the Salt River from Granite Reef Dam to the confluence with the Gila River and the Gila River from that point to Painted Rock Dam are not specifically designated as having protected beneficial uses. It is on the basis of protected uses that specific water quality criteria are applied to individual stream segments. General water quality standards apply to all stream segments.

Although the stream segments in question were not given specifically designated beneficial uses in the State regulations, the "tributary rule" in the regulations has been held to apply to these segments. Under the tributary rule (R9-21-205A), where uses of a watercourse are not specifically designated, the watercourse assumes the use of the nearest downstream segment that is specifically designated. The nearest downstream segment for which designated uses have been set is Painted Rock Lake. Accordingly, standards for Painted Rock Lake (partial body contact, warm water fishery, agriculture, and aquatic life and wildlife) apply to the segments of the Salt and Gila Rivers for which no specific uses were designated.

The State of Arizona is currently in the process of reviewing and revising surface water quality standards. Public meetings were held throughout the State in January, February, and March of 1978, focusing on designating water uses to be protected for specific segments and portions of all rivers, streams, and lakes in Arizona. The associated numerical limits allowed for specific contaminants in the water for each designated protected use were also reviewed. Recommended changes will be presented at further public meetings in mid-1979, and final revisions will be adopted by the Water Quality Control Council in 1979.

As of July 1979, proposed regulations designate protected beneficial uses of partial body contact, agricultural irrigation, and riparian habitat for the effluent-dominated portions of the Salt and Gila Rivers. Numerical criteria for both the existing and proposed standards are included in Appendix A. Under both sets of standards, the highest protected use for the effluent-dominated portions of the Salt and Gila Rivers is partial body contact, with numerical criteria of 1,000 fecal coliform units per 100 ml. Coliform counts in these segments are greatly in excess of this standard. To meet standards, the treatment plants discharging to the river will be required to provide well-functioning secondary treatment plus disinfection.

2.1.3 NEED TO CONSERVE WATER RESOURCES

The Phoenix area is semiarid and water-short. Ground water overdraft is a serious problem. In 1975, the total consumptive use of water supplies in the Salt River Valley was about 1.9 million acre-feet. Of this, 1 million acre-feet was overdraft from ground water (Arizona Water Commission, 1978).

In the study area, reuse of wastewater can help conserve water resources. By reusing wastewater for agricultural irrigation, for example, other better-quality water is made available for higher uses. In addition, recharge of the aquifer may occur as a result of infiltration/percolation, helping to reduce ground water overdraft. Because water resources are being depleted, the point source metro study included increased reuse of effluent within the study area as one goal in developing alternative regional wastewater treatment systems. A separate study in the MAG 208 Water Quality Management Program developed a plan for conservation of wastewater, implementation of which has already begun.

2.1.4 NEEDS OF WASTEWATER TREATMENT FACILITIES

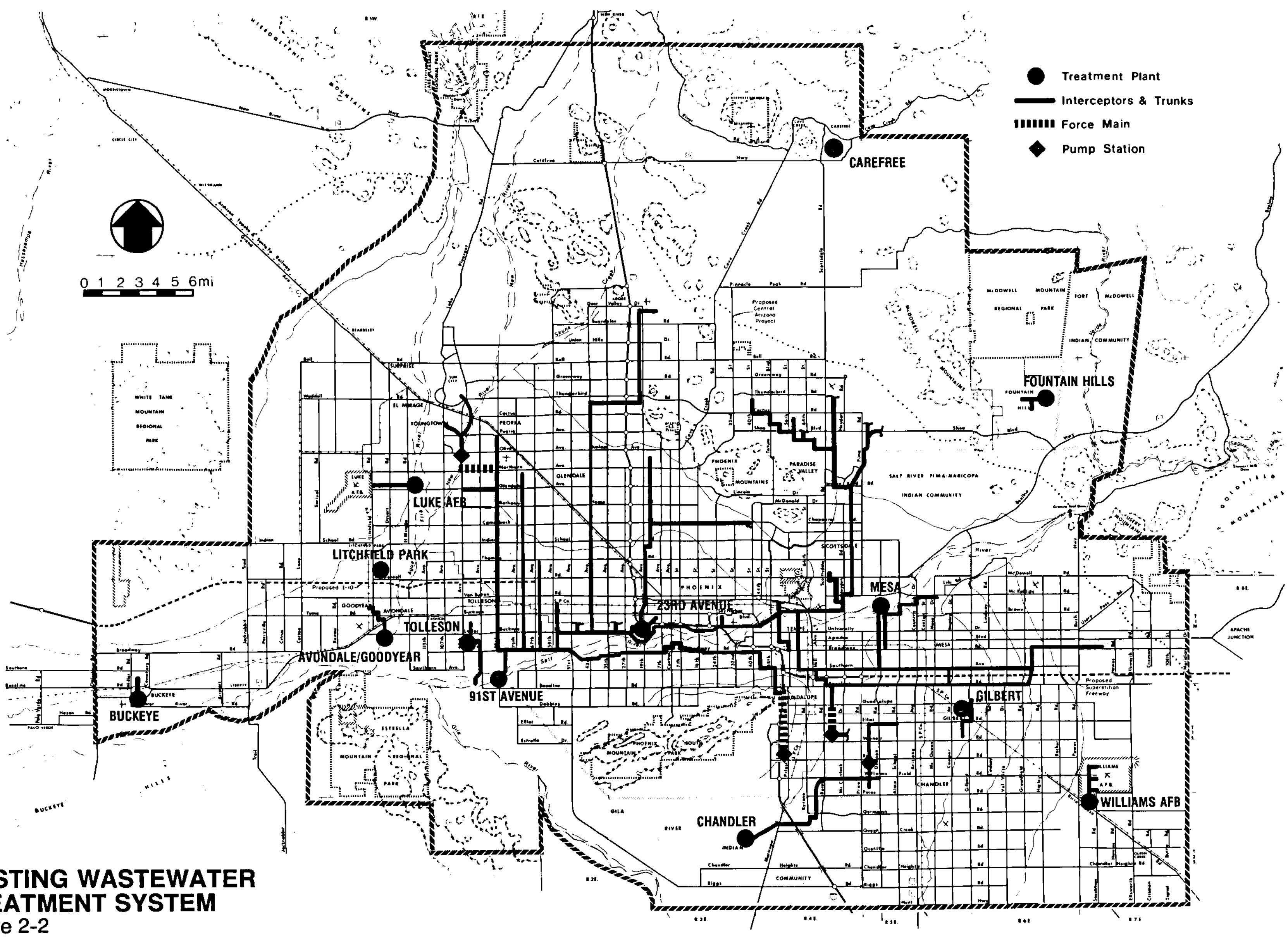
At the time the MAG 208 study began, the existing wastewater treatment system was already strained. Rapid growth in the area had placed stress on all public service sectors, including this system. Most wastewater treatment plants were operating near capacity, had not been adequately upgraded in recent years, and were poorly operated and maintained. This existing system is briefly described below, along with the needs of the system to respond to future population growth and protect water quality.

Wastewater treatment in the metro area is provided largely by facilities managed under the Multi-City Sewer Agreement that was negotiated in 1967 among Phoenix, Glendale, Tempe, Mesa, Scottsdale, and Youngtown. Under this Multi-City Agreement, the cities jointly develop interceptor sewers and plant capacity as needed. The Phoenix 91st Avenue plant, with a design capacity of 95 million gallons per day (mgd) and a rated capacity of 84 mgd, serves Phoenix, Scottsdale, Mesa, Tempe, Glendale, Youngtown, Peoria, and Sun City. Peoria and Sun City rent capacity from Glendale's portion of the 91st Avenue plant. The Phoenix 23rd Avenue plant (design capacity of 40 mgd and rated capacity of 31 mgd) serves portions of Phoenix and Paradise Valley. Other major wastewater treatment plants serve the communities of Avondale/Goodyear, Buckeye, Carefree/Cave Creek, Chandler, Fountain Hills, Gilbert, Litchfield Park, Mesa, Tolleson, and Luke and Williams Air Force Bases. The locations of these plants are shown on Figure 2-2, and an inventory of the plants is provided in Table 2-4. A summary of the needs and problems of the plants and major interceptors is as follows.

Avondale/Goodyear

The existing plant uses an aerated lagoon process and has an NPDES permit capacity of 1.0 mgd. Discharge is to the Agua Fria River. Projected growth for the Avondale/Goodyear area indicates that additional treatment and interceptor capacity will be required by the early 1980's.

At present, the plant cannot meet NPDES permit requirements for discharge to the Agua Fria River. The plant is subject to flooding, and in the 1978 floods it was badly damaged by floodwaters. Interim holding/percolation ponds have been built, but these are considered only a temporary solution.



EXISTING WASTEWATER TREATMENT SYSTEM

Figure 2-2

TABLE 2-4

WASTEWATER TREATMENT PLANTS IN METRO PHOENIX

Plant	Type	Rated Capacity (mgd)	1978 Average Flow (mgd)	NPDES Permit #	1978 Average Effluent (mg/1)		Discharge Location	Reuse	Year Built
					BOD	SS			
Avondale[a]	Aerated lagoon	1.0[c]	0.68	0020214	63	90	Agua Fria	None	1958
Buckeye[b]	Oxidation pond	0.6[d]	0.14	0020222	64	71	Arlington Canal	Irrigation	
Carefree/ Cave Creek	Extended aeration	0.1[d]	--	None	—	—	Land application	Irrigation	
Chandler[a]	Aerated lagoon	3.5[c]	1.73	0021091	16	32	Gila Drain	Irrigation	1968
Fountain Hills ..	Stabilization pond	0.5[d]	—	None	—	—	Land application	Irrigation	1974
Gilbert	Oxidation pond	0.5[d]	—	None	—	—	Land application	Irrigation	
Litchfield Park .	Aerated lagoon	0.4[d]	—	None	—	—	Land application	Irrigation	1966
Luke AFB[a]	Trickling filter	1.5[c]	0.57	0110221	25	28	Agua Fria River	None	1942

TABLE 2-4 (cont.)

Plant	Type	Rated Capacity (mgd)	1978 Average Flow (mgd)	NPDES Permit #	1978 Average Effluent (mg/l) BOD	1978 Average Effluent (mg/l) SS	Discharge Location	Reuse	Year Built
Mesa	Trickling filter	3.3[d]	3.30	None	34	30	Holding ponds	Irrigation	1960
Phoenix 23rd Avenue[a] ...	Activated sludge	31.0[d]	27.2	0020559	18	27	Salt River	Irrigation	1960 1967
Phoenix 91st Avenue[a] ...	Activated sludge	84.0[d]	85.5	0020524	29	49	Salt River	Irrigation	1976
Tolleson[a]	Trickling filter	4.1[c]	0.33	0020338	29	8	Salt River	Turf irrigation	1969
Williams AFB[a] ...	Trickling filter	1.0[d]	0.90	00110230	12	9	Land application	Irrigation	Remdl 1977

Effluent Requirements

	BOD mg/l	SS mg/l
a	30	30
b	30	90

Rated Capacity

c NPDES stated capacity

d Capacity based upon ADHS Requirements

Buckeye

The community of Buckeye, located in the extreme southwest portion of the metro area, operates and maintains its own water and sewer systems. The existing sewage treatment system in Buckeye consists of two oxidation ponds, which operate in series and discharge to the Arlington Canal. Effluent is taken up from the canal for agricultural irrigation. The capacity of the Buckeye system is 0.6 mgd, and population projections indicate that capacity of an additional 0.1 mgd will be required by the year 2000.

The plant generally meets NPDES permit requirements of 30 mg/l BOD and 90 mg/l suspended solids. A chlorination system was under construction at the time of the December 1978 floods and was badly damaged by floodwaters. When this system is completed, coliform requirements of the permit will also be met.

Carefree/Cave Creek

At present, two small privately owned treatment plants with a combined capacity of 0.14 mgd serve the communities of Carefree and Cave Creek. The plants operate as extended aeration units with oxidation ponds that discharge to golf course irrigation ponds. One plant has a capacity of 0.12 mgd and serves the downtown Carefree and Boulders areas. The other small plant has a capacity of 0.015 mgd and serves a residential development. By the year 2000, Carefree is projected to have a population of 5,400, requiring treatment of 0.5 mgd; Cave Creek is projected to have a population of 3,600 and flows of 0.3 mgd. To meet population growth, wastewater treatment service will have to be expanded in the Carefree/Cave Creek area and an appropriate disposal/reuse option selected.

Chandler

The present Chandler plant uses an aerated lagoon system, with an NPDES capacity of 3.5 mgd. The treatment plant is operating well, but population growth will exceed plant capacity in the early 1980's. By the year 2000, the population in the Chandler area is projeced to be 92,700, requiring treatment plant capacity of 8.2 mgd.

The plant is located on Gila River Indian Community lands. Effluent from the plant belongs to the Indian Community under an agreement between the Indians and the City of Chandler. Historically, the effluent has been discharged to the Gila Drain and periodically taken up by a local farmer for use as irrigation water or discharged into the Gila River. Presently, the discharge enters the Gila Drain and flows until it infiltrates and percolates into the stream bed. The agreement with the Gila Indian Community does not include the right to discharge to the Gila Drain, and the Indian Community does not favor the continued use of Indian lands for Chandler's wastewater treatment plant. The quality of the effluent does not currently meet NPDES permit requirements for BOD and suspended solids of 30 mg/l. The City of Chandler is attempting to negotiate a new agreement with the Indians in order to upgrade the quality of the effluent and to expand the plant's capacity.

Fountain Hills

The Fountain Hills Sanitary District operates a recently built (1974) modified activated sludge secondary treatment facility. The capacity of the facility is 0.5 mgd. Population for Fountain Hills is expected to reach 22,500 by the year 2000, requiring treatment capacity of 2.0 mgd. The plant has no discharge permit; effluent is reused for golf course irrigation.

Gilbert

The Town of Gilbert operates a stabilization lagoon system with discharge to a local farming operation for restricted agricultural irrigation. The plant is operating at capacity, and the local farming operation will cease using effluent for irrigation in the near future. Population growth in the area will create demand for increased capacity. By the year 2000, population in the Gilbert area is expected to reach 45,500, requiring treatment of flows of 4.0 mgd.

Litchfield Park

Litchfield Park presently operates an aerated lagoon system with discharge to a land site. The plant is now operating at capacity (0.4 mgd), and the Litchfield Park Service Company plans to install a package plant for interim treatment of wastewaters.

Luke Air Force Base

The present trickling filter plant, built in 1942, cannot meet NPDES permit requirements for discharge to the Agua Fria River. In addition, the Base has indicated a desire to phase out use of the plant if other treatment operations are available.

Mesa

The present trickling filter plant, with a design capacity of 5.0 mgd, operates at 3.3 mgd in order to maintain effluent quality. Development has encroached upon the plant in recent years. The plant is scheduled to be closed down as soon as additional capacity is available at the Phoenix 91st Avenue treatment plant.

Phoenix 91st Avenue and 23rd Avenue Plants

The 91st Avenue plant is an activated sludge secondary treatment facility with a design capacity of 95 mgd, including a 5 mgd on-site trickling filter unit which is not available for service. The plant's rated capacity is 84 mgd, and in 1978 the plant's average daily flows were 85.5 mgd. Plant facilities are in need of retrofitting and upgrading to meet current demands for treatment and to comply with NPDES permit requirements.

NPDES permit inspections conducted in 1978 and 1979 indicate that plant equipment is obsolete and that major deficiencies are occurring because of equipment failure, poor operation and maintenance procedures, and overloads due to rapid population growth. Average values for 91st Avenue effluent discharged to the Salt River in 1978 were 29 mg/l BOD and 49 mg/l suspended solids. Permit requirements for the 91st Avenue plant are 30 mg/l BOD and suspended solids.

In order to bring the 91st Avenue plant into better operating condition, accommodate the current growth in the service area, and improve water quality in the Salt and Gila Rivers, immediate upgrading and retrofitting are required. Plans call for these actions to take place by 1981, with the plant capacity increased to 90 mgd by that time.

The 23rd Avenue plant is an activated sludge secondary treatment facility with a design capacity of 40 mgd and a rated capacity of 31 mgd. In 1978, the average daily flow rate was 27.2 mgd. This plant, like the 91st Avenue plant, is operating with outdated, deteriorated equipment. Complaints have been registered against both the 23rd Avenue and 91st Avenue plants because of odor episodes and proliferation of insects around the treatment facilities. Effluent from the 23rd Avenue plant meets NPDES permit requirements for BOD and suspended solids, according to data from the NPDES inspection reports. Average values for 23rd Avenue effluent in 1978 were 18 mg/l BOD and 27 mg/l suspended solids.

The NPDES permits for both the 91st Avenue and 23rd Avenue plants require that effluent contain average fecal coliform counts equal to or less than 1,000 per 100 ml. As neither plant currently disinfects all effluent, fecal coliform counts are greatly in excess of the limit.

Effluent from the 91st Avenue plant is discharged to the Salt River immediately downstream from the plant. A portion of the flow (7,300 af/yr) is committed to the Arizona Game and Fish Department for maintenance of a wildlife management area in the riverbed near 115th Avenue. Other flow in the river is partially diverted at the Buckeye Heading to the Buckeye Irrigation Canal. This effluent is used in the Buckeye Irrigation District for restricted agricultural irrigation. A future commitment of up to 140,000 af/yr of effluent has been made by the Multi-City Partners for use as cooling water at the Palo Verde Nuclear Generating Station. This commitment is discussed more fully in Section 2.2.2, under the part describing project actions associated with the 91st Avenue and 23rd Avenue plants (pp. 2-44 - 2-46).

Effluent from the 23rd Avenue plant is currently discharged to a canal which empties into the Salt River. An undetermined amount of effluent is taken up from the canal by McDonald Farms, a private farming operation, for use in irrigation of restricted crops. Effluent from the plant is also committed for use at the Palo Verde Nuclear Generating Station, if effluent from the 91st Avenue plant is not available in sufficient quantities. The Roosevelt Irrigation District has an option on up to 20,000 af/yr of effluent from the 23rd Avenue plant provided it is treated to a level appropriate for unrestricted agricultural irrigation and the effluent is not required for Palo Verde.

91st Avenue Interceptor System

Major interceptor sewers for the 91st Avenue and 23rd Avenue plants are shown on Figure 2-2. Existing capacities of major interceptors were compared against future flows by 5-year increments to determine system deficiencies. This analysis may be found in the Point Source Final Plan (MAG 208 Program, 1979b).

Northwest communities presently not sewered to the 91st Avenue plant are projected to have a total peak flow of 47.8 mgd by the year 2000. Interceptor capacity will be required for these communities, which include Surprise, El Mirage, Youngtown, Sun City, Glendale, Luke Air Force Base, and portions of Phoenix. In addition, the eastside community of Mesa, currently served by its own treatment plant, will require a collection system to the

91st Avenue plant when the Mesa plant is decommissioned in the mid-1980's.

Analysis of the Salt River Outfall (SRO), a large interceptor that transports flows from eastside communities to the 91st Avenue plant, indicates deficiencies for some of the communities that jointly own the interceptor. Capacity in the SRO is owned by Phoenix, Scottsdale, Mesa, and Tempe in varying percentages for each of the three segments of the interceptor. While excess capacity is owned by Phoenix in all segments to and beyond the year 2000, the remaining communities will have large deficiencies. These deficiencies occur as early as 1980 for Mesa and Tempe in all segments, and for Scottsdale in two of three segments.

Tolleson

The Tolleson plant is a trickling filter system that provides secondary treatment for flows of up to 4.1 mgd. The plant is in excellent operating condition, and effluent quality is well within NPDES requirements. The plant's permit allows discharge of up to 4.1 mgd of effluent to a channel that leads to the Salt River. However, effluent is currently being used as needed for sod-growing near the plant site. Flows from Peoria and increased flows from Tolleson would require expansion of the plant to reach a capacity of 7.2 mgd by the year 2000. Population serviced in the year 2000 would be approximately 86,700 for the two communities.

Williams Air Force Base

Williams AFB presently operates a trickling filter secondary treatment system with a capacity of 1.0 mgd. Effluent is presently reused for golf course irrigation on the base during most of the year. Excess effluent which cannot be utilized on the golf course overflows to an adjacent private farm where it is reused for restricted agricultural irrigation. If all effluent produced cannot be utilized on the golf course or the farm, it then is discharged to an irrigation canal used by the Roosevelt Water Conservation District.

NPDES permit requirements of 30 mg/l BOD and suspended solids were met by the treatment facility. However, in August 1978 EPA changed requirements to 10 mg/l BOD and suspended solids because waters in the irrigation canal are used at a downstream location for unrestricted agriculture, and the effluent does not meet State standards for use of reclaimed wastewater in unrestricted agricultural operations. Future flows at the base will not require expansion of the facility, but a solution to the problem of not meeting NPDES requirements will need to be developed. Williams AFB is presently considering expansion of the golf course, which will utilize all effluent produced.

2.1.5 MANAGEMENT SYSTEM NEEDS

In order to implement an areawide wastewater treatment plan under Section 208 of the Clean Water Act, an areawide management system to operate, finance, and manage the plan is required. An Inventory and Assessment of the Existing Waste Treatment Management Agencies (Ferguson, Morris, & Simpson, 1977a) was prepared to determine whether the provisions of the Clean Water Act were currently being met by local governments of Maricopa County. Based on this study, it was determined that the existing system did not meet requirements of the Act at the planning, operating, financing, and management levels and could not provide effective areawide wastewater management.

The study concluded that there was no authority for an agency to adopt an areawide waste treatment plan which would be binding upon local governments of Maricopa County. In addition, no agency was found to have the power to assure the operation and maintenance of waste treatment works in conformance with the plan. The study found that local governments of the area possessed adequate statutory authority to individually or by contract jointly meet these requirements, but that the existing system was fragmented, uncoordinated, and unable to make decisions that could be enforced.

2.2 POINT SOURCE METRO PLAN

The selected point source metro plan would provide wastewater treatment for the projected population of the metro Phoenix area and control point source pollution by (1) upgrading and expanding existing wastewater treatment facilities, (2) constructing new facilities, (3) increasing reuse of effluent, and (4) providing an areawide management system to analyze and solve wastewater problems of the Phoenix area.

Under the plan, approximately 85 percent of the area's wastewater would be treated at the 91st Avenue and 23rd Avenue treatment plants in Phoenix, with the remainder treated at nine satellite plants. Reuse of effluent from the plants would include agricultural irrigation, cooling water for the Palo Verde Nuclear Generating Station, maintenance of a wildlife management area, sod-growing, and golf course irrigation. Other reuses may also be developed in continued planning.

The areawide management system calls for MAG to be responsible for ongoing regional waste treatment management planning, 208 plan implementation, and coordination of municipalities and private agencies in meeting the requirements of the Clean Water Act. Subregional operating groups (SROG's) composed of cities and towns would have planning and operational responsibilities for designated areas, and lead agencies from the SROG's would be responsible for day-to-day management of the individual facilities and enforcement of pretreatment requirements, NPDES requirements, and water quality standards.

These provisions of the plan are described in the following three sections (Sections 2.2.1, 2.2.2, and 2.2.3). More detailed information on elements of the plan may be found in the MAG 208 Final Plan (MAG 208 Program, 1979a) and in the Point Source Final Plan (MAG 208 Program, 1979b).

The 208 planning program used a level of detail sufficient to provide the following information: service area flows, plant capacity, responsible planning agency, preferred reuse of effluent, treatment level for preferred reuse, preferred plant location, interceptor capacity and routing, and preferred reuse location. Further study of the facilities may necessitate changing sites within a general locale or altering treatment process and reuse schemes. However, MAG's overall strategy for providing wastewater treatment and protecting water quality is not subject to change without revising the 208 plan. There will be yearly updates of the 208 plan to comply with Clean Water Act requirements that 208 planning be a continuous planning/implementation process with annual updating.

2.2.1 PLAN DESCRIPTION

Facilities

The proposed plan includes thirteen facilities, with interceptor systems. Seven of these facilities comprised Alternative 2, which was selected from the final four alternatives as the preferred plan by the MAG Regional Council (see Section 2.3, Alternatives). In addition, six other facilities (Buckeye, Carefree/Cave Creek, Fountain Hills, Williams Air Force Base, Sun City West, and Sun Lakes) are included in the plan. These facilities serve communities that chose to pursue local options for wastewater treatment early in the development of alternatives.

The facilities included in the selected plan are listed in Table 2-5, and their locations are shown on Figure 2-3. Each facility is described in detail in Section 2.2.3.

Several facilities that were eliminated from consideration during the process of developing alternative plans may be considered further in the future. The Northeast plant, which would have serviced Scottsdale and Paradise Valley, was included in two of the four final alternatives. The 48th Street plant was considered in the earlier subregional evaluation. The MAG Regional Council, in adopting the Draft 208 Plan, provided that these plants be considered for possible inclusion in the plan at a later time.

Provisions for Service

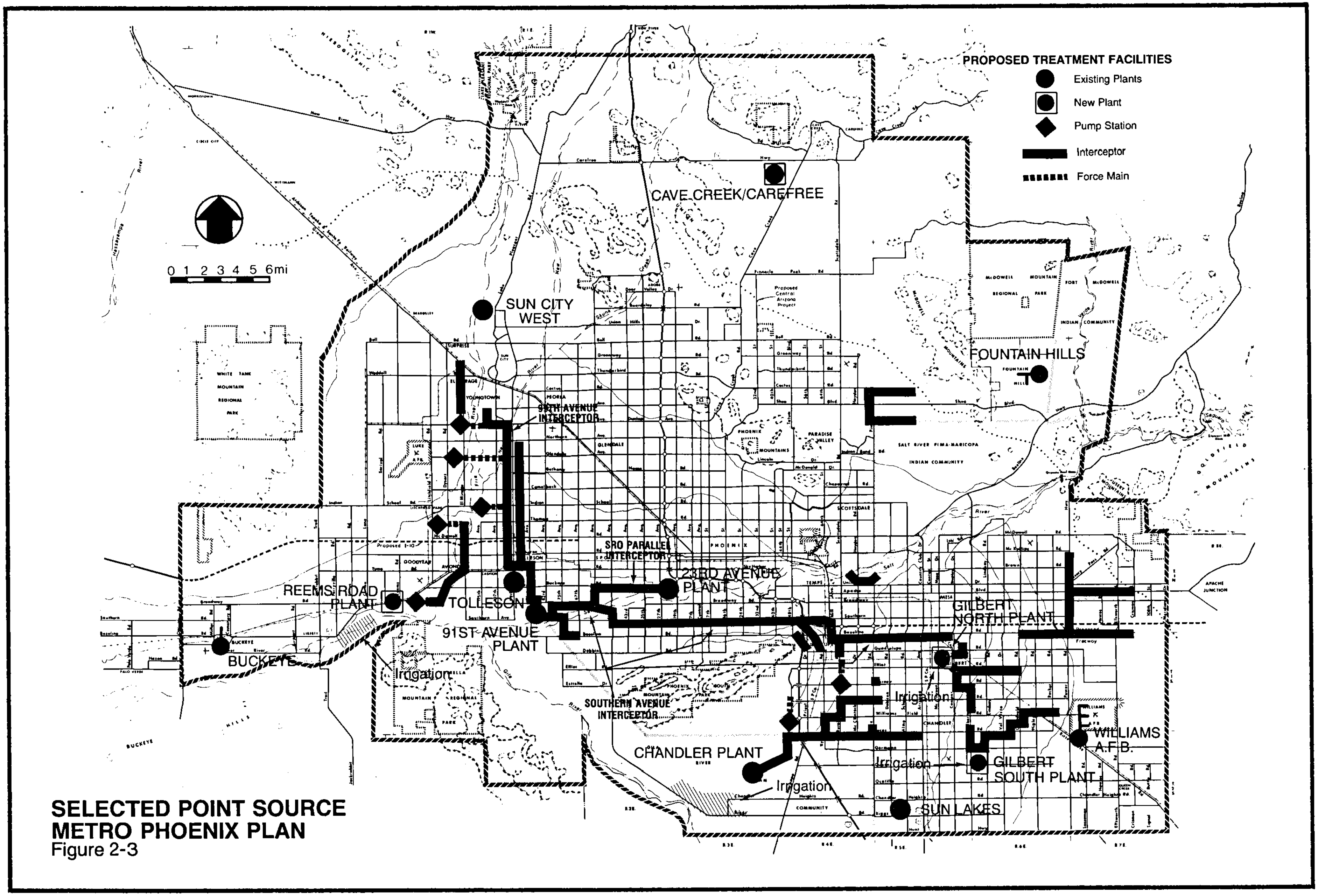
Under the plan, existing plants in Avondale, Litchfield Park, Mesa, and at Luke AFB would close down. Flows from Avondale, Goodyear, and Litchfield Park would be treated at the new Reems Road plant. Flows from Mesa and Luke AFB would be treated at the 91st Avenue plant.

It is proposed that by the year 2000 the Phoenix 91st Avenue and 23rd Avenue plants would handle flows from all areas except Tolleson/Peoria, Avondale/Goodyear/Litchfield Park, Chandler, portions of Gilbert, Buckeye, Carefree/Cave Creek, Fountain Hills, Williams Air Force Base, Sun City West, and Sun Lakes. These communities would be served by subregional or local treatment plants. The proposed expansion and new construction of treatment plants are as follows:

TABLE 2-5

FACILITIES IN SELECTED PLAN

Facility	Project Action	Year 2000 Flow (mgd)
91st Avenue	Expansion	137.0
23rd Avenue	Expansion	37.2
Chandler	Expansion	8.2
Tolleson	Expansion	7.2
Reems Road	New construction	5.4
Gilbert (north)	New construction	2.7
Gilbert (south)	New construction	0.9
Sun City West	Under construction	2.6
Fountain Hills	Expansion	2.0
Williams AFB	Alternate effluent reuse	1.0
Carefree/Cave Creek	Plan for construction	0.8
Buckeye	Expansion	0.7
Sun Lakes	Expansion	0.7
Total		206.4



SELECTED POINT SOURCE METRO PHOENIX PLAN
Figure 2-3

The 91st Avenue plant would be upgraded immediately to handle flows of 90 mgd. A 30-mgd expansion would take place by 1982, and a 17-mgd expansion would be added in 1990 or sooner to handle flows of 137.0 mgd through the year 2000.

Major new interceptors would be required to carry flows to the 91st Avenue plant. An interceptor would be constructed along 99th Avenue to transport flows from Surprise, El Mirage, Youngtown, Glendale, Luke AFB, Sun City East, and portions of Phoenix to the plant. The Southern Avenue Interceptor (SAI) would be constructed to transport flows from Mesa, Tempe, Gilbert, Guadalupe, Paradise Valley, Scottsdale, and Phoenix to the plant. A number of subsystems to both the 99th Avenue Interceptor and the SAI would be required.

The 23rd Avenue plant would be upgraded to handle flows of 37.2 mgd from portions of Phoenix and Paradise Valley through the year 2000.

The Tolleson plant would be expanded to handle a year 2000 flow of 7.2 mgd from Tolleson and Peoria. Flows from Peoria would be collected and carried to the expanded Tolleson plant via a new interceptor along 99th Avenue, or via the 99th Avenue Interceptor proposed for the 91st Avenue plant, with a diversion to the Tolleson plant. MAG has not reached a final decision on whether to have one or two lines.

A new facility at Reems Road would treat flows of 5.4 mgd by the year 2000. Flows would be transported to the facility from Avondale, Goodyear, and Litchfield Park via a major new interceptor from Thomas and El Mirage Roads to the plant.

The existing Chandler plant would be expanded to handle year 2000 flows of 8.2 mgd from Chandler. Major new interceptors along Pecos and Ray Roads would be constructed to carry flows to the plant. If negotiations for the continued use of the plant site on Gila River Indian Community lands cannot be concluded successfully, the Chandler plant would be relocated off Indian lands and an entirely new plant would be constructed.

Two plants would be staged for construction in the Gilbert area. The Gilbert north plant would handle flows of 2.7 mgd by the year 2000. The Gilbert south plant would accommodate flows of 0.9 mgd by the year 2000. An interceptor system would be required to transport flows from Gilbert to the plants.

The new development of Sun City West will have its own privately owned and operated treatment plant. Its year 2000 capacity is expected to be 2.6 mgd, and the effluent will be reused for golf course irrigation.

The Fountain Hills Sanitary District will expand the existing plant to a capacity of 2.0 mgd by the year 2000.

Williams Air Force Base will provide local treatment and reuse of 1.0 mgd of wastewater.

Carefree and Cave Creek will engage in planning for a single treatment plant or multiple plants to serve the needs of the two communities. Facilities to handle flows of 0.8 mgd will be required by the year 2000.

The existing Buckeye treatment plant will be upgraded immediately and expanded in 1995 to handle flows of 0.7 mgd through the year 2000.

The private development at Sun Lakes will expand its existing treatment plant to handle flows of 0.7 mgd by the year 2000.

Treatment Process and Effluent Reuse

Preferred secondary treatment processes in the point source metro plan include: (1) mechanical aeration followed by stabilization lagoons and disinfection ("lagoon systems"), or (2) expansion of an existing activated sludge or trickling filter system. The processes selected were for the purpose of preparing cost comparisons in order to make decisions on the regional system. Subsequent 201 studies will have to complete detailed analysis of alternative processes in order to make final determinations for construction. Preferred processes for facilities are listed in Table 2-6, along with preferred reuses and required levels of treatment.

Treatment processes and levels were developed in accordance with EPA requirements and State standards. Plants larger than 2.0 mgd discharging to rivers or tributaries of rivers (including irrigation canals and dry washes) must meet EPA requirements for BOD and suspended solids of 30 mg/l or less (30-day average). Plants smaller than 2.0 mgd discharging to rivers or tributaries must meet requirements of 30 mg/l or less for BOD and 90 mg/l or less for suspended solids (30-day average). In the proposed plan, only the Buckeye plant is smaller than 2.0 mgd and discharges to a river or tributary (the Arlington Canal).

TABLE 2-6

PREFERRED[a] TREATMENT PROCESSES AND EFFLUENT REUSES FOR POINT SOURCE METRO FACILITIES

Facility	Year 2000 Size (mgd)	Preferred Treatment Process	Preferred Effluent Disposal or Reuse	Level of Treatment Required[b]
91st Avenue	137.0	Upgrade/expansion of existing activated sludge system & disinfection	-Restricted agriculture (Buckeye Irrig. District) -Make-up water for Palo Verde Nuclear Generating Station (PVNGS)	Secondary (30/30)
			-Discharge to Salt River (maintenance of wildlife management area)	Secondary (30/30) + disinfection
23rd Avenue	37.2	Upgrade existing activated sludge system & disinfection	-Restricted agriculture (McDonald Farms)	Secondary (30/30)
			-Unrestricted agriculture (Roosevelt Irrigation District)	Advanced waste treatment (10/10)
			-Make-up water for PVNGS	Secondary (30/30)
			-Discharge to Salt River	Secondary (30/30) + disinfection
Chandler	8.2	Upgrade/expansion of existing lagoon system & disinfection	-Partially restricted agriculture (near-site reuse)	Secondary (30/135) + disinfection

TABLE 2-6 (Cont.)

Facility	Year 2000 Size (mgd)	Preferred Treatment Process	Preferred Effluent Disposal or Reuse	Level of Treatment Required[b]
Tolleson	7.2	Expansion of existing trickling filter system	-Sod farm irrigation -Discharge to Salt River	Secondary (30/30) Secondary (30/30) + disinfection
Reems Road	5.4	Lagoon system with disinfection	-Partially restricted agriculture (near-site reuse)	Secondary (30/135) + disinfection
[Gilbert [(north)	2.7	Lagoon system with disinfection	-Partially restricted agriculture (near-site reuse)	Secondary (30/135) + disinfection
[Gilbert [(south)	0.9	Lagoon system with disinfection	-Partially restricted agriculture (near-site reuse)	Secondary (30/135) + disinfection
Sun City West	2.6	Secondary (under construction)	-Golf course irrigation	Secondary (30/30) + disinfection
Fountain Hills	2.0	Upgrade/expansion of existing activated sludge system	-Turf and golf course irrigation	Secondary (30/30) + disinfection

TABLE 2-6 (Cont.)

Facility	Year 2000 Size (mgd)	Preferred Treatment Process	Preferred Effluent Disposal or Reuse	Level of Treatment Required[b]
Williams AFB	1.0	Existing trickling filter	-Expand existing golf course irrigation	Secondary (30/30) + disinfection
Carefree/ Cave Creek	0.8	To be determined in detailed planning		
Buckeye	0.7	Upgrade/expansion of existing lagoon system	-Discharge to Arlington Canal	Secondary (30/90) + disinfection
Sun Lakes	0.7	Existing secondary	-Golf course irrigation	Secondary (30/30) + disinfection

[a]Preferred treatment processes and reuses developed in 208 planning are subject to change in detailed facility planning.

[b]Numerical criteria in parentheses indicate maximum permitted levels of BOD and suspended solids in mg/l.

If effluent is not discharged to a river or tributary, but is instead reused, then Arizona Department of Health Services (ADHS) regulations for reclaimed wastes apply. These regulations are presented in Appendix B.

Three categories of reuse are provided for in the regulations: restricted, partially restricted, and unrestricted. Most reuses in the selected plan are restricted or partially restricted agricultural irrigation. Secondary treatment is required for restricted uses and secondary treatment plus disinfection for partially restricted uses. Unrestricted uses require advanced wastewater treatment.

ADHS secondary treatment levels for conventional treatment plants are 30 mg/l for BOD and suspended solids. For lagoon systems, requirements are 30 mg/l for BOD and 135 mg/l for suspended solids. Lagoon systems are prohibited from discharging to a receiving stream because the discharge would not meet EPA requirements. If near-site or on-site reuses for effluent from lagoon systems cannot be developed in detailed facility planning, the treatment process would be altered so that discharge or other reuse requirements could be met.

Costs

The total cost of upgrading and expanding existing facilities and constructing new facilities in the metro area is estimated to be approximately $160 million. Costs of the individual treatment plant and interceptor projects are shown in Table 2-7, along with the staging of the projects. Participating communities will prepare 201 facility plans in order to apply for 75 percent funding from EPA. These funds will be made available on the basis of the State's priority system. Costs of the facilities by participating community are presented in Table 2-8. Project costs and annual operation and maintenance costs are included in this table.

These cost estimates were developed on the basis of cost criteria prepared for the final four areawide alternatives. Criteria are described briefly in the Point Source Final Plan (MAG 208 Program, 1979b) and in detail in the Small Array of Wastewater Land Treatment Alternatives, East and West Side Design and Cost Appendix, prepared by Boyle Engineering Corporation for the U.S. Army Corps of Engineers (1979) and the Conventional Treatment Design and Cost Appendix, prepared by Morris, Clester, and Abegglen and STRAAM Engineering for the U.S. Army Corps of Engineers (1979).

TABLE 2-7

COSTS AND STAGING OF TREATMENT PLANT AND INTERCEPTOR PROJECTS

Project	Estimated Cost (millions of $) (Jan. 1978)	Comple-tion Date	Participating Communities
Multi-City System			
Treatment Plants			
91st Ave. treatment plant expansion and upgrading:			
1st stage	32.58	1982	Phoenix
2nd stage	18.80	1990-95	Tempe
			Mesa
			Gilbert
			Guadalupe
			Scottsdale
			Paradise Valley
			Surprise
			El Mirage
			Sun City
			Glendale
			Luke AFB
23rd Ave. treatment plant upgrading	6.00	1983	Phoenix
			Paradise Valley
Collection System			
Southern Ave. interceptor	28.68	1983	Phoenix
			Tempe
			Mesa
			Paradise Valley
			Gilbert
			Guadalupe

TABLE 2-7 (Cont.)

Project	Estimated Cost (millions of $) (Jan. 1978)	Completion Date	Participating Communities
Salt River Outfall parallel interceptor (23rd Ave. to 59th Ave.)	5.83	1985-90	Phoenix Tempe Mesa Scottsdale
East Mesa interceptors ...	2.69	1985	Mesa
Mesa STP bypass interceptor	0.99	1983	Mesa
North Scottsdale interceptors	2.37	1983	Scottsdale
South Tempe interceptors and pumping system	1.95	1984	Tempe
Guadalupe interceptor	0.16	1984	Guadalupe
South Ahwatukee pumping system	0.42	1985-90	Phoenix
Greenway Rd. to Olive Ave. interceptor	1.63	1985	El Mirage Surprise
Olive Ave. pumping system	0.22	1985	El Mirage Surprise
Youngtown interceptor	0.13	1985	Youngtown
Luke AFB pumping system ..	0.51	1983	Luke AFB
Indian School Rd. pumping system	0.27	1985-90	Phoenix

TABLE 2-7 (Cont.)

Project	Estimated Cost (millions of $) (Jan. 1978)	Completion Date	Participating Communities
Indian School Rd. pumping system	0.27	1985-90	Phoenix
99th Ave. interceptor from 111th Ave. to Indian School Rd.	3.44	1983	El Mirage Glendale Luke AFB Sun City Surprise Youngtown
99th Ave. interceptor from Indian School Rd. to 91st Ave. WWTP	8.10	1983	El Mirage Glendale Luke AFB Phoenix Sun City Surprise Youngtown
Multi-System Subtotal	114.77		
AVONDALE/GOODYEAR SYSTEM			
Reems Road plant	7.75	1983	Goodyear Avondale
Interceptor	4.17	1983	Litchfield Park
Subtotal	11.92		
BUCKEYE SYSTEM			
Plant upgrade	0.83	1983	Buckeye
Expansion	0.04	1990-95	
Subtotal	0.87		

TABLE 2-7 (Cont.)

Project	Estimated Cost (millions of $) (Jan. 1978)	Completion Date	Participating Communities
CAVE CREEK/CAREFREE SYSTEM			
Plant	0.81	1980-85	Cave Creek
Interceptor	1.00	1980-85	Carefree
Subtotal	1.81		
CHANDLER SYSTEM			
Plant expansion:			
1st stage	1.42	1982	Chandler
2nd stage	1.46	1990-95	
Interceptors:			Chandler
Ray Rd. int.	7.45	1982	
Ray Rd. int.		1982	
Williams Field Rd. int.		1982	
Gila River int.		1982	
Price int.	0.09	1990-95	
Subtotal	10.42		
FOUNTAIN HILLS SYSTEM			
Plant expansion	3.15	1984	Fountain Hills
GILBERT SYSTEM			
North plant:			
1st stage	1.91	1981	Gilbert
2nd stage	1.11	1990-95	
Interceptors:			
Elliot Rd. int.	2.75	1983	
McQueen Rd. Int.		1983	
Gilbert Rd. int.		1983	
Elliot Rd. int.	0.27	1985	
South Plant:			
Plant	1.43	1990-95	Gilbert

TABLE 2-7 (Cont.)

Project	Estimated Cost (millions of $) (Jan. 1978)	Comple-tion Date	Participating Communities
Interceptors:		1990-95	
Williams Field Rd. int. ....]			
Pecos Rd. int. .... >	2.38		
Germann Rd. int. .....]			
Subtotal	9.85		
SUN CITY WEST SYSTEM	—	1979	Sun City West
SUN LAKES SYSTEM	1.80	1985	Sun Lakes
TOLLESON/PEORIA SYSTEM			
Plant expansion	1.30	1981	Tolleson
Interceptors	5.53	1981	Peoria
Subtotal	6.83		
WILLIAMS AIR FORCE BASE ..	0.16	1979	Williams AFB
Total (all systems)	$161.58		

TABLE 2-8

FACILITY COSTS BY PARTICIPATING COMMUNITY
(Millions of Dollars--January 1978)

Facility/Participating Community	Project Cost[a]	Annual O&M[b]
91ST AVENUE		
El Mirage	2.234	0.024
Gilbert	1.004	0.015
Glendale	10.539	0.162
Guadalupe	1.376	0.025
Luke Air Force Base	2.931	0.059
Mesa	29.273	0.393
Paradise Valley	1.568	0.031
Phoenix	19.591	0.423
Scottsdale	5.332	0.025
Sun City	6.179	0.113
Surprise	2.504	0.026
Tempe	25.943	0.348
Youngtown	0.286	0.001
Subtotal	108.760	1.645
23RD AVENUE		
Phoenix	6.000	NA[c]
Paradise Valley	0.000	NA
Subtotal	6.000	
REEMS ROAD		
Avondale	6.064	0.113
Goodyear	2.345	0.052
Litchfield Park	3.508	0.055
Subtotal	11.917	0.220
BUCKEYE		
Buckeye	0.870	0.003

TABLE 2-8 (Cont.)

Facility/Participating Community	Project Cost[a]	Annual O&M[b]
CAREFREE/CAVE CREEK		
Carefree/Cave Creek	1.810	0.050
CHANDLER		
Chandler	10.425	0.455
FOUNTAIN HILLS		
Fountain Hills	3.150	0.200
GILBERT		
North plant	6.044	0.203
South plant	3.805	0.058
Subtotal	9.849	0.261
TOLLESON		
Peoria	6.834	0.222
Tolleson	0.000	0.070
Subtotal	6.834	0.292
SUN LAKES		
Sun Lakes	1.800	NA
WILLIAMS AIR FORCE BASE		
Williams Air Force Base	0.160	NA
TOTAL	161.575	3.126

[a]Project cost includes interceptor, treatment facility, and reuse costs.

[b]Annual operation and maintenance cost calculated for proposed projects and not for existing equipment.

[c]Not available.

2.2.2 MANAGEMENT SYSTEM

Section 208 of the Clean Water Act requires that there be "adequate authority to carry out appropriate portions of an areawide waste treatment management plan" [§208(c)(2)(A)] and "adequate authority to manage effectively waste treatment works and related facilities serving such area in conformance with the plan" [§208(c)(2)(D)]. To fulfill these requirements, a management system was developed for the point source plan.

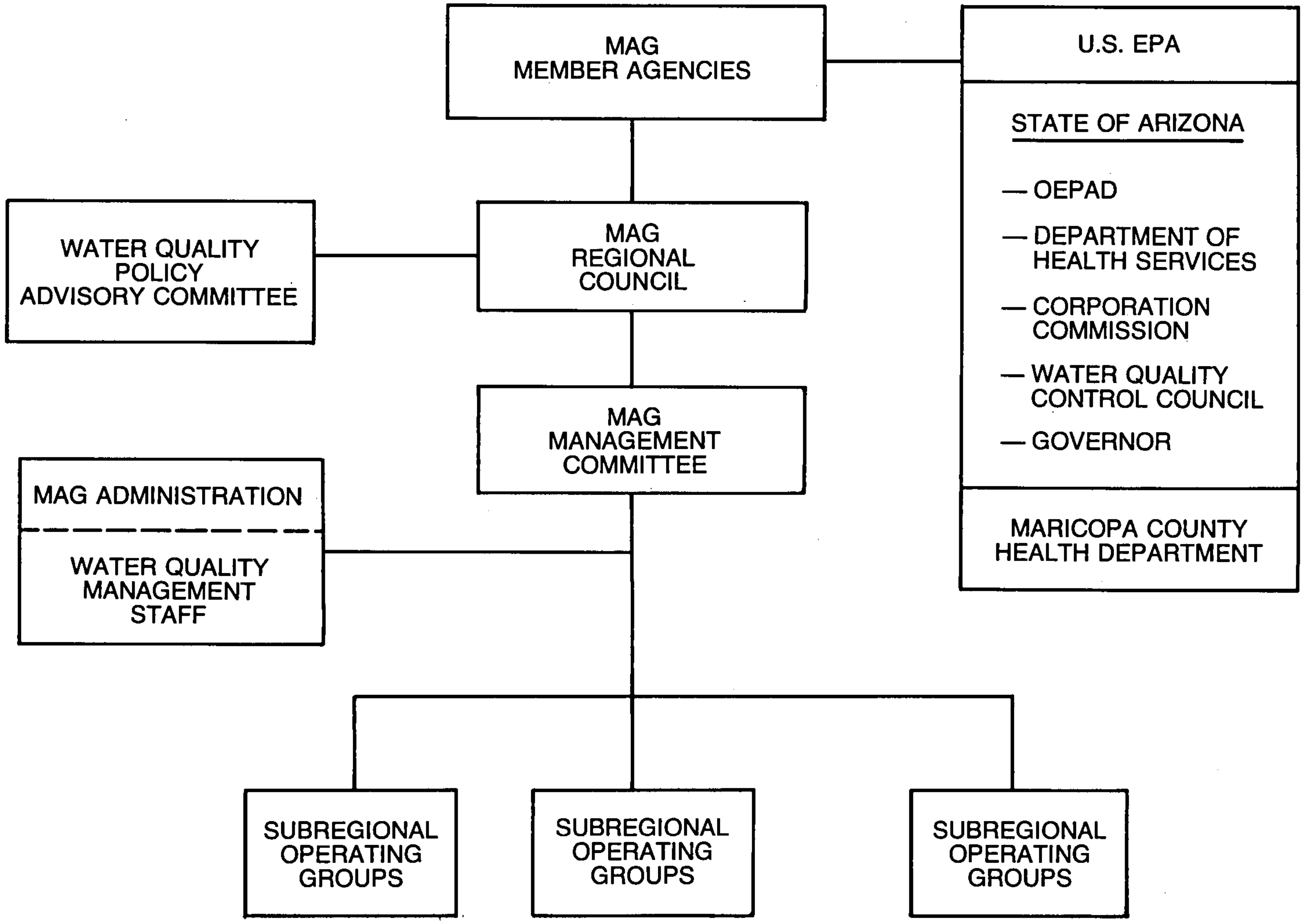
The management system calls for MAG, with the assistance of a Water Quality Policy Advisory Committee and the existing MAG Management Committee, to be responsible for ongoing areawide waste treatment management planning, 208 plan implementation, and coordination of municipalities and private agencies in meeting the requirements of the Clean Water Act. MAG's chief responsibility is to carry out the existing plan and to continue developing further solutions to problems that have been identified.

Subregional operating groups (SROG's), composed of local governments and private agencies, were created by MAG to have coordination, planning, grants management, and operational responsibilities for designated areas. The day-to-day operation of the system will be accomplished by lead agencies from each SROG. Three multiple-member and five single-member SROG's have been designated by MAG for Maricopa County.

An organizational chart for the selected management system is provided on Figure 2-4. The responsibilities of MAG, the SROG's, lead agencies, and other agencies are briefly described in the following subsections. More information on the management system may be found in the Final Point Source Management Plan (MAG 208 Program, 1979c).

MAG Regional Council

Under the selected management system, MAG assumes a major new role in the planning and implementation of areawide waste treatment. MAG's major responsibility will be to adopt and assure implementation of the areawide water quality management plan and to further develop solutions to water quality problems through continued planning. MAG is also responsible for arbitration of disagreements among local governments and private agencies for noncompliance with the plan.



SELECTED POINT SOURCE MANAGEMENT SYSTEM
Figure 2-4

MAG Water Quality Policy Advisory Committee

This new committee of MAG will provide assistance to the Regional Council. EPA expects the Committee to provide recommendations for further plan development and to assist the Regional Council in overseeing plan implementation.

The committee includes representatives of the SROG's, local governments, private agencies, other water and waste treatment interests in the planning area, and selected members of the MAG 208 Technical, Agricultural, and Citizen Advisory Groups. The committee is intended to continue the spirit of public participation in waste treatment planning that was developed in the 208 advisory groups. EPA expects the SROG's to carry out public participation programs in the same spirit.

MAG Management Committee

The MAG Management Committee will provide the first level of coordination of programs, plans, and activities of local governments. The Management Committee is responsible for coordinating the waste treatment plan with other regional plans and with appropriate State and Federal agencies. The committee is also responsible for monitoring compliance of local governments and private agencies with the plan. The financial aspects of the plan, including user fees and industrial cost recovery charges, are coordinated by the committee as well.

MAG Water Quality Management Staff

The Water Quality Management Staff will continue the work of the present MAG 208 Program staff. The major duty of the staff will be to provide assistance, as required, to the Management Committee, the Wastewater Management Policy Advisory Committee, and the Regional Council.

Subregional Operating Groups

The subregional operating group (SROG) concept expands the existing Multi-City Sewer Agreement concept by creating a series of new intergovernmental cooperative agreements. Three multiple-member SROG's have been designated by MAG:

- Multi-City SROG (Phoenix, Mesa, Tempe, Scottsdale, Glendale, Youngtown, Gilbert)
- Avondale-Goodyear SROG
- Tolleson-Peoria SROG

Five single-member SROG's have been designated:

- Buckeye
- Gila Bend
- Gilbert
- Chandler
- Wickenburg

Multiple-member SROG's are established by the adoption of a resolution by participating communities and the execution of intergovernmental agreements among the communities. A SROG Board, composed of officials appointed by the governing body of member agencies, will have responsibilities for coordinating arrangements for financing wastewater treatment, operating and maintaining treatment plants and collection facilities, and monitoring and enforcing State and Federal standards and guidelines.

SROG members are responsible for supplying the SROG Board with information concerning facility needs, population projections, major developments, capacity of the existing system, and the relationship of new proposals to the water quality plan. Within each multiple-member SROG, a lead agency will fulfill staff duties and responsibilities. In single-member SROG's, the governing body of the city or town will serve as the SROG Board and lead agency.

Lead Agencies

In most cases, the lead agency will be responsible for operation and maintenance of jointly owned wastewater collection and treatment facilities of multiple-member SROG's. The lead agency will also serve as a key contact with the EPA, Arizona Department of Health Services, and Maricopa County Health Department for implementation of various Federal and State water quality standards and NPDES permits. The lead agency in most situations will be the NPDES permit holder and 201 grantee and will be responsible for operating and maintaining wastewater collection and treatment facilities in conformance with Federal and State water quality standards and NPDES permit requirements.

2.2.3 INDIVIDUAL FACILITY DESCRIPTION

91st and 23rd Avenue Plants

These two plants treat most of the watewater in the Phoenix area, are located close together, and share in a major effluent reuse agreement. For these reasons, the two plants are described together.

Project Action

The 23rd Avenue plant is projected to treat flows of 37.2 mgd for a population of 372,550 by the year 2000. Portions of Paradise Valley and Phoenix will be served by the plant. To handle these flows, the plant will be upgraded in the near future and disinfection facilties added.

The 91st Avenue plant will treat flows of 137.0 mgd for a population of 1,466,236 by the year 2000. Communities served by the plant include all or portions of Scottsdale, Paradise Valley, Phoenix, Tempe, Mesa, Gilbert, Guadalupe, El Mirage, Glendale, Luke AFB, Sun City, Surprise, and Youngtown.

Plans call for an addition to the 91st Avenue plant, which currently uses an existing activated sludge secondary treatment process, to accommodate projected flows and provide disinfection of effluent. The plant's existing rated capacity of 84 mgd will be increased to 90 mgd in the near future through modifications planned prior to the 208 study. Under the proposed plan, expansion beyond 90 mgd capacity would be staged in two phases: a 30 mgd expansion in 1981 and a 17 mgd expansion in 1990 or sooner, depending upon population growth and needs.

Problems and Options

Detailed planning has begun on the upgrading and expansion of the 23rd Avenue and 91st Avenue plants. The facility plan for the 91st Avenue plant will identify, develop, evaluate, and select the following: a system to disinfect effluent being discharged to the Salt River, minor modifications to improve plant performance, and a treatment process for the initial 30-mgd expansion to the plant. The facility plan for the 23rd Avenue plant will identify, develop, evaluate, and select a system to disinfect effluent and a method to upgrade the plant to 37.2 mgd. The expansion of the 23rd Avenue plant beyond a capacity of 37.2 mgd will also be examined in detailed planning. Any expansion of the facility beyond 37.2 mgd would be accompanied by a commensurate reduction in the capacity of the 91st Avenue plant.

Environmental assessments will be required in facility plans for both the 91st Avenue and 23rd Avenue plants. Both plants have been contributing to odor and insect problems in the vicinity of the plants, as well as creating potential health hazards at river crossings immediately downstream of the plants. Mitigation of odor and insect problems can be achieved through improved maintenance of existing facilities, through upgrading and replacing existing facilities, and through construction of new facilities. Additional mitigation of odor and insect problems can be achieved through design and construction of improved sludge handling facilities and better operating procedures. Reduction of potential health hazards can be accomplished through disinfection of effluent and through provision of adequate buffers, fencing, and warning signs. Mitigation of adverse impacts will be required before EPA approves specific plans.

Sludge from the 23rd Avenue and 91st Avenue treatment plants is being stockpiled at the plant sites under a contract for its sale to Kellogg of Arizona. The 208 sludge management study resulted in a recommendation to dispose of sludge by sanitary landfill after mechanical dewatering (Ferguson, Morris, & Simpson, 1978a). This recommendation was made on the basis of cost effectiveness and technical criteria. Serious questions were raised in the 208 nonpoint study concerning potential ground water pollution resulting from residual waste disposal in landfills (MAG 208 Program, 1979d). The 91st Avenue facility plan will address the problem of sludge disposal/reuse for both the 91st Avenue plant and the 23rd Avenue plant. In addition, special problems of effluent disposal/reuse will be identified and solved in the residuals study. Some of these problems with effluent are discussed in the next subsection. MAG will also be responsible for developing a residual solids plan for the region in cooperation with the affected SROG's.

Effluent Reuse

Effluent from the 23rd Avenue plant is currently discharged to a canal which empties into the Salt River. An undetermined amount of effluent is taken up from the canal for use by McDonald Farms, a private farming operation. The Roosevelt Irrigation District has an option for 20,000 af/yr of 23rd Avenue plant effluent, provided that: (1) it meets standards for unrestricted agriculture, (2) it can be economically transported to the district's existing canal system, and (3) it is not required as cooling water by the Arizona Nuclear Power Project (ANPP).

Effluent from the 91st Avenue plant is committed to ANPP for use as cooling water (up to 140,000 af/yr), to the Buckeye Irrigation Company for restricted agricultural irrigation (30,000 af/yr), and to the Arizona Game and Fish Department for maintenance of a wildlife management area in the Salt River bed near 115th Avenue (7,300 af/yr). Although these reuse commitments were made prior to MAG 208 planning, the commitments are now part of the proposed action of the plan.

The contract for sale of effluent for use at the Palo Verde Nuclear Generating Station was negotiated in 1973 between the cities in the Multi-City Sewer Agreement and the Arizona Public Service Company (APS) and the Salt River Project (SRP). APS is the project manager for the station, which is being constructed by a consortium of utilities.

The amount of effluent optioned in the contract is 140,000 af/yr. Treatment level is specified as secondary treatment (BOD and suspended solids equal to or less than 30 mg/l). If the amount of effluent at the 91st Avenue plant is insufficient to meet the requirements of the commitment, then the contract calls for use of effluent from the 23rd Avenue plant. Commitments of 30,000 af/yr to the Buckeye Irrigation Company and 7,300 af/yr to the Arizona Game and Fish Department are recognized in the contract as prior to the commitment to ANPP.

The actual amount of effluent that is projected to be required by the generating station annually is less than the 140,000 af/yr optioned. Each unit at Palo Verde is estimated to require 21,400 af/yr of effluent (Arizona Public Service, 1978).[1] Three units have been approved by the U.S. Nuclear Regulatory Commission, and an additional two units are pending approval. All five units would require an annual allotment of 107,000 af/yr of effluent, although monthly allotments would vary considerably from this estimate. According to the <u>Final Environmental Statement Relating to Construction of Palo Verde Nuclear Generating Station Units 1, 2, and 3</u> (U.S. Nuclear Regulatory Commission, 1975), 99 percent of the station's water needs will be supplied by the treated effluent, which will be further treated on-site to levels required for operation of the station. The water will be used primarily for cooling condensers.

Effluent will be transported via a pipeline directly from the 91st Avenue plant and/or 23rd Avenue plant to the Palo Verde site and the Buckeye Irrigation District, which will divert flows from the pipeline for use in the district. The transport of effluent to Palo Verde and the District will eliminate the discharge of a

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[1]This estimate of water use per unit at Palo Verde was furnished to the MAG 208 Program on August 10, 1978, by E.E. Van Brunt, APS Vice President and ANPP Project Director. More recent estimates in the Palo Verde Units 4 and 5 Draft Environmental Statement (U.S. Nuclear Regulatory Commission, 1979) vary from 21,300 to 23,500 af/yr per unit.

large amount of effluent currently discharged to the Salt River. Assuming all five units are in operation at Palo Verde, approximately 70 percent of the year 2000 flows from the 91st and 23rd Avenue plants would be transported via the pipeline (137,000 of 194,880 af/yr) on an annual basis.

A more detailed analysis of availability of flows from the 91st and 23rd Avenue treatment plants to meet peak requirements for cooling water at Palo Verde is included in Appendix C. This analysis concludes that maximum flows available under the existing contract with ANPP are not sufficient to meet the peak monthly needs of all five units under the high estimate of needs (2,600 af/mo). With the exception of the Arizona Game and Fish Department's flow of 7,300 af/yr, flow in the Salt River would be eliminated during the peak months starting in 1988 under the high peak month estimate and in 1990 under the low peak month estimate (2,200 af/mo). High and low peak need estimates were supplied by APS (1978) for this analysis.

Some design problems that will need to be addressed in the facility plans for the 91st and 23rd Avenue plants concern the varying amounts of effluent that will be discharged to the Salt River from the plants and the differences in treatment level required for effluent to be delivered through the pipeline or discharged to the river. Effluent discharged to the river will require secondary treatment plus disinfection, while the effluent delivered to Palo Verde and the Buckeye Irrigation District requires only secondary treatment. The amount of effluent discharged to the river at any given time will be contingent upon the water needs and operational requirements of the Palo Verde Nuclear Generating Station, as well as the requirements of the Buckeye Irrigation District and the Arizona Game and Fish Department. EPA may condition grants for expansion of the 23rd Avenue and 91st Avenue treatment plants on minimizing diversions and protecting habitat in the Salt and Gila Rivers.

91st Avenue Interceptors

New interceptors will be required to serve the 91st Avenue plant. Table 2-9 lists the proposed interceptors and shows the projected peak flows from contributing communities to the year 2000. The projected flows shown in this table do not include flows that can be transported in existing interceptors.

Two major systems of interceptors are represented in Table 2-9. The first is the 99th Avenue Interceptor system, and the second is the Southern Avenue Interceptor/Salt River Outfall system.

TABLE 2-9

PROPOSED 91ST AVENUE TREATMENT PLANT INTERCEPTORS PROJECTED PEAK FLOW (mgd)[a]

Interceptor	Contributing Community	1980	1985	1990	1995	2000
99th Avenue System						
Greenway Road to Olive	El Mirage	0.9	1.2	1.1	1.1	1.3
Avenue Interceptor	Surprise	0.9	0.9	1.1	1.1	1.3
Subtotal						2.6
Olive Avenue Pumping	El Mirage	0.9	1.2	1.1	1.1	1.3
System	Surprise	0.9	0.9	1.1	1.1	1.3
Subtotal						2.6
Youngtown Interceptor .	Youngtown	0.3	0.3	0.3	0.3	0.3
Luke AFB Pumping System	Luke AFB	3.3	3.3	3.3	3.3	3.1
99th Avenue Interceptor	El Mirage	0.9	1.1	1.1	1.1	1.3
from 111th Avenue and	Glendale	13.6	16.7	20.0	23.1	26.6
Olive Avenue to 99th	Luke AFB	3.3	3.3	3.3	3.3	3.1
Avenue and Indian	Sun City	6.2	7.0	7.0	7.0	7.0
School Road	Surprise	0.9	0.9	1.1	1.1	1.3
	Youngtown	0.3	0.3	0.3	0.3	0.3
Subtotal						39.6
Indian School Road Pumping System	Phoenix	0.2	0.4	0.5	0.7	2.1
99th Avenue Intercep-	El Mirage	0.9	1.1	1.1	1.1	1.3
tor from Indian School	Glendale	13.6	16.7	20.0	23.1	26.6
Road to the 91st Avenue	Luke AFB	3.3	3.3	3.3	3.3	3.1
WWTP	Phoenix	2.0	2.8	4.4	5.9	8.1
	Sun City	6.2	7.0	7.0	7.0	7.0
	Surprise	0.9	0.9	1.1	1.1	1.3
	Youngtown	0.3	0.3	0.3	0.3	0.3
Subtotal						47.8

TABLE 2-9 (Cont.)

Interceptor	Contributing Community	1980	1985	1990	1995	2000
Southern Avenue Interceptor/Salt River Out-Fall System						
Salt River Outfall Parallel Line - 23rd to 59th Avenues (peaking factor = 2.2)..........	Mesa (incl. East Mesa)	18.1	18.1	18.1	18.1	18.1
	Scottsdale	8.3	9.7	10.3	10.8	11.9
	Tempe	10.8	10.8	10.8	10.8	10.8
Subtotal						40.8
Southern Avenue Interceptor, 59th Avenue to 91st Avenue (peaking factor = 1.9)	Gilbert	0.2	0.2	0.4	0.6	0.8
	Guadalupe	1.0	1.0	1.1	1.1	1.3
	Mesa	16.7	20.1	23.0	26.2	29.6
	Paradise Valley	1.3	1.3	1.3	1.3	1.7
	Scottsdale	7.2	8.4	8.9	9.3	10.3
	Tempe	18.2	24.3	27.4	30.6	34.2
Subtotal						77.9
SAI, 56th Street to 59th Avenue (peaking factor = 2.2)	Gilbert	0.2	0.2	0.5	0.7	0.9
	Guadalupe	1.2	1.2	1.3	1.3	1.5
	Mesa	1.3	5.2	8.6	12.3	16.2
	Paradise Valley	1.5	1.5	1.5	1.5	2.0
	Phoenix	9.7	11.5	13.9	16.3	20.5
	Tempe	10.3	17.4	21.0	24.7	28.8
Subtotal						69.9
SAI, Tempe Canal to 56th Street (peaking factor = 2.2)	Gilbert	0.2	0.2	0.5	0.7	0.9
	Mesa	3.5	7.4	10.7	14.0	18.0
	Tempe	2.3	6.7	9.8	12.9	16.4
Subtotal						35.3
SAI, Cooper Road to Tempe Canal (peaking factor = 2.2)	Gilbert	0.2	0.2	0.5	0.7	0.9
	Mesa	0.0	3.7	7.0	10.3	14.3
Subtotal						15.2

TABLE 2-9 (Cont.)

Interceptor	Contributing Community	1980	1985	1990	1995	2000
East Mesa Interceptors (Baseline Road and Bush Highway)	Mesa	4.8	5.3	5.9	6.6	7.3
Mesa Bypass Interceptors (Mesa WWTP to Salt River Outfall) ...	Mesa	4.4	4.6	4.8	4.8	5.1
Northeast Interceptors (Pima and Doubletree Ranch Road)	Scottsdale	0.5	1.2	2.1	2.6	3.3
South Tempe System (Along Canal Drive at Baseline and Canal Drive)	Tempe	6.6	9.5	11.9	14.7	18.0
(Western Canal and 56th Street)	Tempe	3.6	4.0	4.2	4.2	4.4
Guadalupe Interceptors (Baseline and 56th Street)	Guadalupe	1.2	1.2	1.4	1.4	1.6
South Ahwatukee System	Phoenix	0.1	0.2	0.3	1.0	1.5

[a]This table shows flows in interceptors proposed in the 208 plan. Distribution of flows between interceptors may change in detailed planning; however, total flows will not change.

99th Avenue Interceptor System

A new interceptor is proposed for construction along 99th Avenue (see Figure 2-3) to carry flows from Surprise, El Mirage, Youngtown, Glendale, Luke AFB, Sun City East, and portions of Phoenix to the 91st Avenue plant. These areas are presently not sewered to the plant.

Subsystems connecting to the interceptor include:

- El Mirage/Surprise interceptor, pump station, and force main
- Indian School/107th Avenue pump station and force main
- Luke AFB pump station and force main
- Youngtown interceptor

Southern Avenue Interceptor/Salt River Outfall System

The Southern Avenue Interceptor (SAI) would carry flows from Mesa, Gilbert, Guadalupe, Paradise Valley, Scottsdale, Tempe, and Phoenix to the 91st Avenue plant. The location of the SAI is shown on Figure 2-3. Subsystems and related interceptors include:

- Guadalupe interceptor--to carry flows from Guadalupe to the SAI
- East Mesa interceptor--to carry flows from Mesa to the SAI
- Mesa bypass--to carry flows from the decommissioned Mesa plant to the Salt River Outfall (SRO)
- Salt River Outfall Parallel Interceptor--to alleviate capacity deficiencies in the existing SRO from 23rd Avenue to 59th Avenue for Scottsdale, Tempe, and Mesa
- Northeast interceptor--to carry flows from Scottsdale and portions of Paradise Valley to the SAI and SRO
- South Tempe pumping system
- South Ahwatukee pumping system

MAG has proposed sizing the SAI to accommodate eastside flows based on not fully utilizing the existing SRO. The SRO was constructed by Tempe, Mesa, Scottsdale, and Phoenix in the 1960's and was planned to serve the needs of the communities as far into the future as was foreseeable at the time. In particular, the City of Phoenix designed the SRO's capacity to serve the projected ultimate needs of Phoenix north of the Salt River beyond the year 2000.

The SRO Parallel Interceptor is proposed to carry flows from Tempe, Mesa, and Scottsdale to the SAI at 59th Avenue, and the SAI has been sized to accommodate these and other flows (Table 2-9). Under this proposal, the eastside communities would purchase the needed capacity in the SAI and the SRO Parallel Line from 23rd Avenue to 91st Avenue.

EPA cannot at this time approve MAG's proposal for sizing the SAI. The population which could be served by it would exceed the projected population data base used in the Nonattainment Area Plan (Arizona Department of Health Services, 1978) for projecting pollutant emissions and air quality impacts. The proposal would also exceed EPA's criteria for funding treatment works under Section 201 of the Clean Water Act, and no cost-effectiveness justification has been provided. Finally, no assessment of environmental impacts has been made for the sizing of the SAI. Therefore, EPA will not approve MAG's proposal to build capacity beyond the year 2000 without further analysis.

Chandler System

Population and flows for the Chandler service area in 5-year increments from 1980 to the year 2000 are shown in Table 2-10. The population figures given in this table and in Tables 2-13, 2-14, 2-16, 2-19, 2-20, and 2-21 are for areas within the individual communities that are expected to be sewered in the 1980-2000 period. Centralized wastewater treatment was assumed to be needed wherever population densities are expected to exceed 1.5 persons per acre. Further studies by the communities will define areas to be sewered on the basis of land use and zoning, soil conditions, ground water conditions, environmental inputs, management requirements, and costs.

TABLE 2-10

CHANDLER POPULATION AND FLOWS

Year	Population	Flow (mgd)
1980	30,000	3.0
1985	42,500	4.0
1990	58,800	5.4
1995	75,200	6.8
2000	92,700	8.2

Project Action

The proposed project action for this facility would consist of expanding the existing lagoon treatment system, constructing new interceptors, and reusing effluent for near-site partially restricted or restricted agricultural irrigation.

The existing facility is located on Gila River Indian Community lands, and negotiations are taking place between the City of Chandler and the Tribal Council for the continued use of the site. The Tribal Council is opposed to the proposed expansion of the facility, and unless satisfactory agreements can be reached the Chandler facility will be relocated off Indian lands. At the time of preparation of this EIS, negotiations between the Tribe and the City of Chandler had not been concluded.

The Chandler irrigation reuse site would be located just southwest of the existing wastewater lagoons on lands currently being irrigated with ground water pumped from wells on the reservation. Sufficient effluent for irrigation of from 725 to 2,065 acres in the year 2000 would be provided by the facility. The variation in potential acreages supported by effluent is dependent upon the cropping patterns used. The cropping patterns used in planning reuse sites are shown in Table 2-11 below.

TABLE 2-11

CROPPING PATTERNS

Pattern 1	Pattern 2	Pattern 3
2 years: cotton	2 years: cotton	Bermuda: April-September
3 years: alfalfa	3 years: alfalfa	Rye: October-March
1 year: wheat and sorghum	3 years: wheat and sorghum	

Irrigation of the following areas (including storage areas) would be provided by the Chandler facility:

TABLE 2-12

CHANDLER IRRIGATION LAND REQUIREMENTS

Cropping Pattern	First Stage	Year 2000
I	1,415 acres	2,065 acres
II	1,325 acres	1,940 acres
III	495 acres	725 acres

Problems and Options

As noted earlier, the Chandler facility may be relocated off Indian lands if satisfactory agreements cannot be reached with the Gila River Indian Community. If the required reuse agreements cannot be reached, the lagoon system as proposed would not be implementable because effluent produced would not meet applicable discharge requirements. If the proposed treatment/reuse scheme cannot be implemented, possible options include:

1. A higher (and more costly) level of treatment to meet discharge requirements.

2. A completely new site not on Indian lands with other reuse or discharge options.

Tolleson System

Population and flows for the Peoria and Tolleson service area in 5-year increments from 1980 to the year 2000 are as follows:

TABLE 2-13

TOLLESON SERVICE AREA POPULATION AND FLOWS

Community	1980	1985	1990	1995	2000
			Population		
Peoria	18,008	20,432	33,691	46,933	61,067
Tolleson	4,085	4,675	9,350	14,000	18,900
Total	22,093	25,107	43,041	60,933	79,967
			Flows (mgd)		
Peoria	1.8	2.0	3.1	4.2	5.4
Tolleson	0.5	0.5	0.9	1.4	1.8
Total	2.3	2.5	4.0	5.6	7.2

Project Action

The proposed project action for the Tolleson system includes expanding the existing trickling filter treatment facility, constructing new interceptors, and continuing to reuse effluent for an expanded sod-farming operation adjacent to the site.

Expansion of the plant would take place at the existing site. Land area required for the necessary additions would be negligible. Due to immediate community needs, construction of the additions to the Tolleson plant would be staged to occur in 1980-85.

Flows from Peoria would be transported to the Tolleson plant via an interceptor along 99th Avenue. Two alternatives will be studied in the Tolleson facility plan: use of capacity in the proposed 99th Avenue interceptor to the 91st Avenue plant with a diversion to the Tolleson plant or construction of a separate interceptor along 99th Avenue to carry only flows from Peoria to the Tolleson plant. MAG will make a decision in the near future on this issue, subject to EPA approval.

Problems and Options

If at some future date the existing sod farm ceases to require effluent from the Tolleson plant, the participating communities would need to develop an alternative method of disposal/reuse. The following options are available:

1. Establish the necessary agreements with local farmers to use all the effluent for irrigation.

2. Discharge up to 4.1 mgd to the Salt River (as allowed under the plant's NPDES permit) and establish the necessary agreements with local farmers to use the remainder.

3. Modify the NPDES permit to allow discharge of all of the effluent to the Salt River.

4. Contract for use of the effluent at the Palo Verde Nuclear Generating Station.

Reems Road System

Projected population and flows for Avondale, Goodyear, and Litchfield Park (the Reems Road plant service area) in 5-year increments from 1980 to the year 2000 are as follows:

TABLE 2-14

REEMS ROAD SERVICE AREA POPULATION AND FLOWS

Community	1980	1985	1990	1995	2000
	Population				
Avondale	7,090	9,486	16,673	23,910	31,512
Goodyear	3,284	4,191	8,179	12,077	16,207
Litchfield Park ...	2,847	3,298	6,927	10,636	14,056
Total	13,221	16,975	31,779	46,623	61,775
	Flows (mgd)				
Avondale	0.7	0.9	1.5	2.1	2.8
Goodyear	0.3	0.4	0.7	1.1	1.4
Litchfield Park ...	0.3	0.3	0.6	0.9	1.2
Total	1.3	1.6	2.8	4.1	5.4

Project Action

The proposed project action for this facility is the construction of a new wastewater treatment plant and required interceptors, with reuse of effluent for near-site partially restricted or restricted agricultural irrigation.

The proposed plant would be located approximately 1/2 mile west of Reems Road just north of the Buckeye Irrigation District Canal. The plant would be designed to treat an ultimate (year 2000) flow of 5.4 mgd. The preferred treatment process is a lagoon system.

To transport flows to the plant, an interceptor system would be required from Thomas and El Mirage Roads to the plant site. The system would include: (1) Thomas Road pumping system from 1/2 mile west of Dysart Road to El Mirage Road, (2) El Mirage interceptor from Thomas Road to Lower Buckeye Road, and (3) Lower Agua Fria interceptor from Lower Buckeye Road to the Reems Road plant.

If the lagoon system is used, effluent from the plant would be of suitable quality for near-site restricted or partially restricted agricultural irrigation. Disposal of the effluent to the Buckeye Irrigation Canal or the Gila River would not be permitted due to its inability to meet NPDES permit discharge requirements. The proposed irrigation site is located south of the Buckeye Canal and east of Sarival Avenue. The land required for irrigation of crops (including storage areas) is as follows:

TABLE 2-15

REEMS ROAD IRRIGATION LAND REQUIREMENTS

Cropping Pattern	Year 2000
I	1,360 acres
II	1,280 acres
III	480 acres

See Table 2-11 for a listing of crops included in cropping patterns.

Problems and Options

As discussed earlier, effluent from the proposed lagoon system would not meet EPA requirements for discharge to a receiving stream (the Gila River or Buckeye Irrigation Canal). Effluent also would not meet State standards for unrestricted agricultural operations. Therefore, the development and continued operation of this facility with a lagoon system is contingent upon the development of long-term agreements for near-site use of effluent for partially restricted or restricted agricultural operations. If these agreements cannot be reached, the following options are possible:

1. Develop a more advanced treatment system that would allow either direct discharge or unrestricted agricultural reuse.

2. Negotiate for reuse of effluent as cooling water at the Palo Verde Nuclear Generating Station. Although effluent from the lagoon system would not meet the quality standards called for in the ANPP agreement, it is possible

that after dilution with effluent from the 91st Avenue plant the combined effluent would be acceptable for this reuse.

Gilbert (North and South) Facilities

The Town of Gilbert is located in the southeastern portion of the metro area. The Gilbert wastewater treatment service area would be serviced by the 91st Avenue plant and by two new treatment plants in Gilbert. The northernmost population zone in the Gilbert planning area would be tributary to the 91st Avenue plant via the Southern Avenue Interceptor. Based on the topography of the area, the remaining portions of the Gilbert service area would be sewered to the two new facilities. One facility would be located in the northern part of the planning area near McQueen Road and the Western Canal. The second would be located in the southern part of the planning area near Germann and Gilbert Roads.

Population and flow projections for the north and south Gilbert facilities in 5-year increments from 1980 to the year 2000 are as follows:

TABLE 2-16

GILBERT POPULATION AND FLOWS

Plant	1980	1985	1990	1995	2000
		Population			
North area	8,010	11,450	18,960	25,455	30,170
South area	1,290	1,365	2,905	5,300	10,145
Total	9,300	12,815	21,865	30,755	40,315
		Flows (mgd)			
North area	0.8	1.1	1.7	2.3	2.7
South area	0.1	0.1	0.3	0.5	0.9
Total	0.9	1.2	2.0	2.8	3.6

Project Action

The proposed action for the Gilbert service area consists of construction of the north and south plants, construction of an interceptor system, and reuse of effluent for near-site partially restricted or restricted agricultural irrigation. The preferred treatment process for the plants is the lagoon system.

At the present time, the Town of Gilbert operates a stabilization lagoon system near the proposed north plant site. Effluent from this plant is presently being used by a local farmer for restricted agricultural irrigation. The farmer has decided, however, to discontinue his use of effluent in the near future. Thus, the Town is faced with an immediate need to develop an alternate treatment and disposal system. Construction of the proposed north plant would be staged to accomplish this as follows:

1. Immediate: Construct a facility with a capacity of 1.0 mgd to satisfy the Town's immediate need for treatment.

2. 1980: Construct an addition to yield a combined plant capacity of 1.8 mgd.

3. 1990: Construct another addition to provide plant capacity of 2.7 mgd.

The irrigation/disposal site for the north plant would be located between Cooper and McQueen Roads and Guadalupe and Elliot Roads. Total acreages, including storage requirements, for each of the three cropping options (see Table 2-11) are listed below.

TABLE 2-17

NORTH GILBERT IRRIGATION LAND REQUIREMENTS

Cropping Pattern	First Stage	Year 2000
I	455 acres	680 acres
II	430 acres	640 acres
III	160 acres	240 acres

The south plant would be built in 1990 and provide capacity of 0.9 mgd. The preferred treatment process of aerated lagoons would produce effluent that could be used for restricted or partially restricted agricultural irrigation. The use of effluent for irrigation on private lands near the proposed plant site has been proposed and will be evaluated in the facility plan.

The irrigation/disposal site for the south plant would be capable of handling 0.9 mgd of effluent and would be located southwest of the intersection of Germann and Gilbert Roads. The required land area, including storage, for each of the three cropping patterns (see Table 2-11) is as follows:

TABLE 2-18

SOUTH GILBERT IRRIGATION LAND REQUIREMENTS

Cropping Pattern	Year 2000
I	230 acres
II	215 acres
III	80 acres

Problems and Options

The preferred treatment process for both Gilbert plants was selected with the intention that effluent could be reused for restricted agriculture on private farmland in the vicinity of the treatment plant sites. Should the required reuse agreements not be obtainable, alternate treatment reuse or discharge schemes would have to be considered. Possible options include the following:

1. Collection and treatment at the 91st Avenue plant.

2. Development of a system to provide a higher level of treatment for discharge to the Western Canal or for unrestricted agricultural irrigation.

3. Development of other reuse options in the vicinity of the treatment plants.

If land purchase is necessary at the north and south irrigation sites to retain control of the proposed operation, the costs incurred may be prohibitively high. Local realtors indicate that land near the north site would cost between $8,000 and $10,000 per acre. Land near the south site, somewhat farther removed from development, would cost around $6,000 per acre.

Fountain Hills

Projected population and flows for the Fountain Hills Sanitary District service area to the year 2000 in 5-year increments are as follows:

TABLE 2-19

FOUNTAIN HILLS POPULATION AND FLOWS

Projected	1980	1985	1990	1995	2000
Population	5,000	7,005	10,000	15,000	22,500
Flow (mgd)	0.5	0.7	0.9	1.3	2.0

The existing 0.5 mgd modified activated sludge secondary treatment plant would be required to expand capacity by 1.5 mgd to meet year 2000 flows. Plant effluent would continue to be used for turf and golf course irrigation.

Williams Air Force Base

The existing trickling filter secondary treatment facility with a capacity of 1.0 mgd is adequate to meet the needs of Williams Air Force Base through the year 2000. However, recently revised EPA requirements for discharge of effluent to a Roosevelt Water District irrigation canal cannot be met by the facility. These requirements set limits of 10 mg/1 for BOD and suspended solids. The Air Force Base is presently considering expansion of the existing golf course, which is irrigated with effluent from the treatment plant. The expanded golf course, plus another nearby private agricultural operation, could utilize all effluent that is produced.

Carefree/Cave Creek

The Carefree/Cave Creek area is located in the extreme northeastern portion of the metro Phoenix area and is relatively remote from other communities. Both Carefree and Cave Creek are unincorporated.

The projected population and flows for the two communities are as follows:

TABLE 2-20

CAREFREE/CAVE CREEK POPULATION AND FLOWS

Community	1980	1985	1990	1995	2000
		Population			
Carefree	1,680	2,427	3,480	4,980	5,400
Cave Creek	1,120	1,618	2,320	3,320	3,600
Total	2,800	4,045	5,800	8,300	9,000
		Flows (mgd)			
Carefree	0.2	0.2	0.3	0.4	0.5
Cave Creek	0.1	0.2	0.2	0.3	0.3
Total	0.3	0.4	0.5	0.7	0.8

A preliminary study of regional and local alternatives for Carefree/Cave Creek determined that conveyance of flows to a regional treatment system in Phoenix would not be economically feasible. Two local alternatives were identified for the area:

1. Local treatment at a single facility serving both Carefree and Cave Creek.

2. Local treatment at multiple facilities. Two plants would serve Carefree and a single plant would serve Cave Creek.

Cost estimates of these two alternatives indicate that either option is implementable with little difference in cost. A detailed facility plan study will be required to provide a basis for final plan selection by the two communities.

If local collection, treatment, and reuse systems cannot be implemented for the area, the communities have the option of restricting any future high-density growth in the area. Under this option, the existing high-density development areas could be served by the existing package treatment plants, and all other areas would be served by individual systems. Lot sizes and zoning requirements would have to be predicated on soil suitability on a site-specific basis for this option to be viable.

Buckeye

The community of Buckeye is located in the extreme southwestern portion of the metro area and is relatively remote from other communities. Buckeye operates a small municipal wastewater treatment facility with a capacity of 0.6 mgd.

Projected population and flows for the Buckeye area to the year 2000 are as follows:

TABLE 2-21

BUCKEYE POPULATION AND FLOWS

Projected	1980	1985	1990	1995	2000
Population	3,000	3,800	5,100	6,500	8,000
Flow (mgd)	0.3	0.4	0.5	0.6	0.7

A preliminary study of regional and local alternatives for Buckeye determined that regional treatment of flows would be prohibitively expensive. Since the existing lagoon system has a capacity of 0.6 mgd and with upgrading could accommodate flows through 1995, the proposed project action for Buckeye consists of the following:

1. Immediate: Upgrade the existing system to include flood protection, disinfection, lining, fencing, and laboratory facilities.

2. 1995: Add a third lagoon to provide a total capacity adequate to accommodate the projected flows through the year 2000.

Some problems are associated with expanding the existing facility. The lagoons are located approximately 1/4 mile from existing developed areas and approximately 3/4 mile from the downtown Buckeye area. The lagoon system provides the potential for insects to proliferate and odors to occur. Proximity to encroaching urbanization could mean that the plant could become increasingly unacceptable to nearby residents.

Another problem concerns the location of the plant within the flood plain of the Gila River. Even though flood protection is proposed for the plant, the potential exists for a flood of greater magnitude than a 100-year flood damaging or destroying the plant.

If potential odor, insect, or flooding problems force abandonment of the plant, the Town of Buckeye would have to investigate alternative treatment plant locations and select a site to mitigate potential problems.

2.3 ALTERNATIVES

2.3.1. OVERVIEW OF PLANNING PROCESS

The planning process used to select the preferred alternative for areawide wastewater treatment and collection is shown on Figure 2-5. This chart indicates a gradual transition from 36 conceptual alternatives through the large (20) and small (7) array of regional alternatives. At this point, the metro area was divided into east and west subregions, and alternatives were developed for these areas. Ultimately, two alternatives from the east and west areas were selected for integration into four areawide alternatives. The final plan was then selected from these four.

Evaluations of alternatives developed prior to the integrated areawide alternatives may be found in the following short list of MAG 208 reports:

Large Array of Collection and Treatment Alternatives (Ferguson, Morris & Simpson, 1977b).

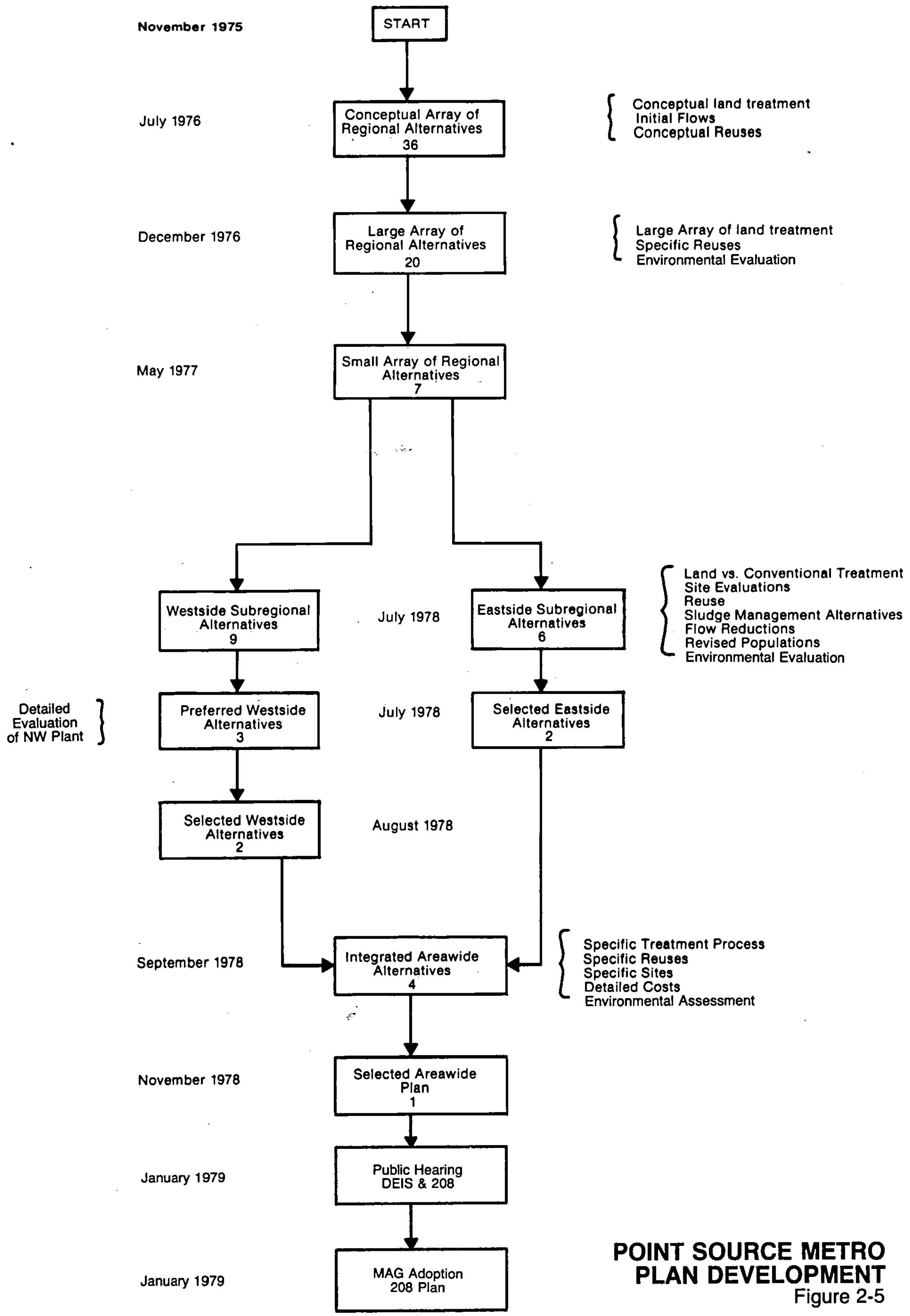
Wastewater Treatment Alternatives, Conventional Treatment Progress Report (Ferguson, Morris & Simpson, 1977c).

Eastside Subregional Alternatives (Ferguson, Morris & Simpson, 1978b)

Metropolitan Phoenix Facility Plan, Evaluation of Alternate Plans (Westside Planning Area) (John Carollo Engineers, 1978a).

Westside Wastewater Treatment Alternatives Summary Report (John Carollo Engineers, 1978b).

Environmental Evaluation of Westside Alternatives, Draft Memorandum No. 4 (Arthur Beard Engineers, 1978a).



POINT SOURCE METRO PLAN DEVELOPMENT
Figure 2-5

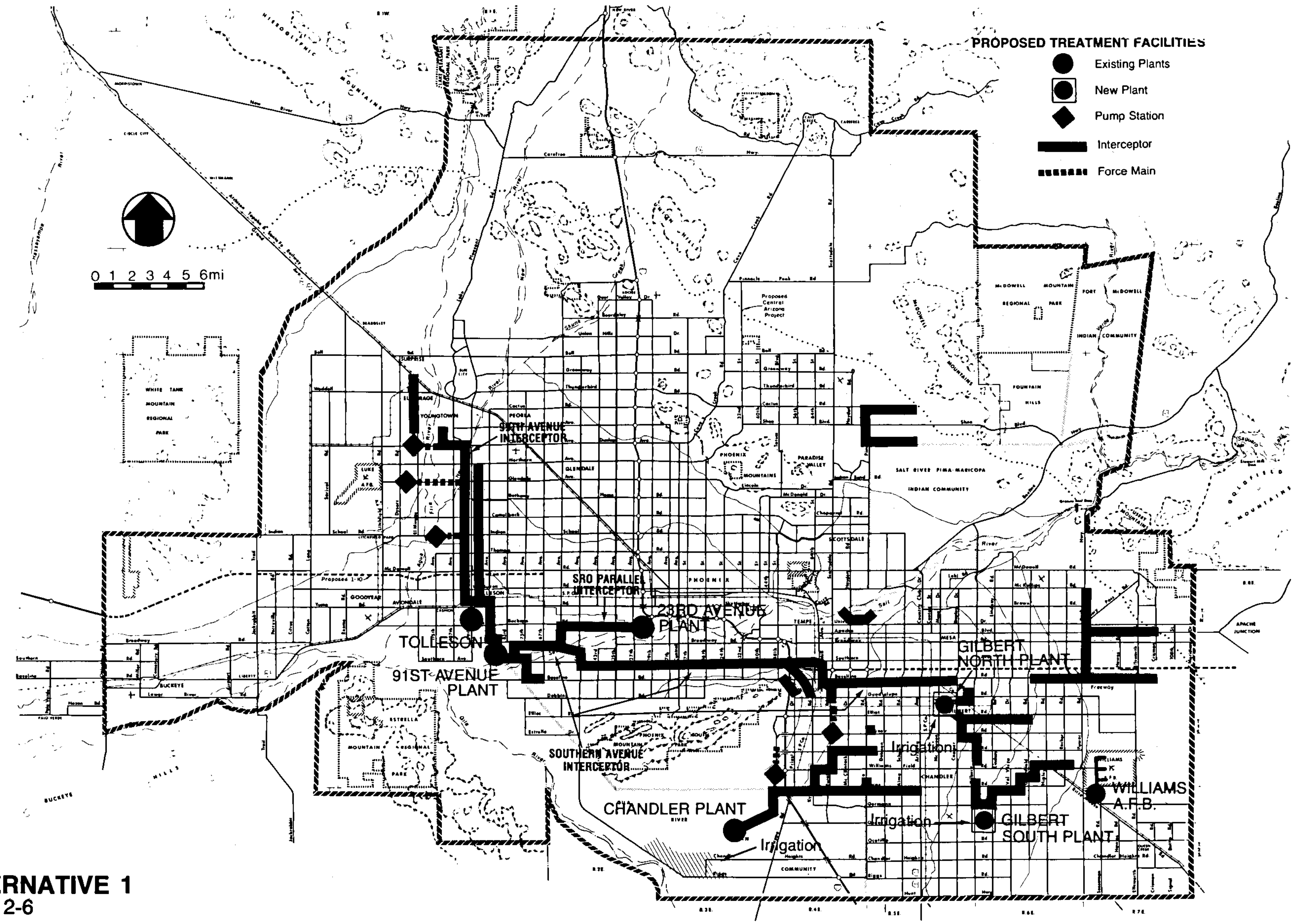
2.3.2 FINAL POINT SOURCE METRO ALTERNATIVES

Four alternative plans for metro area wastewater collection and treatment were developed by September 1978. The plans included six to eight treatment plants, the necessary interceptor/collector lines, preferred plant locations, and preferred treatment levels and reuses. The eight plants included in the alternatives were: Northeast (new construction); Gilbert, north and south (new construction); Chandler (expansion); Reems Road (new construction); Tolleson (expansion); 91st Avenue (expansion); and 23rd Avenue (expansion). Flows to the plants in the year 2000 are shown in Table 2-22 below. The layouts of the alternatives are shown on Figures 2-6 through 2-9.

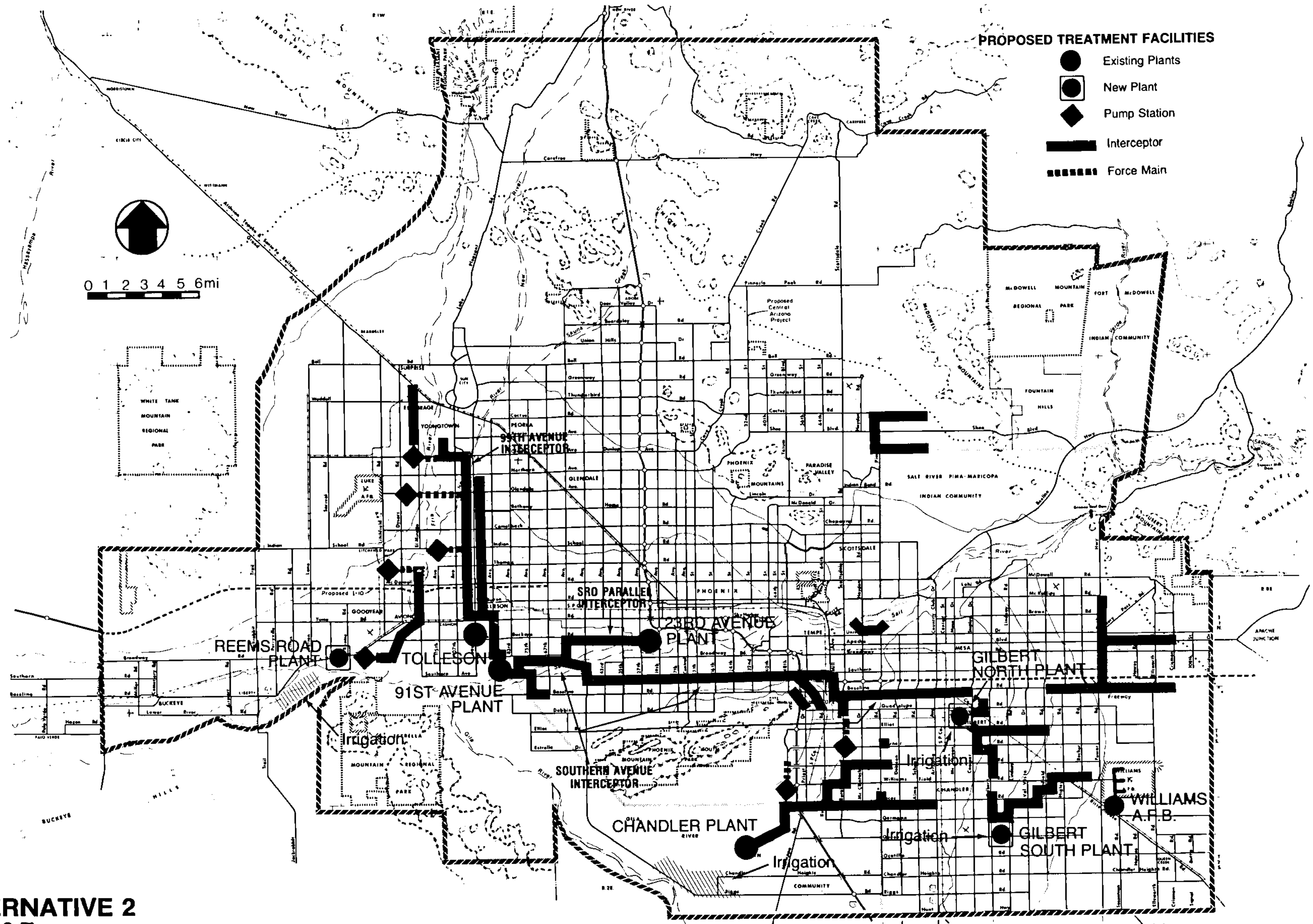
TABLE 2-22

YEAR 2000 FLOWS FOR AREAWIDE ALTERNATIVES
(in mgd)

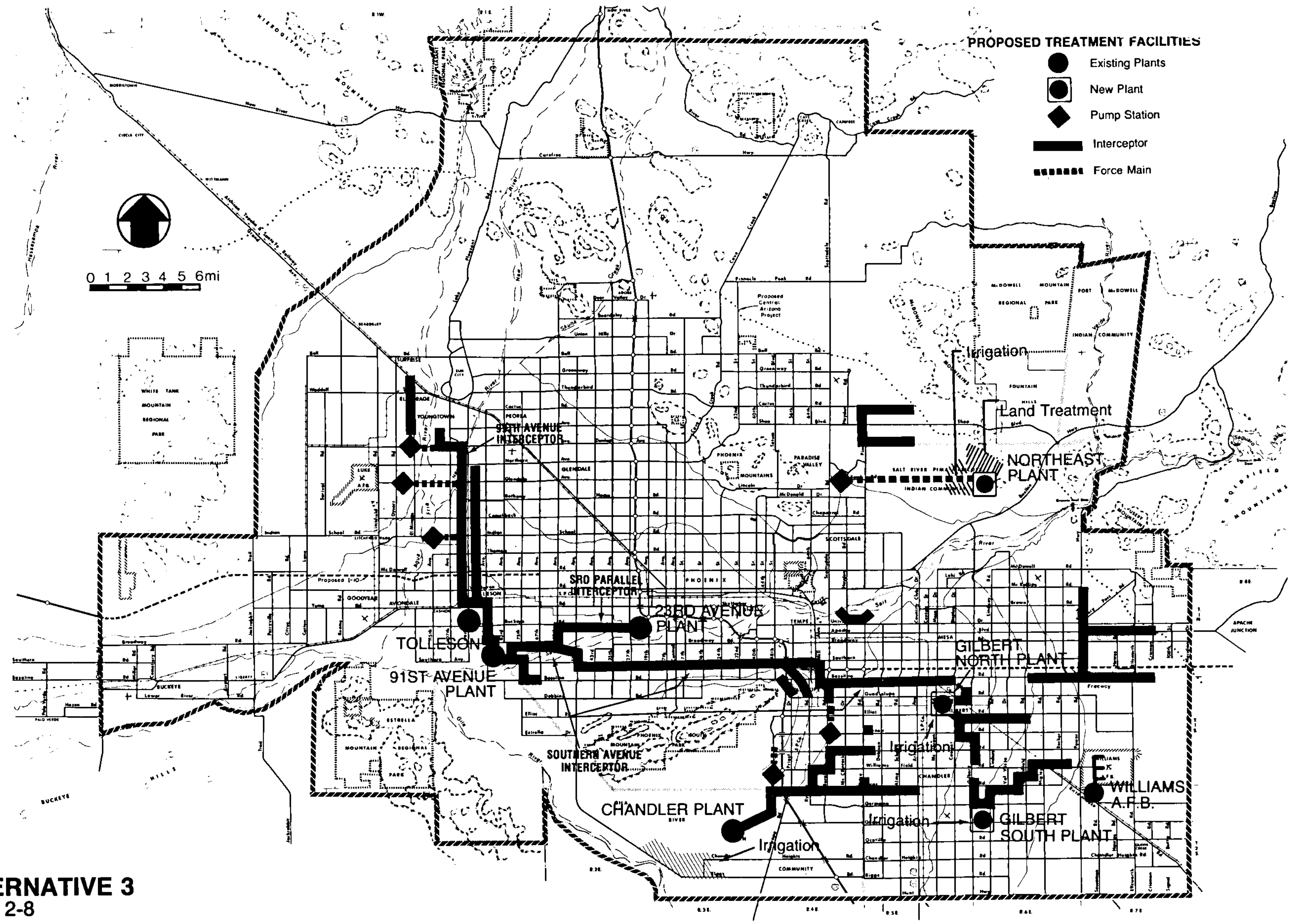
Plant	Alternative			
	1	2	3	4
Northeast	-	-	9.1	9.1
Gilbert (north)	2.7	2.7	2.7	2.7
(south)	0.9	0.9	0.9	0.9
Chandler	8.2	8.2	8.2	8.2
Reems Road	-	5.4	-	5.4
Tolleson	7.2	7.2	7.2	7.2
91st Avenue	142.4	137.0	133.3	127.9
23rd Avenue	37.2	37.2	37.2	37.2
Total flow	198.6	198.6	198.6	198.6



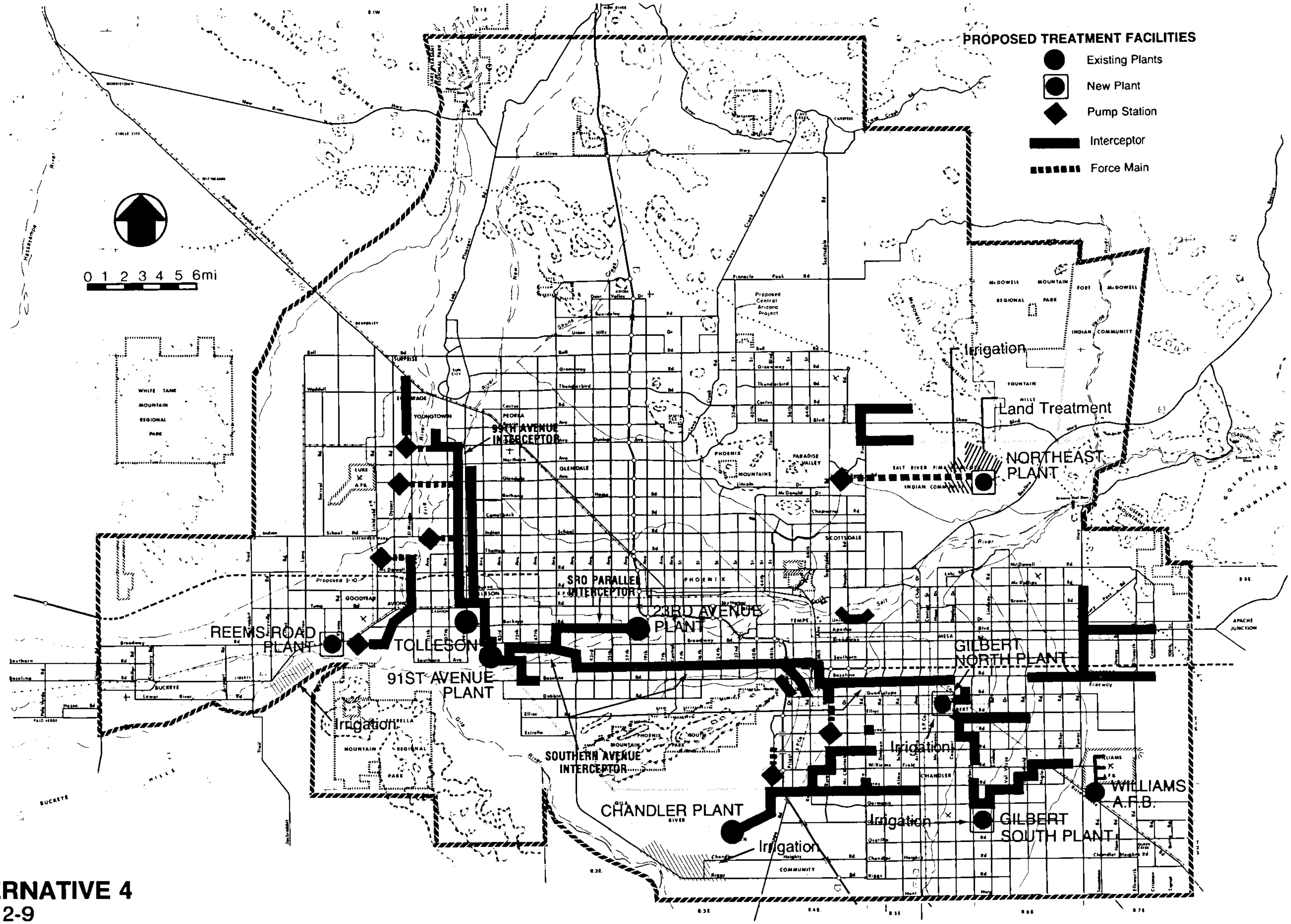
ALTERNATIVE 1
Figure 2-6



ALTERNATIVE 2
Figure 2-7



ALTERNATIVE 3
Figure 2-8



ALTERNATIVE 4
Figure 2-9

The facilities included in the four areawide alternatives represented communities involved in planning a regional wastewater treatment system. At an early stage of planning, four other small communities chose to develop local plans for wastewater treatment and collection. These communities were Fountain Hills, Carefree/Cave Creek, Buckeye, Williams Air Force Base, Sun City West, and Sun Lakes. During evaluation of the areawide alternatives, these six facilities were independent of the regional system of treatment plants and were therefore not included as components of the alternatives. Facilities to service these communities are included in the selected plan described in Section 2.2.

Alternative 1

This alternative provides for the greatest amount of wastewater to be treated at the 91st Avenue plant. Six plants would serve the metro area to the year 2000: 91st Avenue, 23rd Avenue, Tolleson, Gilbert (north and south), and Chandler. The 91st Avenue plant would be expanded to 142.4 mgd to serve all areas except Tolleson/Peoria, portions of Gilbert, and Chandler, which would be served by their own treatment facilities.

The 91st Avenue plant would be expanded by 30 mgd immediately to handle flows from the contributing service areas. Between 1990 and 1995, an additional expansion to 142.4 mgd would come on line to handle flows through the year 2000.

Flows from northeast Phoenix and portions of Paradise Valley would be served to the 23rd Avenue plant. The plant would be upgraded to handle flows of 37.2 mgd.

A major new interceptor system and pump stations would be constructed to collect and carry flows to the 91st Avenue plant from Surprise, El Mirage, Youngtown, Glendale, Avondale/Goodyear, Litchfield Park, Luke AFB, Sun City East, and Phoenix to a major new interceptor along 99th Avenue. Flows from the northeast area, Mesa, and the northernmost portion of Gilbert would be delivered to the 91st Avenue plant by the existing collection system plus a major new interceptor along Baseline Road and Southern Avenue (the Southern Avenue interceptor). No pumping would be required. A new interceptor system would be required to collect and carry flows from east Mesa to the Southern Avenue interceptor. New interceptors would be required in the northeast area to collect flows to the Hayden interceptor.

Flows from Peoria would be collected and carried to the expanded Tolleson facility via a new interceptor along 99th Avenue. The Tolleson plant, with an existing capacity of 2.5 mgd, would be expanded to handle year 2000 flows of 7.2 mgd.

The existing Chandler plant would be expanded from 2.8 mgd to 8.2 mgd by the year 2000. New interceptors along Pecos and Ray Roads would carry flows to the expanded plant.

Two new facilities would be built in the Gilbert area to handle total flows of 3.6 mgd by the year 2000.

Alternative 2

Under this alternative, flows from the metro area would be served as described in Alternative 1, except that flows from Litchfield Park, Avondale, and Goodyear would be carried to a new facility at Reems Road via a major new interceptor from Thomas Road to the plant. A new pump station and pressure sewer would be required to lift and carry flows from Litchfield Park to the interceptor. A new lift station would also be required at Reems Road to lift flows to the plant. The Reems Road plant would handle flows of 5.4 mgd.

The 91st Avenue plant would be expanded to 137.0 mgd by the year 2000. A 30 mgd expansion would be constructed immediately, with a 7 mgd expansion added in 1990.

Alternative 3

Under this alternative, the metro area would be served as described in Alternative 1, except that flows from the northeast portion of the metro area would be treated at a new 9.1 mgd facility located on Salt River Indian Community lands. The facility would handle flows from portions of Scottsdale, Paradise Valley, and Phoenix. A new pump station and force main would be required to lift flows to the proposed site.

The remaining service areas would be served as described under Alternative 1. The 91st Avenue plant would be expanded to 133.3 mgd by the year 2000 to handle flows from all service areas except Chandler, portions of Gilbert, Tolleson/Peoria, and the northeast area. Staging of construction would be the same as described for Alternative 1.

Alternative 4

Under this alternative, eight treatment facilities would serve the metro area. Both the Reems Road and Northeast plants would be constructed. The 91st Avenue plant would be expanded to 127.9 mgd by the year 2000 to handle flows from El Mirage, Glendale, Luke AFB, Phoenix, Sun City, Surprise, and Youngtown. Staging of construction would be as previously described.

Treatment and Reuse

The following list of facilities provides information on treatment process and level and effluent reuse assumed for the alternatives.

- -Northeast: Advanced wastewater treatment either by conventional process or land treatment, with effluent of sufficient quality for unrestricted agricultural use.
- -Gilbert (north and south): Aerated lagoons, stabilization lagoons, and disinfection, with effluent to be used for restricted agricultural irrigation on private farmland.
- -Chandler: Upgrade/expand lagoon system, with effluent to be used for restricted agricultural irrigation on Lone Butte Ranch on the Gila River Indian Community.
- -Tolleson: Expand trickling filter system, with effluent to be used for turf irrigation, discharge to the Salt River, or potential sale to ANPP.
- -Reems Road: Aerated lagoons, stabilization lagoons, and disinfection, with effluent to be used for near-site restricted agricultural operations or potential sale to ANPP.
- -91st Avenue: Expand activated sludge process and add disinfection facilities, with effluent to ANPP for cooling water, Buckeye Irrigation District for restricted agriculture, and the Arizona Game and Fish Department for maintenance of a wildlife management area.
- -23rd Avenue: Expand activated sludge process and add disinfection facilities, with effluent to McDonald Farms, ANPP, and/or Roosevelt Irrigation District (only if land treated).

2.3.3 EVALUATION OF ALTERNATIVES

Alternatives were evaluated for technical and environmental criteria. The primary technical criteria were flexibility and costs. The environmental evaluation included an assessment of impacts to the physical, biological, socioeconomic, and cultural environment. Following is a summary of the technical and environmental evaluation.

Technical Evaluation

Flexibility

In evaluating the flexibility of each of the four alternatives, the primary concern was to identify the alternative offering the most options to the region as a whole for wastewater collection and treatment. In general, a small local plant can be expanded more readily than a large regional plant and as such is more flexible to respond to future population changes.

On the westside, construction of the Reems Road plant (Alternatives 2 and 4) would offer considerably more flexibility than would treatment at the 91st Avenue plant. Without the Reems Road plant, the westside communities of Avondale, Goodyear, and Litchfield Park would be required to develop a costly pumpback system to the 91st Avenue plant.

On the eastside, the Northeast plant (Alternatives 3 and 4) would offer more flexibility for the participating communities. However, construction of the plant would affect the sizing of the proposed Southern Avenue interceptor, which would carry flows from the east side to the 91st Avenue plant. If a plan were selected that included the Northeast plant, then the size of the Southern Avenue interceptor would necessarily be reduced. If the Northeast plant were not included, then the interceptor could be sized to serve projected flows from the northeast communities. This would permit the option of adding the Northeast plant at a later date if more flows were generated than are currently projected.

In summary, Alternative 4, which includes both the Reems Road and Northeast plants, would offer the greatest flexibility, but concerns about the effect of the Northeast plant on other components of the plan offset the advantages of this alternative. Alternative 1, which provides for neither the Reems Road nor the Northeast facility, would be rated lowest in terms of flexibility. Alternative 2 would be rated moderately flexible because of inclusion of the Reems Road facility. Alternative 3 would also be rated moderately flexible because of inclusion of the Northeast facility, but would have the disadvantages discussed in regard to Alternative 4.

Costs

In order to evaluate costs of the alternatives, the various components of the plans were costed and combined as required for each areawide alternative. Components of the plans are collection systems, treatment facilities, and reuse/disposal systems.

Capital and annual operation and maintenance costs were developed; and because not all facilities are scheduled to be constructed at the same time, present worth and equivalent annual costs were developed in order to form an equal basis for comparison along the alternatives. A summary of costs for the four alternatives is presented in Table 2-23.

As may be seen in Table 2-23, Alternative 1 costs least and Alternative 4 costs most. There is a 7 percent difference between capital costs of these two alternatives and a 10 percent difference between total annual costs.

Environmental Assessment

The Point Source Metro Phoenix Alternatives Draft Environmental Assessment/Draft Environmental Impact Statement (DEIS) evaluated the four "project" alternatives against a "no action" alternative using 13 broad environmental categories. For purposes of the assessment, no action was defined as no new construction of municipal wastewater treatment facilities or no expansion of existing facilities. It was assumed that all flows not sewered would be treated by individual septic tank systems or small, privately owned package plants.

Under the no action alternative, the DEIS projected that the absence of new municipally owned or operated wastewater treatment facilities would result in lower density new development, which would expand in an area 65 to 70 percent greater than that projected by MAG in the Guide for Regional Development, Transportation and Housing (1978). By the year 2000, 45 percent of the population would rely on septic tanks or private package plants for wastewater treatment. A proliferation of single-family dwellings on relatively large homesites would occur in order to accommodate septic tank use.

In contrast to the no action alternative, the four project alternatives were developed in conformance with the MAG Guide, which was also used to develop the air quality Nonattainment Area Plan (Arizona Department of Health Services, 1978a) and includes a regional transportation plan. By conforming to the MAG Guide, the 208 plan ensures compatibility with these other plans.

Impacts of the no action alternative and the project alternatives were evaluated in 13 environmental categories in the DEIS. Figure 2-10 shows a summary matrix of impacts of the alternatives in these categories. As may be seen, all of the project alternatives are superior to the no action alternative. In most cate-

TABLE 2-23

SUMMARY OF AREAWIDE ALTERNATIVE COSTS[a]
(Millions of Dollars)

Alternative	Capital Cost	Annual O & M	Total Annual
1. 91st Avenue	114.91	1.87	14.06
Tolleson	6.83	0.29	0.89
Gilbert	9.85	0.26	0.66
Chandler	10.43	0.46	1.10
Total	142.02	2.88	16.71
2. 91st Avenue	107.39	1.64	13.54
Tolleson	6.83	0.29	0.89
Gilbert	9.85	0.26	0.66
Chandler	10.43	0.46	1.10
Reems Road	11.92	0.22	1.29
Total	146.42	2.87	17.48
3. 91st Avenue	105.59	1.64	12.97
Tolleson	6.83	0.29	0.89
Gilbert	9.85	0.26	0.66
Chandler	10.43	0.46	1.10
Northeast	15.54	0.51	1.82
Total	148.24	3.16	17.44
4. 91st Avenue	97.26	1.42	12.59
Tolleson	6.83	0.29	0.89
Gilbert	9.85	0.26	0.66
Chandler	10.43	0.46	1.10
Reems Road	11.92	0.22	1.29
Northeast	15.54	0.51	1.82
Total	151.83	3.16	18.35

[a]Costs of upgrading 23rd Avenue plant and 91st Avenue plant not included in this cost comparison.

ALTERNATIVES

ENVIRONMENTAL CATEGORIES	NO ACTION	1	2	3	4
AIR QUALITY	MA	■ ■	■ ■	■ ■	■ ■
SURFACE WATER	A	■ ■	■ ■	▲ ▲	▲ ▲
GROUND WATER	A	◓ ■	◓ ■	◓ ■	◓ ■
BIOLOGICAL RESOURCES	MA	■ ▲	■ ▲	■ ▲	■ ▲
CULTURAL RESOURCES	A	◓ ■	◓ ■	◓ ■	◓ ■
AESTHETICS	A	◓ ■	◓ ■	◓ ■	◓ ■
PUBLIC HEALTH	HA	◓ ■	◓ ■	◓ ■	◓ ■
LAND USE	HA	▲ ▲	▲ ▲	▲ ▲	▲ ▲
POPULATION	HA	▲ ▲	▲ ▲	▲ ▲	▲ ▲
PUBLIC FACILITIES AND SERVICES	HA	▲ ▲	▲ ▲	▲ ▲	▲ ▲
ECONOMIC ACTIVITY	A	■ ■	■ ■	■ ■	■ ■
PUBLIC AND INSTITUTIONAL ACCEPTABILITY	A	■ ▲	■ ▲	■ ▲	■ ▲

unmitigated

mitigated

IMPACTS

NO ACTION		ALTERNATIVES COMPARED TO NO ACTION	
HA	HIGHLY ADVERSE	▲	MUCH BETTER
A	ADVERSE	■	BETTER
MA	MILDLY ADVERSE	◓	SAME
M	MINOR	□	WORSE
MB	MILDLY BENEFICIAL	△	MUCH WORSE
B	BENEFICIAL		
HB	HIGHLY BENEFICIAL		

DRAFT EIS
SUMMARY IMPACT MATRIX
Figure 2-10

gories, mitigation is shown to lessen the severity of adverse impacts or enhance beneficial impacts.

Few differences can be drawn among the project alternatives, with the exception of surface water impacts. Alternatives 3 and 4 provide greater beneficial impacts to surface water because they provide for wider distribution of effluent within the metro area. The Northeast plant, which is included in these alternatives, offered the opportunity for an effluent-for-ground-water exchange that could have augmented municipal water supplies in Paradise Valley and Scottsdale. However, the Northeast plant would also have diverted flows from the 91st Avenue plant, and reduced the amount of effluent available to meet existing commitments. The contract for sale of effluent to ANPP from the 91st Avenue plant specifies that no upstream treatment plants may be built that would divert flows to the extent that the commitment of effluent could not be met. This provision of the contract acted as a constraint to choosing alternatives containing the Northeast plant, along with considerations discussed earlier under technical criteria. In addition, APS vigorously opposed alternatives including the Northeast plan.

Most adverse impacts were assessed as common to all alternatives. These included short-term construction impacts associated with new facilities, potential insect and odor problems associated with operation of facilities close to developed areas, and potential ground water degradation that might occur at some reuse/disposal sites. As noted earlier, mitigation measures would lessen the severity of these adverse impacts.

2.3.4 PLAN SELECTION AND APPROVAL

Following the technical and environmental analyses of the four areawide alternatives by the MAG 208 staff and consultants, the alternatives were presented to the public, the MAG 208 advisory groups, and the MAG Regional Council. A brochure was prepared that summarized the four alternatives and presented the estimated costs of each. This brochure, Metro 208 Areawide Alternatives (MAG 208 Program, 1978), was distributed to the public and the MAG 208 advisory groups. Presentations were made to the Citizen Advisory Group (CAG), Agricultural Advisory Group (AAG), Technical Advisory Group (TAG), MAG 208 Management Subcommittee, and the MAG 208 Executive Committee. Votes were taken on the alternatives at these advisory group and committee meetings. The results of the voting are as follows.

The Citizen Advisory Group selected Alternative 4 as the preferred wastewater treatment and collection plan. The group's decision was based on a desire to retain as much effluent as possible for reuse within the generating community, rather than export the water to a regional plant at 91st Avenue. Also, the group viewed this alternative as the most flexible, leaving the most options open for the future on a community level.

The Agricultural Advisory Group voted unanimously to select Alternative 2, which includes the Reems Road plant but not the Northeast plant. The group recommended, however, that the Northeast plant be considered for inclusion in the plan at a later date. The reasons the AAG approved Alternative 2 were given as follows:

1. Moderate cost
2. Existing commitments for effluent from the 91st Avenue plant that might not be met with a Northeast plant.
3. The inclusion of the Northeast plant at this time requiring downsizing of the Southern Avenue interceptor.
4. The fact that the Northeast plant could be built at a later time.

The Technical Advisory Group voted unanimously to select Alternative 2. The group's decision was based on two primary concerns: (1) the required downsizing of the Southern Avenue interceptor if the Northeast plant were included in the selected plan and (2) the need for the Reems Road plant on the westside.

The TAG was concerned that the Southern Avenue interceptor and other downstream interceptors would necessarily be downsized if Alternatives 3 or 4 (which include the Northeast plant) were selected. It was thought that the timing of the Northeast plant decision was critical. Since the proposed plant would be located on Salt River Indian Community lands, extensive negotiations on a long-term agreement for the use of the land and for the proposed effluent-for-ground-water exchange might be required prior to implementation. Should these negotiations fail, the Southern Avenue interceptor and other downstream interceptors would be undersized and would have to be paralleled with relief sewers prior to the year 2000. Thus, it was felt that to exclude the Northeast plant now would ensure adequate capacity in the Southern Avenue interceptor and downstream interceptors. In addition, the

Northeast plant could be considered for inclusion at a later date if it is needed.

The second of the group's concerns had to do with the westside communities' growth. It was felt that the Reems Road plant would best serve these communities and would eliminate a costly pumpback system to the 91st Avenue plant.

For reasons similar to those expressed by the advisory groups, the MAG 208 Management Subcommittee and the Executive Committee voted for Alternative 2. The MAG Regional Council tentatively approved the selection of Alternative 2 in November 1978. The resolution adopted by the Regional Council in regard to the alternative is included in Appendix D.

A public hearing on the Draft 208 Plan and Draft Environmental Impact Statement on the Point Source Metro Phoenix Alternatives was held on January 15, 1979. Prior to the public hearing, the advisory groups, Management Subcommittee, and Executive Committee made recommendations to the MAG Regional Council. These recommendations may be found in Appendix D. On January 17, 1979, the Regional Council voted to adopt the MAG 208 Draft Plan, which included Alternative 2 as the preferred plan for wastewater collection and treatment in the metro area. On June 27, 1979, the Regional Council adopted the Final 208 Plan, which was essentially the same as the Draft 208 Plan. The Regional Council's resolution to approve the final plan is included in Appendix D. The plan has been submitted to the Governor of the State of Arizona, and certification is expected in late July 1979.

EPA proposes to approve MAG's point source metro plan because it satisfies the requirements of the Clean Water Act and there are no adverse impacts of sufficient magnitude to outweigh the benefits to be derived. When the plan has been certified by the Governor of Arizona, EPA will take final action, which may include imposition of conditions.

Chapter 3
Affected Environment

3.0 AFFECTED ENVIRONMENT

The MAG 208 metropolitan Phoenix study area is shown on Figure 3-1. The study area is located in Maricopa County in south-central Arizona and includes communities that are presently within, or are expected to be within, a contiguous metropolitan area centered around the City of Phoenix, and whose water supplies and problems are interrelated. The area encompasses approximately 2,300 square miles and includes five major cities, a number of smaller cities and towns, two Air Force bases, and all or portions of three Indian communities.

The physical, biological, socioeconomic, and cultural characteristics of the study area are briefly described in the Study Area Profile (Section 3.1). Sensitive environmental features are described in more detail in Section 3.2. The features that are included in Section 3.2 are water resources, air quality, the Salt-Gila system downstream from the 91st Avenue treatment plant, and population and land use.

3.1 STUDY AREA PROFILE

3.1.1 PHYSICAL CHARACTERISTICS

Geography and Geology

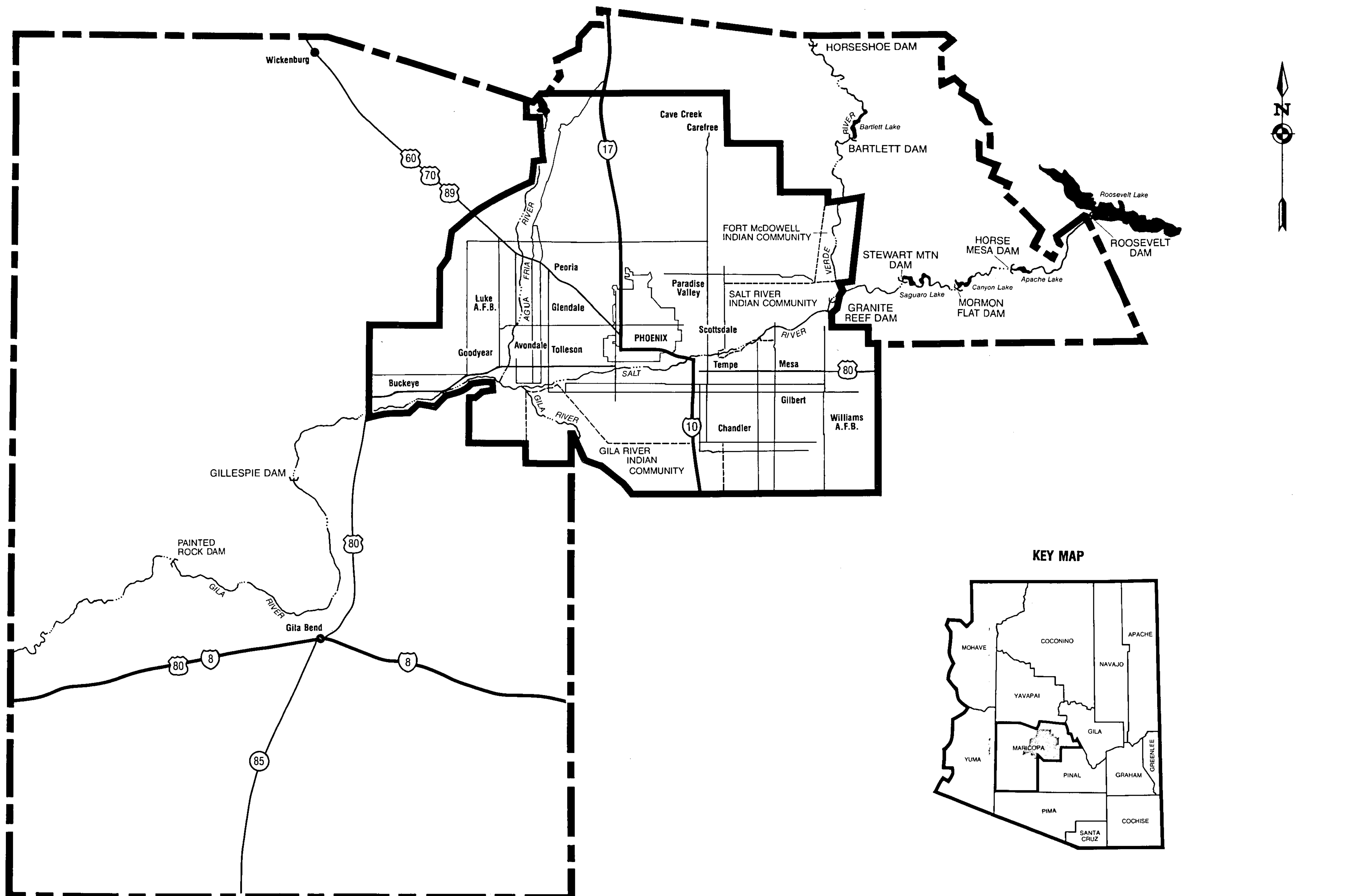
The metropolitan Phoenix area is located in the Salt River Valley at approximately 1,500 feet elevation. The Salt River Valley, which is approximately one-third larger than the metropolitan area as shown on Figure 3-1, is a wide, flat, alluvium-filled valley surrounded by rugged, low-relief mountain ranges. The Phoenix, Salt River, McDowell, Usury, Sierra Estrella, and White Tank Mountains are ranges that surround the Phoenix area. Uplifting and down faulting of the land surface formed these fault block mountains. Erosion filled the valleys with alluvium, which consists of silts, clays, sands, and gravels deposited in layers. The study area is in a region with no significant earthquake hazards.

The soil types in the study area are derived from parent materials characteristic of the Basin and Range Physiographic Province. General soil types in the area are sandy loams, limy clay loams, and limy loamy soils (U.S. Department of Agriculture, 1977). When irrigation is available, soils in the Salt River Valley can be developed into good cropland.

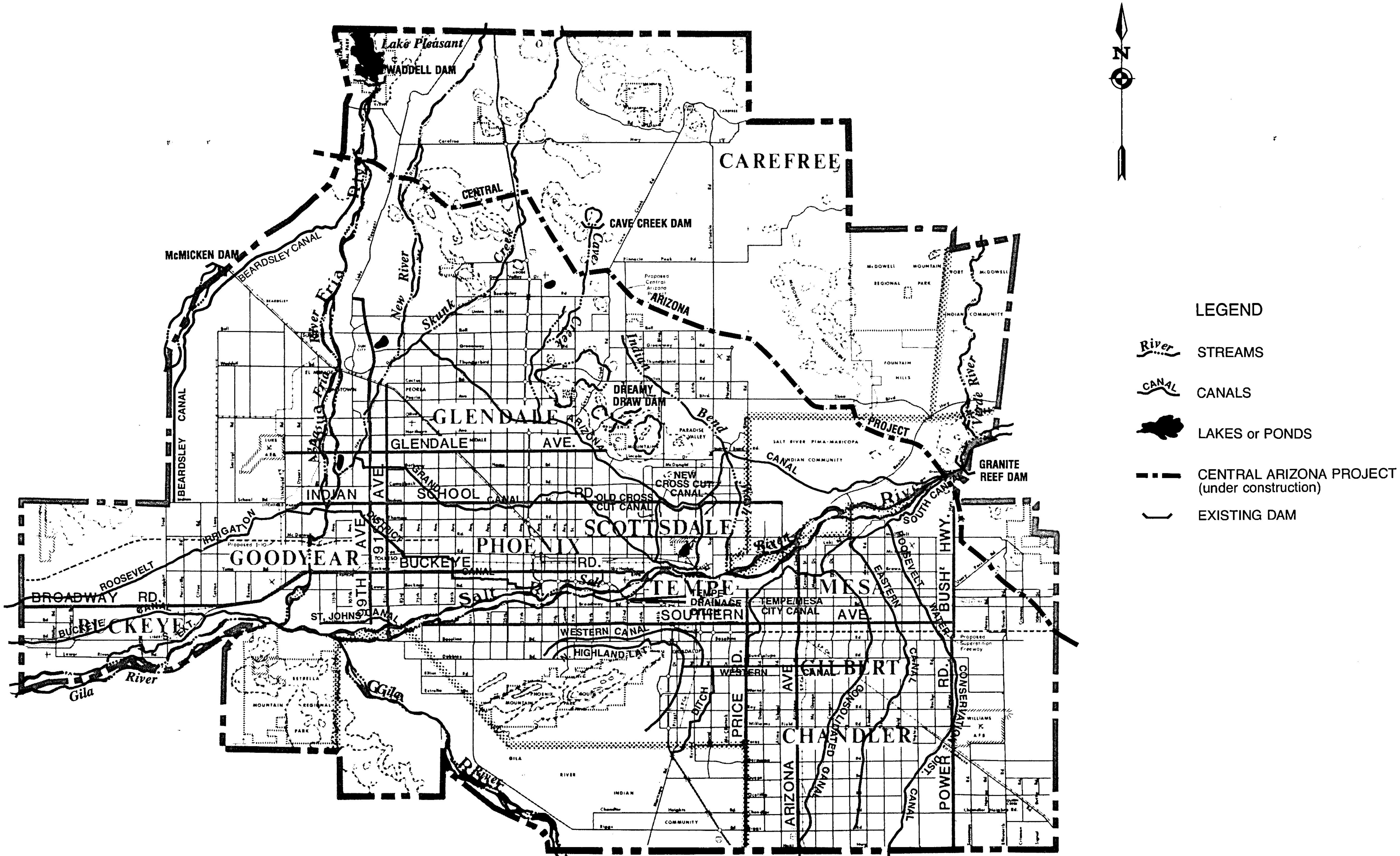
Water Resources

The study area is entirely within the Gila River drainage basin and is drained by the Salt and Agua Fria Rivers and their tributaries. New River, Skunk Creek, Cave Creek, and Indian Bend Wash drain parts of the study area to the Salt and Agua Fria Rivers. The Verde River is a major tributary to the Salt River. The Salt River has a drainage area of 16,040 square miles and the Agua Fria River an area of 2,340 square miles. The Salt and Agua Fria converge into the Gila River in the southwestern corner of the study area.

Upstream of the study area, the flows of the Salt, Verde, and Agua Fria Rivers are controlled by dams and reservoirs (see Figure 3-1) that provide a steady surface water supply. Joint flow from the Salt and Verde Rivers is distributed at the Granite Reef Diversion Dam to the Arizona Canal and South Canal, from which it is further distributed into the canal system of the Salt River Valley (see Figure 3-2). Flow in the Agua Fria is diverted to the Beardsley Canal. Because of upstream impoundments, there is no steady natural flow in the Salt and Agua Fria Rivers within the



STUDY AREA IN MARICOPA COUNTY
Figure 3-1



WATER BODIES AND MAJOR RELATED STRUCTURES
Figure 3-2

study area. The permanent pools of water in the Salt River result from wastewater treatment plant effluent, stormwater runoff, and return flows from irrigated agricultural land.

The reservoirs on the Salt and Verde Rivers are part of the Salt River Project (SRP). The SRP distributes surface and ground water through a canal system for use in urban and agricultural irrigation and for supply of a portion of the municipal water for Phoenix, Glendale, Mesa, Tempe, and Scottsdale. Agua Fria water is used to irrigate agricultural land. The average surface water diversion from 1930 to 1972 was 860,000 af/yr from the Salt-Verde system and 32,000 af/yr from the Agua Fria River (Arizona Water Commission, 1978).

According to the Arizona Water Commission (1978), consumptive use of water in the Salt River Valley in 1975 was 1,897,000 af/yr, while dependable supplies were 878,000 af/yr. Ground water reserves were overdrafted at a rate of 1,019,000 af/yr to supplement the dependable surface supply. In 1975, agriculture accounted for about 83 percent and urban uses for 16 percent of total withdrawals. As increasing areas are urbanized, agricultural use is expected to decline over the next 20 years.

Surface and ground water quality varies throughout the study area. In general, the water quality of surface water supplies from the Salt and Verde Rivers upstream of the study area is better than the quality of the Salt and Gila Rivers draining the area. For the most part, pollutants in upstream waters consist of dissolved salts and are from natural nonpoint sources. Discharges from wastewater treatment plants are the major sources of pollution in the study area. Discharges from the 91st Avenue and 23rd Avenue treatment plants maintain a permanent flow in the Salt and Gila Rivers from 91st Avenue to the Buckeye Heading. This flow is characterized by high concentrations of dissolved solids, nitrogen, and suspended solids, and very high bacterial counts.

Ground water quality varies from fewer than 500 parts per million (ppm) total dissolved solids northwest of Luke Air Force Base, in Paradise Valley, and near Apache Junction and Chandler Heights, to more than 3,000 ppm along and near the Gila River from its confluence with the Salt River to Gillespie Dam (Arizona Water Commission, 1978). Other constituents, such as fluorides, nitrates, chromium, arsenic, sulfates, hardness, lead, and radioactivity are found locally. Concentrations of these constituents are attributed mainly to natural sources, although the effects of man-related activities, such as long-term application of agricultural and irrigation waters, also are believed to have an effect but have not been studied conclusively in the study area. MAG is carrying on continuing 208 studies to analyze the impacts of these activities on ground water.

(See Section 3.2.1 for a more detailed description of water resources.)

Climate and Air Quality

The climate of the Phoenix area is semiarid, characterized by low annual rainfall, hot summers, and mild winters. Maximum daily temperatures range from 65°F (18°C) in January to 105°F (41°C) in July. Low temperatures range from 78°F (26°C) in July to 38°F (3°C) in January. The annual rainfall in Phoenix averages 7 inches per year.

The Phoenix area has long been known for its clean air and clear skies. However, with its rapid growth, Phoenix has experienced increasing air pollution, largely as a result of automobile emissions. The location of the metropolitan area in a broad valley is conducive to the accumulation of air pollutants. In addition, general atmospheric conditions favor the development of temperature inversions that may persist for extended periods of time, allowing ambient pollutant concentrations to exceed levels defined in State and Federal standards.

Three kinds of air pollutants generally exceed health-based standards in Phoenix: photochemical oxidants (ozone), carbon monoxide, and total suspended particulates. Because of problems with these air pollutants, the Phoenix metropolitan area has been designated a nonattainment area for the pollutants. A Nonattainment Area Plan has been prepared (Arizona Department of Health Services, 1978a) that proposes air quality control strategies that are projected to result in attainment and maintenance of standards over the next 20 years.

Air quality in the study area is described in more detail in Section 3.2.2.

3.1.2 BIOLOGICAL CHARACTERISTICS

Vegetation cover within the metropolitan Phoenix area includes several natural vegetation communities of the Sonoran Desert, as well as irrigated agricultural cropland and vegetation associated with urban development. Both urban expansion and agricultural interests have significantly reduced the extent of the natural communities in the area. What was once Sonoran Desert has been preempted by commercial, residential, and industrial construction, while additional thousands of acres have been converted to irrigated cropland. Desert communities still exist in outlying areas and in regional parks.

The natural desert communities in the Phoenix area are characterized by plants and animals that are adapted to the hot, arid climate. Plant species tolerate the arid climate primarily through water conservation mechanisms. Adaptive traits include sparse foliage, spines, small leaves, or the absence of leaves altogether; a thick, waxy covering on leaves and stems to reduce drying out; water storage; and extensive root systems. Adaptations to the desert environment vary among plant species, with plant life tending to be distributed to conform to the "moisture gradient," or the availability of water.

The major natural desert communities in the Phoenix area are: (1) paloverde-saguaro in upland areas, (2) creosotebush-bursage in lower, drier outwash plain areas, (3) desert saltbush in the fine-grained alluvium of the Salt-Gila flood plain, and (4) riparian vegetation along major stream channels and associated terraces and in areas of shallow ground water. Some of the characteristics of these communities are as follows.

The giant saguaro cactus and its co-dominant, the little-leaf paloverde, occur on dry mountain slopes and upper reaches of bajadas (outwash plains) in Maricopa County. The paloverde and saguaro mix with a variety of cacti (such as the fishhook cactus, barrel cactus, hedgehog cactus, cholla, and prickly pear) and various shrubs (creosotebush, crucifixion thorn, bursage, and brittlebrush) in this paloverde-saguaro upland community.

The creosotebush-bursage community, unlike the paloverde-saguaro community, does not have emergent (i.e., rising above the rest of the vegetation) cacti and paloverde trees; rather, the shrub cover of sparse creosotebush and triangle bursage or white bursage is of a fairly uniform height throughout. The larger shrubs, cacti, and trees are absent, except along desert washes where ironwood, mesquite, blue paloverde, andd catclaw may persist.

On the low-lying alkaline flood plain of the Salt and Gila Rivers, the saltbush community replaces creosotebush-bursage. This community is dominated by desert saltbush, a short, gray-green shrub that grows in thick stands along with seep weed and pickle weed.

Along the major drainages, riparian communities occupy the flood plain where moisture is sufficient to support growth. Cottonwood and mesquite are important trees in the deciduous riparian woodlands community, although the invasion of salt cedar and the clearing of the cottonwoods and mesquite have all but eliminated the cottonwood-mesquite woodlands that were widespread along the Salt, Gila, and Agua Fria Rivers in the study area before Anglo settlers arrived. Cattail marsh and other wetland habitats have also been subjected to eradication through development, although patches of wetland habitat persist where surface flows exist, such as downstream from the 91st Avenue treatment plant outfall, along irrigation ditches, and adjacent to impoundments. The riparian communities provide habitat for a great many species of wildlife, particularly nesting birds, and are among the most important links in maintaining the biological diversity and productivity in the area.

Cropland is another important form of vegetation in the Phoenix area, occupying approximately one-third of the study area. Large tracts of irrigated cropland are located primarily in the western and southeastern parts of the metropolitan area. Crops grown are mainly cotton, alfalfa, grains, and vegetables. Nut crops and citrus orchards are interspersed throughout the area, with sizeable orchards in the eastern and southeastern portions of the area. Other cultivated vegetation includes exotic trees and shrubs and several varieties of grasses that have been introduced for urban landscaping.

Wildlife are present in all the habitats, with the riparian and paloverde-saguaro communities offering the richest habitat for desert fauna. These habitats provide the most abundant source of food for wildlife. Areas of intensive urban development and agricultural activity usually have a limited wildlife diversity and abundance, although some bird species flourish around agricultural areas.

Representative Sonoran desert wildlife in the Phoenix area include: amphibians and reptiles such as the spadefoot toad, whiptail lizard, and gopher snake or bullsnake; birds such as the roadrunner, desert sparrow, cactus wren, Gambel's quail, white-winged dove, mourning dove, mockingbird, and red-winged blackbird; and mammals such as the blacktail jackrabbit, rock squirrel, pocket gopher, kangaroo rat, and striped skunk.

Wildlife, particularly birds, are attracted to vegetation in desert washes and along major creeks and rivers. Cottonwood and mesquite provide important nesting, feeding, resting, and roosting sites. A major riparian community, the Fred J. Weiler Green Belt, extends along the Gila River from the Town of Liberty in the southwest portion of the study area nearly 100 miles westward and southwestward to the Town of Date Palm. The Green Belt is a special use area for wildlife under the direction of the U.S. Department of the Interior, Bureau of Land Management, and provides a major habitat for white-winged dove, mourning dove, shorebirds, waterfowl, quail, and other wildlife.

Flows from the 91st Avenue and 23rd Avenue treatment plants contribute to the support of riparian habitat along the Salt River from 91st Avenue to 115th Avenue. At 115th Avenue, near the confluence of the Salt and Gila Rivers, the Arizona Game and Fish Department maintains a wildlife management area. The City of Phoenix has an agreement with the Department to discharge 7,300 af/yr of effluent at a constant rate from the 91st Avenue treatment plant to help support this wildlife area. Vegetation in the area includes cattails, willows, salt cedar, cottonwoods, and various species of annual and perennial grasses and forbs. Numerous species of birds, herpetofauna, and small mammals use the wildlife area. (The wildlife management area and the Fred J. Weiler Green Belt are described in greater detail in Section 3.2.3.)

Both the Federal Government and the State of Arizona have published lists of "special status" biota. The most recent Federal list of endangered and threatened wildlife and plants was published in 1979 (U.S. Department of Interior, Fish and Wildlife Service, 1979). The Arizona Native Plant Law (Arizona Revised Statutes, 1976) protects various native plants, among them species of the lily, amaryllis, orchid, orpine, and cactus family. A list of threatened wildlife in Arizona has been prepared by the Arizona Game and Fish Department (1978).

Wildlife on the Federal list in the study area include the peregrine falcon, Yuma clapper rail, and bald eagle. These species also appear on the Arizona Game and Fish Department list of threatened wildlife. Peregrine falcons were sighted in the area in 1971, although they are not known to nest in the area. Bald eagles are located peripheral to the study area along the Verde River in the Fort McDowell Indian Reservation and Bartlett Dam areas. The Yuma clapper rail was sighted in 1970 near 107th Avenue along the Salt River and in 1976 near El Mirage Road on the Gila River (Todd, 1976).

3.1.3 SOCIOECONOMIC CHARACTERISTICS

Population and Land Use

Approximately 1.3 million people live in the metropolitan area. The population of the area has grown steadily since 1940. Total population is expected to reach approximately 2.3 million by the year 2000. Growth in the area is caused by inmigration of people attracted to the climate, job opportunities, nearby recreational areas, retirement communities, and other amenities of the "sunbelt" region.

As a result of rapid growth in the area, the chief land use changes over the last 20 to 40 years have consisted of urbanization of agricultural and natural land. This urbanization is characterized by low-density, single-family development. In 1975, approximately 18 percent of the land area was devoted to urban uses, while the remaining 82 percent was agricultural and natural land. Over the next 20 years, agricultural and natural land area is expected to continue to decrease, as urbanization increases. (See Section 3.2.4 for a more detailed description of population and land use.)

Economy

The economy of the Phoenix area has been influenced over the last few decades by rapidly expanding urban development, which has caused a relative decline in agricultural growth. Substantial growth has occurred in the development of retirement communities, housing, government, tourism, manufacturing, and other activities related to the area's natural amenities.

The three leading industries in Maricopa County are manufacturing, tourism, and agriculture. Manufacturing, much of it in electronics, is the leading income producer for Maricopa County, the State of Arizona, and the Phoenix metropolitan area. The State's manufacturing output grew from $926 million in 1966 to $2.14 billion in 1976 (Arizona Department of Economic Security, 1977b). Metropolitan Phoenix's share was $1.60 billion in 1976.

Tourism and travel play a major role in the economy of the metro area. As the second leading income producer in Maricopa County in 1976, tourism generated approximately $1.25 billion in revenue (Arizona Department of Economic Security, 1977b), an increase of almost 11 percent over the previous year.

While the Phoenix area is not nearly as dependent on agriculture as is the remaining portion of Maricopa County, productivity of farming in the County does have an impact on the economic viability of the Phoenix area. Maricopa County has the highest gross farm income of any county in Arizona. The County produces the largest amount of crops and livestock in the State and the fifth largest amount in the nation. Agricultural workers totaled an estimated 13,900 persons in Maricopa County in 1976 (Arizona Department of Economic Security, 1977c), or about 4 percent of total County employment. Total County farm income increased from $275 million in 1970 to $934 million in 1976.

Housing

Since at least 1960, the number of households in Maricopa County has increased at a faster rate than the population, due to a steady decrease in the average number of persons per household. Single-family homes dominate the housing market. Of the almost 500,000 housing units estimated to be available in 1975 (Maricopa Association of Governments, 1978), 63 percent were single-family homes, 27 percent condominiums, townhouses, and apartments, and about 10 percent mobile homes. Sixty-three percent of all housing has been built since 1960 (Maricopa Association of Governments, 1978). Most newer homes, particularly single-family homes, have been constructed in the outlying portions of the metropolitan area.

Transportation

Rapid growth in the Phoenix area has strained the existing transportation network. Approximately 94 percent of all residents in the area commute to their places of work by automobile; 2 percent use public transportation (Phoenix Newspapers, 1977). A recent MAG survey on transportation states that congestion is one of the most critical areas of concern for local residents (Maricopa Association of Governments, 1977).

There are 2,146 miles of major streets in the metropolitan Phoenix area. Most major streets are located on section lines, creating a grid pattern spaced at 1-mile intervals with north-south and east-west orientation. The Black Canyon, Maricopa, Pima, and Superstition Freeways service the area.

Public transportation is provided throughout the study area by three major carriers and 200 buses. Air travel is served by Sky Harbor International Airport, through which 4.4 million passengers arrived and departed in 1976. An additional six general aviation airports also are located within the study area. Other transportation services include two railroads, two transcontinental buslines, ten transcontinental trucklines, 34 interstate trucklines, and 39 intrastate trucklines (Phoenix Newspapers, 1977).

Water and Wastewater Services

The Salt River Project (SRP) distributes water from the Salt and Verde Rivers via canals to the Phoenix area for municipal and agricultural uses. Municipal and industrial water is supplied by private and public water systems in the study area. Public systems for the communities of Phoenix, Glendale, Mesa, Tempe, and Scottsdale supply a mix of ground and surface water to consumers. All other communities in the study area rely on ground water sources alone. Treatment of ground water supplies varies from no treatment to chlorination and desalting. Treatment of surface water includes sedimentation, filtration, and chlorination.

Wastewater treatment is provided by 13 major treatment plants in the area, and a number of smaller treatment plants and package plants. The majority of the wastewater in the metropolitan area is treated at the 91st Avenue and 23rd Avenue treatment plants in Phoenix. The existing system is fully described in Section 2.1.3 of this report.

Energy

Electricity in the study area is provided primarily by SRP and the Arizona Public Service Company (APS). Both SRP and APS rely on fossil-fueled generating stations to produce the majority of their power. Three fossil-fueled generating stations are presently being constructed or expanded to provide a portion of their generating capacity to the study area. These stations are located outside the study area.

In addition, the Palo Verde Nuclear Generating Station is under construction at a site about 15 miles west of Buckeye and 50 miles west of downtown Phoenix. This is just outside the boundary of the study area. A consortium of utilities from Arizona and nearby states is developing the facility. Both SRP and APS are part of the consortium, which is known as the Arizona Nuclear Power Project (ANPP), and APS is the project manager and operator of the station.

Three units of 1,270-Mwe each have been approved for Palo Verde by the Nuclear Regulatory Commission, with two additional units pending approval. Units 1 through 3 are scheduled to go on-line in 1982, 1984, and 1986. Cooling water for the station will consist of treated wastewater from the 91st Avenue treatment plant, with effluent from the 23rd Avenue plant utilized if flows from 91st Avenue are not sufficient to meet demands. The effluent will be piped directly from the plants to the station site.

3.1.4 CULTURAL AND AESTHETIC CHARACTERISTICS

Archaeology

The Phoenix metropolitan area was a major population center during portions of the prehistoric past and contains abundant archaeological remains. The Hohokam tradition, which appeared about 350 B.C., is the principal cultural complex represented within the study area. The riverine Hohokam, whose territory centered on the Salt and Gila Rivers, were sedentary village dwellers who practiced irrigated agriculture. They lived in sizable communities and produced a wide variety of material goods including plain and decorated ceramics. The Hohokam disappeared from the area in about 1450 A.D. for reasons that have not been determined.

Known Hohokam sites within the Salt River Valley are reported to be in excess of 800 (Burton, 1977; Stone, 1976). Most of these sites, located both along the area's major and tributary river systems and on irrigable lands adjacent to rivers, consist of villages or large permanent habitation sites, or of medium- to large-sized shard areas which may also be the remains of habitation sites. The remains of several major sites (for example, Pueblo Grande) have been preserved and restored and are accessible to the public. Several prehistoric sites, including the Pueblo Grande Ruin (Phoenix), Hohokam-Mormon Canals (Mesa), and Hohokam-Pima Irrigation Sites (Phoenix), have been entered on the National Register of Historic Places. Numerous other archaeological sites have either been nominated to or are considered to be potentially eligible for inclusion in the State or National Registers of Historic Places.

With the disappearance of the Hohokam culture in approximately A.D. 1450, a hiatus of about 300 years appears in the archaeological record. The Pima and Papago Indians who inhabited the area at the time of Spanish contact may have been the cultural descendants of the Hohokam, but their development during this "protohistoric" period is largely unknown.

History

Although explorers, missionaries, trappers, and military personnel frequented the Salt River Valley, few data exist concerning the Indian occupation of the valley between A.D. 1450 and the establishment of the nearby Gila and Salt River Indian Reservations, in 1859 and 1879, respectively. Historic Indian groups who are native to the study area include the Pima, Papago, Maricopa, and Yavapai.

Between the late 1860's and 1900, a network of small irrigated agricultural communities was established by immigrant Anglo settlers throughout the Salt River Valley. The establishment of Fort McDowell on the Verde River in 1865 and the passage of the Homestead Act of 1862 provided military protection and the opportunity to secure title to public lands. By 1870, "Phoenix Settlement" (or "Mill City") had an established population of 300. Construction of the Arizona Canal north of the Salt River and other canals to the south, and the arrival of branchline railroads connected to transcontinental routes, resulted in expansion of agriculture with the subsequent growth of Phoenix and development of a number of satellite communities during the 1880's and 1890's.

SRP's construction of Theodore Roosevelt Dam on the Salt River provided irrigation water and hydroelectric power for the area. This structure was the first multipurpose dam authorized under the National Reclamation Act of 1902 and was completed in 1911. In the 1920's and 1930's three more dams were built by SRP on the Salt River to conserve water and generate hydroelectric power. Two dams were constructed on the Verde River as well.

In the early twentieth century, the economy of the area continued to be agriculturally based. The demand for cotton during World War I induced an increase in its production, while more truck crops were grown as transportation facilities made out-of-state markets available. During World War II, the area was the site of a number of military airfields and defense plants. After the war, the area entered into a sustained period of urbanizatin and economic growth. The development of air conditioning made life in metropolitan Phoenix comfortable the year around. People and businesses continue to be attracted by the climate, recreational and retirement amenities, and economic opportunities.

Arizona's State Historic Preservation Officer conducted an initial survey of historical resources (sites, buildings, and structures) within the metro area. This study (Hall, 1977) encompassed both research and evaluation of significant historical, architectural, and cultural resources. Field investigation research was completed in an area of approximately 200 square miles to verify resources located in the records search and to identify resources that might be impacted in the near future. This process led to an inventory containing more than 550 entries.

Seven sites in the Phoenix area have been entered on the National Register of Historic Places. They are: Hackett House, Tempe; Farmer Goodwin House, Tempe; Taliesin West, Scottsdale; Rosson House, Phoenix; the Phoenix Carnegie Library and Library Park, Phoenix; Evans House, Phoenix; and the Arizona State Capitol Building, Phoenix. An additional 176 historic sites are considered to be potentially eligible for nomination to either the State or National Register of Historic Places (Hall, 1977).

Aesthetics

Phoenix lies on a flat, gently sloping piedmont, broken only by distinct, rugged mountains. The subtle, muted desert colors are enhanced in the sharp light of early morning and late afternoon. In the spring, following the winter rains, annual flowering plants carpet the desert, and the perennial vegetation greens and blooms. Until the late 1960's, clear visibility for 50 miles or more was common; now degradation of air quality in the area often reduces the usual visibility to 8 to 12 miles or less. Despite smoke, dust, and other air pollutants, Arizona's sky is still spectacular, especially in the summer when cumulus clouds build up in the afternoon.

Man's activities have greatly altered the natural aesthetics of the desert. The climate encourages outdoor recreation, and private swimming pools are commonplace; 12 percent of the households in Maricopa County have swimming pools. Although a strong concern exists for retention of open space and natural vegetation in Maricopa County, some of the population who have migrated from more humid climates prefer the appearance of green lawns, landscaped areas, and lakes to the appearance of the native desert.

As the land close to the urban core has become more densely developed with multi-family and commercial construction, the single-family developments have moved out into the desert and agricultural lands in leapfrog fashion. More and more of the desert is subject to urban sprawl; many large-scale developments, complete with recreational lakes and green irrigated vegetation, dot the valley floor.

3.2 SENSITIVE ENVIRONMENTAL FEATURES

3.2.1 WATER RESOURCES

Both water quantity and water quality are sensitive environmental features in the Phoenix area. Water supply in the area is considered critical due to a consistent ground water overdraft. Water quality problems emerge locally in the form of high nitrates, fluorides, arsenic, chromium, and salinity (total dissolved solids). The existing wastewater system has contributed to poor surface water quality in the Salt and Gila Rivers downstream from the 91st Avenue and 23rd Avenue treatment plants.

Water Use and Supply

Over much of the Phoenix area, water use patterns are changing, principally because of urban development. Since 1940, over 50 percent of the farmland within the Salt River Project boundaries has been urbanized (Arizona Water Commission, 1978). Nevertheless, agricultural irrigation still accounts for a large majority of water withdrawals. Total surface and ground water withdrawals in 1975 in the Salt River Valley amounted to 2,690,000 acre-feet, with 2,223,000 acre-feet (83 percent) used for agriculture and 467,000 acre-feet (17 percent) used for all other purposes (Arizona Water Commission, 1978). Municipal and industrial per capita water demand was approximately 340 gallons per capita per day in 1975.

Water depletion exceeds supplies in the area. Consumptive use of water in the Salt River Valley in 1975 was 1,897,000 acre-feet and dependable supplies were 878,000 acre-feet, resulting in a ground water overdraft of 1,019,000 acre-feet (Arizona Water Commission, 1978). Supplies are scheduled to be augmented beginning in the 1980's with importation of Colorado River water through the Central Arizona Project (CAP), a U.S. Bureau of Reclamation Project.

The CAP proposes to bring approximately 1,200,000 af/yr of Colorado River water from Lake Havasu into central and southeastern Arizona by means of aqueducts and pumping stations. The project, authorized by Congress in 1968, is partially completed. The Granite Reef Aqueduct, which will carry water from Lake Havasu to the Phoenix area, is scheduled to be completed in the mid-1980's. Final allocations of water have not been made, and there are some uncertainties about flows in the Colorado River being sufficient to supply Arizona's entitlement. However, assuming that flows are adequate, the Arizona Water Commission (1978) estimated that 510,000 af/yr of CAP water would be introduced into the Salt River Valley in 1990, with lesser amounts available after the year 2000 as other entitlements are exercised.

Treated wastewater is another source of water in the metropolitan area. Currently, approximately 38,800 af/yr of effluent, or 25 percent of the estimated wastewater flows, are committed to agricultural or golf course irrigation and support of wildlife. This represents less than 2 percent of the total water withdrawals for all purposes in the Salt River Valley in 1975. Remaining wastewater flows enter ephemeral watercourses that drain the study area.

Flooding

The study area is subject to large-scale floods, each associated with a particular seasonal precipitation. During the winter months, precipitation within the area is typically widespread and of low intensity. The relatively low intensity of the winter storms does not generally cause flooding problems along the intermediate-sized ephemeral streams, which are numerous throughout the area. A portion of the winter precipitation generally accumulates at higher elevations and is stored until gradual warming occurs in the spring. However, rapid melting of the accumulated snow pack may occur with unseasonably warm conditions. More commonly, rain melting the snow pack results in heavy runoff into the Salt and Gila Rivers, which sometimes causes widespread flooding. During the summer months, precipitation comes in the form of thunderstorms, characterized by high-intensity rainfall of short duration. These thunderstorms sometimes cause flooding along the intermediate-sized streams but seldom produce enough volume to cause serious flooding along the larger watercourses (U.S. Army Corps of Engineers, 1976).

Although the flow of the Salt River is controlled by dams and reservoirs, these impoundments are operated with water conservation as the primary objective and as such do not provide adequate flood protection. The flood of record on the Salt River was in 1891 with a flow of 300,000 cubic feet per second. More recently, floods occurred in 1965-66, 1973, and 1978. The severe 1978 floods, with flows of 122,000 and 140,000 cubic feet per second on the Salt River in March and December, have increased public pressure for flood-control measures. The Central Arizona Water Control Study, a joint U.S. Army Corps of Engineers and U.S. Bureau of Reclamation study, was initiated in 1979 to determine the best plan for flood control and CAP water storage in the Phoenix area. The study will examine alternatives to Orme Dam, which had been authorized to meet both of these needs but was eliminated from CAP by the President in April 1977. Depending on the alternative chosen, floodwaters can be conserved and used to augment the area's water supplies in varying amounts.

Surface Water Quality

Surface water quality varies throughout the study area, but in general supplies from the Salt and Verde Rivers upstream of the study area are of good quality, compared to the water in segments of the Salt and Gila Rivers draining the area. These downstream reaches are subject to pollution from wastewater treatment plant dicharges, irrigation return flow, tailwaters from irrigation canals, and urban runoff.

This pattern of downstream degradation of surface waters is shown in generalized water quality maps prepared by the U.S. Geological Survey (USGS) which indicate that total dissolved solids (TDS) concentrations increase in a downstream direction from headwater areas (Rainwater, 1962). The pattern is confirmed in data collected during the period 1972-1976 at Salt, Verde, and Gila River water quality stations (Table 3-1). Stations on the Verde and Salt Rivers provide data on principal sources of surface water supplies delivered to the study area, while the station on the Gila River provides data on the principal source of surface water draining the area.

The constituents selected for inclusion in Table 3-1 are those for which data are available in USGS annual reports and for which the EPA Interim Primary Drinking Water Regulations or Proposed Secondary Standards under the Safe Drinking Water Act of 1975 state a "mandatory limit" or "maximum contaminant level." These standards are shown in Table 3-2. When primary standards are exceeded, the water source can be rejected for drinking water purposes. The secondary standards set desirable limits, and, when exceeded, alternative sources should be used if they are available. The data shown in Table 3-1 are for untreated river water that is not being used for drinking or public water supply without further treatment.

As shown in Table 3-1, water from the Verde River has the best quality. An indicator of general overall water quality is the concentration of TDS in water. TDS is a measure of salinity. For the years 1972 to 1976, the Verde River reported TDS ranges of between 116 and 402 mg/l, while the TDS of the Salt River was between 349 and 788 mg/l. Both of these rivers have considerably lower concentrations of TDS than the 202 to 4,740 mg/l range of the Gila River.

TABLE 3-1

MINIMUM AND MAXIMUM CONCENTRATIONS OF SELECTED CONSTITUENTS
IN SALT, VERDE, AND GILA RIVER WATERS, 1972-1976
(Concentrations in mg/l)[a]

Constituent	1972	1973	1974	1975	1976
Salt River Below Stewart Mountain Dam[b]					
Sulfate	34-74	44-75	41-49	43-62	44-72
Chloride	300*-320*	100-280*	99-150	150-240	220-280*
Fluoride	.3-.5	.2-.5	.2-.4	.3-.5	.2-.4
Total dissolved solids (TDS)	708*-788*	353-760*	349-446	463-649*	628*-658*
Nitrate[e]	.02-.59	0-2.4	.00-.00	0-.02	.04-.06
Arsenic[f]	-	-	.004-.004	.003-.004	.003-.004
Cadmium[f]	0	0	0-0	<.01-.01	<.01-.01
Chromium[f,g]	-	-	0-0	0-0	0-.01
Lead[f]	-	-	.1*	-	.1*
Mercury[f]	-	-	0-0	0-.0001	0-0
Selenium	-	-	.001-.002	0-0	0-0
Verde River Below Bartlett Dam[c]					
Sulfate	40-81	11-48	42-65	24-80	21-69
Chloride	15-25	3.6-14	14-24	8.5-30	5.7-26
Fluoride	0-.5	.1-.6	.2-.6	.2-.5	.2-.3
TDS	281-402	116-316	254-364	191-378	155-364
Nitrate[e]	.00007-.00029	.04-3.6	0-.55	.02-.31	.01-.29
Arsenic[f]	-	-	.015-.021	.009-.018*	.011-.018*
Cadmium[f]	-	-	0-0	<.01-.01	<.01-.01
Chromium[f,g]	-	-	<.01-.01	0-0	0-.01
Lead[f]	-	-	.1*	.1*-.1*	.1*-.1*
Mercury[f]	-	-	.0-.0	0-.0001	0-.0002
Selenium	-	-	0-.003	.001-.001	0-.0001

TABLE 3-1 (Cont.)

Constituent	1972	1973	1974	1975	1976
Gila River Above Diversions at Gillespie Dam[d]					
Sulfate	-	-	750*-1,100*	170-1,100*	22-1,100*
Chloride	-	-	1,300*-1,600*	250-1,500*	20-1,600*
Fluoride	-	-	.4-5.6*	.2-2.6*	.5-2.8*
TDS	-	-	3,500*-4,740*	384-4,310*	202-4,700*
Nitrate[e]	-	-	9.7-11*	.03-.28	6.8-12*
Arsenic[f]	-	-	.008-.023	.009-.011	.12*-.19*
Cadmium[f]	-	-	.01-.02*	.01-.01	.01-.01
Chromium[fg]	-	-	.01-.03	0-.02	.02-.02
Lead[f]	-	-	.1*-.1*	.1*-.1*	.1*-.2*
Mercury[f]	-	-	0-.0001	.001-.003*	0-.0003
Selenium	-	-	.007-009	.008-.010*	.0001-.019*

[a]Concentrations equal to or exceeding EPA primary or secondary standards (Table 3-2) are identified with an asterisk (*).

[b]Sampling location below Stewart Mountain Dam, 9.5 miles upstream from the Verde River.

[c]Sampling location 1,300 feet below Bartlett Dam.

[d]Sampling location 8 miles downstream from the Hassayampa River.

[e]Several of nitrate concentrations shown include nitrite.

[f]Analyses shown for arsenic, cadmium, chromium, lead, and mercury are for "total," which is generally higher than "dissolved." EPA standards do not differentiate between "total" and "dissolved."

[g]Analyses are for undifferentiated chromium. EPA primary standard of 0.05 is for hexavalent chromium.

Source: U.S. Geological Survey Water Resource Data, 1972-76; Dames & Moore, 1977

TABLE 3-2

EPA DRINKING WATER STANDARDS
(concentrations in mg/1)

Constituent	Primary[a]	Secondary[b]
pH	-	NNS[c]
Total dissolved solids (TDS)	-	500
Calcium	-	NNS
Sodium	-	NNS
Iron	-	0.3
Manganese	-	0.05
Copper	-	1
Hardness (as $CaCO_3$)	-	NNS
Alkalinity (as $CaCO_3$)	-	NNS
Chloride	-	250
Sulfate	-	250
Nitrate (as N)	10	-
Nitrate (as NO_3)	45	-
Fluorides	1.4	-
Bicarbonate	-	NNS
Phosphorus	-	NNS
Arsenic	0.05	0.01
Silver	0.05	-
Chromium (hexavalent)	0.05	-
Cadmium	0.01	-
Lead	0.05	-
Selenium	0.01	-
Mercury	0.002	-
Zinc	-	5
Barium	1	-
Cyanide	0.2	-
Phenols	-	0.001

[a]Interim Primary Drinking Water Regulations.

[b]Proposed Secondary Standards under Safe Drinking Water Act of 1975.

[c]NNS - No numerical standard.

Source: Federal Register, 1975, 1977

Comparing the data shown in Table 3-1 with EPA primary and secondary standards (Table 3-2) indicates contravention of standards for a number of constituents, primarily in the Gila River. The concentrations of TDS in the Salt River exceeded EPA secondary standards of 500 mg/l for 1972 and 1976 and for portions of 1973 and 1975. The TDS concentrations in the Verde River were within the standard for all five years. The TDS concentrations in the Gila River exceeded the standard in all three years for which data are provided.

Verde River waters exceeded the primary standards for lead and secondary standards for arsenic. In the Salt River, concentrations of lead exceeded the primary standard, while TDS and chloride exceeded the secondary standards. In the Gila River, concentrations of fluoride, nitrate, arsenic, cadmium, lead, mercury, and selenium exceeded primary standards; concentrations of sulfate, chloride, and TDS exceeded secondary standards.

Data from the City of Phoenix Water and Sewers Department (1978) indicate that TDS levels in the waters of the Arizona and South Canals are in an intermediate range between the upstream Salt-Verde levels and the downstream Gila levels. For the period from April 1977 through April 1978, the average TDS concentration of canal water at the Val Vista Water Treatment Plant on the South Canal, 4 to 5 miles south of Granite Reef Dam, was 646 mg/l. The maximum average monthly concentration was 943 mg/l in March 1978, a high-discharge month, and the minimum was 451 mg/l in February 1979.

At the Deer Valley Water Treatment Plant on the Arizona Canal, approximately 30 miles west of Granite Reef Dam, the average TDS concentration of canal water for the April 1977 to April 1978 period was 667 mg/l. The maximum average monthly concentration was 1,070 mg/l for March 1978 and the minimum was 444 mg/l for January 1978.

Data from the U.S. Department of Agriculture, Water Conservation Laboratory (1977) for the effluent-dominated flow of the Salt River approximately 1-1/2 miles downstream from the 91st Avenue treatment plant show TDS levels higher than those found upstream, but significantly lower than levels in the Gila River farther downstream. These data are displayed in Table 3-3. As indicated by Table 3-3, the flow in the river at this site is almost entirely wastewater effluent. Fecal coliform levels greatly exceed State surface water standards of 1,000 units per 100 ml for this reach of the Salt River. Criteria for these standards are presented in Appendix A.

TABLE 3-3

WATER QUALITY OF SALT RIVER AT FLUSHING MEADOWS[a] FOR 1977
(Concentrations in mg/l unless noted)

Constituent	Maximum	Minimum	Average
Total dissolved solids	1,165	800	1,075
Nitrate (as N)	33.9	19	27.4
Fluoride	2.88	1.1	2.08
Phosphorus			7.9
Boron	0.68	0.45	0.59
Total organic carbon			26
Suspended solids	70	9	32.2
Fecal coliform			3×10^5/100 ml

[a] 1-1/2 miles west of 91st Avenue wastewater treatment plant.

Source: U.S. Department of Agriculture, Agricultural Research Service, U.S. Water Conservation Laboratory, 1977.

Ground Water Supply

The Salt River Valley contains two major ground water areas: the East and West Basins. Natural rock barriers of low permeability restrict ground water movement between the basins. The East Basin is bounded by the McDowell, Usury, Superstition, San Tan, Salt River, and Phoenix Mountains. The Paradise Valley and Chandler areas are subbasins of the East Basin. The West Basin is bounded by the Hieroglyphic, New River, Phoenix, Salt River, Sierra Estrella, and White Tank Mountains. The Deer Valley area is a subbasin of the West Basin. The study area comprises a sizable and highly developed portion of the two basins.

Water-bearing alluvial deposits exist in the upper several thousand feet of the basins. A layer of low permeability 600 to 1,200 feet below the surface exists in the West Basin and about 1,100 feet below the surface in the East Basin. It is estimated that about 100 million acre-feet of ground water is stored above a depth of 700 feet, and 50 million acre-feet is stored below in the next 500 feet of the basins (Arizona Water Commission, 1978).

Ground water inflow and natural recharge to the ground water basins are estimated to be slight (Thiele, 1965). Rainfall is normally low, and evapotranspiration losses are high. Primary sources of recharge are return flow from irrigation, surface water, and canal seepage. In the urban area, storm runoff is an additional source of recharge. Ground water pumpage is the major source of discharge. A small amount of ground water flows out of the West Basin west of Buckeye. There is no significant ground water outflow from the East Basin.

It has been estimated that more than 70 million acre-feet of ground water has been pumped from the Salt River Valley since 1923 (Clark et al., 1975). Ground water is currently being pumped and used at a rate exceeding the rate of recharge, resulting in a gradual decline of ground water levels throughout the area. The Arizona Water Commission (1978) estimates a ground water overdraft of 1,019,000 acre-feet in 1975 for the Salt River Valley.

The study area is included in a designated critical ground water basin. Critical ground water basins are designated by the Arizona Land Commission when sufficient ground water supplies are not available for irrigation of cultivated lands at current rates of withdrawal. Drilling of irrigation wells for development of new farmland is prohibited in critical ground water basins, but there are no prohibitions against developing new wells for non-irrigation purposes.

Ground Water Flow

According to Schmidt (1978), ground water in the East Basin prior to extensive withdrawals flowed from Paradise Valley southward toward the Salt River; ground water in the Chandler subbasin flowed northward toward the Salt River. Ground water also flowed from the East Basin to the West Basin through the Tempe Narrows. Under present conditions, the regional direction of ground water flow in the East Basin is toward three large pumping depressions, located in Scottsdale, east of Mesa, and in the Queen Creek area.

In the West Basin, ground water prior to extensive withdrawals flowed southward from the Beardsley area and Deer Valley toward the Salt and Gila Rivers. Ground water along the Salt River flowed westward from the Tempe Narrows toward the confluence with the Gila River. From the confluence, ground water flowed westward past the Buckeye area and left the Salt River Valley. Under present conditions, the regional direction of ground water flow is toward a large pumping depression near Luke Air Force Base. Smaller pumping depressions occur in Deer Valley and at Glendale. Since about 1950, ground water near the Gila River and in the eastern part of the Buckeye area has tended to flow northward.

Ground Water Quality

Ground water is pumped for public supply by a number of municipalities. Generally, the quality of well water is suitable for public supply throughout the study area. Local water quality problems are evident in northwestern and southwestern portions of the area, and in isolated sites in the eastern portion of the area. Ground water is also pumped by irrigation districts and mixed with surface water for irrigation of crops. Some farmers in the study area pump ground water for use without mixing. Ground water is generally of suitable quality for irrigation of a variety of crops except near the Gila River and in the Buckeye area. Here, special cultivation practices have to be employed to accommodate the very high salts (3,000+ mg/l TDS) in the ground waters. Ground water of superior quality is found in the northern part of the West Basin, in the northern part of Paradise Valley, and in the eastern part of the East Basin.

According to Schmidt (1978), salinity in the East and West Basins has remained fairly constant since the 1920's. This trend is likely due to an equilibrium between factors that concentrate salts in the ground water and those which dilute the ground water. Despite the overall trend of constant salinity, levels have increased in the last 20 years near Gilbert (due to irrigation return flow), Chandler (due to changing ground water movement patterns), and Goodyear-Liberty (also due to changing ground water patterns).

In the East Basin, lowest salinities are found in parts of Paradise Valley and in the Queen Creek area, and highest salinities occur southwest of Chandler. In the West Basin, lowest salinities occur in the northern part of the basin, and highest salinities occur to the south near the Gila River. In general, salinity increases toward the southeast in the East Basin and toward the southwest in the West Basin.

Chloride content is distributed much like salinity in ground water. According to Schmidt (1978), in 1976 chloride generally exceeded the 250 mg/l secondary standard for drinking water (see Table 3-2) in the Chandler/Gilbert area, west of Buckeye, and near the confluence of the buted much like salinity in ground content equalled or exceeded the 250 mg/l secondary standard in four areas: Buckeye-Liberty, near Tolleson, near Gilbert, and south of Guadalupe.

Nitrate content is primarily a problem in the West Basin (Schmidt, 1978). High nitrate contents have been found in ground water in the West Basin since large-scale pumping first commenced in the 1920's. Contents in a large area currently exceed the primary standard of 45 mg/l for nitrate (as NO_3). The area averages 8 miles in width and extends southwest from Deer Valley to the Hassayampa River. There are also other scattered locations throughout both basins where concentrations of 45 mg/l are exceeded. Historical well water data indicate that nitrate levels are generally decreasing in most of the West Basin east of the Agua Fria River. West of the river, primarily in the Buckeye Irrigation District, levels are increasing. Schmidt (1978) attributes increases in nitrates in the Buckeye Irrigation District to use of treated wastewater effluent for irrigation over the last 15 years. Schmidt identified these increased nitrate concentrations in the eastern part of the District (east of Buckeye).

Fluoride levels exceed the primary standard of 1.4 mg/l west of Jackrabbit Road and exceed 3.0 mg/l just west of Buckeye. Fluoride distribution is probably related to natural subsurface deposits and movement of ground water. Higher fluoride levels may be encountered in the future as deeper wells are drilled into the alluvial deposits.

Chromium content in well water of the West Basin is generally below the primary standard of 0.05 mg/l for hexavalent chromium in drinking water. However, chromium content exceeds 0.02 mg/l in the Deer Valley and Glendale areas in the West Basin. In the East Basin, chromium content often exceeds the maximum contaminant level in parts of Paradise Valley. The data suggest that these higher levels in parts of the Paradise Valley area are associated with finer-grained facies in the alluvium. Higher chromium levels are often found with higher water temperatures. Arsenic has a distribution similar to that of hexavalent chromium in Paradise Valley.

Lead content exceeds the primary standard of 0.05 mg/l in ground water in a 1-mile-wide, 10-mile-long area south of the Salt River and east of the Gila River confluence.

In summary, the major ground water quality problems at present in the Salt River Valley are increasing salinity in two areas and high contents of salinity, chromium, arsenic, nitrate, and fluorides in a number of areas in the valley. High salinity adversely affects the usefulness of water for agricultural, municipal, and industrial purposes. The other constituents affect health and may result in expensive treatment, blending with higher-quality water, or abandonment of the source for drinking water purposes.

3.2.2 AIR QUALITY

Air quality in the Phoenix area has become degraded in recent years because of urbanization and the increased number of automobiles in use. According to the Arizona Department of Health Services (1978b), the major cause of air pollution in the Phoenix area is the automobile. The major pollutants of concern in the area are photochemical oxidants (ozone), carbon monoxide, and total suspended particulates. The Phoenix metropolitan area was designated a nonattainment area for these three pollutants because of violations of both primary and secondary standards.

Current Air Quality Conditions

The Administrator of the EPA has established two sets of standards for air quality throughout the United States. Primary standards define the maximum pollutant levels allowable and necessary to protect the public health with an adequate margin of safety. Secondary standards define the maximum pollutant levels allowable and necessary to protect the public welfare from any known or anticipated adverse effects. In addition, the State of

Arizona Department of Health Services has established standard maximum levels of pollutants considered to be in the best interest of the health of the general public. The Federal and State ambient air quality standards are summarized in Table 3-4.

Summaries of 1977 air quality data for oxidants, carbon monoxide, and total suspended particulates are presented in Tables 3-5 through 3-7. Supplementary data relating to the chemical composition of particulates are provided in 1977 Air Quality data for Arizona (Arizona Department of Health Services, 1978c).

Standards for oxidants and the State standard for carbon monoxide were violated at all of the sites where those pollutants were monitored. A summary of the technical analysis for oxidants and carbon monoxide (base year 1977) for the Phoenix area is presented in Table 3-8. Concentrations of total suspended particulates (TSP) violated the State (and Federal annual) standards at all locations where TSP was measured, except at the Valley National Bank Center. The Federal 24-hour standard was exceeded at all but three locations. At the sites where nitrogen dioxide and sulfur dioxide were monitored, none of the current standards were violated in 1977.

Plans to Control Air Quality Problems

Under the Clean Air Act Amendments of 1977, nonattainment area plans must be prepared for areas in which pollutants are shown by monitored data or modelling to exceed National Ambient Air Quality Standards (NAAQS). The Nonattainment Area Plan must include control strategies demonstrating expeditious attainment of NAAQS by December 31, 1982. For carbon monoxide and oxidants an extension to December 31, 1987, is permissible, provided the plan demonstrates attainment as expeditiously as practical. To meet this test a series of "Reasonably Available Control Technologies" (RACT) for stationary pollution sources and "Reasonably Available Control Measures" (RACM) for mobile sources must be developed. The Nonattainment Area Plan for Carbon Monoxide and Photochemical Oxidants, Maricopa County Urban Planning Area was prepared by the Arizona Department of Health Services in December 1978. A plan for TSP is in preparation.

The Nonattainment Area Plan calls for three mandatory strategies, two voluntary strategies, three ongoing strategies, and a number of additional transportation and stationary source strategies. Use of these strategies is projected to lead to attainment of carbon monoxide standards in 1982 and photochemical oxidant standards in 1985, and for maintenance of these standards through

TABLE 3-4

FEDERAL AND ARIZONA AMBIENT AIR QUALITY STANDARDS
(Concentrations in ug/m^3 unless noted)

Pollutant	Averaging Time	Federal		Arizona Standard
		Primary Standard	Secondary Standard	
Photochemical oxidants (ozone)	1 hour[a]	235[b]	235[b]	160
Carbon monoxide	1 hour[a]	40 (mg/m^3)	40 (mg/m^3)	40 (mg/m^3)
	8 hour[a]	10 (mg/m^3)	10 (mg/m^3)	10 (mg/m^3)
Nitrogen dioxide	Annual	100	100	100
Sulfur dioxide	3 hour[a]		1,300	1,300
	24 hour[a]	365		260
	Annual	80		50
Total suspended particulates (TSP)	24 hour[a]	260	150	150
	Annual geometric mean	75	60[c]	75
Hydrocarbons (nonmethane)	3 hour[a]	160[c]	160[c]	160

[a]Federal standard is not to be exceeded more than once a year; State standard is not to be exceeded.

[b]As of April 10, 1979, the Federal standard for ozone (photochemical oxidants) was relaxed from 160 ug/m^3 to 235 ug/m^3.

[c]These "standards" are actually guides to be used to monitor progress in attaining other standards.

Source: Arizona Department of Health Services, 1978c

TABLE 3-5

1977 OXIDANTS DATA SUMMARY
(Concentrations in ug/m^3)

Nearest City or Town	Site Location	Annual Avgs.	1-Hr. Avgs.	
			Maximum	2nd High
Phoenix	4732 S. Central	19	187	183
Phoenix	1845 E. Roosevelt	29	310	300
Phoenix	8531 N. 6th St.	27	196	185
Phoenix	15 E. Monroe	35	220	202
Phoenix	1740 W. Adams	33	275	240
Scottsdale	2857 N. Miller Rd.	22	196	189

Source: Arizona Department of Health Services, 1978c

TABLE 3-6

1977 CARBON MONOXIDE DATA SUMMARY
(Concentrations in mg/m^3)

Nearest City or Town	Site Location	Annual Avgs.	1-Hr. Avgs.		8-Hr. Avgs.	
			Maximum	2nd High	Maximum	2nd High
Mesa	3rd Place & Center	2	24	22	13	11
Phoenix	3300 W. Camelback	2	26	24	22	21
Phoenix	4732 S. Central	2	19	19	11	11
Phoenix	8531 N. 6th St.	2	24	24	10	9
Phoenix	1845 E. Roosevelt	3	31	30	24	23
Phoenix	15 E. Monroe, Valley Bank Annex	3	46	45	21	18
Phoenix	1740 W. Adams	3	38	37	29	23
Scottsdale	2857 N. Miller Rd.	2	31	30	14	14
Scottsdale	13665 N. Scottsdale Rd.	1	7	7	5	4

Source: Arizona Department of Health Services, 1978c

TABLE 3-7

1977 PARTICULATES DATA SUMMARY
HIGH-VOLUME SAMPLER
(Concentrations in ug/m^3)

Nearest City or Town	Site Location	Annual Geom. Mean	24-Hr. Avg.	
			Maximum	2nd High
Mesa	3rd Place & Center	128	270	259
Phoenix	1845 E. Roosevelt	144	299	254
Phoenix	4732 S. Central	155	390	356
Phoenix	8531 N. 6th Street	109	281	226
Phoenix	241 N. Central, Valley Bank Center, Roof	74	497	417
Phoenix	15 E. Monroe, Valley Bank Annex, 3rd floor	113	844	678
Phoenix	1740 W. Adams	132	252	246
Phoenix	1845 E. Roosevelt	101	232	202
Scottsdale	2857 N. Miller Rd.	118	273	248
Scottsdale	13665 N. Scottsdale Rd	179	589	417

Source: Arizona Department of Health Services, 1978c

TABLE 3-8

SUMMARY OF TECHNICAL ANALYSIS FOR OZONE AND CARBON MONOXIDE (BASE YEAR 1977)
Phoenix, Arizona

	Ozone	Carbon Monoxide
Standards		
Federal standard[a]	1-hr: 160 ug/m^3	8-hr: 10 mg/m^3
Maximum recorded	310 ug/m^3	29 mg/m^3
Second highest	300 ug/m^3	24 mg/m^3
Number of violations	Approx. 175	Approx. 187
Extent of violations	Most of central metro area	Most of metro area
Emissions	(nonmethane hydrocarbons)	
Traffic (%)	56	95
Nontraffic (%)	44	5
Total emissions	223 tons/day	940 tons/day
Controls		
Present	Vehicle inspection/maintenance, computerize traffic signals, carpooling, mass transit	
Possible future	Vapor recovery Phases I & II	Increased carpooling and mass transit, various voluntary strategies (e.g., modified work schedules)
Attainment		
Goal for attainment of standard	Before December 31, 1985	Before December 31, 1982

[a]See Table 3-4.

Sources: Arizona Department of Health Services, 1978a, 1978c.

the year 2000. However, the recent revision of the Federal standard for ozone (photochemical oxidants) from 160 ug/m^3 to 235 ug/m^3 (April 10, 1979) will result in attainment of the oxidants standard in the Phoenix area by 1982. A revision of the Nonattainment Area Plan to that effect is planned. The mandatory, voluntary, and ongoing control strategies included in the plan are as follows:

Mandatory Strategies:

1. Inspection/Maintenance (I/M) of vehicles. To be continued in accordance with existing statutory requirements. The emissions inspection standard will be adjusted, as necessary, to attain the carbon monoxide standard by 1982 and to assist in the attainment of the oxidants standard by 1985. As a result of the nonattainment analysis, the emissions inspection standards became more stringent in January 1979.

2. Vapor Recovery--Stage I. To be implemented in accordance with necessary rules and regulations by no later than June 20, 1979 (process of adopting regulations extends date to April 1, 1980).

3. Vapor Recovery--Stage II. The State proposes implementation by December 31, 1982, provided a prior period of determination establishes the actual need and feasibility. EPA requires expeditious attainment of the ozone standard and, therefore, has prescribed the adoption of RACT by July 1, 1982, for this source category of hydrocarbons since the Nonattainment Area Plan does not demonstrate attainment until 1985.

Voluntary Strategies:

1. Carpooling. To be implemented on a voluntary basis and administered with the objective of improving automobile occupancy.

2. Modified Work Schedules. To be implemented on a voluntary basis with emphasis on the winter period of maximum temperature inversions.

Ongoing Strategies:

1. Traffic System Improvements

2. Mass Transit Improvements

3. Regional Development Planning

The Nonattainment Area Plan is based on Arizona Department of Economic Security (1977a) population projections for Maricopa County with allocations within the County by MAG (1978). These projections are also used by the MAG 208 Program. The Nonattainment Area Plan is compatible with the 208 plan, the regional transportation plan, and the regional development plan.

3.2.3 SALT-GILA RIVER SYSTEM DOWNSTREAM FROM 91ST AVENUE

The 91st Avenue and 23rd Avenue treatment plants discharge effluent to the Salt River that helps support vegetation downstream from the plants and is used by the Buckeye Irrigation District to irrigate crops. The vegetation supported by effluent is riparian habitat, which is biologically and aesthetically valuable in the desert environment of the study area. The expected reduction in discharges that will occur with diversion of flows to the Palo Verde Nuclear Generating Station is likely to affect this riparian vegetation, at least in some segments of the river (see p. 4-17).

The affected segments of the Salt and Gila Rivers are described in this section, with reference to available literature. Field investigations will be required in detailed studies to sample vegetation and wildlife in these sensitive affected areas.

The River System

Studies by Halpenny and Greene (1975), Halpenny and Clark (1977), Management Research, Inc. (1978), and the U.S. Nuclear Regulatory Commission (1975, 1979) provide descriptions of the river system from the 23rd Avenue treatment plant in Phoenix to Gillespie Dam (Figure 3-1). This 43-mile stretch of river contains four distinct segments. Two segments of the river are fully within the 208 metropolitan study area. Approximately one-half of the third segment is within the study area, and the fourth segment is entirely outside the study area.

The four segments of the river system are: (1) 23rd Avenue to 91st Avenue (Salt River), (2) 91st Avenue to the Buckeye Heading

(Salt and Gila Rivers), (3) Buckeye Heading to South Extension Canal Discharge (Gila River), and (4) South Extension Canal Discharge to Gillespie Dam (Gila River). Wastewater effluent from treatment plants is the major source of water supply in this system. Other sources of water are deliveries from the Salt River Project (SRP), irrigation tailwaters, drainage-well water, ground water seepage, rainfall, storm runoff, and underflow (subsurface stream flow). Major classes of water disposition are diversions for irrigation, evapotranspiration, and recharge to ground water through infiltration/percolation. Estimates of 1976 water supply and disposition for these major elements by river segments are shown in Table 3-9. A discussion of each of the segments follows, with the major emphasis on Segment 2.

Segment 1: 23rd Avenue to 91st Avenue

This segment between the two treatment plants is approximately 8-1/2 miles long. Effluent from the 23rd Avenue plant is the major source of water in the segment (Table 3-9). The effluent is discharged from the 23rd Avenue plant and flows through a canal passing McDonald Farms, where an unmeasured quantity is taken up for irrigation.

In 1976, only about 5 percent of this segment was vegetated. An estimated 210 acres were vegetated, while 4,110 acres were unvegetated (Management Research, Inc., 1978). The vegetation consisted primarily of willows, cottonwoods, and salt cedar (U.S. Nuclear Regulatory Commission, 1979), some portion of which was eradicated from the river bottom in the March and December floods of 1978.

Segment 2: 91st Avenue to Buckeye Heading

This segment of the river is 6-1/2 miles long and includes the confluences of the Salt and Gila Rivers and the Gila and Agua Fria Rivers. Effluent from the 91st Avenue treatment plant is the primary source of water supply, but some effluent from the 23rd Avenue plant also reaches this segment (Table 3-9). Effluent from the Avondale plant and the Tolleson plant (when not used for sod-growing) is discharged to this segment, but the volume of effluent is very small from these sources (Table 3-9).

From 91st Avenue to 115th Avenue (just upstream of the Salt-Gila confluence), virtually the only steady source of water is effluent. From 115th Avenue to the Buckeye Heading, other sources enter the river. These include irrigation tailwaters and deliveries of SRP water for the Buckeye Irrigation District. SRP

TABLE 3-9

ESTIMATED WATER SUPPLY AND DISPOSITION IN SALT-GILA SYSTEM
FROM 23RD AVENUE TO GILLESPIE DAM, 1976
(Thousands of Acre-feet)

River Segment	Inflow		Outflow	
Segment 1: 23rd Avenue to 91st Avenue	23rd Avenue effluent	41,800	Diversion[a]	200
	Irrigation tailwater	8,800	Evapotranspiration	3,900
	Rainfall	200	Ground water recharge	30,100
	Underflow	100	Subtotal	34,200
	Ground water seepage	300		
	Subtotal	51,200		
Segment 2: 91st Avenue to Buckeye Heading	Segment 1 flow	17,000	Diversion	0
	91st Avenue effluent	82,000	Evapotranspiration	11,900
	Other effluent	800	Ground water recharge	3,300
	Irrigation tailwater	0	Subtotal	15,200
	Upper Gila River	100		
	Rainfall	1,400		
	Underflow	400		
	Ground water seepage	1,700		
	SRP deliveries[b]	14,500		
	Subtotal	117,900		
Segment 3: Buckeye Heading to South Extension Canal Discharge	Segment 2 flow	102,700	Diversion	89,000
	Agua Fria River	0	Evapotranspiration	7,400
	Rainfall	4,100	Subtotal	96,400
	Underflow	1,100		
	Ground water seepage	5,100		
	Subtotal	113,000		

TABLE 3-9 (Cont.)

River Segment	Inflow		Outflow	
Segment 4: South Extension Canal Discharge to Gillespie Dam	Segment 3 flow	16,600	Diversion	8,200
	Hassayampa River	6,500	Pumping	7,500
	Irrigation tailwater	23,200	Evapotranspiration	47,800
	Centennial Wash	5,200	Subtotal	63,600
	Drainage wells	20,600		
	Rainfall	11,900		
	Underflow	3,200		
	Ground water seepage	14,600		
	Subtotal	101,800		

[a] The amount of effluent diverted by McDonald Farms has not been measured. In all probability, the large amount of outflow assumed by Halpenny and Clark (1977) for ground water recharge is, in part, diversions by McDonald Farms.

[b] SRP delivers 1.1 percent of all water diverted by SRP at Granite Reef Dam to the Buckeye Irrigation Company through a "feeder ditch" that enters the Gila River just above the confluence with the Agua Fria River.

Source: Halpenny and Clark, 1977; U.S. Nuclear Regulatory Commission, 1979 deliveries are made through a "feeder ditch" that discharges to the Gila River just upstream of the confluence with the Agua Fria River. The Buckeye Irrigation District diverts nearly all the flow in the river at the Buckeye Heading for irrigating crops. These diversions are discussed in the section on Segment 3.

In the 1930's, phreatophytic vegetation, mainly the non-native salt cedar, spread upstream from Gillespie Dam as far as the Tempe Narrows (Halpenny and Greene, 1975). Phreatophytes are long-rooted trees and shrubs that are usually dependent upon ground water. Heavy pumping of ground water in the Salt River Valley caused a decline in the water table, which led to the loss of most of this ground-water-dependent vegetation in the river bottom by the 1960's, with the exception of a ribbon of vegetation from the 91st Avenue treatment plant to the Buckeye Heading. This vegetation was supported by effluent from the treatment plant. The 91st Avenue plant had begun operating in 1958; by 1962, discharges were great enough for flows to reach the Buckeye Heading (Halpenny and Greene, 1975).

Although flash flooding in 1965 washed out the phreatophytes downstream from the 91st Avenue plant, the vegetation became reestablished. By 1976, over half of the river bottom in the segment between 91st Avenue and the Buckeye Heading was vegetated (3,190 acres of a total of 5,470 acres) (Management Research, Inc., 1978). Heavy flooding in 1978 eradicated some portion of this vegetation, but that which remains has not been quantified.

Prior to the flooding, a rich riparian habitat had been established in the reach of the river from 91st Avenue to 115th Avenue. The vegetation included deciduous trees such as willows and cottonwoods, as well as salt cedar, which was not as dominant as in other segments. In addition, areas of cattail marsh provided valuable wildlife habitat. Birds such as the least bittern, ruddy duck, Virginia rail, and long-billed marsh wren, which are known to breed in only a few other areas of the State, were identified in the 91st-Avenue-to-115th-Avenue reach of the river (U.S. Nuclear Regulatory Commission, 1979). The Yuma clapper rail, which is a Federally identified endangered species, was sighted twice in this reach: in 1970 near 107th Avenue along the Salt River (approximately 1-1/2 miles from the 91st Avenue treatment plant) and in 1976 near El Mirage Road on the Gila River (Todd, 1976). The preferred habitat of the clapper rail is marsh with dense emergent wetland vegetation, such as cattail and bulrush marsh. No sightings have been made since 1976, and flooding may have washed away the clapper rail habitat in 1978.

Included in the segment of the river between 91st Avenue and the Buckeye Heading are a proposed natural area, a wildlife management area, and two small segments of the Fred J. Weiler Green Belt. The Ariona State Parks Board has proposed the riverbed from 91st Avenue to 115th Avenue as a natural area. The Arizona Game and Fish Department currently maintains a wildlife management area in the riverbed near 115th Avenue. This wildlife area is supported by committed flows of 7,300 af/yr of effluent from the 91st Avenue treatment plant. Most of the Fred J. Weiler Green Belt borders the Gila River in the fourth segment of the Salt-Gila system, and it is described below.

Segment 3: Buckeye Heading to South Extension Discharge Canal

This segment covers a distance of 10 miles. Although there is little flow in the segment during the summer because of the major diversion of flows at the Buckeye Heading, a shallow water table downstream from Jackrabbit Trail sustains a considerable amount of vegetation. In 1976, approximately 65 percent of the segment was vegetated (3,800 of 5,900 acres) (Management Research, Inc., 1978). Approximately half of the segment, from Jackrabbit Trail to the South Extension Canal Discharge, is outside the study area. Jackrabbit Trail marks the western boundary of the 208 metropolitan Phoenix study area.

Diversions at the Buckeye Heading averaged 82,000 af/yr over the five-year period from 1972 to 1977 (Management Research, Inc.). Most of the diverted water is effluent (Table 3-9), but SRP deliveries to the Buckeye Irrigation District under a 1943 stipulated agreement are also part of the diversions. In 1976, a total of 152,600 af/yr of irrigation water was used in the Buckeye Irrigation District, of which effluent constituted 70,800 acre-feet, pumped water 63,600 acre-feet, SRP deliveries 14,500 acre-feet, and other surface water 3,700 acre-feet (Halpenny and Clark, 1977). Approximately 18,000 acres are farmed in the District.

Rights of the District to divert water at the Heading were established in 1917 under the Benson-Allison Decree. This decree set forth priorities for diversions for irrigation of 19,865.5 acres of land serviced by the Buckeye Irrigation Company. The decree authorized diversions of more than 400 cubic feet per second at the Heading. Under the decree, Maricopa County Superior Court retained jurisdiction over the waters subject to appropriation; and the uses of any waters in the Salt and Gila Rivers below Joint Head Dam (a structure that was located in the Salt River at approximately 48th Street) are still subject to judicial supervision.

When effluent from the 91st Avenue treatment plant began to be available in quantity in the late 1950's, the District entered negotiations with the City of Phoenix to secure an assured supply of effluent for irrigation. Although the Benson-Allison Decree gives priority to the District to divert water at the Buckeye Heading, the District acted to obtain an agreement with the City that would guarantee that a fixed quantity of effluent would be discharged to the river each month. The agreement, signed in June 1971, provided for the Buckeye Irrigation Company to withdraw claims relating to floodwaters stored behind Horseshoe Dam and to pay for and receive 2,500 acre-feet of effluent each month for a term of 40 years, with the effluent measured at the 91st Avenue treatment plant at the point of discharge into the Salt River (Halpenny and Greene, 1975). When the pipeline to the Palo Verde Nuclear Generating Station is completed, this commitment of effluent will be carried to the District through the pipeline. Although the agreement specifies a monthly quantity of effluent, the commitment is usually converted to 30,000 af/yr.

Segment 4: South Extension Discharge Canal to Gillespie Dam

This 18-mile segment is bordered almost entirely by riparian vegetation consisting largely of salt cedar and other phreatophytes, which are supported by surface water flows from a variety of sources (Table 3-9) and by a very shallow ground water table. The vegetation is part of the Fred J. Weiler Green Belt, which is a 63,000-acre resource conservation area set aside in 1970 by the U.S. Bureau of Land Management for purposes of preserving wildlife and other important natural values. The Green Belt extends in scattered parcels of public land along the Gila River from the town of Liberty to the town of Date Palm.

The Green Belt is considered by biologists to be one of the finest white-winged dove habitats in the nation. Concentrations of one hundred nests per acre are not uncommon in some flood plain thickets along the Green Belt. Waterfowl and shorebirds migrate through the Green Belt. Many winter there, while others stop for food and rest in spring and fall. Mallards, pintail, teal, redheads, and canvasback are some of the popular duck species. Canada geese are also frequent visitors. Herons, egrets, yellowlegs, and Wilson's snipe are among the many shorebirds that use the Green Belt marshes. Gambel's quail also thrive in the area.

Besides migratory and upland game birds, the Green Belt is also inhabited by mule deer, bobcat, fox, coyote, racoon, and javelina. Songbird species are plentiful, with most of the common desert birds nesting in the thickets. Songbirds such as cardinals, finches, hummingbirds, orioles, tanagers, woodpeckers, flickers, and roadrunners, plus a wide variety of hawks and owls, and a diverse assemblage of toads, lizards, frogs, and snakes, attract naturalists from all over the country to the Green Belt.

3.2.4 POPULATION AND LAND USE

The rapid population growth in the Phoenix area dominates regional planning. In particular, planning for wastewater treatment is keyed to expected patterns of growth. The recent history of the Phoenix area shows heavy inmigration with accompanying expansion of low-density urbanization. This pattern is expected to continue over the next 20 years and into the twenty-first century.

Population

Maricopa County is one of the fastest growing counties in the United States. Its population has roughly doubled every decade between 1940 and 1960, and between 1960 and 1977, as indicated in Table 3-10. Heavy inmigration to the Phoenix metropolitan area has been the principal cause of the County's growth and has resulted in a population composed of more young households than the national average.

In 1975, the estimated total population within the metropolitan area was 1,233,530 persons, representing 93 percent of the population of the County. The majority of the area's population is concentrated in the larger cities of Phoenix, Scottsdale, Tempe, Mesa, and Glendale. Most of the outlying, smaller communities in the County are within sparsely populated planning areas.

The racial composition of Maricopa County is shown in Table 3-11. The largest minority in the County is the Mexican-American group, indicated in Table 3-11 as "Spanish heritage." This group accounts for approximately 15 percent of the total population of the area, while blacks and Indians comprise 3 percent and 1 percent of the population, respectively.

Population projections for the County indicate that the population will reach 2,297,000 by the year 2000, with 2,260,000 persons living in the metropolitan area (see Table 2-1). These projections were made by the Arizona Department of Economic Security, the designated State planning agency.

TABLE 3-10

MARICOPA COUNTY POPULATION[a]
1940-1977

Year	Total Population	Absolute Increase	Percentage Increase
1940	186,193		
1950	331,770	145,577	78.0
1960	663,510	331,740	99.9
1970	971,228	307,718	46.4
1977	1,292,000	320,772	33.0

Source: Valley National Bank, 1977

TABLE 3-11

POPULATION OF MARICOPA COUNTY BY RACIAL AND ETHNIC GROUP, 1975

Racial/Ethnic Group	Number	Percent[a] of Total
White	1,183,000	95.00
Black	40,000	3.22
Indian	14,000	1.14
Other	8,000	.64
Total	1,245,000	100.00
Spanish heritage[b]	181,770	14.60

[a]Percentages are applied to total population and rounded.

[b]Generally included in counts for "White" population.

Source: Maricopa Association of Governments, 1978; Arizona Department of Economic Security, 1976

Land Use

The Phoenix metropolitan area encompasses approximately 2,300 square miles, or 1,472,000 acres. Land use changes in the area over the past 30 to 40 years have consisted primarily of the urbanization of irrigated fields and orchards and natural desert grazing land. The 1975 mix of urban use categories and various open-space categories is presented in Table 3-12.

About 18 percent of the land area is devoted to urban uses and parks, while the remaining 82 percent is classified agricultural and natural acreage. Much of this land has been mapped and classified as prime farmland by the U.S. Department of Agriculture Soil Conservation Service. No unique farmland was identified. Agricultural land use is about equally divided between west and southeast portions of the study area. Natural acreage is located largely in the northern portion of the study area in more mountainous terrain.

Urban development is centered in downtown Phoenix. Commercial enterprises and government offices are concentrated in the downtown area and along Central Avenue. Outlying residential areas and local service and trade industries begin to occupy land adjacent to agricultural operations outside a 4- to 5-mile radius of downtown Phoenix. Residential areas, shopping centers, and "strip" commercial developments along major arteries characterize the urbanization in Phoenix.

Continual outward expansion of the metropolitan area during the last 20 years has formed an extensive contiguous urban area. This growth resulted in the rapid development of Scottsdale and Paradise Valley to the east, Tempe and Mesa to the southeast, the Maryvale-Glendale area to the west, and the Sun City retirement community to the northwest of downtown Phoenix.

Nearly three-fourths of County land is owned by Federal, State, and Indian governments. The metropolitan area contains a considerable amount of Arizona State Trust Lands to the north and west of Phoenix that may be fully developed for urban use in the future, according to the Arizona Land Department.

In contrast, three Indian communities on the eastern and southern perimeters of the study area act, to some extent, as buffers to urban development (see Figure 3-1). The Fort McDowell Indian Community encompasses 24,680 acres and is located northeast of Phoenix. The Salt River Pima-Maricopa Indian Community to the east includes 49,300 acres, and the Gila River Indian Community

TABLE 3-12

LAND USE IN THE URBAN STUDY AREA[a]

Use	Acres	Percent of Study Area
Residential	138,163	9.4
Commercial	32,597	2.2
Industrial	20,867	1.4
Transportation	10,490	.7
Open space (dedicated)[b]	62,664	4.3
Agriculture	366,574	24.9
Natural	840,045	57.1
Total	1,471,400	100.0

[a]Data from Arthur Beard Engineers (1978b) for the more urbanized portion of the study area were aggregated with estimates of land use proportions for the outlying territory, using maps prepared by the U.S. Department of Agriculture and the Maricopa Association of Governments.

[b]Includes regional parks and recreation areas.

includes 372,000 acres in Maricopa and Pinal Counties. While these lands belong to the Indians, the lands are held in trust for them by the Federal government.

Development on Indian lands is controlled by the Tribal Council of each community. In general, the Tribal Councils have attempted to retain control of the land, keeping it mainly in agricultural use. However, there are pressures, both from within and without the tribal communities (particularly the Salt River Indian Community because of its proximity to east Scottsdale) to develop these lands for urban purposes. The extent to which the Tribal Councils succumb to these pressures will affect both the Indian Communities and the development patterns of the surrounding area.

Chapter 4
Environmental Consequences

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter presents descriptions and analyses of the most important beneficial and adverse impacts of the proposed action. An introduction to the impact analysis appears in Section 4.1. Impacts that stem from the proposed action--the point source metro wastewater management plan--are presented in Section 4.2, along with measures to mitigate. General impacts of regional growth, which is supported by the plan, are presented in Section 4.3. Remaining sections in the chapter are as follows: Section 4.4, Unavoidable Adverse Impacts; Section 4.5, Irreversible, Irretrievable Commitments of Resources; and Section 4.6, Short-Term Uses of the Environment vs. Long-Term Enhancement.

4.1 INTRODUCTION

The objective of this EIS is to explain clearly the basis of EPA's proposal and to provide full public disclosure of impacts. It is also intended that this analysis provide a foundation for more detailed impact assessments of the individual wastewater treatment plants and interceptors that comprise the facilities plan. This process of impact assessment is called "tiering." In the case of some entities which will be applying for 201 construction grants for specific facilities, the EIS may provide sufficient coverage to allow for declarations of no significant impact.

The impact assessment for the EIS was guided by two major considerations.

First, the proposed action is a plan to improve and protect water quality in the Phoenix area; hence, most of the impacts of the plan are beneficial. Provision of physical and institutional means for upgrading and operating the areawide wastewater treatment system will improve and protect the environment. Wastewater discharges will be of higher quality than they are today, surface water quality standards will be met, effluent will be reused to a greater degree, and planned-for growth will be accommodated by the provision of wastewater treatment. This growth, however, will result in adverse impacts to the environment, principally because of low-density urban expansion. Accordingly, the impact assessment in this chapter shows both the net beneficial impacts of the plan itself and the net adverse impacts of growth in the Phoenix area over the next 20 years.

Non-growth-related impacts of the selected plan (both direct and indirect impacts) are presented first (Section 4.2). These impacts are primarily beneficial, although some adverse impacts are also identified. Statements in Section 4.2 should be read with the recognition that they do not reflect impacts of urbanization associated with the plan. The impacts of the plan's support of growth are presented separately in Section 4.3.

Impact analysis in Section 4.3 is based on the premise that provision of wastewater treatment in the Phoenix area will not induce significant additional population growth. Trends for the area show that inmigration has been caused and will continue to be caused by strong forces--such as economic opportunities, retirement amenities, and the favorable climate--that are unrelated or marginally related to wastewater treatment. However, provision of sewage treatment for the area does mean that the projected increases in population can be readily accommodated.

In Section 4.3, the future of the Phoenix area with the selected wastewater treatment plan is compared to conditions that would develop without any additional municipal wastewater treatment facilities ("without-project" conditions). This presentation shows that, for the most part, the selected wastewater treatment plan mitigates many adverse impacts which would otherwise have a high likelihood of occurring in the without-project future.

The second major aspect of the impact assessment concerns the scope of the proposed action. This action is a broad plan that requires coverage of impacts of the plan as a whole on the metropolitan Phoenix area. In addition, sufficient coverage of impacts of the individual facilities is required to provide a foundation for more detailed site-specific environmental evaluations later on in the planning process. In general, the EIS emphasizes areawide impacts of the plan as a whole, or local impacts with areawide significance.

Local impacts of the facilities are displayed on an impact matrix (Figure 4-1, map pocket), and local impacts of areawide significance are discussed in the text of this chapter. More detailed facility planning and environmental work will be required to quantify and evaluate fully many of these facility-specific impacts.

Impacts were determined on the basis of facility plans and environmental studies from the latter phases of the MAG 208 Program. Although facility plans were developed somewhat generically in these phases, the level of detail of the work was sufficient to identify potential environmental problems of the facilities and to permit an analysis of the impacts of the areawide alternatives.

4.2 IMPACTS OF THE SELECTED PLAN

4.2.1 WATER RESOURCES IMPACTS

Implementation of the selected 208 point source plan for the Phoenix area will result in improving the quality of discharges from wastewater treatment plants, leading to better surface water quality in stream segments affected by the discharges. In addition, the plan's effluent reuse schemes will increase the amount of effluent reused and help improve effluent distribution for agricultural irrigation, energy production, and biological enhancement. Effluent reuse could, without mitigation, adversely affect ground water quality in two locations, but, in general, elements of the plan will have little or no effect on regional ground water.

These surface and ground water impacts are described in the following subsections.

Improvement of Discharges and Surface Water Quality

One of the requirements of the Final Point Source Management Plan (MAG 208 Program, 1979c) is that all discharges from existing, expanded, upgraded, and new facilities will be in compliance with discharge requirements established by EPA and surface water quality standards established by the State of Arizona. Under the selected plan, MAG is responsible for assuring that discharges from facilities meet standards in the planning area. The SROG Boards are responsible for notifying MAG of any violations of NPDES permits or State standards. Lead agencies in the SROG's have day-to-day responsibility for operating the treatment plans, for notifying the SROG Boards of violations (see pp. 2-41 - 2-42), and for protecting the treatment works.

Currently, discharges from the 23rd Avenue and 91st Avenue treatment plants, which treat 80 to 90 percent of the area's sewage, do not meet NPDES permit requirements. Recent Arizona Department of Health Services inspection reports on these plants identified deficiencies of operation and specific effluent requirements that were not being met (see pp. 2-18 - 2-19). In particular, lack of disinfection of effluent prior to discharge has resulted in fecal coliform concentrations in discharged wastewater that are a thousand times or more above NPDES requirements and State surface water quality standards.

The addition of adequate disinfection facilities at the plants and improved plant operation and maintenance procedures as called for in the wastewater management plan will lead to these plants meeting discharge requirements. Thus, 80 to 90 percent of the area's sewage that is inadequately treated will be brought up to standard with implementation of the selected plan. The remaining 10 to 20 percent of the area's sewage will be treated at nine other treatment plants. These plants will also treat effluent to levels specified by NPDES permits if discharges occur. Assurance that treatment plants will meet requirements is specified in the selected plan as the responsibility of MAG, the SROG's, and the lead agencies.

The stream segment primarily affected by discharges is the portion of the Salt River immediately downstream from the 91st Avenue Plant. Flow in this segment is largely effluent from the 91st Avenue and 23rd Avenue treatment plants and currently does not meet existing or proposed surface water quality standards. (See pp. 3-24 - 3-25 for a characterization of this effluent-dominated flow and Appendix A for summaries of the water quality standards.) Proposed standards for this segment of the Salt River would allow use of the water for partial body contact (recreation), agricultural irrigation, and riparian habitat (Appendix A). The fecal coliform criterion for these protected uses is 1,000 units per 100 ml, which is also the requirement for fecal coliform in the recently revised NPDES permits[1] for the 91st Avenue and 23rd Avenue treatment plants. Properly operating secondary treatment and disinfection processes at the treatment plants are expected to result in the effluent-dominated flow meeting the standards for fecal coliform and other surface water quality standards for this segment of the river.

Other treatment plants that are in violation of NPDES permit requirements are located at Avondale/Goodyear and Luke AFB. Under the selected plan, these plants would be phased out. Sewage treatment needs of Avondale/Goodyear would be met by the proposed Reems Road plant, with effluent used for near-site agricultural irrigation. Treatment needs of Luke AFB would be handled by the 91st Avenue plant.

Discharge at the Buckeye treatment plant currently meets NPDES permit requirements, and compliance with requirements is expected to continue over the planning period.

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[1]The requirement for fecal coliform was changed from 200 units per 100 ml to 1,000 per 100 ml, according to the Consent Decree between the City of Phoenix and EPA adjudicated May 10, 1979.

At Chandler, Tolleson, and Williams Air Force Base, the selected plan proposes increased reuse of treated effluent for agricultural irrigation, turf farming, and golf course irrigation. It is expected that only the Tolleson plant will be discharging effluent to a water body, since Chandler and Williams Air Force Base will employ total reuse priorities. Discharges from the Tolleson plant will occur when flows exceed the demand for irrigating the near-site turf farm. Discharges at Tolleson are currently well within NPDES permit requirements, and it is expected that discharges in the future will meet requirements.

Effluent Supply and Distribution

Population growth in the Phoenix area will result in increased wastewater flows. Wastewater supplies will increase over the present by approximately 50 percent (149,000 to 223,000 af/yr) by the year 2000. Effluent will be beneficially used in irrigating crops, producing electrical energy, and maintaining and creating wildlife habitat. A portion of the treated wastewater produced in the area was being used or planned for these uses prior to development of the MAG 208 Plan. In particular, the commitment of up to 140,000 af/yr of effluent to the Arizona Nuclear Power Project (ANPP)[1] was made prior to 208 planning.

Implementation of the plan will bring about increased reuse of treated wastewater over a wider area than before, as shown in Table 4-1. Currently, approximately 25 percent of the treated wastewater is committed to reuse. By the year 2000, approximately 95 percent of the effluent will be committed to reuse. Of this 95 percent, about 83 percent of the effluent was arranged for reuse prior to 208 planning.

Treated wastewater will also be reused over a greater area, as shown in Table 4-1. Prior to 208 planning, a small amount of treated wastewater (1,100 af/yr) was being reused in the southeast portion of the study area. This amount will increase by more than thirteen-fold during plan implementation. Large increases in reuse will also occur in the west central and southwest portions

[1]ANPP refers to the consortium of utilities that will own and operate the Palo Verde Nuclear Generating Station. Arizona Public Service Company is the project manager for the station. The contract for effluent was negotiated between the cities in the Multi-City Sewer Agreement and Arizona Public Service and the Salt River Project in 1973.

TABLE 4-1

EFFLUENT REUSE COMMITMENTS
(Acre-Feet per Year)

Wastewater Supply[a]	Treatment Facility	Reuse	Amount of Committed Effluent[b]	Location in Study Area
		Year 1979		
	Gilbert	Irrigation	1,100	Southeast
	Tolleson	Turf farm irrigation[c]	400	W central
	23rd Ave.	McDonald Farms	–[d]	Central
	91st Ave.	Buckeye Irr. District	30,000[e]	Southwest
		AZ Game & Fish Dept.	7,300	Southwest
149,000			38,800+	
		Year 2000		
	Gilbert	Irrigation	4,000	Southeast
	Chandler	Irrigation	9,200	Southeast
	Tolleson	Turf farm irrigation[c]	2,000	W central
	23rd Ave.	Roosevelt Irr. District	20,000[f]	W central
		McDonald Farms	–[d]	Central
	91st Ave.	Buckeye Irr. District	30,000[e]	Southwest
		AZ Game & Fish Dept.	7,300	Southwest
		AZ Nuclear Power Proj.	140,000[g]	W of area
	Reems Rd.	Irrigation	6,000	Southwest
223,000			218,500+	

[a]Rounded to nearest 1,000.

[b]Rounded to nearest 100.

[c]Occasional bypass from turf farm to Salt River occurs.

[d]Undetermined amount of 23rd Avenue effluent used by McDonald Farms.

[e]Contract amount. Actual amount of effluent currently diverted by Buckeye Irrigation District is approximately 82,000 af/yr (Management Research, Inc., 1978).

[f]Effluent must be treated for unrestricted agricultural use and transported to the Roosevelt Irrigation District. This commitment is secondary to Arizona Nuclear Power Project commitment.

[g]Contract amount. Amount of effluent projected for use by 5 units at the Palo Verde Nuclear Generating Station is 107,000 af/yr (21,400 af/yr for each unit). See Appendix C.

of the study area (Table 4-1). The largest reuse will occur outside the study area and outside the Salt River Valley at the Palo Verde Nuclear Generating Station near Buckeye. Although not all of the 140,000 af/yr of optioned effluent is expected to be used on an annual basis by the station, the commitment to ANPP still represents the single largest commitment of effluent over the planning period. Five units at the station are projected to use 107,000 af/yr of effluent, with peak monthly demand varying from 2,200 to 2,600 af/mo (see Appendix C).

Ground Water Impacts

Ground Water Quality

Sources of potential ground water pollution in the selected plan include: (1) leaking sewers, (2) seepage from treatment lagoons and storage ponds, (3) leachate from residual sludge reuse or disposal sites, (4) recharge of effluent used for agricultural irrigation, and (5) recharge of effluent discharged to stream beds. These sources are not considered to be great enough cumulatively to represent a significant adverse impact to regional ground water quality. Some potential adverse local effects of significance can be identified. However, these effects can be mitigated. It should also be recognized that MAG has begun a major program to protect ground water quality.

Data collected in the 208 program indicate that adverse impacts have occurred locally in the past as a result of seepage from lagoons, discharge to stream beds, and irrigation with effluent (Schmidt, 1978; MAG 208 Program, 1979d). Pollution from leaking sewers has not been documented locally, but it has recently been recognized as a significant source of pollution in other parts of the country. Sewage sludge and effluent used for irrigation are the most significant sources of potential ground water pollution associated with the proposed action.

Sewage sludge can pollute ground water when it is placed in sludge drying beds from which percolation can occur. Also constituents in sludge located in stockpiles, landfills, and on farmland can leach into subsurface materials and ultimately ground water. Numerous trace elements in raw sewage become concentrated in sludge after treatment. Nitrogen, lead, chromium, arsenic, and total salt concentrations would be of concern as potential ground water pollutants.

Sludge management is receiving further study in the residuals/effluent facility plan for the 91st and 23rd Avenue plants and in ongoing regional planning. Agricultural spreading, sale of sludge, and landfilling are some of the options for disposal that will be studied. In the case of landfills, sites should be carefully chosen, measures taken to prevent leaching of constituents, and monitoring of ground water beneath sites undertaken. These steps would be mandated by new requirements of the Arizona Department of Health Services for landfills. In addition, MAG and EPA are developing requirements. Impacts of sludge and landfilling are discussed in detail in Nonpoint Sources of Pollution, Final Report (MAG 208 Program, 1979d).

Effluent used in agricultural irrigation is a potential source of pollution that could affect ground water underlying irrigation sites. The primary constituents of concern in effluent used for irrigation are total nitrogen and organic compounds. If chlorination is used to disinfect effluent, chlorinated hydrocarbons are also potential pollutants of concern. Maximum contaminant levels for nitrates and some organic compounds (primarily constituents of pesticides) have been established by EPA under the Safe Drinking Water Act. Nitrates at high levels in drinking water cause illness, and refractory organic compounds have a range of deleterious effects. Chlorinated hydrocarbons are potential carcinogens.

The selected plan increases reuse of effluent over the present, with agricultural irrigation one of the major reuses. Small lagoon systems in the plan were designed for near-site reuse of effluent for irrigation. For purposes of calculating acreages needed for reuse sites, nutrient uptake rates were identified for crops used in the proposed cropping patterns and loading criteria for nutrients were determined. The accepted range for nitrogen and the adopted design value used in the MAG 208 Program are shown in Table 4-2.

As may be seen in Table 4-2, the upper limit in the range of suggested uptake rates for nitrogen was used in most cases, resulting in the use of high loadings of nitrogen in designing reuse schemes and calculating the required acreages for crops. If these design loadings are used and the uptake of nitrogen by crops falls short of maximum, it is likely that nitrate levels in ground water beneath reuse sites will increase. This is of particular concern at two sites: Tolleson and north Gilbert.

The Tolleson plant and near-site turf farm operation are upgradient of Tolleson and Cashion, and public water supply could be impacted by high nitrates or refractory organic compounds. The nitrogen loadings in effluent applied to the turf farm need to be

TABLE 4-2

NITROGEN UPTAKE RATES
(Lbs/acre/year)

Crop	Range[a]	Design Value
Cotton	66-100	100
Alfalfa	155-480	400
Wheat	50-81	75
Sorghum	250	250
Bermuda	350-600	600
Rye	180-250	250

[a]The range for uptake rates was taken from: Wastewater Treatment with Land systems and Land Treatment by Municipal Wastewater Effluents: Design Factors II (U.S. Environmental Protection Agency, 1975, 1976).

Source: MAG 208 Program, 1979b

evaluated carefully, and a more conservative approach to loadings is recommended in light of the potential for ground water degradation. In addition, a monitoring program of soil and ground water in the vicinity of the reuse site is warranted, including installation of suction cups and monitor wells on the site. The monitoring program should be reviewed annually and the operation altered if ground water quality degradation occurs.

Irrigation with effluent, as well as seepage from lagoons, could also adversely affect ground water beneath the proposed north Gilbert reuse site. Ground water beneath the site is suitable for municipal supply, and the facility is in close proximity to a municipal well field. These factors contribute to the potential for adverse ground water impacts to occur. Nitrogen loadings in the irrigation waters should be carefully evaluated at the reuse site, and soil and ground water beneath the site monitored regularly as part of the reuse operation.

Although the potential for recharge or percolation of effluent to ground water exists at other reuse sites, the existing ground water beneath these sites is already poor and adverse effects are therefore not expected to be significant.

In summary, nitrogen loadings used in planning for irrigation with effluent may lead to increased concentrations of nitrates in ground water beneath effluent reuse sites, particularly in the case of the Tolleson and north Gilbert facilities. The loadings should be evaluated in further planning. A conservative approach to the loadings is recommended. Monitoring of soil and ground water is also recommended at any site underlain by moderate to good quality ground water, and especially at any site close to municipal supply wells.

Ground Water Quantity

Ground water quantity will be primarily affected by the export of substantial volumes of effluent to the Palo Verde Nuclear Generating Station in the Lower Hassayampa area west of Buckeye. This commitment of effluent was made prior to 208 planning. By the year 2000, 107,000 af/yr of effluent is estimated to be required by 5 units operating at the station, with up to 140,000 af/yr of effluent optioned (see Appendix C).

The export of this amount of effluent from the Salt River Valley will have an adverse impact on regional ground water supplies, which are currently being overdrafted. The 107,000 af/yr of effluent projected for use at Palo Verde in the year 2000 represents approximately one-tenth of the 1975 overdraft amount of 1 million af/yr estimated by the Arizona Water Commission (1978) for the Salt River Valley. Locally, but outside the 208 study area, ground water overdraft in the Lower Hassayampa area will be prevented by use of imported effluent, assuming that local ground water supplies would be an alternate source of water for Palo Verde.

Incidental export of salt occurs with the export of effluent to Palo Verde. This is considered beneficial for salt balance in the Salt River Valley, but it could adversely affect ground water in the Lower Hassayampa area, depending on the disposition of salts. If 107,000 af/yr of effluent at an average salinity of 800 mg/l are imported to the site, the annual amount of imported salt would be about 117,000 tons.

4.2.2 AIR QUALITY IMPACTS

Minor local, short-term air quality changes will occur during construction phases of the wastewater management plan. These changes will consist principally of increases in fugitive dust. Increases in dust will occur most often during excavation and laying of interceptor lines in the more highly developed northwest, northeast, and eastern portions of the metropolitan area. Dust associated with construction is subject to State fugitive-dust control regulations, which will be complied with during facility construction.

Compatibility with the Nonattainment Area Plan

On a regional scale, carbon monoxide, photochemical oxidants (ozone), and total suspended particulates (TSP) are problem pollutants in the Maricopa County Urban Planning Area, and the area has been identified as a nonattainment area for these pollutants. The primary cause of TSP in the metropolitan Phoenix area is the reentrainment of windblown soil particles and dust from undeveloped, sparsely vegetated desert lands and from croplands peripheral to the area. Automobile emissions are the primary cause of carbon monoxide problems and contribute significantly to ozone problems.

The number of automobiles, their time in use, and hence the amount of emissions produced are largely dependent on the population distribution in the area. Population projections for Maricopa County used in the MAG 208 Program were those developed by the Arizona Department of Economic Security (DES) (1977). Population distribution within the County was allocated by MAG

(1978). (See Table 2-1, p. 2-5.) These same projections were used by the Arizona Department of Health Services (1978a) in preparation of the Nonattainment Area Plan for Carbon Monoxide and Photochemical Oxidants. (See pp. 3-19 to 3-29 of the Nonattainment Area Plan for a complete listing of assumptions used in modeling vehicle emissions.)

The Nonattainment Area Plan was unofficially submitted to EPA in December 1978 and the official submittal was partially completed with the transmittal of the revised inspection/maintenance program in March 1979. The State is currently in the process of adopting rules for constructing or modifying major new sources. These additional rules should be submitted in August 1979. EPA expects to approve most of the Nonattainment Area Plan by September 1979 and the entire plan by February 1980. The plan is consistent with the MAG 208 Plan on the basis of shared population assumptions and the jurisdictional review of MAG (see p. 11-1 of the Nonattainment Area Plan). In addition, both plans were developed under a memorandum of agreement between MAG and the Department of Health Services. This memorandum provides for integration of work plans and consistency of data and control strategies relative to the two plans. The text of the memorandum is included in Appendix E.

Compliance with the Clean Air Act Amendments

Section 316 of the Clean Air Act Amendments of 1977 provides that the Administrator of the EPA may under certain circumstances withhold, condition, or restrict grants to applicants for construction of sewage treatment plants. These circumstances include cases in which:

1. Such treatment plant will not comply with Section 111 of the Clean Air Act Amendments regarding the emission standards of performance for new stationary sources, or with Section 112 regarding national emission standards for hazardous air pollutants.

2. The state involved does not have in effect, or is not carrying out, a State Implementation Plan approved by the Administrator which expressly quantifies and provides for the increase in emissions of each air pollutant, which increase may reasonably be anticipated to result directly or indirectly from the new sewage treatment capacity which would be created by such construction.

3. The construction of such treatment plant would create new sewage treatment capacity which:

   a. may reasonably be anticipated to cause or contribute to, directly or indirectly, an increase in emissions of any air pollutant in excess of the increase provided for the area concerned in the state implementation plan, or

   b. would otherwise not be in conformity with the applicable state implementation plan

4. Such increase in emissions would interfere with, or be inconsistent with, the applicable state implementation plan of any other state.

The point source metro wastewater management plan complies or does not comply with these requirements as follows:

1. Treatment plants included in the plan do not use incineration or other processes that will result in direct emission of air pollutants. Therefore, no emissions standards will be violated by the plants, per sections 111 and 112 of the Clean Air Act Amendments.

2. The State of Arizona has in effect a state implementation plan prepared under the Clean Air Act of 1970. Nonattainment area plans, which are revisions to the State Implementation Plan, are in various stages of completion and are intended to meet the requirements of the Clean Air Act of 1977. The Nonattainment Area Plan for Carbon Monoxide and Photochemical Oxidants, Maricopa County Urban Planning Area, was informally submitted to EPA in December 1978, and the implementing regulations for the control strategies of vehicle inspection/maintenance and vapor recovery were submitted in 1979. The Nonattainment Area Plan will undergo further revision as a result of the recent relaxation of Federal standards for ozone. The State Implementation Plan has not yet quantified and provided for the emissions associated with the 208 plan.

3. The wastewater treatment system proposed for the Phoenix area will provide for treatment of flows of 206.5 mgd in the year 2000 for a population of 2,268,000 in the metro area. The year 2000 population for the municipal planning area used in the Nonattainment Area Plan (an area

smaller than the metro area as defined in the MAG 208 Program) is projected by DES to be 2,055,800. Vehicles miles traveled (VMT) in the year 2000 are projected to be 39.09 (x 10^6) for this population. No treatment capacity will be provided by the proposed system as a whole, or by individual treatment plants, that will cause an increase in emissions over the emissions projected in the Non-attainment Area Plan.

4. The Phoenix metropolitan area is not contiguous with any other state, and there is no evidence to demonstrate that air quality strategies in Maricopa County significantly affect air quality in neighboring states.

Impact of Salt River Outfall Excess Capacity

Although no treatment plants are included in the selected wastewater management plan that support additional or unplanned-for growth in the Phoenix area, one inconsistency in population distribution has been identified in the interceptor system. This inconsistency involves approximately 8 miles of the Salt River Outfall (SRO), an existing interceptor which carries flows from Phoenix, Scottsdale, Mesa, and Tempe to the 91st Avenue treatment plant.

The City of Phoenix sized the SRO to handle flows from Phoenix to and beyond the year 2000. However, before the year 2000, capacity owned in the SRO by Scottsdale, Mesa, and Tempe will not be sufficient to carry portions of their flows to the 91st Avenue plant. In the year 2000, Phoenix will own excess capacity of approximately 7 to 8 mgd in the SRO. This excess hydraulic capacity could service an additional 80,000 people if treatment capacity in the 91st Avenue plant were expanded to handle flows. Phoenix has objected to making optimal use of the SRO by sharing capacity it owns. Therefore, MAG has proposed that additional flows from Scottsdale, Mesa, and Tempe would be handled by the proposed Southern Avenue Interceptor, rather than the SRO, allowing the excess capacity to remain in the SRO for use by Phoenix beyond the year 2000. EPA cannot now approve this proposal to build excess capacity in the Southern Avenue Interceptor. (See p. 2-51 for additional explanation.)

4.2.3 BIOLOGICAL RESOURCES IMPACTS

Net Effects of the Plan

Construction of treatment facilities in the selected plan will result in removal of portions of cropland, saltbush, and creosotebush-bursage communities. The saltbush and creosotebush-bursage communities that will be removed were found to have generally lower biotic habitat values, primarily as a result of intensive human encroachment in the study area. These communities, along with the paloverde-saguaro and riparian communities, will also undergo change due to plant operations and associated habitat management schemes. Terrestrial habitat losses of 700 acres can be offset by creation of 390 acres of similar or improved habitat (Table 4-3), depending on the biological habitat development scheme selected for each wastewater treatment plant (Dames & Moore, 1978).

Despite some habitat losses, net biological changes throughout the area are expected to be beneficial as a result of implementation of the plan (Table 4-3). This is expected because increased water supply will enhance riparian habitat and associated aquatic conditions that in turn will contribute to wildlife diversity, particularly aquatic, semiaquatic, riparian-dwelling, and certain upland wildlife. A major loss of riparian habitat is expected to occur with reduced discharges of effluent to the Salt River (see below).

More than a fifteen-fold aquatic habitat increase can be realized with the selected plan (Table 4-3). This increase could result from operation of aeration ponds and impoundments for storing treated wastewater for irrigation (Dames & Moore, 1978). Depending on the development scheme that is chosen, aquatic habitat can be managed to support waterfowl, songbirds, game birds, and fish. This habitat can also increase the biological diversity of the study area and improve the area's overall biological resources.

No habitat that would be affected by the construction or expansion of wastewater treatment facilities is known to presently support species of wildlife on the Federal list of threatened and endangered wildlife and plants (U.S. Department of Interior, Fish and Wildlife Service, 1979). Changes in effluent discharges from the 91st Avenue treatment plant may affect riparian habitat in the Salt and Gila Rivers that is maintained by effluent flows. The Yuma clapper rail, which is an endangered species on the Federal list, was sighted in 1970 and 1976 in marshy areas downstream from

Table 4-3

SUMMARY OF BIOLOGICAL IMPACTS[a]

Impact	Terrestrial Habitat: Acres[b]	Terrestrial Habitat: Habitat Unit[c,d]	Aquatic Habitat: Area[b]
Losses	700	26,000	20
Gains	390	15,000 to 36,000[e]	330

[a]Impacts are based on land areas, locations, and operational activities identified in the MAG 208 Plan. Changes in location, area, or operation of systems will require reanalysis of biological impacts.

[b]Rounded off to nearest 10 acres.

[c]Rounded off to nearest 1,000 units.

[d]Habitat units are measures of habitat quality, based on the condition of the habitat, the relative value of major habitat types, and the extent of the habitat affected.

[e]Potential differences are due to various habitats that could be developed for each treatment plant.

the 91st Avenue plant (Todd, 1976). However, no sightings have been made since 1976, and it is likely that the floods of 1978 drastically altered potential habitat for the rail. The Yuma clapper rail and wastewater treatment will be studied in more detail during facility-specific planning.

Threatened and endangered flora on the Federal list have not been found in the affected areas. Some State-protected flora, particularly species of the cactus family, will be encountered during facility and interceptor line construction. These plants will be handled in accordance with the Arizona Native Plant Law (Arizona Revised Statues, 1976).

Biological Enhancement Opportunities

Water resources and water-based habitat are naturally scarce in the desert areas of Arizona. The construction and operation of treatment lagoons and storage ponds for effluent reuse offer the opportunity to develop biological resources and to expand the multiple uses of water. In addition, the development of these resources can provide opportunities for recreational land uses such as hunting and bird watching.

Several components and operational schemes associated with wastewater treatment facilities provide opportunities for biological enhancement. These include: (1) impoundment of water in the treatment process, (2) transportation of water from the treatment plant in open ditches, (3) discharge of water into an existing drainage, (4) land treatment of wastewater, (5) provision of buffer zones around lagoons, ponds, and impoundments, and (6) irrigation of crops with effluent.

Habitats that may be developed in conjunction with these elements include: (1) riparian woodlands (i.e., areas of cottonwood, mesquite, and willow), (2) nonwoodland riparian vegetation (i.e., native brush, grass, and forbs), (3) early field succession (i.e., annual herbaceous growth), (4) wetlands (i.e., cattail areas adjacent to impoundments), (5) open water (i.e., impounded or flowing water).

Impoundments offer watering sites for quail, dove, rabbit, songbirds, and perhaps shorebirds, and they attract waterfowl into the area. Ideally, native shrubs and grasses could be planted at the perimeter of the impoundments, the plant species being keyed to the food and cover requirements of the wildlife and the ability of the species to grow and reproduce under the operating conditions of the facility. Canal banks could be lined with trees such as mesquite and cottonwood as a means of promoting dove and songbird habitat. Shrub cover would also provide habitat for dove and, perhaps, for quail and rabbit. Buffer zones could be planted with cottonwood, mesquite, lycium, and saltbush to promote dove and quail. Most vegetative cover near impoundments would provide habitat for amphibians, such as frogs and some species of toad.

Fisheries could potentially be developed in conjunction with wastewater impoundments, but enhancement of fish populations depends on the continuous availability of suitable-quality water. Because of the fluctuations in quality of effluent, a fishery project that is totally compatible with public health and safety parameters is unlikely.

Further discussion of opportunities for developing biological habitat in conjunction with wastewater treatment facilities may be found in the Fish and Wildlife Enhancement Report (Dames & Moore, 1978).

Effect of Discharges to the Salt River

Since the mid-1960s, the 91st Avenue and 23rd Avenue treatment plants have discharged increasing volumes of effluent to the Salt River. According to Halpenny and Greene (1975), discharge of effluent to the river has contributed to the upstream spread of salt cedar from the Gillespie Dam area. Salt cedar is a phreatophyte, a form of vegetation with long roots that is sustained by ground water. Phreatophytes usually cannot exist in areas where the depth to ground water is greater than about 15 feet. According to Halpenny and Greene (1975), salt cedar has replaced the former cottonwood-mesquite environment in the Gillespie Dam area, and its abundance is increasing in other reaches of the Salt and Gila Rivers below the treatment plants. Halpenny and Greene (1975) conclude that effluent from the 91st Avenue and 23rd Avenue treatment plants supports the salt cedar where depth to ground water is too great to be reached by the roots of the plants.

Effluent from the treatment plants also supports other vegetation, such as cattails, willows, cottonwoods, and various species of annual and perennial grasses and forbs. In particular, a continuous flow of effluent in the amount of 7,300 af/yr is committed to support a wildife management area in the Salt riverbed near 115th Avenue. The wildlife area is maintained by the Arizona Game and Fish Department. The area was formed by the construction of a low dike that holds back flow, creating a wetland habitat. Recent floods in 1978 have significantly altered this habitat.

The effects of future discharges on vegetation in the river are primarily contingent on the water requirements of the Palo Verde Nuclear Generating Station. As described earlier in this report (pp. 2-45 - 2-46), a contract was negotiated in 1973 by the cities in the Multi-City Sewer Agreement for the sale of up to 140,000 af/yr of effluent to Arizona Public Service Company and the Salt River Project. The effluent will be used as cooling water at the Palo Verde Nuclear Generating Station west of the town of Buckeye and will be transported to the station through a pipeline from the 91st Avenue treatment plant. In addition, 30,000 af/yr of effluent contracted to the Buckeye Irrigation District will be furnished through the pipeline.

The transport of effluent via the pipeline will result in reduced discharges to the Salt River. The amount of these discharges will vary depending on the number of units operating at the station and their needs for water. Units 1, 2, and 3 are scheduled to go on line in 1982, 1984, and 1986, respectively. Construction permits have not been obtained for Units 4 and 5, but if approval is obtained, they would go on line in 1988 and 1990, respectively. The annual water requirements of each unit are estimated by Arizona Public Service (1978) to be 21,400 af/yr. Peak monthly needs will vary from 2,200 af/mo to 2,600 af/mo (Arizona Public Service, 1978).

Table 4-4 shows the varying amounts of effluent that are expected to be discharged to the Salt River in 1980, 1985, 1990, 1995, and the year 2000 under three different water requirements for the Palo Verde Station: annual, low monthly, and high monthly estimates of needs. The monthly estimates have been converted to annual rates for purposes of this comparison, and the peak requirements for the Buckeye Irrigation District have not been included in the analysis. These three sets of conditions indicate that the amount of effluent discharged to the river will probably vary widely, depending on the number of units in operation, the season, and the actual peak requirements for water.

A minimum discharge of 7,300 af/yr of effluent is assumed, as this amount is committed to the Arizona Game and Fish Department. According to Table 4-4, this minimum discharge would occur by 1990 under the low peak monthly estimate and in the 1990-95 period, or earlier, under the high peak monthly estimate (see Appendix C). Other factors not shown in these calculations could also influence the amount of effluent diverted and, therefore, the amount of

Table 4-4

DISPOSITION OF EFFLUENT FROM 91ST AVENUE AND 23RD AVENUE TREATMENT PLANTS, 1980-2000
(Acre-Feet per Year)

Year	Flows[a]	Buckeye Irrigation District	PVNGS[b]	Transported by Pipeline	Discharge to Salt River[c]
Disposition with Annual Water Requirement for PVNGS					
1980	135,500	30,000[d]	-	-	135,500
1985[e]	156,000	30,000	42,800	72,800	83,200
1990[f]	168,100	30,000	107,000	137,000	31,100
1995	180,300	30,000	107,000	137,000	43,300
2000	195,100	30,000	107,000	137,000	58,100
Disposition with Low Peak Monthly Need Estimate for PVNGS					
1980	135,500	30,000[d]	-	-	135,500
1985[e]	156,000	30,000	52,800	82,800	73,200
1990[f]	168,100	30,000	130,800[g]	160,800	7,300[h]
1995	180,300	30,000	132,000	162,000	18,300
2000	195,100	30,000	132,000	162,000	33,100

Table 4-4 (Cont.)

Year	Flows[a]	Buckeye Irrigation District	PVNGS[b]	Transported by Pipeline	Discharge to Salt River[c]
Disposition with High Peak Monthly Need Estimate for PVNGS					
1980	135,500	30,000[d]	-	-	135,500
1985[e]	156,000	30,000	62,400	92,400	63,600
1990[f]	168,100	30,000	130,800[g]	160,800	7,300[h]
1995	180,300	30,000	143,000[g]	173,000	7,300[h]
2000	195,100	30,000	156,000	186,000	9,100

[a]Flows were projected on the basis of Arizona Department of Economic Security population projections, MAG population allocations within Maricopa County, and wastewater flow reduction of approximately 10 percent.

[b]Annual requirements and low and high peak monthly need estimates for the Palo Verde Nuclear Generating Station were supplied by Arizona Public Service (1978). The annual estimate of water requirements is 21,400 af/yr per unit, or 107,000 af/yr for 5 units. The low peak monthly need estimate is 2,200 af/mo, or a rate of 26,400 af/yr, per unit. The high monthly need estimate is 2,600 af/mo, or a rate of 31,200 af/yr, per unit. Monthly estimates have been converted to annual estimates for purposes of this analysis.

[c]Discharge to Salt River includes commitment of 7,300 af/yr to the Arizona Game and Fish Department. This is the minimum amount of effluent that would be discharged to the river.

[d]Deliveries of effluent to the Buckeye Irrigation District will continue to be made via the Salt River until the PVNGS pipeline is operational.

[e]In 1985, 2 units are scheduled to be operational at PVNGS.

[f]In 1990 and thereafter, 5 units are expected to be operational at PVNGS (3 scheduled, 2 proposed).

[g]Flows are not adequate to meet peak needs of PVNGS.

[h]Minimal discharge to Salt River.

Source: Appendix C

effluent discharged. Some of these factors include peak needs of the Buckeye Irrigation District, losses of effluent due to evaporation, and the inability of Palo Verde to utilize all the effluent available at a given time if effluent quality does not meet on-site treatment requirements at the power plant. (See Appendix C for an analysis of available flows and commitments for effluent.)

Not shown in Table 4-4 are the conditions that would develop if the entire 140,000 af/yr of effluent optioned in the contract were used. If this occurred, no effluent would be discharged to the river from 1982 to 1993, with the exception of the commitment to the Arizona Game and Fish Department (see Appendix C). The contract provides for the use of up to 140,000 af/yr of effluent for the generation of electrical power at any site chosen by Arizona Public Service/Salt River Project, but the utilities have indicated that only the amount of effluent required at the Palo Verde Nuclear Generating Station will be used.

The segment of river that is expected to be most affected by the reduction in amount of effluent and the interruption of a continuous supply of water is the portion of the Salt River from 91st Avenue to the confluence of the Salt and Gila Rivers near 115th Avenue. The Arizona Game and Fish Department's wildlife management area is located near 115th Avenue. The riverbed from 91st Avenue to 115th Avenue has been proposed as a natural area by the Arizona State Parks Board. There is little other flow besides effluent in this segment of the river, except during periods of precipitation or when water is released from upstream impoundments.

Consequences of water diversion were assessed in the environmental statements on Palo Verde Units 1, 2, and 3 (U.S. Nuclear Regulatory Commission, 1975) and Units 4 and 5 (U.S. Nuclear Regulatory Commission, 1979). Both environmental statements projected adequate flows to sustain vegetative growth in the environmentally sensitive Fred J. Weiler Green Belt along the Gila River downstream from the study area. Although effluent flows used in these environmental statements are greater than those projected by the MAG 208 Program, EPA concurs that the vegetative growth downstream from 115th Avenue will probably be relatively unaffected by wastewater diversions because of the additional sources of water and the higher water table in these segments. (See pp. 3-37 - 3-42 for a description of the segments.)

Riparian communities between 115th Avenue and the Buckeye Canal Heading, and downstream into the Fred J. Weiler Green Belt, receive irrigation tailwater from both sides of the Salt and Gila

Rivers, as well as surface water from the Salt River Project just upstream of the confluence of the Agua Fria and Gila Rivers. In addition, the water table is higher in these downstream segments than it is closer to the 91st Avenue treatment plant (Halpenny and Greene, 1975). Thus, riparian communities downstream of 115th Avenue are not totally dependent on wastewater flows, and it is unlikely that any significant removal of vegetative thickets downstream of 115th Avenue would occur due to reduced or altered discharges. Changes that could occur at these locations would consist of shifts in plant species distribution, which may or may not be immediately evident.

It is expected that reduced effluent flows in the river will lead to degradation of riparian habitat along the river segment from 91st Avenue to 115th Avenue. This conclusion was also reached by the NRC staff in the Palo Verde Units 4 and 5 Environment Statement (Nuclear Regulatory Commission, 1979). Continuous flows of at least 7,300 af/yr to the wildlife management area at 115th Avenue will help maintain vegetation. However, it is probable that by reducing annual flows of effluent in the river from the 1980 level to approximately 60 percent by 1985 and 10 percent by 1990 (Table 4-4), some vegetation in this stretch of the Salt River will be eliminated. Further reduction of flows in summer months (when peak diversions to Palo Verde would occur) would also contribute to the removal of some vegetation. EPA has asked the Nuclear Regulatory Commission to minimize diversions to Palo Verde because of impacts to riparian habitat and ground water overdraft.

To predict specific riparian community changes between 91st Avenue and 115th Avenue will require more information on operational procedures for supply of effluent to the Palo Verde Nuclear Generating Station and the Buckeye Irrigation District. Impact assessment will also require field investigations to determine the current condition of the riparian community, to track and quantify the movement of effluent, and to establish transpiration factors for vegetation in the wildlife management area and along the river from 91st Avenue to 115th Avenue.

The status of the Yuma clapper rail, a Federally designated endangered species, will also need to be determined in detailed studies. The clapper rail was sighted in 1970 near 107th Avenue along the Salt River (approximately 1-1/2 miles from the 91st Avenue treatment plant) and in 1976 near El Mirage Road on the Gila River (Todd, 1976). Effluent flows supported areas of potential clapper rail habitat prior to the floods of 1978, which may have destroyed all or portions of the habitat.

Concern about the contribution of vegetation thickets in the Salt and Gila Rivers to flooding may lead to the clearing of most of this vegetation over the planning period. Halpenny and Greene (1975) and Robinson (1965) related phreatophyte growth to increasing the areal extent of flooding. According to Halpenny and Greene (1975), dense stands of salt cedar caused flooding over a greater area downstream from the Salt-Gila confluence in 1973 than occurred in 1966 when flows were three times greater but the salt cedar less abundant. Channel clearing is one of the alternatives being studied by the Central Arizona Water Control Study, a joint U.S. Army Corps of Engineers/U.S. Bureau of Reclamation study that began in 1979. Recently (May 1979), work was authorized by Maricopa County and the State of Arizona to clear the Salt-Gila River channel from 91st Avenue to Gillespie Dam. An environmental assessment will be required before clearing can be initiated.

4.2.4 SOCIOECONOMIC IMPACTS

The principal non-growth-related socioeconomic consequences of the selected point source metro wastewater management plan are discussed under the following headings:

- Impacts of Proposed Facilities
- Impacts of Proposed Effluent Reuses
- Impacts of Plan Implementation

Although there are facility-specific or local consequences associated with each of the proposed project actions, the emphasis here is placed upon impacts which are regional in scope or are local with regional significance. Impacts of facilities are summarized on Figure 4-1 (map pocket at back of report). Additional information on the expected local effects of the facilities may be found in Section 4.2 of the DEIS. Site-specific environmental assessments are required as part of detailed facility plans.

Impacts of Proposed Facilities

Conversion of Agricultural Lands

Construction of wastewater treatment facilities will primarily affect agricultural areas. A total of 263 acres of land will be required for the construction of four new wastewater treatment plants by 1995 (Table 4-5). Two hundred and fifty-four acres, or 97 percent of this total, are currently in agricultural production. Most of this land is designated as prime irrigated

Table 4-5

CHARACTERISTICS OF LAND TO BE UTILIZED
FOR TREATMENT PLANT FACILITIES
IN SELECTED PLAN

Facility	Prime Farm Acreage[a]		Other Acreage	Ownership Status
	Phase I	Phase II		
Chandler	-	-	9.0	Gila River Indian Reservation land
Gilbert				
(north)	54.8	82.2	-	Private: to be purchased by SROG
(south)	-	26.0	-	Private: to be purchased by SROG
Tolleson	-	-	-	Existing site owned by Tolleson
91st Avenue	-[b]	-	-[b]	Owned by Phoenix
23rd Avenue	-	-	-	No expansion of existing facility
Reems Road	146.0	146.0	-	Private: to be purchased by SROG
TOTAL	200.8	254.0	9.0	

[a]Corresponds to phases in plant construction.

[b]Sludge processing facilities could require extensive additional acres of land outside existing plant site.

farmland by the U.S. Soil Conservation Service. The loss of 254 acres of farmland represents less than 1/10th of 1 percent of the 366,574 acres in the metropolitan Phoenix area classified as agricultural in 1975 (see p. 3-48). Roughly 43 percent of this agricultural area, or 108 acres, is expected to be urbanized or under strong urban pressure by the year 2000, even if not used for treatment facilities. Thus, the actual amount of agricultural land removed from production that can be attributed solely to the project is approximately 146 acres.

Local Land Use Conflicts and Issues, Related Population Impacts

Two aspects of the proposed treatment plants may result in conflicts over land uses. First, the presence of a sewage treatment plant may discourage the development of adjacent properties in residential and commercial uses. This effect is related to actual or perceived aesthetic problems of odor, unsightliness, insects, and similar conditions associated with wastewater treatment facilities. Second, reuse of effluent for agricultural irrigation implies, and may require, a commitment to maintain the area to be irrigated in production of nonedible crops for an extended period of time. On the other hand, the presence of treatment facilities may create unique opportunities for development of industrial, agricultural, or recreational facilities which would benefit from use of the effluent.

The principal land use conflicts expected from the proposed treatment facilities are discussed by facility in the following paragraphs. Impacts related to effluent reuse are discussed on pp. 4-31 - 4-38.

Gilbert: Local land use conflicts are expected to be pronounced at the north Gilbert site. The area surrounding and including the proposed plant site and reuse area is actively urbanizing, and property owners and developers have planned improvements, including some residential development which will not be compatible with the treatment plant. Construction of the plant will result in the localized dislocation of some privately planned developments. The Gilbert community land use plan will need modification to accommodate the proposed north Gilbert facility, and some compensation of property owners adjacent to the site may be required. The south Gilbert site is located in an area designated as "reserve." Some industrial, commercial, and residential uses are planned within 1 mile of the proposed site. Development is sufficiently far in the future, however, to allow for orderly and relatively noncontroversial modification of existing land use plans and zoning, if deemed necessary, to assure compatible peripheral land uses. The proposed south Gilbert site is within the City of Chandler's planning area.

Chandler: Expansion of the existing Chandler plant would support agricultural activities on Gila River Indian Community lands as well as support tribal plans for industrial development along Interstate-10 near the reservation's northern border. This may constitute an important factor in successfully negotiating planned plant expansion within the Gila River Indian Community.

Tolleson: Utilization of existing unused capacity at the Tolleson plant to service needs, on a temporary basis, from the communities of Peoria, Glendale, and Sun City will preclude the need for moratoria on new construction in these areas in the immediate future. This, in turn, will ensure continued development in these communities, in accordance with the adopted regional growth plan.

Reems Road: Installation of an interceptor line along Buckeye Road leading to the Reems Road plant may become a factor contributing to some minor earlier-than-anticipated urbanization along Buckeye Road. The diversion of major traffic flows from Buckeye Road north to Interstate-10 on its completion will, however, minimize the impetus for this type of development through the study period.

23rd Avenue: The existing 23rd Avenue plant is located in a heavily urbanized area, characterized primarily by industrial, office, and commercial development. An estimated 2,600 persons live within 1 mile of the plant. The number of persons employed in the area may be significantly larger. Proposed modifications to the treatment facility are intended to significantly reduce the frequency and intensity of odor episodes and insect breeding which are presently recurring sources of complaints.

The 23rd Avenue plant has been designated to treat increased amounts of residual solids (sludge). The method and amount of waste to be treated have not yet been specified. If sludge is disposed of on site, it could produce significant adverse effects on the surrounding land uses.

The 23rd Avenue site is considered highly sensitive due to the degree of development surrounding the facility. If odors are not reduced, existing property could be developed less intensely than would otherwise be expected, and some existing activity could be displaced. The current sizable resident and working population would continue to be adversely affected.

91st Avenue: The existing 91st Avenue plant is considered a serious nuisance by surrounding residents and operators of public facilities, primarily due to odor and insect problems. Although no additional potentially conflicting development is planned north of the Salt River in the vicinity of the plant, District 7 of the Gila River Indian Community (GRIC) to the south is continuing to grow. The GRIC estimates the current population of this community at 680 persons. Current facilities located in this area include a foster children's home, a convalescent hospital, a community services building and park, and several churches. Expansions of the 91st Avenue plant can be expected to intensify opposition from the Indian community unless existing adverse impacts are eliminated or reduced, and probable impacts from the expansions are mitigated. EPA requires that conditions causing adverse impacts be analyzed and mitigated in detailed facility planning.

Residual solids (sludge) are expected to be dewatered at the treatment plant site. Options for reuse/disposal include sanitary landfilling, sale to a private contractor, and land spreading. Impacts of the selected sludge handling operation could be significant and will be assessed in the residuals/effluent facility plan for the 91st Avenue and 23rd Avenue treatment plants.

Cumulative Effects: From a regional perspective, the cumulative effects of local land use conflicts associated with the treatment plants are not expected to be significant, assuming that mitigation measures to control odor and insect problems are included in facility design. The public will be given the opportunity to comment on all the facility plans developed.

Temporary Construction Impacts: Temporary land-use impacts due to construction of plant facilities and interceptors consist mostly of impaired use of land because of interruption of access and increased noise, dust, and other minor effects of construction activity. Construction and expansion of the plants themselves should cause few problems to neighboring uses, while impacts associated with interceptor construction will be more widespread. Table 4-6 summarizes the effects of interceptor construction of the major lines.

Site Availability

Several of the satellite treatment plants included in the selected plan are to be sited in areas expected to urbanize or be under significant development pressure by the year 2000. This is particularly true of the north Gilbert site. Some of these plants will not be required for from 5 to 12 years. In order to ensure

Table 4-6

TEMPORARY SOCIOECONOMIC EFFECTS OF INTERCEPTOR CONSTRUCTION[a]

Interceptor Locations	Summary of Temporary Effects
El Mirage Road, south of Bell to Northern	Minimal—area undeveloped
99th Avenue, Northern to Tolleson site	Minimal--area undeveloped
Youngtown to 99th Avenue via Olive Avenue, 99th Avenue to 91st Avenue via Buckeye Road	Minimal—area undeveloped
Lower Buckeye Road, from 23rd Avenue to 59th Avenue, south on 59th Avenue to the Southern Avenue Interceptor at Broadway	Disruption of access to residential, commercial, industrial, and public facilities along Lower Buckeye Road between 23rd Avenue and 35th Avenue. Minimal impacts west of 35th Avenue
Southern Avenue, across Phoenix and Tempe; along Baseline into Mesa to Gilbert	Disruption of access to residential, commercial, and civic facilities; and dust, noise, and other adverse effects, mostly in area from 27th Avenue across Tempe and Mesa
East Mesa: Along Baseline, Apache Boulevard, and Bush Highway	Disruption of access and effects of dust, noise, etc., mostly along Bush Highway and Apache Boulevard
Pecos Road, Ray Road to Chandler Plant	Dust, noise, disruption of access, and other effects will impact a small population in the area
Gilbert Road and Elliot Road, to Gilbert North Plant	Dust, noise, and disruption of access will affect residents and businesses along Elliot Road in the community of Gilbert
Interceptors at Gilbert South Plant	Effects of this future construction will depend on area land uses at that time
El Mirage Road south from Thomas to Yuma, along Buckeye Road to Reems Road plant	Some disruption in access, and dirt and noise effects likely near Avondale on El Mirage, and along Buckeye Road

[a]Applicable to major interceptors only.

their availability when required, these sites will have to be acquired or optioned well before they can be utilized. Since the plant and reuse configurations being considered for the sites are land intensive, site acquisition costs will be substantial. Site acquisition will have to be a priority for the Subregional Operating Groups (SROGs) established in these areas.

A second potential problem relates to Indian land held in trust status by the Federal government. The Chandler plant is located on the Gila River Indian Community (GRIC). The GRIC has recently expressed disapproval of the planned expansion of the plant. If current plans are still pursued, extensive negotiations may be required before the necessary approval is secured.

There is an alternate site for the Chandler plant located just off the GRIC lands should negotiations reach an impasse and sewage treatment needs of Chandler become critical. Sufficient study of this alternative has been completed to allow for its substitution with a minimum of delay.

Impacts of Proposed Effluent Reuses

Support of Agriculture

Although construction of facilities will remove a total of 254 acres of farmland from production, use of effluent for irrigation will support agriculture. This support includes (1) provision of additional agricultural water supplies, (2) requirements that include the long-term commitment of land irrigated with effluent to agricultural purposes under reuse agreements (see p. 4-37), and (3) improvement of ground water supplies through additional recharge.

The acreage that could be supported by irrigation with effluent will vary depending upon the cropping pattern used and the final reuse selected at individual facilities. At this planning level, it is estimated that from 1,500 to 3,500 acres could be irrigated with effluent from the treatment plants, depending upon the cropping pattern used (Table 4-7). These acreages exclude the 18,000 acres of farmland currently irrigated by the Buckeye Irrigation District using a mixture of effluent from the 91st Avenue plant and pumped water. It also excludes the roughly 34,000 acres of land in the Roosevelt Irrigation District that may be irrigated with a mixture of effluent from the 23rd Avenue plant and pumped water if the effluent meets requirements of the District and is not required for use at the Palo Verde Nuclear Generating Station.

TABLE 4-7

POTENTIAL LAND AREA FARMED WITH EFFLUENT

SITE	ACREAGES UTILIZED UNDER CROPPING PATTERN: [e]										APPLICATION		OWNERSHIP STATUS
	I. 2 years cotton, 3 years alfalfa, 1 year small grains				II. 2 years cotton, 3 years alfalfa, 3 years small grains				III. Bermuda (April-Sept.), Rye (Oct.-March) (No Storage Required)		New Irrigated Land Created	Effluent Replaces Existing Groundwater use or CAP water	
	Initial Phase		Ultimate Phase		Initial Phase		Ultimate Phase						
	Crop Ac.	Storage[f] Ac.	Crop Ac.	Storage Ac.	Crop Ac.	Storage Ac.	Crop Ac.	Storage Ac.	Initial Phase	Ultimate Phase			
Chandler	1294	117	1894	171	1198	126	1755	185	495	725	Possible in future	Yes	Reservation land
Gilbert (north)	--	--	--	--	--	--	--	--	159[a]	238[a]	0	Yes[g]	Private land-to be purchased by op. group
(south)	--	--	208	19	--	--	193	20	--	79	0	Yes[g]	Private land - contractual agreement needed
Tolleson	--	--	--	--	--	--	--	--	b	b			Private land
91st Avenue	c	--	--	--	--	--	--	--	--	--	0	Yes	Private land - contracts needed
23rd Avenue	d	--	--	--	--	--	--	--	--	--			Private land - contracts needed
Reems Rd.[h]	693	63	1360	113	642	68	1156	122	265	476	0	Yes	Private land - reuse agreement needed
TOTALS	1987	180	3462	303	1840	194	3104	327	919	1518			

[a] Current plans are to irrigate forage crops for later possible conversion to recreational turf.
[b] Plant now irrigating about 33 acres of commercial turf acreage. Turf acreage could be expanded to 100 acres with increased effluent flow by the year 2000.
[c] Effluent now services the Buckeye Irrigation District and irrigates an undetermined amount of total acreage. Future allocations are not determined.
[d] Effluent contracted for by Roosevelt Irrigation District, pending attainment of specified treatment levels and availability of effluent for irrigation.
[e] Areas assume an additional 5% allowance in land area for roads, fences, etc., related to farming operations.
[f] Surface acres assuming a 15' deep lagoon.
[g] These areas are served by surface water irrigation systems at present.
[h] Actual construction of this facility is not phased, although flows will gradually increase to allow irrigation of ultimate acreage shown.

Support of Energy Production

The commitment of proposed volumes of effluent for cooling water at the Palo Verde Nuclear Generating Station will make it the single largest use of effluent over the planning period. The contract negotiated by the City of Phoenix (acting for the Multi-City Partners) and Arizona Public Service/Salt River Project (acting for the Arizona Nuclear Power Project, or ANPP)[1] calls for the sale of up to 140,000 af/yr of effluent from the 91st Avenue and 23rd Avenue treatment plants. The actual amount of effluent required for all five units at the Palo Verde station is estimated by Arizona Public Service (1978) to be 107,000 af/yr. This amount represents approximately 50 percent of the wastewater effluent available from all the treatment plants in the metro area by the year 2000.

The use of effluent for cooling water at Palo Verde will have significant economic benefits, primarily in revenues from property, sales, and income taxes and in wages and salaries. Management Research, Inc. (1978), in a study prepared for Arizona Public Service, concludes that the use of effluent for power production would result in economic benefits per acre foot of $3,314 for property taxes, $28 for sales taxes, $147 for State income taxes, and $265 for wages and salaries. Assuming a use of 107,000 af/yr of effluent for five units at Palo Verde, total dollar benefits per year would amount to approximately $400 million. In addition, sale of the effluent at $20 to $30 per acre-foot will result in income of from $2 to $3 million per year for the Multi-City SROG, assuming that 107,000 af/yr of effluent is used.

Competition for Effluent

Wastewater effluent provides a desirable source of water for both agricultural irrigation and power production in the Phoenix area. Both agricultural interests and ANPP have expressed interest in obtaining additional amounts of effluent from the 91st Avenue and 23rd Avenue treatment plants. According to Management Research Inc. (1978), ANPP has requested an additional allocation of 50,000 af/yr of effluent, while Northwest Mutual Life Insurance Company (Gila River Ranches) and J. L. King Enterprises (Arrowhead

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[1]ANPP is used in this report to indicate the owners and operators of the Palo Verde Nuclear Generating Station. Arizona Public Service Company is the project manager for the station. The contract for effluent was negotiated with Arizona Public Service and the Salt River Project in 1973.

Ranch) have requested future allocations of up to 100,000 af/yr and 3,000 af/yr of effluent, respectively.

Current agricultural users of effluent may wish to increase the amount of effluent used or seek an option on effluent presently appropriated on an informal basis. McDonald Farms, which presently withdraws an unmeasured amount of effluent from the 23rd Avenue treatment plant discharge canal, may make formal application for a quantity of effluent on the basis of prior appropriation. The amount of effluent used and the probability of the Farms' obtaining future options on the effluent are not known. The Buckeye Irrigation District currently diverts approximately 82,000 af/yr of effluent at the Buckeye Canal Heading (Management Research, Inc., 1978). The contract amount is 30,000 af/yr of effluent. The future disposition of effluent to the District has not been fully determined at this time. When effluent deliveries by the ANPP pipeline begin in 1982, the District will receive the contract allotment of 30,000 af/yr by the pipeline. The District will also continue to have the right to divert flows at the Buckeye Heading, and may augment the 30,000 af/yr contract amount with available flows in the river. It is estimated that the District's probable future use of effluent would be approximately 75,000 af/yr, or 45,000 af/yr more than the contract amount (Management Research, Inc., 1978).

The Roosevelt Irrigation District has an option on 20,000 af/yr of effluent from the 23rd Avenue treatment plant if the effluent is not required for ANPP and if it is treated to levels necessary to irrigate "unrestricted" crops. Management Research, Inc. (1978), estimates that in the future there is a "medium to high" probability that the Roosevelt Irrigation District would use an additional 20,000 af/yr of effluent if it were treated to the necessary level and were available at current prices.

Flows from the 91st Avenue and 23rd Avenue treatment plants are projected to be adequate to meet most existing commitments for effluent. However, flows are not adequate to meet all existing commitments, requests for future allocations, and other probable needs. Table 4-8 shows the amount of uncommitted effluent available in the future, assuming that the ANPP commitment of 140,000 af/yr of effluent is met by fulfilling annual water needs of 21,400 af/yr per unit for five units at the Palo Verde Nuclear Generating Station. At no time during the planning period are there adequate amounts of uncommitted effluent to meet the Gila River Ranches and J. L. King Enterprises requests for a total of 103,000 af/yr of effluent. Enough effluent is available, using these projections, to supply the Roosevelt Irrigation District

Table 4-8

UNCOMMITTED EFFLUENT AVAILABLE FROM 91ST AVENUE AND 23RD AVENUE TREATMENT PLANTS 1980-2000
(Acre-Feet per Year)

Year	Effluent Flows[a]	Buckeye Irrigation District	Arizona Game & Fish Department	Arizona Nuclear Power Project[b]	Total Committed Effluent	Uncommitted Effluent
1980	135,500	30,000	7,300	-	37,300	98,000
1985	156,000	30,000	7,300	42,800[c]	80,100	75,900
1990	168,100	30,000	7,300	107,000[d]	144,300	23,800
1995	180,300	30,000	7,300	107,000[d]	144,300	36,000
2000	195,100	30,000	7,300	107,000[d]	144,300	50,800

[a]Flows were projected in the MAG 208 Program on the basis of Arizona Department of Economic Security population projections, MAG population allocations within Maricopa County, and a wastewater flow reduction of 10 percent.

[b]The contractual commitment to ANPP is for up to 140,000 af/yr of effluent. These projections use annual water requirements of 21,400 af/yr for each unit at the Palo Verde Nuclear Generating Station (Arizona Public Service, 1978).

[c]Two units are scheduled to be in operation at the PVNGS in 1985.

[d]Three units are scheduled to be in operation at the PVNGS in 1986; two additional units pending approval would go on line in 1988 and 1990.

Source: Appendix C.

with 20,000 af/yr of effluent through the planning period. ANPP's request for an additional 50,000 af/yr of effluent could not be met in the 1990s, and could be met only marginally in the year 2000. The Buckeye Irrigation District's use of 45,000 af/yr over the contract allotment of 30,000 af/yr could be met through 1985, but flows would not be adequate to meet this need in the 1990-1995 period.

The projections in Table 4-8 do not include conditions that would result under peak water need requirements of the Palo Verde Nuclear Generating Station. If effluent is held in reserve to meet peak needs at the power plant, then the ability of the treatment plants to deliver an assured supply of effluent to any other additional user is impaired. Peak water needs are estimated by Arizona Public Service (1978) to be 2,200 to 2,600 af/mo per unit, or a required flow rate of of 132,000 to 156,000 af/yr for all five units. If this range of flows must be held in reserve for the power plant's peak needs, then there is no uncommitted effluent in 1990, under 11,000 af/yr in 1995, and under 25,000 af/yr in the year 2000. See Appendix C for an analysis of available flows of wastewater vs. commitments for effluent.

If effluent is not available in sufficient quantities to meet agricultural demands, farmers presently using or planning to use effluent would be required to respond in one or more of the following ways:

1. Seek other sources of water

2. Pay increased costs of pumping water from existing wells, which in many cases contain water with excessive salts for growing certain crops

3. Adjust cropping patterns

4. Reduce the size of the acreage to be irrigated.

If effluent flows from the 91st Avenue and 23rd Avenue plants are insufficient to meet peak water demands of the Palo Verde Nuclear Generating Station (see Appendix C), ANPP may seek to augment supplies from the Tolleson and Reems Road plants, or from a different source of water.

Sale of Effluent

Almost all of the effluent from the planned treatment plants will be sold for some beneficial purpose, primarily for agricultural irrigation or production of power. Sale of the effluent for either purpose will tend to lower wastewater treatment costs to consumers, although some agricultural revenues will be offset by the costs of providing delivery systems for the effluent.

No effluent charges have been determined as yet. Effluent used by ANPP will be sold at between $20 and $30 per acre-foot. Except for existing contracts, charges for agricultural users will be negotiated separately for each facility. The Buckeye Irrigation District currently pays less than $4 per acre-foot for effluent, while much of the surface irrigation water delivered through the canal system is sold at less than $6 per acre-foot. Pumped ground water may be several times as expensive as surface sources, depending on well depth. The importance of these revenues from sale of effluent can be assessed by assuming a probable price for it. If the average price received for effluent from all sources is $15 per acre-foot, then revenues of $46 per million gallons of treatment effluent would be available to offset costs of treatment (plus some undetermined costs of effluent delivery).

The planned wastewater treatment system will produce effluent at an average cost of about $300 annually per million gallons, covering the construction and operation of new facilities. Thus, at an average price of $46 per million gallons, the effluent sold (about 96 percent of all effluent produced) could recover up to 15 percent of new treatment costs.

Effluent Pricing Issues

Pricing of effluent for agricultural reuses will have to be established on a case-by-case basis for each SROG as part of its detailed implementation planning. Pricing is expected to be based upon both the prevailing price for the next most available source of water, and the ability of the reuser to pay. Establishment of a long-term, fixed-price contract based upon today's prices could result in a windfall profit over the long run for the recipient. Failure to provide adequate long-term guarantees on the price of effluent could, however, discourage potential users.

The pricing mechanism finally selected is expected to provide for variable prices tied to, but slightly below, those charged by alternative water suppliers, such as the Central Arizona Project.

Contractual Requirements for Agricultural Reuse

The Maricopa County Department of Health Services indicates it will not accept agricultural irrigation as a bona fide reuse unless there is a binding contract with the property owners to take the effluent for an extended period of time. This contract period could range from 20 years to the life of the proposed plant. An earlier proposal for agricultural reuse of effluent from a plant in Sun City was denied because the continued availability of the land for that purpose was not guaranteed.

A contract to accept effluent would preclude a property owner from developing his land into urban uses during the life of the agreement, unless an approved alternative reuse were identified, and would probably not be acceptable to property owners who anticipate urbanizing their land in the next 20 years. It would also restrict use of the land to cultivation of crops not used directly for human consumption.

The Gila River Indian Community plans to maintain large-scale agricultural operations indefinitely, and no conflict is anticipated. The 208 Plan assumes that there will be farmers on non-Indian lands willing to contract for effluent in areas not expected to urbanize by the year 2000. If contracts cannot be obtained, however, the affected SROGs will have to either (1) purchase the land necessary for the reuse (as anticipated around the north Gilbert plant) or (2) find an alternative reuse.

Impacts of Plan Implementation

Employment and Capital Expenditures

Table 4-9 shows the number of new jobs created at each of the major plant locations. The highest figures correspond to ultimate plant capacities. From both a local and regional perspective, the additional employment created by the planned facilities would be negligible.

Estimated capital expenditures for construction of the planned treatment facilities total approximately $160 million. Most of these costs will be incurred in the construction of the plants and sewer lines and, therefore, represent payments to the local construction industry. The impact of the proposed expenditures can be assessed by comparing this level of expenditure to the total volume of construction activity in the metro area.

Dollar value of building permits in Maricopa County has averaged $734 million annually from 1973 through 1977, ranging from a low of about $484 million in 1975 to a high of over $1,100 million in 1977 (Valley National Bank, 1977). Estimated costs for the wastewater treatment system outlined in the MAG 208 Plan

Table 4-9

DIRECT EMPLOYMENT AT PROPOSED FACILITIES

Site	Number of New Jobs Created
Chandler	5-7
Gilbert, North	3-4
Gilbert, South	2
Tolleson	10
91st Avenue	15-30
23rd Avenue	-
Reems Road	4
Total	39-57

total $160 million. Spread over a 13-year period (assuming construction is in place by 1992), these costs, at an annual average of $12.3 million per year, would represent about 1.7 percent of Maricopa County's total construction dollars, if total construction annual averages remain the same as during the 1973-1977 period. (Since the rate of population growth over the next 10-15 years is expected to slow somewhat, the 1973-1977 averages seem reasonable.)

Compared to the added costs associated with providing on-site sewage treatment for each development project or individual building, the level of expenditure for the treatment plant system would not, by itself, significantly impact the local economy. However, the timing of this construction could influence the impact on the regional economy. If major facility construction is initiated during a period of heavy construction activity, it will tend to encourage inflation of materials and labor costs. By contrast, facility construction could have a counter-cyclical effect if initiated during a depressed construction period.

Costs of Treatment to the Public

The future costs per household of wastewater treatment, under the point source metro plan, will vary from community to community but will be higher, overall, than current costs. Costs of treatment facilities in the point source metro plan are shown in Chapter 2 (Tables 2-7 and 2-8, pp. 2-32 - 2-38). Table 4-10 presents cost comparisons among communities by showing unit costs based on sewage flows in excess of each community's existing treatment capacity at its respective facility under the selected plan. On the whole, unit costs show less variation when calculated in this manner, but considerable variation among communities is evident.

Part of this variation is due to the fact that some communities incur costs for an entirely new treatment system while others are paying for only an expansion of existing facilities. Other major cost variations are explained by the necessity of some communities to provide interceptor lines to new or expanded treatment facilities. This condition is common for communities at some distance from the treatment plant, such as El Mirage and Surprise.

Figures in Table 4-10 are somewhat misleading for cities whose primary expense under the new plan is construction of interceptors. Scottsdale, for example, incurs considerable costs of interceptor line construction while expanding its present

Table 4-10

PROJECT COSTS FOR NEW FACILITIES BY COMMUNITY[a]

Facility & Community	Flow in Excess of Present Capacity/ Ownership (MGD)	Equivalent Annual Cost[b] ($ Million)	Unit Cost[b] ($/MG)	Annual House-hold Cost ($/Yr)
91st Avenue				
El Mirage	0.60	0.250	1,141	91
Gilbert	0.40	0.124	849	68
Glendale	4.50	1.342	817	65
Guadalupe	0.70	0.185	724	58
Luke AFB	1.40	0.372	728	58
Mesa	10.70	3.537	906	72
Paradise Valley	0.90	0.221	673	54
Phoenix	9.13	2.782	835	67
Scottsdale	0.50	0.503	2,756	220
Sun City	3.17	0.839	725	58
Surprise	0.62	0.275	1,215	97
Tempe	9.60	3.087	881	70
Youngtown	–[c]	0.025	489	39
Subtotal	42.22[d]	13.542	879	70
Chandler				
Chandler	2.6	1.097	1,156	92
Gilbert				
North Plant	2.7	0.503	510	41
South Plant	0.9	0.161	490	39
Tolleson				
Peoria	4.7	0.821	479	38
Tolleson	–[e]	0.07	107	9
Reems Road				
Avondale	2.8	0.660	646	52
Goodyear	1.3	0.266	561	45
Litchfield Park	1.3	0.365	769	62
Subtotal	5.4	1.291	655	52
Totals	58.52	17.485	819	65

[a]Facilities included in this analysis are those in selected Alternative 2.

[b]Included capital and O&M costs.

[c]No new treatment costs, interceptor only, unit cost based on .14 mgd flows.

[d]Slight discrepancies exist between this total and ownership of existing capacity, due to unused ownership of Youngtown.

[e]No new treatment costs, costs for additional O&M expenses only.

treatment capacity at the 91st Avenue plant by only 5 percent. Scottsdale's unit costs of new components appear high when based on additional treatment capacity but are relatively low when based on existing plus new capacity.

Costs of existing treatment facilities have been calculated by the City of Phoenix Water and Sewer Department for the 91st Avenue and 23rd Avenue plants. Costs covering all aspects of the treatment system average about $325 per million gallons treated in the current fiscal year. This figure is considerably less than the unit cost of new components of the 91st Avenue plant. Part of these higher costs are due to increased construction costs for the new facilities and, in some cases, the higher levels of treatment available under the new system.

Annual household costs, in Table 4-10, are based on an average household sewage flow rate of 80,000 gallons per year; and the figures are, therefore, proportional to those in the "unit cost" column. High unit and household costs are associated with two communities, El Mirage and Surprise. About one third of the population in these communities have incomes below the poverty level, according to the 1970 census. To the extent that these costs were actually to be borne by households, the higher costs in these two communities would constitute a hardship on those families of low economic status.

However, the cost figures in Table 4-10 cannot be construed to represent actual charges per household. The actual amount that each household will pay for new waste treatment will depend upon several factors, including: (1) the amount, if any, of the Federal contribution toward capital costs for the system (expected to be as much as 75 percent or more); (2) the methods of financing non-Federal costs; and (3) the extent of total costs to be borne by households, as compared with industrial and commercial users. (City of Phoenix Water and Sewer Department figures indicate households contribute about 55 percent of flows to the 91st Avenue and 23rd Avenue plants. User charges for the different categories of users may not be proportional to their contribution toward sewage flows.)

<u>The Redistribution of Income Through User Charges</u>

Operation costs of the new treatment system components will be financed through user charges. While user charges are an efficient financing mechanism because those who use the system pay for it, the charges impose a heavier burden on low-income households. A poor household will pay the same for wastewater treatment as an affluent one living in the same area and discharging an equal amount of wastewater. This charge will constitute a larger proportion of the poor household's income than the more affluent one; and the poor household can exercise little discretion in the amount of sewage treatment it "buys." This situation tends to shift income away from poorer households relative to those with more income. This can exacerbate the financial situation of low-income families in communities with high treatment costs.

Access to the System by Smaller Communities

Under the Final Point Source Management Plan (MAG 208 Program, 1979c), individual communities expecting to discharge flows to the 91st Avenue treatment plant must "buy in" to the system. The cost to each will be determined by its proportion of all flows going into the plant, multiplied by the total amount of the local (non-Federal) share of the initial capital costs. This initial "buy-in" amount will probably be financed by bonds in most communities.

A small community such as Guadalupe may not have an adequate assessed value to support bonds to pay for its share of the cost of the expanded treatment plants. The user costs per household may also be excessive, even if the city has adequate bonding capacity to pay for the system. The result may be either a community which cannot afford to participate in the regional system or a community with households paying a disproportionately high percentage of their income for wastewater collection and treatment.

Besides Guadalupe on the eastside, kindred problems exist in the following two westside areas:

1. El Mirage/Surprise

   El Mirage and Surprise do not have the necessary population to support their own system and may not have an adequate tax base to meet the costs of tying into the 91st Avenue facility.

2. Goodyear/Avondale

   These communities have limited resources and could have difficulty tying into the proposed Reems Road plant.

Additional study will be required to determine whether these areas can finance their share of the system costs without placing an unusually heavy burden on their residents.

Institutional Changes

A key element in the 208 planning process is the identification of a management structure with sufficient authority to implement the plan and operate the treatment system. Out of all the existing public bodies in the MAG region involved in wastewater management, none had the capability required to adopt and carry out the 208 Plan on a coordinated regional basis.

Following a review of available management options, MAG 208 Program participants selected a system which establishes MAG as the overall planning agency, with a number of Subregional Operating Groups (SROG's) responsible for operation of the individual facilities. The SROG's are made up of a lead agency and individual communities. (For a more complete description of the management system, see pp. 2-39 - 2-42.) This system has been established through a series of intergovernmental contracts in which local governments in the region delegate certain powers and responsibilities to both MAG and the SROG's. Each SROG, in turn, designates a lead agency, subject to MAG Regional Council's approval, to carry out staff activities on behalf of the subregional group members.

Since MAG retains overall responsibility not only for planning but for assuring implementation and coordination of the adopted plans, the Regional Council will assume an expanded role in Maricopa County which is likely to be reflected in other regional concerns as well. The SROG's, serving as smaller versions of MAG, take the place of another formal level of government and utilize existing local government structures to the fullest extent possible.

The system chosen was considered to be the least disruptive to the present political structure and, therefore, the most acceptable to individual communities. Successful functioning of the system, however, requires a commitment on the part of each organizational level to cooperate in carrying out the overall wastewater management plan. Cooperation is needed among individual communities within each SROG, and SROG's must be willing to operate under the adopted regional plan and the overview of MAG. At the same time, communities must be willing to accept an expansion of MAG's authority. Most likely, the SROG's will help insulate MAG from direct confrontation with member communities over possible disputed 208 issues. The increased awareness of common regional concerns and interests fostered by the 208 process to date and the new institutional arrangements needed to implement the plan can be expected to carry over into other regional programs and prove a benefit to the region.

Implication of 208 Plan for the Rio Salado Project

Several wastewater treatment plant locations were proposed and analyzed earlier in the 208 planning process and subsequently eliminated. Among these was a plant in Phoenix at 48th Street near the Salt River. A plant in this location could have efficiently provided effluent to the proposed Rio Salado project to irrigate turf and supply surface water for the river park. In fact, the provision of effluent to the Rio Salado was the primary reason for consideration of this plant site. The decision to delete the plant was based on, among other things, uncertainty regarding the Rio Salado project and the lack of economic justification for the higher cost associated with inclusion of the plant.

This decision does not preclude consideration of the plant in the future, either when the treatment system needs to be expanded or when other priorities within the planning process dictate such reconsideration. Some of the same constraints to selection of the 48th Street site may still be present, however. In the absence of the plant, the feasibility of using effluent to support the Rio Salado project is lessened.

While the use of effluent to supply the project is expected to be less expensive than potable supplies or CAP water, there are health and aesthetic problems associated with its usage. Other supplies, e.g., ground water, may prove to be available in sufficient quantities to support Rio Salado.

4.2.5 ARCHAEOLOGICAL IMPACTS

The selected plan has the potential for disturbing archaeological sites, mainly by direct removal or destruction of artifacts during construction of interceptor lines. Table 4-11 shows the miles of interceptor lines in the selected plan that traverse areas thought to contain significant archaeological resources.

These areas are based on an archaeological resource inventory compiled for the study area (Burton, 1977). Based on the assumption that similar environments will have had similar prehistoric usage, the various environmental zones within the study area were evaluated in terms of predicted site density and average potential

Table 4-11

MILES OF INTERCEPTOR LINE IN
ARCHAEOLOGICAL SENSITIVITY ZONES

Facility	Miles of Interceptor Line by Sensitivity Zone			
	Very High	High	Moderate	Low
Chandler	-	-	5.4	9.0
Gilbert	-	-	-	19.3
Tolleson	-	-	1.0	8.0
Reems Road	-	8.5	-	1.0
91st Avenue	0.2	7.5	4.0	15.2
23rd Avenue	-	-	-	-
Totals	0.2	16.0	10.4	52.5

Source: Burton, 1977

site significance and were ranked in accord with their overall archaeological sensitivity.

Very high sensitivity was attributed to properties on or presently under consideration for nomination to the National Register of Historic Places, while high sensitivity was attributed to other areas expected to contain a high density of very significant archaeological resources. Moderate-sensitivity zones were presumed to have fewer sites and/or less significant archaeological remains, while low-sensitivity zones were expected to have very few sites and/or sites of little significance.

The archaeological information shown in Table 4-11 is based, in large part, on predicted, rather than recorded, archaeological data and is, therefore, highly generalized. Not all areas of high sensitivity are known, nor are areas designated as low-sensitivity zones known to be totally free of significant archaeological resources. In all cases an intensive, on-foot survey of areas that will be directly affected by construction will be necessary before archaeological clearance can be given. EPA will not award 201 facility construction grants without a demonstration of archaeological clearance.

An inventory of historic sites in the Phoenix area (Hall, 1977) identified more than 550 existing historic sites. Proposed projects in the wastewater management plan were reviewed by the Acting State Historic Preservation Officer, and no historic resources on the National Register of Historic Places were identified as being affected by the plan (Garrison, 1979). An archaeological site on the State inventory is located near the perimeter of the proposed Reems Road facility, and siting studies will be required to assure that artifacts would be protected during plant construction.

4.2.6 MITIGATIVE MEASURES

Some adverse impacts of the wastewater management plan can be remedied by implementing mitigative measures during detailed planning. These measures have been identified throughout Section 4.2. Suggested measures to be employed by delegated agencies are summarized in Table 4-12.

Table 4-12

MITIGATIVE MEASURES

Source Activity	Potential Impact	Mitigation
Operation of 91st Avenue treatment plant.	Continued odor, insect, and public health problems for nearby residents, particularly in the Gila River Indian Community.	Improved maintenance, upgrading and replacing existing facilities, disinfecting effluent, and providing adequate buffers, fencing, and warning signs.
Operation of 23rd Avenue treatment plant.	Continued odor, insect, and public health problems for nearby urbanized area.	Same as mitigations for 91st Avenue plant.
Participation of Guadalupe, El Mirage, Surprise, Goodyear, and Avondale in regional treatment system.	Inability to finance participation through community revenues or disproportionately high share of individual household income to finance system operations.	Analysis of problem by SROG's and development of cost-sharing alternatives, if warranted.
Construction of interceptor lines.	Disturbance or destruction of archaeological artifacts.	Site inspection by qualified archaeologist prior to construction and resource recovery, if warranted.
	Increases in fugitive dust.	Adherence to Arizona fugitive dust regulations.

Table 4-12 (Cont.)

Source Activity	Potential Impact	Mitigation
Reuse of effluent from Tolleson and north Gilbert plants.	Potential increases in nitrate concentrations in ground water.	Reanalysis of nitrogen loadings for agricultural reuse, regular monitoring of ground water in vicinity of site, and adjustment in treatment or reuse activities if warranted.
Construction associated with 91st Avenue, Chandler, Reems Road, and Gilbert facilities.	Loss of about 700 acres of terrestrial habitat and about 20 acres of aquatic habitat.	Include biological enhancement considerations in design of new and expanded treatment facilities.
Reduction in effluent discharges to Salt River.	Degradation of riparian habitat from 91st Avenue to 115th Avenue.	Study of habitat, including identification of any special-status plants and wildlife, and development of plans to minimize diversions and assure adequate water supply for valuable habitat.

4.3 IMPACTS OF GROWTH

4.3.1 WASTEWATER TREATMENT PLANNING AND REGIONAL GROWTH

As described in Section 3.2.4, the population of the Phoenix metropolitan area is growing rapidly. This growth is attributed primarily to the climate, retirement amenities, business opportunities, and the general life-style of this "sunbelt" region. Undoubtedly, the recent extreme winter weather in the East and Midwest, coupled with heating fuel supplies, has helped increase inmigration to the Southwest.

Increased population densities require increases in public services, including sewage-treatment services. The MAG 208 Plan was predicated on the need to service planned-for growth in the Phoenix area. Although sewage-treatment service is not expected to induce significant growth, the provision of this service responds to growth and helps support it. A general assessment of regional growth is included in this EIS to demonstrate the secondary and tertiary effects of the wastewater management plan's support of growth in the Phoenix area.

The Regional Plan adopted by MAG (1978) was used as a foundation for 208 planning. Thus, the 208 wastewater management plan is closely related to the Regional Plan and dependent upon many of its projections. The Regional Plan is described in Section 4.3.2. To help assess the impacts of growth as provided for in the Regional Plan, conditions in the area without any added or expanded municipal wastewater-treatment facilities ("without project") are also described (Section 4.3.3). These conditions are summarized from the DEIS Section 3.2 description of the "no action" alternative and the Arthur Beard Engineers (1978c) description of "future-without" conditions.

4.3.2 MAG REGIONAL PLAN

The MAG Guide for Regional Development, Transportation and Housing (1978) is a policy plan drafted to provide a framework for coordinating the physical planning activities of the region. The report includes goals and objectives, and policies for achieving these, in the areas of overall development, population growth, transportation, and housing within the planning area.

The Guide's Regional Development Plan is intended to be a composite of the plans of local jurisdictions. The local plans are subject to continual updating and revising, but all share a number of underlying land-use goals and objectives agreed upon by

MAG member jurisdictions. Briefly summarized, these common goals and objectives call for:

1. A commitment to plan for growth on a coordinated regional basis

2. Encouragement of land use patterns which are efficient in terms of transportation needs, provision of services, and other factors

3. Preservation of agricultural and other open space in those areas where development is not needed, or until it is needed

4. Provision of adequate recreational open-space opportunities for the area's growing population

5. Provision of new development with a "full range of urban facilities and services commensurate with the character of the subregion" (Guide, p. II-1)

6. Application of local development policies which balance public costs of development with demand for new housing, commercial space, and other uses.

Within the framework of these common goals and objectives, the Plan also embodies a number of concepts and assumptions affecting development patterns. These include:

1. The assumption that the trend of rapid growth sustained over the last several decades will slow somewhat, but remain strong enough for the metro study area population to reach up to 2.3 million by the year 2000

2. The designation of "open space" for those areas considered unsuited for development due to: (1) flood, subsidence, noise, and safety hazards; (2) presence of environmentally sensitive features such as prime recreational opportunities, archaeological sites, and so forth

3. The assumption that irrigated agricultural activity will probably not expand into presently natural areas, due to the designation of Maricopa County as a "critical groundwater area"

4. The designation, by local jurisdictions, of "Regional Activity Centers" for more intensive development of all

urban uses and coordination into regional plans for transportation, etc.

As a basic component of the Guide, population increases expected to occur over the next 20 years were allocated throughout the urbanized area of Maricopa County. The allocations provide a common means of determining the effect of future growth on both small areas and the region as a whole. The basic unit of population allocation is the Community Aggregate Planning Model (CAPM) zone. Population changes up to the year 2000 were allocated to these zones in a manner consistent with local plans and MAG regional planning objectives. MAG adopted these population figures for planning the 208 regional wastewater treatment system (see Table 2-1).

The Guide recognizes that a viable transportation system is a vital element in the continued growth and development of the region and in the maintenance of the high-quality life style enjoyed by many area residents. Goals for transportation contained in the Guide center around promoting a system which is efficient, safe, and energy conserving and which also accommodates the diverse travel needs of different segments of society. Future major transportation corridors identified in the Guide are consistent with State and Federal transportation plans.

The presence of a sizable substandard housing stock in the region is addressed in the Guide. Goals within the document's Housing Element call for promoting the availability of decent housing at minimal cost and for taking action which will help disperse a broad range of housing opportunities throughout the region and avoid problems of inadequate housing opportunities that have plagued many rapidly growing West Coast cities.

4.3.3 "WITHOUT-PROJECT" CONDITIONS

Impacts of providing a regional wastewater treatment system can be measured by comparing the planned patterns of regional development, population distribution, and other elements with patterns that would develop in the absence of any new or expanded municipal wastewater treatment facilities.

Present wastewater treatment plants in the Phoenix area are essentially operating at capacity. It has been assumed, for purposes of this analysis, that no new construction of municipal wastewater treatment facilities would occur after 1980, nor would existing facilities be upgraded and expanded to handle increased flows. All flows not presently sewered would be treated by septic tank systems or small, privately owned package plants. Tabulations in Table 4-13 show the population figures and quantities of sewered and unsewered wastewater if these conditions were to prevail. By the year 2000, approximately 45 percent of the population in the Phoenix area would rely on septic tanks or private package plants for wastewater treatment.

These "without-project" conditions were developed to isolate the effects of the selected wastewater management plan. The likelihood of the conditions occurring is somewhat remote. In fact, a failure to provide new treatment facilities would imply that many other governmental and institutional arrangements would have regressed from their current status. However, these conditions do provide an important, if theoretical, measure of the effect of the selected wastewater plan in the context of regional growth.

Overall population for the Phoenix area is assumed to be the same for both with- and without-project futures. Since planning for the regional wastewater treatment system used MAG's population projections, the wastewater treatment facilities that would be available in the study area would not influence changes in the amount of growth. These facilities would, however, affect where this growth occurs, the type of growth, and, ultimately, the quality of life in the study area. In the absence of new, municipally owned or operated wastewater treatment facilities, it has been projected that lower density new development would occur, and this development would spread over a larger area than projected by MAG. The number of persons per square mile in the newly developed areas would be reduced below the level shown in the MAG Guide, especially in those areas that do not have excess treatment capacity and/or have soil conditions that would limit the use of septic tanks.

To more precisely measure these effects, the following assumptions and procedures were used to reallocate projected population growth within the study area in the absence of new municipal wastewater treatment facilities (Arthur Beard Engineers, 1978c):

1. Current density was assumed to remain unchanged within a district which had more population than could be supported on individual septic-tank units. No excess capacity was assumed except in Tolleson.

2. No specific projections of the location of high-density clusters using package plants and private systems were

Table 4-13

FUTURE QUANTITIES OF SEWERED
AND UNSEWERED WASTEWATER[a]
(Without-Project Conditions)

Year	MAG Urban Area Population	Percent Un-sewered	Acre-Feet/ Year Un-sewered	Acre-Feet/ Year Sewered	Acre-Feet/ Year Total
1975	1,229,000	7.2	9,889	127,454	137,343
1980	1,386,000	10.8	16,719	138,085	154,804
1985	1,588,000	22.1	38,110	134,332	172,442
1990	1,799,000	31.3	59,766	131,181	190,947
1995	2,015,000	38.6	81,196	129,156	210,352
2000	2,260,000	45.3	104,937	126,712	231,649

[a]"Sewered"--with existing wastewater treatment facilities; "unsewered"--serviced by septic tanks or private package plants.

Source: Arthur Beard Engineers, Inc., 1978c.

made. Although the continued use of small plants and package plants in larger developments would be extended, it was not possible to project the exact locations of these developments except in a few instances.

3. Future population density in unsewered areas was determined on the basis of soil capability. Conservatively high carrying capacity estimates were as follows: Areas with severe soil limitations were assumed to support 0 to 1 unit per acre, or 800 persons per square mile. Areas with moderate soil limitations were assumed to support 1 to 2 units per acre, or 1,600 persons per square mile. Areas with slight limitation were assumed to support 2 to 3 units per acre, or 3,200 persons per square mile. Where a combination of soil types exists, the saturation point was based upon approximate proportion of each soil type.

4. Reallocations of population from one area to another were based on soil conditions rather than existing septic-tank regulations within the jurisdiction. This is because regulations governing septic tanks may change during the planning period.

4.3.4 POPULATION PROJECTIONS AND DISTRIBUTION

Population projections upon which regional planning is based were developed by the Arizona Department of Economic Security (DES), which is the designated State agency for projecting future population levels. The county-wide DES figures were allocated by MAG to smaller areas in a manner consistent with local plans and MAG regional planning objectives. The basic unit of population allocation is the Community Aggregate Planning Model (CAPM) zone. These zones are aggregated (and split as necessary) to make up municipal and county planning areas.

Total population in the metropolitan area is expected to reach 2,268,000 by the year 2000, according to MAG's adopted Guide. The adopted distribution of this population within the study area is shown in Table 2-1 of this report (p. 2-5). This distribution assumes that new municipal wastewater treatment facilities will be built and that the future land use plan adopted for the region will be realized by the year 2000.

State population projections are reviewed on a yearly basis, and MAG periodically reallocates projected populations within the study area as required to accommodate significant changes in overall projections. During the period in which impacts of the MAG 208 Plan were being assessed, some MAG member communities expressed the opinion that allocated populations were too low. To the extent that these observations are correct, the deficiencies will be reflected in changes to the 208 Plan as it is updated.

Population distribution under without-project conditions is shown in Table 4-14. In this table, MAG year-2000 projected densities and year-2000 densities under without-project conditions are compared for each CAPM zone. The far-right-hand column shows the year-2000 difference in population for each zone assuming no new wastewater treatment facilities are built. Zones that show population losses are those that are projected, under the MAG plan, to receive more additional population than could be supported by septic tank systems, based on soil characteristics. The zones that gain population are receiving the spillover effects from neighboring areas and reach the populations shown based either on maximum septic tank system carrying capacity or the population to be accommodated from neighboring zones.

Without the project, population would be reallocated generally in the following manner. The Northeast service area would absorb any spillover population from adjacent Central and East service areas that would not completely absorb surplus populations within CAPM zones inside their own boundaries. Part of the east and all of the Southeast service areas would lose excess population to adjacent CAPM zones outside these service areas' boundaries. In general, Goodyear and the County districts gain most of the shift toward more remote, rural areas. Other districts that make significant shifts within their own CAPM zones and service areas are Phoenix, Avondale, and Peoria. Westside service areas have far fewer urban or saturated districts than eastside service areas. A summary of population reallocated between service areas under without-project conditions in the year 2000 is given in Table 4-15.

4.3.5 LAND USE

The general land use pattern expected under the MAG Regional Plan is shown on Figure 4-2. The pattern illustrated is based on the goals of the MAG Guide and on the assumption that the year-2000 population for the Phoenix metropolitan area will reach up to 2.3 million, or about double the 1975 population. (The MAG metropolitan area designation varies from the point source metropolitan area in that the Buckeye area is not included in the MAG area.) Land use in this area is affected primarily by the conversion of agricultural land and open space to urban uses.

TABLE 4-14

PROJECTED POPULATION DENSITIES
AND NET POPULATION GAIN OR LOSS BY CAPM ZONE, YEAR 2000
(Without Project Conditions)

Service Areas	CAPM Zone	Area (sq. mi.)	1975 Density (sq. mi.)	MAG[b] 2000 Density (sq. mi.)	Without Project[b] 2000 Density (sq. mi.)	Net Gain or loss (CAPM Zone)
(Eastside Areas)						
Northeast	6	43.0	0	58	2,000	83,500
Scottsdale	14	8.5	540	905	2,500	25,300
	15	23.0	30	622	1,200	13,300
	28	6.5	391	1,354	1,200	- 1,000
Paradise Valley	26	2.0	11	21	1,200	2,300
	27	9.2	530	723	2,600	17,500
Phoenix	13	11.4	926	3,070	1,600	-16,800
	26	2.3	1,038	1,982	1,200	- 1,800
	12	3.0	4,978	5,000	5,000	0
Central-91st Avenue						
	3	13.0	469	2,431	800	-21,200
	4	20.0	656	2,390	800	-31,000
	5	24.0	167	1,600	1,600	0
	10	8.0	2,342	4,000	2,342	-13,000
	11	10.1	1,040	3,406	1,040	-24,000
	12	2.0	1,798	3,300	800	- 3,000
	13	4.0	40	2,150	1,600	- 2,200
	17	10.9	4,717	5,009	4,717	- 3,200
	18	4.0	853	1,163	1,200	0
	24	5.9	6,215	6,271	6,215	0
	34	9.9	6,300	6,737	6,300	- 4,100
	35	6.5	2,973	2,608	2,608	0
	40	29.4	513	1,323	1,200	- 2,500
	43	8.4	497	83	1,200	11,000
	51	8.2	1,812	1,562	1,562	0
	52	29.7	320	1,212	2,000	24,000
	53	20.5	2,192	2,917	2,192	-15,000
	54	8.9	1	2,955	1,600	-12,000
	55	1.2	1,200	5,167	1,600	- 4,300
	61	0.5	18	2,272	1,600	- 300
	42	1.0	5,037	5,850	5,037	- 800
		28.0	33	182	1,000	23,000
Area Outside CAPM						
Central-23rd Avenue	12	5.9	2,345	2,932	2,345	- 3,500
	17	4.0	3,611	3,950	3,611	- 1,400
	18	5.3	2,878	3,519	2,878	- 3,400
	24	3.0	5,467	5,533	5,467	- 200
	25	12.5	4,861	4,992	4,861	- 1,600
	26	7.4	1,508	2,379	1,508	- 6,500
	27	6.4	2,267	2,391	2,267	- 800
	35	3.5	5,660	4,857	5,660	0
	36	5.0	8,696	11,440	8,696	-13,700
	37	8.0	5,377	5,488	5,377	- 900
	41	5.9	4,663	4,831	4,663	- 1,000
	42	8.0	5,082	5,606	5,082	- 4,200
	43	1.4	3.899	1,000	1,000	0
	51	9.4	1,567	755	755	0
Paradise Valley						
	26	1.8	1,464	2,310	1,464	- 1,500
	27	2.0	1,592	2,344	1,592	- 1,500
Southeast	61	1.0	18	2,264	1,600	- 600
Phoenix	54	1.9	56	2,895	1,600	- 2,300
Tempe	55	4.1	1,007	5,146	1,600	-14,000
	61	3.6	45	2,333	2,000	- 1,200
Chandler	56	5.1	111	3,100	800	- 1,080
	61	12.9	61	2,324	2,000	- 4,000
	62	14.6	1,385	2,929	1,385	-22,500
	66	18.0	29	230	1,400	24,700
Gilbert	56	1.1	149	3,019	800	- 2,400
	57	8.1	444	2,585	800	-14,400
	58	9.0	87	357	800	4,000
	62	0.4	833	2,995	833	- 800
	63	20.0	72	206	1,200	20,000
County	64	9.3	353	377	AFB	0
	67	7.6	104	987	2,000	7,700
East Paradise Valley	27	1.0	1,060	1,550	1,060	- 500
Scottsdale	28P	1.6	2,000	4.188	2,000	- 3,500
	28P	2.1	4,800	5,476	4,800	- 1,400
	38P	7.9	4,466	4,316	4,316	0
	38P	4.0	5,423	5,225	5,225	0
Phoenix	42	2.5	917	2,000	2,000	0
	43	1.0	155	0		0
Tempe	44	24.9	3,120	4,560	3,380	-29,400
	55	7.9	1,308	5,190	2,500	-21,000

TABLE 4-14 Cont.

Mesa	45	21.7	3,410	4,100	3,410	- 3,400
	46	21.5	842	1,665	1,900	4,700
	47	19.3	573	1,119	1,200	0
	48	1.7	245	479	1,200	20,000
	56	12.9	628	3,140	1,200	-25,000
	57	6.9	130	2,580	800	-13,500
	58	7.0	512	2,114	1,200	- 6,400
	59	0.5	1,982	3,000	1,980	- 600
Gilbert	56	2.4	152	3,075	800	- 5,500
	57	1.9	174	2,631	800	- 3,500
	58	.3	267	1,100	800	- 90
County	48	28.3	245	480	1,200	20,000
	59	14.5	1,052	2,052	2,000	0
Guadalupe	55	1.5	285	5,333	2,000	- 2,300
Areas Not Served						
NE	16	20.0	75	1,125	1,125	0
SE	60	21.0	5	19	1,000	20,500
	65	42.0	38	48	1,000	40,000
	68	18.0	45	51	1,000	17,000
	63	16.0	27	42	1,000	15,200
	67	10.4	67	255	450	2,070
(Westside Areas)						
Avondale	32	6.5	955	1,821	2,000	180
	33	11.0	36	1,797	1,200	- 6,560
	49	0.5	0	0	600	300
	50	11.0	165	428	1,800	15,090
El Mirage	7	10.0	27	710	600	- 1,100
	8	3.25	1,121	1,847	600	- 2,350
	21	2.5	0	160	1,200	2,600
Glendale	2	11.0	105	910	600	- 3,400
	3	5.0	32	1,080	600	- 2,400
	9	0.75	2,102	3,600	2,102	- 1,120
	10	8.5	1,089	4.165	1,090	-26,150
	22	14.0	460	2,708	1,200	-21,100
	23	15.5	3,398	4,091	3,200	-10,730
Goodyear	20	1.0	0	0	1,600	1,600
	21	1.25	0	0	1,600	2,000
	31	22.0	14	245	2,500	49,600
	32	9.75	505	3,046	2,500	- 5,500
	49	17.0	30	47	1,900	31,500
Luke AFB	21	7.5	660	667	667	0
Peoria	2	7.0	70	888	2,000	13,110
	9	8.0	558	2,809	1,200	- 9,040
	19	7.5	1,101	4,208	1,200	-29,560
	22	3.0	105	2,170	1,200	- 2,910
	23	0.5	120	1,902	1,200	- 350
Phoenix	21		NA	100	600	500
	22	2.0	12	450	1,200	300
	32	1.0	NA	100	600	500
	33	8.0	794	5,175	1,200	-31,800
	50	12.25	253	98	600	7,350
Surprise	8	1.75	1,943	3,886	1,943	- 3,400
Tolleson	33	0.5	750	3,780	Excess	
	40	1.0		100	Capacity Exists	
Sun City	1	0.75	0	0	3,200	2,400
	2	3.0	631	3,634	3,200	- 1,300
	8	9.0	2,840	3,112	3,200	800
	9	3.25	1,040	2,617	3,200	1,900
Youngtown	8	1.0	2,000	2,200	2,000	- 200
Maricopa County						
I	1	21.25	82	1,342	1,200	- 3,000
	2	2.0	113	500	2,500	4,000
II	1	10.75	0	830	600	- 3,000
	7	30.5	15	207	470	- 8,180
	20	15.0	10	12	470	6,900
	21	5.25	31	20	490	2,460
III	31	5.0	198	385	490	520
	49	4.0	98	170	490	1,280
IV	8	0.75	6	268	3,000	2,600
	21	6.0	4	247	1,900	6,100
	22	4.5	4	254	600	1,200
	49	3.0	0	0	1,200	3,600

[a]Includes only those portions of study area divided into CAPM zones.

[b]Densities contained in MAG Guide for Regional Development, Transportation and Housing (1978).

[c]Densities projected for study area assuming no new or expanded municipal wastewater treatment facilities.

SOURCE: Arthur Beard Engineers, Inc., 1978c

Table 4-15

SUMMARY OF POPULATION REALLOCATED BETWEEN SERVICE AREAS, YEAR 2000 (Without-Project Conditions)

Service Area	Total Population Loss Within Service Area	Total Population Gained Within Service Area	Total Loss or Gain to Adjacent Service Area
(Eastside areas)			
Southeast	- 63,280	+ 56,400	- 6,880
Northeast	- 19,600	+141,900	+122,300
Central (19th)	-136,600	+ 58,000	- 76,600
Central (23rd)	- 40,200	0	- 40,200
East	-128,990	+ 37,600	- 91,390
CAPM zones outside service area[a]	0	+ 94,770	+ 94,770
(Westside areas)			
Avondale	- 6,560	+ 15,572	+ 9,010
El Mirage	- 3,450	+ 2,600	- 850
Glendale	- 64,900	0	- 64,900
Goodyear	- 5,300	+ 82,900	+ 77,600
Peoria	- 41,860	+ 13,110	- 28,750
Phoenix	- 31,800	+ 8,650	- 23,150
Sun City	- 1,300	+ 5,100	+ 3,800
Surprise	- 3,400	0	- 3,400
Tolleson	0	0	0
Youngtown	- 200	0	200
County districts	0	+ 30,840	+ 30,840
TOTALS	-547,440	+547,440	0

[a]Zones 60,65,68,63 partial and 67 partial at 62.5 percent saturation 1000 pop/sq.mi.

Source: Arthur Beard Engineers, Inc., 1978c.

The extent of the urbanized area expected under the MAG Regional Plan in the year 2000, compared to the existing area, is shown on Figure 4-3. This additional area represents a somewhat more dense pattern of development than that of the existing urbanized area. From an existing average density of 3,500 persons per square mile, the future area would accommodate an average of between 4,000 and 4,500 persons per square mile due to the expected in-filling of vacant parcels within the existing area and the provision of a greater amount of higher density housing (Maricopa Association of Governments, 1978).

The amount of land expected to convert from agricultural and natural use to urban uses up to the year 2000 with and without the project is shown in Table 4-16. Under the MAG Regional Plan, urban land area more than doubles, while agricultural land is reduced by approximately half. (Virtually all irrigated farmland in the metropolitan area, including that expected to convert to urban use, is designated "prime" farmland by the U.S. Department of Agriculture, Soil Conservation Service.) Natural area, the predominant land use in the metro area, is reduced by only 11 percent.

Under without-project conditions, 67 percent more urbanized area would be created than would exist with the project. Losses of agricultural and natural lands beyond the 1975 base would be 28 percent and 145 percent greater, respectively, without the project. Differences in land use between the with-project and without-project conditions are illustrated on Figure 4-4.

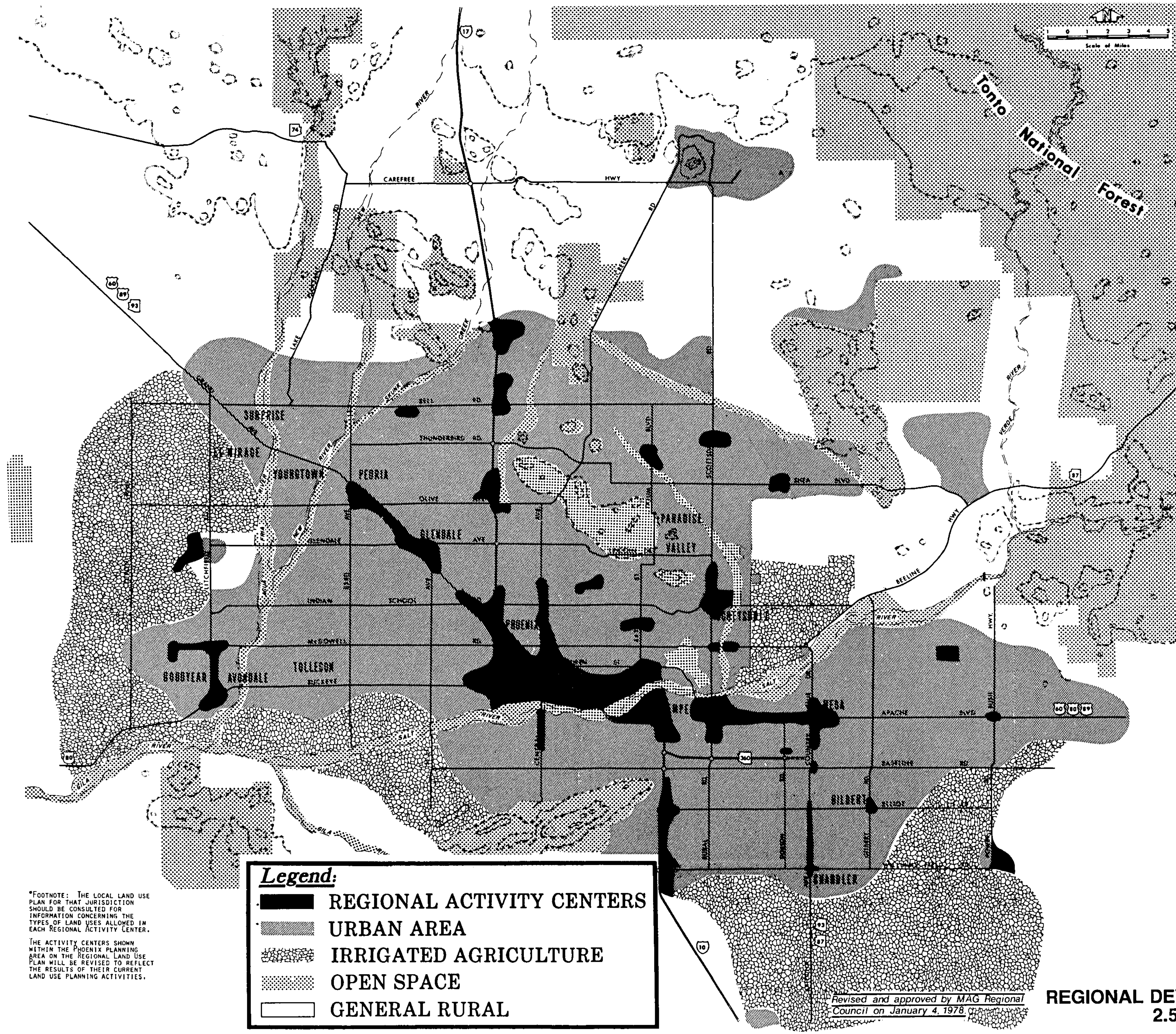
4.3.6 TRANSPORTATION

The Transportation System Plan for the region consists of three main elements:

1. Long-Range Transportation System Plan
2. Transportation System Management Element
3. Regional Airport Systems Plan

The Long-Range Transportation System Plan consists of a planned system of streets, highways, expressways and freeways, and the planned transit system. It is the basis for specific route-location studies and the source from which projects can be selected for the 5-year improvement program.

The backbone of the Transportation Plan is the system of major streets on a 1-mile grid pattern throughout the metropolitan area. Several freeway extensions are also planned for future

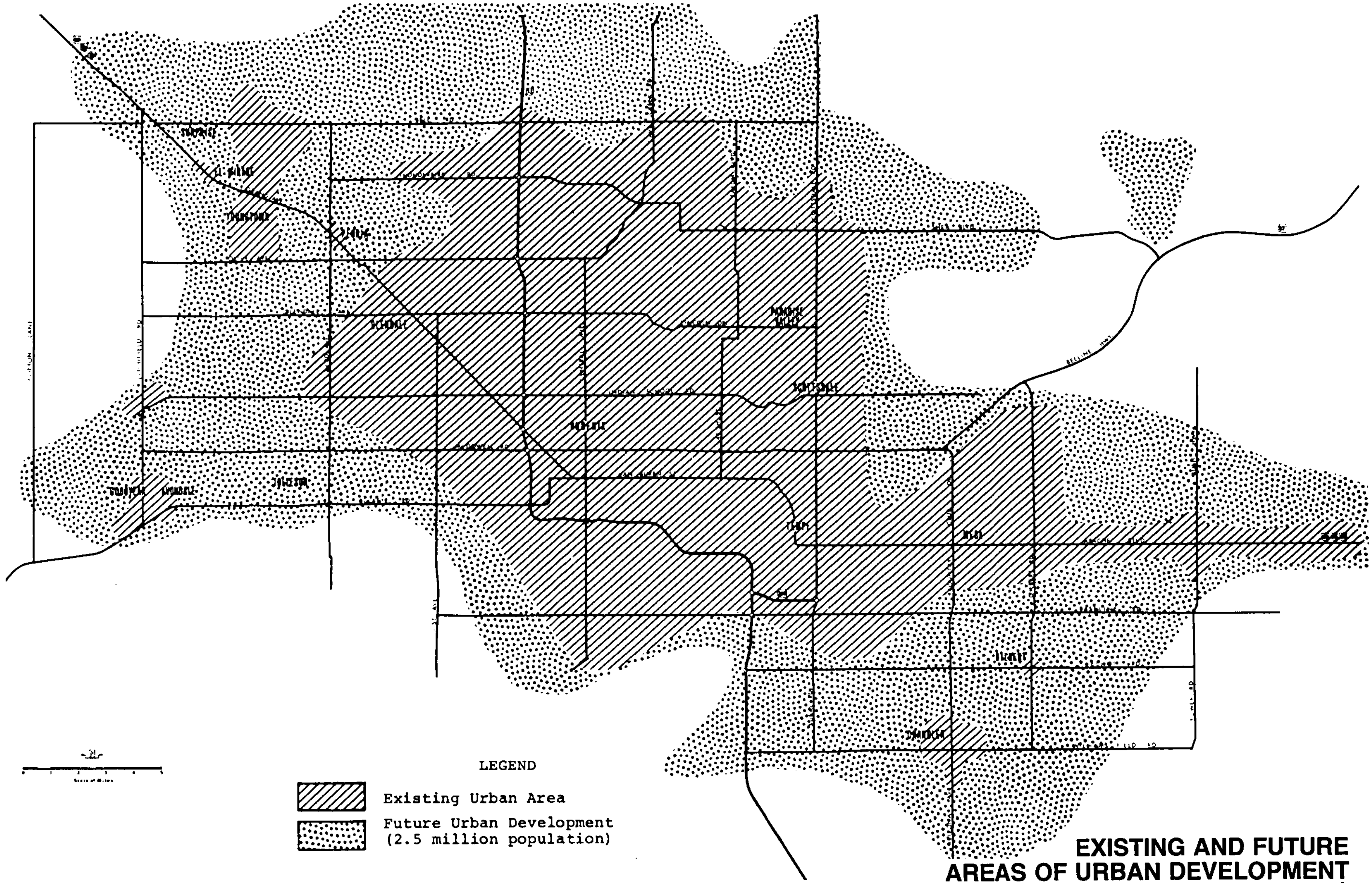


*FOOTNOTE: THE LOCAL LAND USE PLAN FOR THAT JURISDICTION SHOULD BE CONSULTED FOR INFORMATION CONCERNING THE TYPES OF LAND USES ALLOWED IN EACH REGIONAL ACTIVITY CENTER.

THE ACTIVITY CENTERS SHOWN WITHIN THE PHOENIX PLANNING AREA ON THE REGIONAL LAND USE PLAN WILL BE REVISED TO REFLECT THE RESULTS OF THEIR CURRENT LAND USE PLANNING ACTIVITIES.

Source: Maricopa Association of Governments, 1978.

REGIONAL DEVELOPMENT POPULATION
2.5 MILLION — METRO AREA
Figure 4-2



EXISTING AND FUTURE AREAS OF URBAN DEVELOPMENT
Figure 4-3

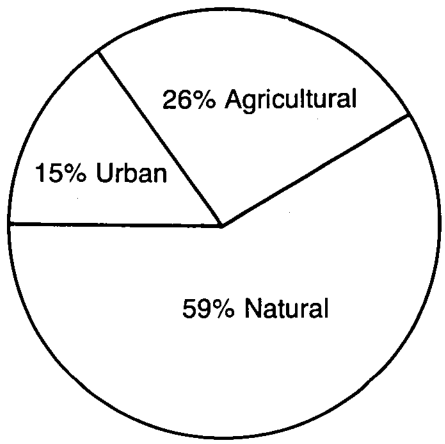
Source: Maricopa Association of Governments, 1978.

Table 4-16

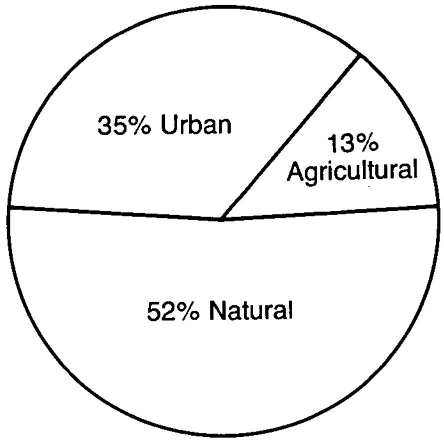
PROJECTED CHANGES IN LAND USE WITH AND WITHOUT NEW MUNICIPAL WASTEWATER TREATMENT FACILITIES 1975-2000

Year	Urban		Agricultural		Natural	
	Acres (1,000)	Sq. Mi.	Acres (1,000)	Sq. Mi.	Acres (1,000)	Sq. Mi.
Without New Municipal Wastewater Treatment						
1975	231.7[a]	334	366.6	572.8	840.6	1,313
1980	318.9	498	312.6	488	789.1	1,247
1985	376.6	588	283.3	443	760.9	1,189
1990	477.7	746	231.3	361	711.8	1,112
1995	578.8	904	180.8	282	661.2	1,033
2000	678.7	1,060	129.8	203	612.3	957
Net Change 1975-2000	465.0		(236.8)		(228.3)	
With New Municipal Wastewater Treatment						
1975	213.7[a]	334	366.6	572.8	840.6	1,313
1980	276.4	432	324.8	507	819.7	1,281
1985	310.1	485	302.3	472	808.5	1,263
1990	370.7	579	261.9	409	788.3	1,232
1995	431.4	674	221.6	346	767.9	1,200
2000	492.2	769	181.2	283	747.5	1,168
Net Change 1975-2000	278.5		(185.4)		(93.1)	

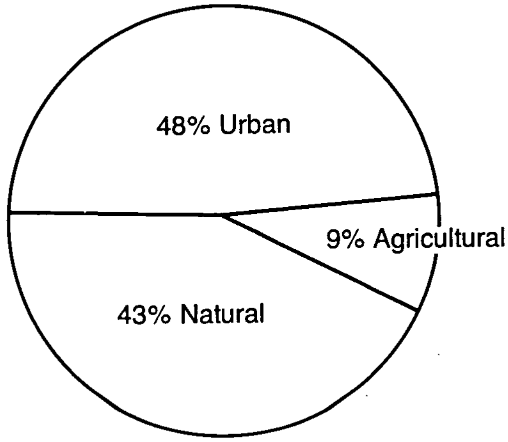
[a]Figures are adjusted to reflect exclusion of regional parks from "urban" designation.



1975



2000 — With new treatment facilities



2000 — No new treatment facilities

LAND USE BY TYPE
METROPOLITAN PHOENIX
Figure 4-4

years. While plans include the expansion of the present bus system, public transit is expected to remain a relatively insignificant mode of travel through the end of the century.

Travel in the Phoenix area will increase with growth expected under the Regional Development Plan. Although travel volumes and patterns will vary according to the final configurations of road and transit systems, land use, etc., vehicle miles of travel (VMT) in the year 2000 are expected to be approximately double the 1975 VMT of 18.2 million per day (Maricopa Association of Governments, 1977). Expanded public transit systems could reduce the VMT in the Phoenix area, but the low-density, dispersed land use configuration set forth in the Regional Development Plan is not compatible with efficient transit systems. MAG researchers estimate that an expanded version of the present bus system could account for only 1.7 percent of person trips in the metropolitan area in the year 2000 (Maricopa Association of Governments, 1977). This compares to 0.6 percent of person trips attributed to public transit in 1976.

Under without-project conditions, the much larger area of urbanization would significantly increase normal driving distances within the metropolitan area above those projected by MAG. This more dispersed urban area would also preclude much of the savings in future VMT expected in the Transportation Plan because it would make improved public transit and carpooling systems less efficient.

4.3.7 HOUSING

The total number of new housing units required in the metropolitan area by the year 2000 is expected to be the same under both project and without-project conditions. This is because both futures assume the same total population and demographic composition of residents. Projected future housing demand for Maricopa County is indicated in Table 4-17.

The difference between project and without-project conditions would occur in the type of new housing built in the area. The number and proportion of new multiple-family units, townhouses, and mobile homes increased dramatically in Maricopa County between 1970 and 1975. During these years, 1.2 multiple-family units were built to every single-family unit built. If new municipal wastewater facilities are provided, this trend toward a much higher percentage of multiple-family units and townhouses in new housing starts would continue.

Table 4-17

PROJECTED FUTURE HOUSING DEMAND,
MARICOPA COUNTY

Year	County Populations	Households	Average Size	Vacant Units[a]	Total Units
1975	1,245,000	429,334	2.86	32,315	461,649
1980	1,483,500	540,653	2.74	34,509	575,163
1985	1,612,000	608,301	2.65	32,017	640,318
1990	1,836,118	700,021	2.64	36,843	736,865
1995	2,060,236	791,741	2.62	41,671	833,412
2000	2,297,000	883,461	2.60	46,499	929,960

[a]Vacancy rates equal 7% to 1975, 6% to 1980, and 5% thereafter.

SOURCES: Maricopa Association of Governments, 1978; Arthur Beard Engineers, Inc., 1978c.

Without new municipal wastewater treatment facilities, this trend would be expected to reverse due to lower overall densities and greater dispersion of new development. Single-family units would again dominate the new construction market. By 1985, it is projected that only one multiple-family unit would be built during the 10-year period for every 3.2 single-family units built. This ratio would remain constant through the year 2000. Because fewer new townhouse and multiple-family units would be built, construction costs per unit and costs of housing generally would be greater. Other expenditures, including community facilities, services, and developer costs would also be higher for low-density (single-family) versus high-density (multiple-family) units.

4.3.8 ECONOMY

Changes in the area's economy as a result of growth will stem primarily from the reduction of agricultural output. As cropland is replaced by urban uses, Maricopa County's critical ground water status will probably prevent expansion of agriculture into more remote locations. Agriculture-related industries that will probably also experience a decline include agrochemicals, food processing, retail trade (in farm equipment, for example), and wholesale trade in raw and processed foods and products.

The loss of agricultural land which would occur without the project has been calculated to be 236,800 acres over the period up to the year 2000 (see p. 4-64), or 51,400 acres more than would occur if the growth pattern followed the MAG Regional Development Plan. The loss of 51,400 additional acres in agricultural production by the year 2000 would represent a loss of about $30 million (1977 dollars) in annual gross output. Considering that urbanization under the planned growth concept of the MAG Regional Development Plan would result in a loss of 185,400 acres, or about $109 million in production, the impacts of additional losses incurred without new treatment would not be of major significance, especially since the losses are incurred incrementally over more than a 20-year time span.

The accelerated decline of agriculture expected if no municipal treatment facilities are built or expanded would bring about a greater reduction in agriculture-related industries than would occur with project conditions. However, the gradual nature of the reduction should allow the individual businesses involved to make the necessary adjustments with minimal hardship.

4.3.9 AIR QUALITY

The major cause of air pollution in the Phoenix area is the automobile. Population growth in the area will result in increased vehicle miles in travel (VMT) and increased automobile emissions. However, the air quality Nonattainment Area Plan (Arizona Department of Health Services, 1978a) projects that, with the use of combined control strategies (see pp. 3-30 - 3-37), future air quality in the Phoenix area will be superior to the existing air quality. Table 4-18 shows projected carbon monoxide and nonmethane hydrocarbon levels expected with the use of the combined control strategies.

The data in Table 4-18 show that residents in the Phoenix area will experience improved air quality conditions as compared to current conditions. Carbon monoxide and nonmethane hydrocarbon concentrations will decline to levels well within the acceptable range. This decline, according to the Nonattainment Area Plan, will begin after 1980 and will bring carbon monoxide levels into compliance with Federal standards by 1982. Photochemical oxidant standards are projected to be achieved by 1985. The recent relaxation of the Federal standard for photochemical oxidants will mean that the standard for this pollutant can now be reached by 1982; the Nonattainment Area Plan is being revised to reflect this change.

Under without-project conditions, VMT would be expected to increase more than under with-project conditions, primarily because of the more dispersed population distribution in the study area. Increased VMT would be expected to lead to increased emissions of pollutants from automobiles. This is a less desirable condition than that which would occur with the project under the MAG Regional Development Plan.

Major changes in land use and population distribution occurring under without-project conditions would delay attainment of air quality goals unless further controls are implemented. This is a significant undesirable air quality situation, in light of existing carbon monoxide and photochemical oxidant problems in the Phoenix area.

The net result of these changes under without-project conditions is that air quality would not improve as much as under project conditions. However, the air quality model now in use by the Arizona Bureau of Air Quality Control would probably be unable to detect discernible air quality changes in outlying areas under without-project conditions (Arizona Department of

Table 4-18

PROJECTED CARBON MONOXIDE CONCENTRATIONS
AND NONMETHANE HYDROCARBON EMISSIONS,
PROJECT CONDITIONS, 1980-2000[a]

Year	Peak 8-Hour CO Reading (ppm)[b]	Nonmethane Hydrocarbons (tons/day)[c]
1980	9.5	160
1985	7.5	115
1990	7.0	105
1995	6.5	105
2000	7.0	110

[a]Project conditions include use of combined control strategies for attainment of air quality goals.

[b]National Ambient Air Quality Standard for CO = 9 ppm.

[c]Maximum allowable nonmethane hydrocarbon emissions to attain National Ambient Air Quality Standard for photochemical oxidants (ozone) = 119 tons/day.

SOURCE: Arizona Department of Health Services, 1978a

Transportation, 1979). Although VMT would tend to increase because of a more dispersed population distribution in the area, even with projected increases in mass transit, meteorological mixing conditions would tend to disperse increased concentrations of automobile emissions in outlying areas. The downtown corridor would probably remain an area of relatively high atmospheric pollutants compared to the outlying areas due to the continued existence of traffic concentration centers in downtown Phoenix (Arizona Department of Transportation, 1979).

4.3.10 WATER RESOURCES

Water Use

Over much of the study area water use patterns are changing, principally because of urban development. Since 1940, over 50 percent of the farmland within the Salt River Project service area has been urbanized, and this trend is expected to continue. Total surface and ground water withdrawals for agriculture in 1975 within the Salt River Valley (which is approximately one-third larger than the metropolitan area) amounted to approximately 2,223,000 acre-feet, or roughly three times the urban water use (Arizona Water Commission, 1978). By the year 2005, agriculture is projected to be depleting about twice as much as urban uses, and by 2020 depletions for the two uses are projected to be almost equal (Arizona Water Commission, 1978). Overall, total water depletion in the Valley by the year 2005 should be somewhat less than it is today, although the population of the area will almost double. This is because agricultural uses require more water than do urban uses, and the decline in agriculture in the area will therefore result in significant reductions in water use (Arizona Water Commission, 1978).

It is expected that water use under without-project conditions would be further reduced than under project conditions (Arthur Beard Engineers, 1978c). Without-project conditions assume a greater conversion of agricultural lands to urban uses (see p. 4-64), and the decline in irrigated acreage combined with a wide dispersal of urban population would lead to lower rates of water use. Without-project projections show urban uses increasing over agricultural uses slightly by the year 2000 in the Phoenix area (Arthur Beard Engineers, 1978c).

Surface Water Availability

With or without the project, surface water supplies from the Salt and Verde Rivers are expected to decline as a result of increased use in upstream areas (Arizona Water Commission, 1978). By the year 2005, the average annual diversion from the Salt and Verde Rivers is projected to decrease from the current 860,000 af/yr to 824,000 af/yr (Arizona Water Commission, 1978). Little change is expected in the amount of water available for diversion from the Agua Fria River.

The Central Arizona Project (CAP) will provide the major source of new water in the area. Final allocations of CAP water have not been made, but it is assumed for purposes of projection that 510,000 acre-feet of water will be available in 1990 and 494,000 acre-feet in 2005 (Arizona Water Commission, 1978).

With the project, increased population growth in the study area is expected to increase wastewater flows at treatment plants by approximately 50 percent over the present (from 149,000 to 223,000 af/yr). Approximately 50 percent of the year-2000 flows will benefit water supply in the study area by being reused in the Salt River Valley Basin. The remaining flows (approximately 107,000 af/yr) are expected to be exported to the Lower Hassayampa River area for use as cooling water at the Palo Verde Nuclear Generating Station.

Without the project, approximately 45 percent of year-2000 flows would not be sewered. This amount (100,000 af/yr) would not be available as treated wastewater for reuse, and existing commitments to agricultural interests and ANPP could not be met in full.

Surface Water Quality

No major growth-induced changes in surface water quality are expected in the study area. Surface water in the area consists primarily of water contained in man-made impoundments and canals whose quality is expected to remain largely unaffected by growth patterns. Other sources of surface water include effluent discharged from treatment plants into receiving streams or impoundments. State surface-water-quality standards and Federal discharge requirements will have to be complied with regardless of growth patterns in the study area.

Ground Water Changes

Ground water overdrafting is predicted to continue in the study area in the near future but is expected to be reduced by approximately 60 percent when CAP water is brought into the study area (Arizona Water Commission, 1978). Overdraft is expected to rise again when CAP allocations are reduced in the twenty-first century. To the year 2020, ground water in storage above 700 feet will be reduced by about 20 percent, with approximately 80 million acre-feet of water remaining in this portion of the aquifer (Arizona Water Commission, 1978). Little change in ground water quality is expected in the area. Local alteration of ground water quality may occur due to changes in flow patterns caused by pumping and the application of treated wastewater for limited agricultural uses.

More wastewater would be retained in the area for ground water recharge without the project than with it. The result would be a probable reduction in ground water overdraft without the project. Approximately 45 percent (100,000 af/yr) of wastewater would be unsewered in the year 2000 without the project. This amount of wastewater would be discharged from septic tanks or package plants within the metropolitan area, thereby contributing to ground water recharge. However, leachate from this extensive nonpoint source would increase the likelihood of degrading the quality of water pumped from municipal wells. Nitrate and dissolved organic carbon would be of special concern if on-site disposal by septic tanks were practiced at too great a density or without sufficient control or adequate design and construction.

4.3.11 BIOLOGICAL RESOURCES

By the year 2000, growth in the metropolitan area is expected to result in the loss of approximately 93,000 acres of natural area (see Table 4-16, p. 4-64). Most of this natural area consists of creosotebush-bursage and saltbush habitat, both of which are considered to be of lower quality than paloverde-saguaro or riparian habitat. Much of the valuable riparian habitat along the Salt and Gila Rivers would not be subject to wholesale removal due to urban expansion into the flood plain. This is because current municipal and County zoning generally excludes urban development in the riparian flood plain. Furthermore, most of the riparian habitat lies outside the metro Phoenix "urban fringe."

Without the project, year-2000 losses of natural land area are projected to amount to approximately 228,300 acres, or 135,000 more acres than with the project (see Table 4-16, p. 4-64). Most of this natural area is creosotebush-bursage and saltbush habitat, which is abundant in Maricopa County. Approximately 2 miles of riparian habitat downstream from the 91st Avenue treatment plant between 91st and 115th Avenues would receive less discharged wastewater under without-project conditions. This could alter the floristic composition of the plant community and significantly change its habitat quality.

4.3.12 ENERGY CONSUMPTION

Levels and types of energy used in the Phoenix area are strongly related to the need for extensive summer cooling, the predominance of private automobile travel within the dispersed metropolitan area, and the presence of light industrial activity. Under these circumstances, refined petroleum and various electrical generating resources will remain important to the Phoenix area throughout the planning period. Alternate energy sources, such as solar power, could be developed over the next 20 years, but these developments cannot be predicted accurately at this time.

Total energy consumption for the State of Arizona has been estimated for 1975, with projections of future consumption prepared up to 1985 (Frank, 1977). Table 4-19 shows the 1975 energy use by consumptive category.

If energy use is proportionate to population within the State, Maricopa County would have consumed approximately 336 trillion BTU's (TBTU's) of energy in 1975. Projected statewide consumption in 1985 is expected to range from 959.0 to 1,152.8 TBTU's depending upon the level of conservation effort (Frank, 1977).[1] Maricopa County's share of this total would be 527 to 635 TBTU's based on the projected 1985 County proportion of total State population.

Fuels for Arizona's energy needs in 1975 were derived from coal, natural gas, petroleum, and hydropower, as shown in Table 4-20.

In future years, these proportions will change. Unless newly discovered sources of natural gas can be quickly exploited, limited natural gas supplies will likely necessitate greater electrical production in the future to accommodate additional residential and industrial activity. Increasing reliance on electricity would increase fuel consumption, since production of electricity involves overall energy losses in the form of waste heat of production, losses during transmission, etc. Nuclear power will be a major new source of energy for production of electricity in the Phoenix area when the Palo Verde Nuclear Generating Station near Buckeye, Arizona, begins production in the mid-1980s. The future emphasis to be placed on developing

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[1]Frank based consumption projections on a 1985 State total population that is 15 percent higher than current DES projections.

Table 4-19

ARIZONA ENERGY CONSUMPTION IN 1975

Category	Trillion BTU's	Percent of Total
Residential	119.2	19.5
Commercial	140.3	22.9
Industrial	142.9	23.4
Transportation	209.6	34.2
Total	614.4	100.0

SOURCE: Frank, 1977.

Table 4-20

FUEL SOURCES FOR ARIZONA ENERGY CONSUMPTION, 1975

Fuel	Trillion BTU's	Percent of Total
Coal	85.5	13.9
Natural gas	160.8	26.2
Petroleum	290.3	47.2
Hydro-power	77.8	12.7
Solar	?	?
Total	614.4	100.0

SOURCE: Frank, 1977.

proven solar power is unclear, but substantial emphasis could significantly alter use of other energy sources.

Future energy trends for the nation include reduced petroleum consumption due to increased automobile efficiency (more miles per gallon) and conservation measures associated with higher oil prices and dwindling supplies. Coal consumption is expected to rise as coal replaces petroleum fuels for generating electricity. Nuclear power may also increase as use of petroleum products declines. The future of nuclear energy will be contingent upon public acceptability, the availability of other energy sources, price, and whether or not relatively secure waste disposal can be developed.

Transportation Fuel

According to MAG projections, vehicle miles of travel (VMT) in the year 2000 in the Phoenix area are expected to be approximately double the 1975 VMT of 18.2 million per day (Maricopa Association of Governments, 1977). Gasoline consumption is expected to increase by only about one-third, however, from 1.4 to 1.9 million gallons per day, due to Federal legislation requiring auto makers to produce vehicles which achieve 27.5 miles per gallon mileage ratings by 1985.

Dramatic changes in VMT and transportation energy use could result from significant increases in carpooling. If average vehicle occupancy increased from 1.33 persons per auto (estimated for 1973) to just 1.5 persons per auto, VMT would drop over 10 percent, and gasoline consumption in the year 2000 would be down to 1.7 million gallons per day from the projected 1.9 million gallons daily (Maricopa Association of Governments, 1977). An expanded public transit system is not expected to alter VMT because the low-density, dispersed land use configuration of the adopted Regional Development Plan does not encourage significantly increased use of public transportation.

Natural Gas

Natural gas supplies for Arizona are finite, and the cost of natural gas is now increasing rapidly. Currently, about 1.32×10^{13} BTU's of gas are consumed in Maricopa County yearly for household purposes and about 6.9×10^{9} BTU's for industrial purposes (derived from Frank, 1977). Although some residential gas customers may be added to those already in existence, overall annual gas consumption in the metropolitan area is not expected to increase, regardless of growth, unless new natural gas discoveries can be rapidly exploited.

Electricity

The Arizona Public Service Company (1979) estimates that 10,000 kilowatt hours (KWH) of electricity are consumed yearly for each residential meter in service. Assuming an average household size of 2.86 persons in Maricopa County (Maricopa Association of Governments, 1978), about 479,000 households existed in the metropolitan area in 1975. These households consumed an estimated total of 4.79 X 10^9 KWH annually.

The average number of households in the metropolitan area is expected to increase, over time, faster than the total population, due to the trend toward smaller households. (These smaller households may, in turn, consume less per household unit than those of the current size.) Arizona Public Service (1979) estimates that year-2000 consumption of electricity will average approximately 15,000 KWH per year per household. Assuming this rate of consumption, the 952,000 households (at 2.6 persons per household) projected for the Phoenix area in the year 2000 would consume approximately 14.3 x 10^9 KWH annually, or about three times as much electricity as in 1975.

4.3.13 ARCHAEOLOGICAL RESOURCES

Many archaeological sites in the metro area have been destroyed due to residential, commercial, and industrial construction, and agricultural development. Others have been excavated and reported by archaeologists and provide a permanent record of their existence. In addition, the remains of several major sites (for example, Pueblo Grande) have been preserved and restored and are accessible to the general public.

Several prehistoric sites, including the Pueblo Grande Ruin (Phoenix), Hohokam-Mormon Canals (Mesa), and Hohokam-Pima Irrigation Sites (Phoenix) have been entered on the National Register of Historic Places. Numerous other archaeological sites have either been nominated to or are considered to be potentially eligible for inclusion in the State or National Registers of Historic Places.

Public awareness and regulatory controls will probably continue to create a climate of vigilance over urban and agricultural development in archaeologically sensitive areas. The interest and resulting archaeological studies being conducted for the Valley's freeway expansion and requirements for archaeological clearance in sensitive zones prior to construction of Federally funded projects, such as the MAG 208 Plan and flood control programs in the area, are examples of prevailing conditions.

It is assumed that growth in the area over the next 20 years will result in destruction of a minor amount of archaeological artifacts. However, recent archaeological studies in the 208 area and archaeological-related lesiglation and regulations will keep this inadvertent destruction to a minimum. Conversely, the lack of a 208 program and associated lack of additional sewage-treatment facilities would increase the likelihood of archaeological site destruction due to greater urban sprawl. In this situation, it is likely that adverse impacts to archaeological resources without the project would be greater than with the project.

4.4 UNAVOIDABLE ADVERSE IMPACTS

4.4.1 UNAVOIDABLE ADVERSE IMPACTS OF THE SELECTED PLAN

Implementation of the selected plan will result in the loss of approximately 720 acres of terrestrial habitat and 20 acres of aquatic habitat. Habitat losses will be offset by creation of terrestrial and aquatic habitat associated with buffer zones around facilities and effluent reuse schemes.

Construction of interceptor lines will result in increased fugitive dust episodes along approximately 55 miles of interceptor line. Some, but not all, dust can be controlled by dust-abatement measures required by State regulations during construction.

Operation of treatment plants will result in occasional odor episodes. However, the current frequency of odor episodes will be reduced by upgrading of facilities and use of better operating procedures. Several thousand persons in homes and commercial and industrial establishments in the vicinity of the 91st Avenue, 23rd Avenue, and north Gilbert treatment plants will be subject to these periodic odor episodes. Other treatment plants are sufficiently distant from development that odor episodes would not have an adverse effect.

Approximately 254 acres of farmland will be taken out of agricultural production to provide treatment plant sites for all the facilities envisioned. Most of this land is classified as prime farmland by the U.S. Soil Conservation Service, but nearly half is expected to be urbanized or under strong urban pressure by the year 2000, even if not used for treatment facilities.

The costs of wastewater treatment to most households, businesses, and institutions will increase within the region as a result of the proposed plan. These higher costs will result from the need to expand the treatment system to respond to growth. The amount of increase will vary from community to community depending upon the specific requirements of each. Communities that will bear a greater burden of the increased costs include Guadalupe, El Mirage, Surprise, Avondale, and Goodyear, with a high percentage of low- and moderate-income persons.

Since low-income households tend to produce as much effluent and be charged the same for sewer services as higher income households, the higher costs anticipated for wastewater treatment will result in lower income households spending a larger percentage of their income for this service. This redistribution of income will be even more pronounced in smaller, less affluent communities where the cost per household is expected to be higher than in more affluent portions of the area.

The costs of tying into the regional system will constitute a considerable financial burden for some communities, due to the following special conditions:

- Guadalupe: The town of Guadalupe may not have an adequate assessed value to support bonds to pay for its share of the cost of the expanded treatment plants. The user costs per household may also be excessive, even if the city has adequate bonding capacity to pay for the system.

- El Mirage/Surprise: These communities do not have the necessary population to support their own system and may not have an adequate tax base to meet the costs of tying into the 91st Avenue system.

- Avondale/Goodyear: These communities have limited resources and could have difficulty supporting the construction and operation of the proposed Reems Road plant.

4.4.2 UNAVOIDABLE ADVERSE IMPACTS OF GROWTH

As the Phoenix metropolitan area continues to grow in both population and urbanized area, approximately 185,000 acres of prime farmland now being farmed will be taken out of production. About 93,000 acres of natural landscape will be converted to urban use.

Ground and surface water resources will continue to be depleted, but by the year 2000 total water depletion in the Salt River Valley is projected to be somewhat less than it is today. This is because agricultural uses require more water than do urban uses. Although population will grow in the area, the projected decline in agricultural activity will result in a compensating savings in water use.

Population growth will require increased use of energy resources, particularly electricity. While growth will account for half the increased consumption of electricity, other factors, including a greater reliance on this energy source, account for the other half of the increased consumption.

Some archaeological resources will be destroyed by the spreading urbanized area.

4.5 IRREVERSIBLE, IRRETRIEVABLE COMMITMENTS OF RESOURCES

Wastewater flows of approximately 223,000 af/yr by the year 2000 will be committed to treatment in the regional wastewater treatment system. Approximately 95 percent of flows will be committed to reuse for electric energy production, agricultural irrigation, and support of wildlife habitat.

The 254 acres of prime farmland used for treatment plant sites will be irretrievably lost.

An average of about $17.5 million annually over the economic life of the wastewater treatment system will be expended for materials, fuels, and labor for plant construction, and for labor, energy, and materials for plant operation. Up to 15 percent of these expenditures can be recovered through sale of wastewater effluent.

Resources for managing wastewater treatment in the study area will shift from local governments to Subregional Operating Groups and to MAG under the adopted management system.

As urban growth continues in the Phoenix area, materials, energy, and labor will be irretrievably committed to construction of urban structures and systems and to the maintenance of the area's lifestyle. Much of this commitment will be irretrievable.

4.6 SHORT-TERM USES OF THE ENVIRONMENT VS. LONG-TERM ENHANCEMENT

The metro Phoenix wastewater management plan is a set of actions and institutional changes that will lead to enhancement of the environment over the planning period and beyond. The plan seeks to protect and improve water quality in the metro Phoenix area by improving wastewater treatment facilities and by providing for a new areawide wastewater management system to assure that the facilities will be operated properly and that discharges will meet water quality standards. The management system will also result in more effective areawide wastewater and water resources planning over the next 20 years. No short-term uses of the environment at the expense of long-term enhancement are expected under this plan.

Chapter 5
Comments and Responses

5.0 COMMENTS AND RESPONSES

5.1 INTRODUCTION

The DEIS on Point Source Metro Phoenix Alternatives for the MAG 208 Water Quality Management Plan was circulated to over 350 agencies, organizations, firms, municipalities, Indian communities, libraries, and individuals (see DEIS pp. iv-xiii). Comments were received from the following. Asterisks indicate that a comment required a response.

Comment Document	Comment Received from
A	*Advisory Council on Historic Preservation
B	*Federal Energy Regulatory Commission
C	U.S. Department of the Interior, Fish and Wildlife Service
D	*U.S. Department of the Interior, Office of the Secretary
E	*U.S. Department of Agriculture, Soil Conservation Service
F	U.S. Department of Transportation, Federal Highway Administration
G	*Arizona Department of Transportation
H	*Arizona Game and Fish Department, Planning and Evaluation Branch
I	*Arizona State Land Department
J	*Arizona Water Commission
K	Arizona State Clearinghouse A-95 Review
K1	*Arizona Department of Economic Security
K2	Arizona Oil and Gas Conservation Commission
K3	Arizona State Parks Board
K4	Arizona Agriculture and Horticulture Commission
K5	Arizona Game and Fish Department, Fisheries Division
K6	Arizona Department of Health Services, Bureau of Water Quality Control
K7	Central Arizona Association of Governments
K8	Maricopa Association of Governments
K9	District IV Council of Governments
K10	City of Tempe
L	*Gila River Indian Community
M	*Arizona Public Service Company
N	*John S. Schaper (Buckeye Irrigation Company)
O	*David E. Creighton
P	*Orme Lewis, Jr.

Comment Document	Comment Received From
Q	*Thomas S. Rothweiler
R	*Adron W. Reichert (Holly Acres Flood Control Association)
S	*Gilbert T. Venable (Citizens Concerned About the Project and the Maricopa Audubon Society)

Numerous comments on the DEIS corrected errors of fact, omissions, or inconsistencies in the text. A fewer number of comments concerned major issues having to do with the impact of the proposal on the environment. Several comments questioned the presentation of material. In revising the DEIS, it was EPA's intent to respond to these comments to the fullest extent possible. This involved expanding the analysis of some impacts, reorganizing the document, focusing on the selected alternative, and eliminating some of the text from the DEIS. The resulting FEIS is a more concise document organized to meet requirements of new Council on Environmental Quality regulations (40CFR 1500-1508).

In the following section (Section 5.2), the comment documents are presented. Portions of the comments requiring responses are numbered. In Section 5.3, responses to the comments are presented, with each response keyed to the comment document and number indicated in Section 5.2.

Responses were prepared by representatives of EPA, Region IX, MAG, the U.S. Army Corps of Engineers, and the consulting firms of Dames & Moore; the Natelson Company; Stevens, Thompson & Runyon, Inc.; Ferguson, Morris, & Simpson, Inc.; Arthur Beard Engineers, Inc.; Camp, Dresser, & McKee, Inc.; Boyle Engineering Corporation; Kenneth Schmidt & Associates; John Carollo Engineers; and Morris, Clester, & Abegglen. EPA acted in a review capacity for responses not drafted directly by the agency.

Most responses to major comments included changes in the analysis and/or presentation of the EIS. In particular, comments from the Arizona Public Service Company (Comment Document M) and the Buckeye Irrigation Company (Comment Document N) led to a reexamination of the assumptions used in the DEIS discussion of impacts of the sale and transportation of effluent to the Palo Verde Nuclear Generating Station. Appendix C, which compares effluent flows from the 91st Avenue and 23rd Avenue treatment plants against existing and future commitments, was included in the FEIS in response to these comments. Section 4.3, Impacts of Growth, was prepared for the FEIS partially in response to a comment from the Arizona Department of Transportation (Comment Document G).

Specific comments regarding errors or inconsistencies led to a reappraisal of the information presented in the DEIS. Most of the errors identified in the comments appeared in the environmental setting chapter of the DEIS (Chapter 3). This chapter was condensed significantly for the FEIS, in keeping with CEQ regulations encouraging the use of a concise description of the environment. In no case was any information eliminated that was important to the analysis of impacts. Responses to comments identifying errors or inconsistencies in the DEIS indicate where changes have been made in the FEIS or acknowledge the error if the passage in question has not been included in the FEIS.

5.2 COMMENT DOCUMENTS

In this section, the comment documents are provided. At each comment or portion of a comment requiring a response, a number may be found. This number corresponds to the written response, which may be found in Section 5.3. The following list shows where comments and responses are located by page number.

Comment Document	Comment From	Comment Page No.	Response Page No.
A	Advisory Council on Historic Preservation	5-6	5-48
B	Federal Energy Regulatory Commission	5-7	5-48
C	U.S. Dept. of Interior, Fish and Wildlife Service	5-7	No response
D	U.S. Dept. of Interior, Office of the Secretary	5-8	5-48
E	U.S. Dept. of Agriculture, Soil Conservation Service	5-9 - 5-10	5-49 - 5-50
F	U.S. Dept. of Transportation, Federal Highway Administration	5-10	No response
G	Arizona Dept. of Transportation	5-11	5-50 - 5-51

Comment Document	Comment From	Comment Page No.	Response Page No.
H	Arizona Game and Fish Dept., Planning and Evaluation	5-12	5-51
I	Arizona State Land Dept.	5-12	5-51
J	Arizona Water Commission	5-13 - 5-14	5-52 - 5-54
K	Arizona State Clearinghouse A-95 Review	5-14 - 5-19	
K1	Arizona Dept. of Economic Security	5-15	5-54
K2	Arizona Oil and Gas Conservation Commission	5-15	No response
K3	Arizona State Parks Board	5-16	No response
K4	Arizona Agriculture and Horticulture Commission	5-16	No response
K5	Arizona Game and Fish Dept., Fisheries Division	5-17	No response
K6	Arizona Dept. of Health Services, Bureau of Water Quality Control	5-17	No response
K7	Central Arizona Association of Governments	5-18	No response
K8	Maricopa Association of Governments	5-18	No response
K9	District IV Council of Governments	5-19	No response
K10	City of Tempe	5-19	No response
L	Gila River Indian Community	5-20 - 5-27	5-54 - 5-55
M	Arizona Public Service Co.	5-27 - 5-33	5-56 - 5-66

Comment Document	Comment From	Comment Page No.	Response Page No.
N	John S. Schaper (Buckeye Irrigation Company)	5-33 - 5-38	5-66 - 5-74
O	David E. Creighton	5-39 - 5-42	5-74 - 5-78
P	Orme Lewis, Jr.	5-42	5-79
Q	Thomas S. Rothweiler	5-43	5-79
R	Adron W. Reichart (Holly Acres Flood Control Association)	5-44 - 5-45	5-77
S	Gilbert T. Venable (Citizens Concerned About the Project/Maricopa Audubon Society)	5-46 - 5-47	5-80

Advisory Council On Historic Preservation

1522 K Street N.W.
Washington D.C.
20005

RECEIVED BY E.P.A (HE-152) 9
REGION IX
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December 28, 1978

Mr. Paul De Falco, Jr.
Regional Administrator, Region IX
Environmental Protection Agency
215 Fremont Street
San Francisco, California 94105

Dear Mr. De Falco:

This is to acknowledge receipt of the draft environmental statement for the Point Source Metropolitan Phoenix Element of Areawide Water Quality Management Plan, Maricopa County, Arizona on November 22, 1978. We regret that we will be unable to review and comment on this document in a timely manner pursuant to Section 102(2)(C) of the National Environmental Policy Act of 1969.

1 Nevertheless, the Environmental Protection Agency is reminded that, if the proposed undertaking will affect properties included in or eligible for inclusion in the National Register of Historic Places, it is required by Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470f, as amended, 90 Stat. 1320) to afford the Council an opportunity to comment on the undertaking prior to the approval of the expenditure of any Federal funds or prior to the issuance of any license. The "Procedures for the Protection of Historic and Cultural Properties" (36 CFR Part 800.4) detail the steps an agency is to follow in requesting Council comment.

Generally, the Council considers environmental evaluations to be adequate when they contain evidence of compliance with Section 106 of the National Historic Preservation Act, as amended. The environmental documentation must demonstrate that either of the following conditions exists:

1. No properties included in or that may be eligible for inclusion in the National Register of Historic Places are located within the area of environmental impact, and the undertaking will not affect any such

property. In making this determination, the Council requires:

--evidence that the agency has consulted the latest edition of the National Register (Federal Register, February 7, 1978, and its monthly supplements);

--evidence of an effort to ensure the identification of properties eligible for inclusion in the National Register, including evidence of contact with the State Historic Preservation Officer, whose comments should be included in the final environmental statement.

2. Properties included in or that may be eligible for inclusion in the National Register are located within the area of environmental impact, and the undertaking will or will not affect any such property. In cases where there will be an effect, the final environmental statement should contain evidence of compliance with Section 106 of the National Historic Preservation Act through the Council's "Procedures for the Protection of Historic and Cultural Properties".

Should you have any questions, please call Michael C. Quinn at (303) 234-4946, an FTS number.

Sincerely,

Louis S. Wall

Louis S. Wall
Assistant Director
Office of Review and Compliance, Denver

COMMENT DOCUMENT A

BY E.P.A

GION IX

COMMENTER

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(HE-152) 2

FEDERAL ENERGY REGULATORY COMMISSION
REGIONAL OFFICE
555 BATTERY STREET, ROOM 415
SAN FRANCISCO, CA 94111

December 20, 1978

Mr. Paul De Falco, Jr.
Regional Administrator
U.S. Environmental Protection
Agency - Region IX
215 Fremont Street
San Francisco, CA 94105

Attention: Region IX Hearing Office

Dear Mr. De Falco:

We have reviewed your draft environmental impact statement on Point Source Metro Phoenix Alternatives For MAG 208 Water Quality Management Plan, dated November 1978.

As you are no doubt aware, on October 1, 1977, pursuant to provisions of the Department of Energy Organization Act, the Federal Power Commission ceased to exist and its functions and regulatory responsibilities were transferred to the Secretary of Energy and the Federal Energy Regulatory Commission, an independent regulatory commission within the Department of Energy. Reference to the Federal Power Commission on
1 pages v and vi in your report should therefore be changed to the Federal Energy Regulatory Commission.

We have reviewed your draft statement to determine the effect on matters affecting the Federal Energy Regulatory Commission's responsibilities. Such responsibilities relate to the licensing of non-Federal hydroelectric projects and associated transmission lines; certification for construction and operation of natural gas pipeline facilities, defined to include both interstate pipeline and terminal facilities; and the permission and approval required for the abandonment of natural gas pipeline facilities.

Our review indicates there would not be any significant impacts in those areas of concern nor serious conflicts with this agency's responsibilities if this plan were adopted.

Sincerely,

Eugene Neblett
Regional Engineer

Copy to:
Director, Maricopa Association of Governments
208 Water Quality Management Program
111 South Third Avenue
Phoenix, Arizona 85003

COMMENT DOCUMENT B

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Ecological Services
2934 W. Fairmount Avenue
Phoenix, Arizona 85017

January 15, 1979

Mr. Mark Frank, Program Coordinator
Maricopa Association of Governments
Water Quality Management Plan
111 South Third Avenue
Phoenix, Arizona 85003

Dear Mr. Frank:

We have reviewed the draft final plan for the MAG 208 Water Quality Management Program dated December 1978 and have the following comments.

The plan is well done and if carried out should improve the water quality in Maricopa County. The point source plan selected will have less adverse impact on wildlife resources than other alternative plans considered.

The Department of the Interior provided comments to the Regional Administrator, Environmental Protection Agency, Region IX, on the draft environmental statement for Point Source Metro Alternatives for MAG 208 Water Quality Management Plan. Since chapter VIII, Environmental Assessment, in this draft is a summary of the DEIS we believe those Interior comments also apply to chapter VIII of this plan.

The opportunity to review and comment on your draft water quality program is appreciated.

Sincerely,

Gilbert D. Metz
Field Supervisor

cc:
Director, Arizona Game and Fish Dept., Phoenix
Regional Director, FWS, Albuquerque (ES)
Area Manager, FWS, Phoenix

COMMENT DOCUMENT C

(HE-152) 10

UNITED STATES
DEPARTMENT OF THE INTERIOR

OFFICE OF THE SECRETARY
PACIFIC SOUTHWEST REGION
BOX 36098 • 450 GOLDEN GATE AVENUE
SAN FRANCISCO, CALIFORNIA 94102
(415) 556-8200

REC'D BY E.P.A
REGION IX
COMM. CENTER
JAN 17 11 49 AM '79

ER 78/1143 January 16, 1979

Mr. Paul De Falco, Jr.
Regional Administrator
Environmental Protection Agency
Region IX
215 Fremont Street
San Francisco, CA 94105

Dear Mr. De Falco:

The Department of the Interior has received and reviewed the draft environmental statement for Point Source Metro Phoenix Alternatives for MAG 208 Water Quality Management Plan, Maricopa County, Arizona.

It is our view that the draft environmental statement generally does an adequate job of describing resources of the area. However, we believe the impact analysis could be improved in certain areas and offer the following comments.

1 It would be useful in the analysis of the no-action alternative to assess ground-water impacts that may result if importation of water from the Central Arizona Project does not materialize as expected (p. 3-125).

2 Throughout the document it is indicated that establishment of regional treatment facilities will result in enhancement of wetlands due to impoundment of surface waters. It is true, that with careful planning and design, the ponds would provide habitat for wildlife. However, losses of valuable habitat on the Gila River caused by a decrease in wastewater effluent released into the river would likely result in an overall loss of wildlife habitat.

3 Page 2-25, Lines 6-8 - Federal regulations concerning rare and endangered species of fish and wildlife are referenced. The Endangered Species Act of 1973 uses the terms "threatened" and "endangered," not "rare." The Fish and Wildlife Coordination Act requires that project planning consider impacts on all fish and wildlife resources.

This statement adequately addresses recreation and cultural resources for this level of planning; however, recreational open space opportunities should be considered in more detail in the plan implementation stage.

COMMENT DOCUMENT D

Thank you for the opportunity to review the draft environmental statement for the Maricopa Association of Government 208 Water Quality Management Plan. If you have any questions regarding these comments, please contact me.

Sincerely,

Patricia S. Port
Patricia Sanderson Port
Regional Environmental Officer

cc: Director, OEPR (w/copy of incoming)
Director, Fish and Wildlife Service
Director, Heritage Conservation and Recreation Service
Asst. Sec., Bureau of Indian Affairs
Director, Geological Survey
Director, Bureau of Land Management
Director, Bureau of Mines
Commissioner, Bureau of Reclamation
Reg. Dir., FWS
Reg. Dir., HCRS
Reg. Dir., BIA
Asst. Dir., GS
Reg. Dir., BM
State Liaison, BM
Reg. Dir., BR
Reg. Dir., BLM

COMMENT DOCUMENT D

United States Department of Agriculture
Soil Conservation Service
3008 Federal Building
Phoenix, Arizona
85025

January 19, 1979

Mr. Mark Frank
Program Coordinator
Maricopa Association of Governments
Water Quality Management Program
111 South Third Avenue, Room 300
Phoenix, Arizona 85003

Dear Mr. Frank:

We have reviewed the Draft Environmental Assessment/Impact Statement of the Point Source Metro Phoenix Alternatives, dated November 1978. We offer the following comments:

General

1. We are pleased with the efforts that the alternative plans make to mitigate the loss of irrigated lands.

1 2. Cost data for the various alternatives should be provided. It is impossible to fully assess the relative merits of each facility without this information. For instance, it may be beneficial to take advantage of economies of scale by increasing the capacity of the Chandler plant, extend the interceptor lines eastward, and eliminate both Gilbert facilities.

2 3. All of the alternative plans will contribute to the demise of irrigated agriculture. We realize that a 208 waste water treatment plan is not a single tool to prevent urban sprawl; however, the statement is remiss in not presenting alternatives that would help to prevent the conversion of agricultural lands. For instance, there is no discussion of alternatives that would encourage development on the large amounts of vacant lands within the urban areas.

3 4. The statement should state the reasons why the northeast facility will produce good quality effluent for unrestricted agricultural use, while the other facilities produce fair quality effluent for restricted agricultural use. It should also address the differences in costs for the various treatments.

COMMENT DOCUMENT E

Specific Comments

Page 3-6, lines 20-26 and page 3-8, lines 1-2

4 The discussion of the soils is very brief. The USDA 1969 reference given is out of date. As a minimum, the following references should be added to the reference section and referred to in the section 3.1.2 "Geology and Soils."

> U. S. Department of Agriculture, Soil Conservation Service, 1973. General Soil Map, Maricopa County, Arizona. Portland, Oregon 1973.
>
> U. S. Department of Agriculture, Soil Conservation Service, 1974. Soil Survey of Eastern Maricopa and Northern Pinal Counties Area, Arizona. Washington, U. S. Government Printing Office, 1974.
>
> U. S. Department of Agriculture, Soil Conservation Service, 1977. Soil Survey of Maricopa County, Arizona, Central Part. Washington, U. S. Government Printing Office, 1977.

Copies of these publications are enclosed for your use.

Page 4-23

5 The rationale for the overland flow portion for the Northeast Facility, Option 2, is not clear. Is the site to be used for groundwater recharge or agricultural operations on the reservation? If for agriculture, then storage facilities instead of overland flow should be considered to reduce losses.

Page 4-23, line 12

6 The statement, "The effluent would be of sufficient quality for unrestricted agricultural use," does not agree with Figure 4-5, which says "restricted" use.

Page 4-71, line 11

7 This statement says that the export of salts to the Palo Verde Station will have a beneficial effect on groundwater quality. This is in conflict with the statement on page 4-70, line 26, that the use of effluent in the Buckeye Irrigation District has decreased the salinity of the groundwater.

COMMENT DOCUMENT E

We appreciate being given the opportunity to review this draft statement.

Sincerely,

Thomas G. Rockenbaugh
State Conservationist

Enclosures: Three Reference Documents

cc: (w/o encls.)
Director, Office of Federal Activities, EPA, Washington, D.C. (5 copies)
R. M. Davis, Administrator, SCS, Washington, D.C.

COMMENT DOCUMENT E

(HE-152) 8

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION NINE
Two Embarcadero Center, Suite 530
San Francisco, California 94111

ARIZONA
CALIFORNIA
NEVADA
HAWAII
GUAM
AMERICAN SAMOA

RECEIVED
E. P. A. REGION IX

December 21, 1978

IN REPLY REFER TO

HED-09

Mr. Paul De Falco, Jr.
Environmental Protection Agency
215 Fremont Street
San Francisco, CA 94105

Dear Mr. De Falco:

We have reviewed the Draft Environmental Impact Statement on the Point Source Metro Phoenix Alternatives for the MAG 208 Water Quality Management Plan in Maricopa County, Arizona, and have no specific comments to offer.

We appreciate this opportunity to review the subject Draft Statement.

Sincerely yours,

for F. E. Hawley
Regional Administrator

COMMENT DOCUMENT F

(HE-152) 3

ARIZONA DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

206 South Seventeenth Avenue Phoenix, Arizona 85007

BRUCE BABBITT
Governor

WILLIAM A. ORDWAY
Director

December 28, 1978

OSCAR T. LYON, JR., P.E.
Assistant Director
and State Engineer

Environmental Protection Agency
Region IX Hearing Office
215 Fremont Street
San Francisco, California 94105

Re: Maricopa County, Arizona
208 Water Quality Management Program
Draft Environmental Impact Statement

Gentlemen:

We have received a copy of the DEIS on the proposed 208 Water Quality Management Program and offer the following comments:

1 1. Although we do not see any direct impacts of the 208 Program on transportation, the impacts of growth and land use changes from all alternatives will have an indirect impact on the area transportation system.

2 2. In reviewing the Draft EIS, we have not found a complete or detailed discussion of the impact to regional air quality which would be an impact of the 208 Program.

We could not find any future air quality estimates in numerical form. What will be the future air quality due to increases in population and changes in land use? We would like to see the predicted air quality values compared with the ambient air quality standards and not generalized as was done on pages 3-117 through 3-121. We find it interesting that a plan which can affect regional population and land uses only takes four pages to discuss air quality in an area where violations of the ambient air quality standards are a common occurrence. What methods or models for estimating future air quality were used? What is the accuracy of these prediction methods over the regional area studied?

3 3. Your discussion on archaeology and historic resources appears very general. How many of these resources will be effected? Are they eligible for the National Register? What mitigation plans have been developed?

4. On page ii of the summary the following sentence appears..."While localized impacts are described in the DEIS, the primary purpose of the assessment is to provide information concerning area wide impacts and to solicit comments on these impacts.

COMMENT DOCUMENT G

HIGHWAYS • AERONAUTICS • MOTOR VEHICLE • PUBLIC TRANSIT • ADMINISTRATIVE SERVICES • TRANSPORTATION PLANNING

4 There is very little discussion of the impact on the population projections, the housing demand, the change in water quality or volumes. An example is on page 4-8, lines 6 through 8..."Impacts are mainly seen as beneficial except for instances of potential contravention of water standards and public health/aesthetics influences." This statement is typical of the DEIS and indicates to the reviewer that a brief evaluation was made of the impact and a generalized statement was used to cover all possibilities.

As a whole, our review indicates that the DEIS contains a general description of the regional area and a superficial look at impacts. A discussion of the local or regional social, economic and environmental impacts from the 208 Program was not found.

Thank you for this opportunity to comment.

Very truly yours,

OSCAR T. LYON, JR., P.E.
State Engineer

James E. Dorre

JAMES E. DORRE, Manager
Environmental Planning Services

JED:jf

Arizona Department of Transportation
P. O. Box 13588
PHOENIX, AZ. 85002

COMMENT DOCUMENT G

Governor
BRUCE E. BABBITT

Commissioners:
FRANK FERGUSON, JR., Yuma, Chairman
MILTON G. EVANS, Flagstaff
C. GENE TOLLE, Phoenix
WILLIAM H. BEERS, Prescott
CHARLES F. ROBERTS, O.D., Bisbee

Director
ROBERT A. JANTZEN

Asst. Director, Operations
PHIL M. COSPER

Asst. Director, Services
ROGER J. GRUENEWALD

ARIZONA GAME & FISH DEPARTMENT

2222 West Greenway Road Phoenix, Arizona 85023 942-3000

January 25, 1979

Maricopa Association of Governments
Water Quality Management Program
111 South Third Avenue, Room 300
Phoenix, Arizona 85003

Re: Point Source Metro Phoenix Alternatives for MAG208 Water Quality Management Plan: Draft Environmental Assessment/Environmental Impact Statement

Gentlemen:

We have received and reviewed the above-referenced document and appreciate the opportunity to provide comments.

1 The draft document appears to be well done and we concur with the selection of objectives and programs. Our principal concerns center on the potential of reduced flows in the Salt River channel below 91st Avenue and resultant loss of valuable riparian habitat along that waterway. Of particular concern is the allocated 7,300 acre-feet of water which presently supports our wildlife management area at 115th Avenue. We understand and trust that this allocation will continue.

Sincerely,

Robert A. Jantzen, Director

By: Richard L. Stephenson
Richard L. Stephenson, Wildlife Specialist
Planning and Evaluation Branch

RLS:dd

cc: Environmental Protection Agency, San Francisco, California

COMMENT DOCUMENT H

Arizona
State Land Department
1624 WEST ADAMS
PHOENIX, ARIZONA 85007
602 271-4634

John M. Little
Acting Commissioner

December 21, 1978

Mr. Mark Frank, Program Coordinator
Maricopa Association of Governments
208 Water Quality Management Program
111 South Third Avenue
Phoenix, Arizona 85003

Dear Mr. Frank:

The staff of the Natural Resource Conservation Division of the State Land Department has reviewed the draft document, M.A.G. and E.P.A. Environmental Impact Statement on point source Metro-Phoenix alternatives.

We find the document to be generally technically sound and comprehensive. Particularly, we applaud the use of numbered lined pages which has made the review process much easier. No attempt on our part was made to edit the document, however, the following specific comments are offered for your consideration:

1 P. 2-29 L3 - Suggest that Painted Rock Lake is closer to 70 miles than 100 miles from the confluence of the Salt and Gila.

2 P. 3-12 L18-21 - In FIA designated regulatory floodways no structures may be constructed. The word flooding should be changed to flood prone area.

3 P. 3-65 L8 - Should be big galleta not alleta.

4 P. 3-62 Figure 3-13 - Symbols are missing in many areas.

5 P. 3-76 Figure 3-15 - Indicates existing highways that do not exist.

Thank you for the opportunity to comment.

Sincerely,

Robert Yount

Robert Yount, Director
Natural Resource Conservation

REY/lf

cc: State Clearinghouse

COMMENT DOCUMENT I

KEL FOX, CH.
JOHN L. LEIBER, V. CH.
WESLEY E. STEINER
EXECUTIVE DIRECTOR
AND
STATE WATER ENGINEER
VICKIE MOONEY
SECRETARY

BRUCE E. BABBITT, GOVERNOR

Arizona Water Commission
222 NORTH CENTRAL AVENUE, SUITE 800
Phoenix, Arizona 85004
TELEPHONE (602) 258-7561

MEMBERS
PETER F. BIANCO
MARYBETH CARLILE
GLEN G. CURTIS
W. N. JACK SHAWVER
J. C. WETZLER
EXOFFICIO MEMBERS
ANDREW L. BETTWY
MARSHALL HUMPHREY

February 2, 1979

Maricopa Association of Governments
Water Quality Management Program
111 South Third Avenue, Room 300
Phoenix, Arizona 85003

Gentlemen:

Reference is made to the Draft Environmental Assessment on Point Source Metro Phoenix Alternatives, dated November 1978.

Comments on the report by the Water Commission are contained herein. Only the portions of the report dealing with water use, supply and quality have been reviewed. Other aspects were not evaluated.

For the most part the report adequately assesses the impacts
1 expected from 208 alternatives. Our greatest concern is in the lack of consistency in dealing with water supplies. The report, Current and Expected Water Supplies and Demands and Groundwater Conditions in Maricopa County, prepared by the Water Commission for the 208 study in June 1978 is recommended as the basic source of information for water supply and use. It is suggested that all reference to existing conditions be to this report.

The assessment went into a detailed presentation of projected
2 groundwater conditions expected under the No Action Alternative, with reliance on a report prepared by Arthur Beard Engineers. Although the Water Commission has not undertaken detailed evaluations of water supply and use conditions expected under the assumption of no action, a cursory evaluation indicates that the findings by Arthur Beard are overly optimistic relative to groundwater conditions. It is suggested that this part of the report be condensed to indicate only that overdraft would be reduced under this alternative.

Specific comments on the report are detailed below. Reference is to page and line.

3-19:22. It is suggested that the agreements recently reached
3 between the City and EPA be discussed.

3-23:5. Revise to read ". . . the Gila River at Gillespie Dam
4 8 miles . . .".

3-23:15. Suggest that it be noted that the secondary standards
5 are recommended limits only, and violations do not require treatment.

3-31:9. References to groundwater in storage refer to the Salt
6 River Valley Basin, which differs from the study area. The difference is not great but should be noted. This discrepancy is present several times in the report (e.g. 3-33:5, 3-125:6).

Figure 3-6. Legend should indicate less than 100 feet and
7 greater than 200 feet. Also credit source and give date.

3-25:21. Other reasons for constant trends in salinity are:
8 the monitoring program is, by nature of the wells sampled, unable to detect the quality of the return flows or the seepage; and the quality of the water as pumped is predominantly influenced by the inplace quality of the water in the aquifer which is a function of water levels and well depth. The analysis actually monitors only quality of supplies.

3-40:21 and 3-42:10. It is doubtful that the indicated replace-
9 ment can be demonstrated. More than likely the wells are now withdrawing water from deeper in the aquifer which is of better quality.

3-42:18. The owner of the land has the right to use the water
10 he does, not have ownership of the water.

3-42:4. Notices of intent to drill are required for all wells,
11 not just irrigation wells.

12 3-80:110. SRP relies mostly on non-hydro sources.

3-121:26. The 290 gpcd value is low. The Water Commission
13 estimated M&I withdrawal at about 340 gpcd in 1975. This value however includes a substantial amount of loss associated with delivery of surface water.

3-122:25. It should state that Salt-Verde flows are assumed to
14 continue at 859,000 acre-feet per year.

3-130:6. Existing data hasn't shown such contamination. The
15 deductive model may be too simplistic.

16 4-26:14, 16, 20. Should be "Town of Paradise Valley".

4-27:1. The report first says adverse impacts are unlikely, then
17 the rest of the page discusses the concern.

4-71:6. The effluent in the river is not the source of high
18 groundwater levels in the district, rather it is the import and appli-

cation of surface water, and the low use of groundwater by the two irrigation districts. This is shown by the regional groundwater levels.

19 4-87:17. Suggest report elaborate on impacts to ANPP.

20 4-89:8. Groundwater quality in the Buckeye area is considerably lower in quality (TDS) than effluent. Also the effluent in the river is not now adding significantly to groundwater supplies.

21 4-166:5. This should be updated to current projections. Data prepared for units 4 and 5 of ANPP indicates only minor shortages in peak months during the late 1980's.

22 4-176:2. This paragraph is not supported in body of report.

23 4-177:2. The availability of effluent is based on projected effluent flows and a contract for delivery.

The Water Commission will be happy to answer any questions you have related to our comments.

Sincerely,

Wesley E. Steiner

Wesley E. Steiner
Executive Director

cc: Environmental Protection Agency

COMMENT DOCUMENT J

SIGNOFF

OMB Approval No. 29–R0218

FEDERAL ASSISTANCE

2. Applicant's application — a. Number; b. Date 19 Year Month Day

3. State application identifier — a. Number AZ 78-28-0002-02; b. Date Assigned 19 78/12/14 (Year month day)

1. Type Of Action (Mark appropriate box) ☐ Preapplication ☐ Application ☐ Notification Of Intent (Opt.) ☐ Report Of Federal Action

Leave Blank JAN 9 1979

Jo Ann Youngblood

4. Legal Applicant/Recipient
- a. Applicant Name : Maricopa Association of Govts.
- b. Organization Unit : 208 Water Quality Mgmt. Program
- c. Street/P.O. Box : 111 South Third Avenue
- d. City : Phoenix e. County : Maricopa
- f. State : Arizona g. Zip Code : 85003
- h. Contact Person (Name & telephone no.) : Mark Frank, Program Coordinator (602) 262-3403

5. Federal Employer Identification No.

6. Program (From Federal Catalog) — a. Number 66.426; b. Title Water Pollution Control-State & Area-wide Water Quality Mgmt. Planning Agency — EPA, Off of Water & Hazardous Materials

7. Title and description of applicant's project MAG & EPA Draft Environmental Assessment/Environmental Impact Statement on Point Source Metro Phoenix Alternatives - This analyzes the impacts of four alternative plans for the management of point source water pollution in the metropolitan Phoenix area. The alternatives were developed through an extensive public involvement program, including review & evaluation by various 208 advisory groups.

8. Type of applicant/recipient
A–State G–Special Purpose District
B–Interstate H–Community Action Agency
C–Substate District I–Higher Educational Institution
D–County J–Indian Tribe
E–City K–Other
F–School District
(Specify): Enter appropriate letter B

9. Type of assistance
A–Basic Grant D–Insurance
B–Supplemental Grant E–Other
C–Loan Enter appropriate letter(s) E

10. Area of project impact (Names of cities, counties, states, etc.) Maricopa County, Arizona

11. Estimated number of persons benefiting

12. Type of application
A–New C–Revision E–Augmentation
B–Renewal D–Continuation
Enter appropriate letter A

13. Proposed Funding		14. Congressional Districts Of:	
a. Federal	$ .00	a. Applicant 1,2,3,4	b. Project 1,2,3,4
b. Applicant	.00	16. Project Start Date Year month day 19	17. Project Duration Months
c. State	.00		
d. Local	.00		
e. Other	.00	18. Estimated date to be submitted to federal agency 19 Year month date	
f. Total	$ – .00		

15. Type of change For 12c or 12e
A–Increase Dollars F–Other Specify:
B–Decrease Dollars
C–Increase Duration
D–Decrease Duration
E–Cancellation
Enter appropriate letter(s)

19. Existing federal identification number

20. Federal agency to receive request (Name, city, state, zip code) EPA

21. Remarks added ☐ Yes ☐ No

22. The Applicant Certifies That
a. To the best of my knowledge and belief, data in this preapplication/application are true and correct, the document has been duly authorized by the governing body of the applicant and the applicant will comply with the attached assurances if the assistance is approved.
b. If required by OMB Circular A-95 this application was submitted, pursuant to instructions therein, to appropriate clearinghouses and all responses are attached:

	No response	Response attached
(1) Arizona State Clearinghouse	☐	☐
(2) Region I Clearinghouse (MAG)	☐	☐
(3)	☐	☐

23. Certifying representative — a. Typed name and title; b. Signature; c. Date signed Year month day 19

24. Agency name

25. Application received 19 Year month day

26. Organizational Unit

27. Administrative office

28. Federal application identification

29. Address

30. Federal grant identification

31. Action taken
☐ a. Awarded
☐ b. Rejected
☐ c. Returned for amendment
☐ d. Deferred
☐ e. Withdrawn

32. Funding	
a. Federal	$ .00
b. Applicant	.00
c. State	.00
d. Local	.00
e. Other	.00
f. Total	$ .00

33. Action date 19 Year month day

34. Starting date 19 Year month day

35. Contact for additional information (Name and telephone number)

36. Ending date 19 Year month day

37. Remarks added ☐ Yes ☐ No

38. Federal agency A–95 action
a. In taking above action, any comments received from clearinghouses were considered. If agency response is due under provisions of Part 1, OMB Circular A-95, it has been or is being made.
b. Federal Agency A-95 Official (Name and telephone number)

Section I - Applicant / Recipient Data
Section II - Certification
Section III - Federal Agency Action

424-101

Standard Form 424 Page 1 (10-75)
Prescribed by GSA, Federal Management Circular 74-7

COMMENT DOCUMENT K

DEC 14 1978

COMMENT SHEET FOR STATEWIDE
208 INTERIM OUTPUT REVIEW

SAI # 78-28-0002-02

COG: Maricopa Ass'n of Govts.

Reply due date January 9, 1979

Task # ____

Return comments to:

State Clearinghouse
1700 W. Washington, Room 500
Phoenix, AZ 85007

Title Draft Environmental Assessment/Environmental Impact Statement on Point Source Metro Phoenix Alternatives

Mr. Jack Kronenfeld
Office of Planning
Dept. of Economic Security
Site Code: 045Z

Reviewers:

- ____ MAG (Mark Frank)
- ____ PAG (Jack Bale)
- ____ DIST. IV (Terry Kearney)
- ____ CAAG (Lester Snow)
- ____ SEAGO (Roger Manning)
- ____ Health Dept. Services (Paul McClellan, Connie Astros, Bruce Scott, Jack Lindeman, and Harley Hiett)
- ____ Water Quality Control Council (Kenneth McDonald, Charles Stott, Scudder Gookin, Archie Mellon, Howard Bethel, Robert Sternberger
- ____ Agriculture & Horticulture (James Carter)
- ____ Game and Fish (Ned Rathbun)
- ____ State Land Department (Robert Yount)
- ____ Mineral Resources Department (Glen Walker)
- ____ Oil and Gas Commission (John Bannister)
- ____ Arizona Outdoor Recreation Coordinating Commission (Mary Alice Bivens)
- ____ Parks Board (Allen Gross)
- ____ Arizona Department of Transportation (Ron McCready)
- ____ Water Commission (Tom Clark)
- ____ Inter-tribal Council of Arizona (Alberta Tippeconnic)
- ____ EPA-Regional Council (Richard Reavis)
- ____ Department of Economic Security (Jack Kronenfeld)
- ____ Soil Conservation Service (Mack Miller)
- ____ Other (specify)

Comments: Use additional sheets if necessary

1 As indicated in Chapter III the population projections utilized for this 208 Report were revised on July 7, 1978, by the Technical Advisory Committee established under Executive Order 77-5. Even the revised projection for Maricopa Co. will prove too low since the county has experienced phenomenal growth during 1978 which is expected to continue during 1979. The projections for Maricopa Co. adopted on July 7, 1978 were as follows:

1980	1,436,000	1995	2,077,200
1985	1,621,900	2000	2,352,300
1990	1,831,600		

During the Spring of 1979, the Dept. of Economic Security will review all current population estimates and projections for the State and its 14 counties. From the evidence already available, it is certain that the population projection for Maricopa County will be raised to at least 2.4 million for the year 2000. It is our hope that the Maricopa Ass'n of Gov't will consider these reissues when updating their 208 plan for Maricopa County.

COMMENT DOCUMENT K1

Reviewer's signature Jack Kronenfeld   Date 1-2-79

Title Demographic Planner   Telephone 255-5984

DEC 14 1978

COMMENT SHEET FOR STATEWIDE
208 INTERIM OUTPUT REVIEW

SAI # 78-28-0002-02

COG: Maricopa Ass'n of Govts.

Reply due date January 9, 1979

Task # ____

Return comments to:

State Clearinghouse
1700 W. Washington, Room 500
Phoenix, AZ 85007

Title Draft Environmental Assessment/Environmental Impact Statement on Point Source Metro Phoenix Alternatives

Mr. John Bannister
Oil & Gas Conservation Comm.
1624 West Adams, Room 310
Phoenix, AZ 85007

Reviewers:

- ____ MAG (Mark Frank)
- ____ PAG (Jack Bale)
- ____ DIST. IV (Terry Kearney)
- ____ CAAG (Lester Snow)
- ____ SEAGO (Roger Manning)
- ____ Health Dept. Services (Paul McClellan, Connie Astros, Bruce Scott, Jack Lindeman, and Harley Hiett)
- ____ Water Quality Control Council (Kenneth McDonald, Charles Stott, Scudder Gookin, Archie Mellon, Howard Bethel, Robert Sternberger
- ____ Agriculture & Horticulture (James Carter)
- ____ Game and Fish (Ned Rathbun)
- ____ State Land Department (Robert Yount)
- ____ Mineral Resources Department (Glen Walker)
- ✓ Oil and Gas Commission (John Bannister)
- ____ Arizona Outdoor Recreation Coordinating Commission (Mary Alice Bivens)
- ____ Parks Board (Allen Gross)
- ____ Arizona Department of Transportation (Ron McCready)
- ____ Water Commission (Tom Clark)
- ____ Inter-tribal Council of Arizona (Alberta Tippeconnic)
- ____ EPA-Regional Council (Richard Reavis)
- ____ Department of Economic Security (Jack Kronenfeld)
- ____ Soil Conservation Service (Mack Miller)
- ____ Other (specify)

Comments: Use additional sheets if necessary

I favor Alternative I as it provides the maximum treatment facilities and should prove less expensive in the long run

COMMENT DOCUMENT K2

Reviewer's signature [illegible]   Date [illegible]

Title [illegible]   Telephone [illegible]

DEC 14 1978

COMMENT SHEET FOR STATEWIDE
208 INTERIM OUTPUT REVIEW

SAI # 78-28-0002-02

COG: Maricopa Ass'n of Govts.

Reply due date January 9, 1979

Task # ____

Return comments to:

State Clearinghouse
1700 W. Washington, Room 500
Phoenix, AZ 85007

Title Draft Environmental Assessment/Environmental Impact Statement on Point Source Metro Phoenix Alternatives

Ms. Annette Grove
Arizona State Parks Board
1688 West Adams
Phoenix, AZ 85007

Reviewers:

- ____ MAG (Mark Frank)
- ____ PAG (Jack Bale)
- ____ DIST. IV (Terry Kearney)
- ____ CAAG (Lester Snow)
- ____ SEAGO (Roger Manning)
- ____ Health Dept. Services (Paul McClellan, Connie Astros, Bruce Scott, Jack Lindeman, and Harley Hiett)
- ____ Water Quality Control Council (Kenneth McDonald, Charles Stott, Scudder Cookin, Archie Mellon, Howard Bethel, Robert Sternberger
- ____ Agriculture & Horticulture (James Carter)
- ____ Game and Fish (Ned Rathbun)
- ____ State Land Department (Robert Yount)
- ____ Mineral Resources Department (Glen Walker)
- ____ Oil and Gas Commission (John Bannister)
- ____ Arizona Outdoor Recreation Coordinating Commission (Mary Alice Bivens)
- ____ Parks Board (Allen Gross)
- ____ Arizona Department of Transportation (Ron McCready)
- ____ Water Commission (Tom Clark)
- ____ Inter-tribal Council of Arizona (Alberta Tippeconnic)
- ____ EPA-Regional Council (Richard Reavis)
- ____ Department of Economic Security (Jack Kronenfeld)
- ____ Soil Conservation Service (Mack Miller)
- ____ Other (specify)

Comments: Use additional sheets if necessary

COMMENT DOCUMENT K3

Reviewer's signature Annette Grove Date Dec 27, 1978

Title Landscape Designer Telephone 255-4174

DEC 14 1978

COMMENT SHEET FOR STATEWIDE
208 INTERIM OUTPUT REVIEW

SAI # 78-28-0002-02

COG: Maricopa Ass'n of Govts.

Reply due date January 9, 1979

Task # ____

Return comments to:

State Clearinghouse
1700 W. Washington, Room 500
Phoenix, AZ 85007

Title Draft Environmental Assessment/Environmental Impact Statement on Point Source Metro Phoenix Alternatives

Mr. James R. Carter, Director
Agriculture & Horticulture
1688 W. Adams, #414
Phoenix, AZ 85007

Reviewers:

- ____ MAG (Mark Frank)
- ____ PAG (Jack Bale)
- ____ DIST. IV (Terry Kearney)
- ____ CAAG (Lester Snow)
- ____ SEAGO (Roger Manning)
- ____ Health Dept. Services (Paul McClellan, Connie Astros, Bruce Scott, Jack Lindeman, and Harley Hiett)
- ____ Water Quality Control Council (Kenneth McDonald, Charles Stott, Scudder Cookin, Archie Mellon, Howard Bethel, Robert Sternberger
- ✓ Agriculture & Horticulture (James Carter)
- ____ Game and Fish (Ned Rathbun)
- ____ State Land Department (Robert Yount)
- ____ Mineral Resources Department (Glen Walker)
- ____ Oil and Gas Commission (John Bannister)
- ____ Arizona Outdoor Recreation Coordinating Commission (Mary Alice Bivens)
- ____ Parks Board (Allen Gross)
- ____ Arizona Department of Transportation (Ron McCready)
- ____ Water Commission (Tom Clark)
- ____ Inter-tribal Council of Arizona (Alberta Tippeconnic)
- ____ EPA-Regional Council (Richard Reavis)
- ____ Department of Economic Security (Jack Kronenfeld)
- ____ Soil Conservation Service (Mack Miller)
- ____ Other (specify)

Comments: Use additional sheets if necessary

I HAVE REVIEWED THIS 450 PAGE REPORT. IT FAIRLY PRESENTS THE METHOD USE TO ARRIVE AT THE FOUR ALTERNATIVE PLAN FOR MANAGEMENT. IT IS ESSENTIAL THAT A "NO ACTION ALTERNATIVE" NOT BE CONSIDERED. ALTERNATIVE 2 IS THE BEST PLAN. THERE IS A NEED FOR THE DEVELOPMENT OF MORE AND BETTER DATA TO RESOLVE THE ISSUES PRESENTED IN "5.0"

COMMENT DOCUMENT K4

Reviewer's signature James R. Carter Date 12/14/78

Title Director Telephone 255-4373

DEC 14 1978

COMMENT SHEET FOR STATEWIDE
208 INTERIM OUTPUT REVIEW

SAI # 78-28-0002-02

COG: Maricopa Ass'n of Govts.

Reply due date January 9, 1979

Task # ____

Title Draft Environmental Assessment/Environmental Impact Statement on Point Source Metro Phoenix Alternatives

Return comments to:

State Clearinghouse
1700 W. Washington, Room 500
Phoenix, AZ 85007

Mr. Alban R. Essbach
Game and Fish Department
2222 West Greenway Road
Phoenix, AZ 85023

Reviewers:

- ____ MAG (Mark Frank)
- ____ PAG (Jack Bale)
- ____ DIST. IV (Terry Kearney)
- ____ CAAG (Lester Snow)
- ____ SEAGO (Roger Manning)
- ____ Health Dept. Services (Paul McClellan, Connie Astros, Bruce Scott, Jack Lindeman, and Harley Hiett)
- ____ Water Quality Control Council (Kenneth McDonald, Charles Stott, Scudder Cookin, Archie Mellon, Howard Bethel, Robert Sternberger
- ____ Agriculture & Horticulture (James Carter)
- x Game and Fish (~~Ned Rathbun~~) KEN HANKS
- ____ State Land Department (Robert Yount)
- ____ Mineral Resources Department (Glen Walker)
- ____ Oil and Gas Commission (John Bannister)
- ____ Arizona Outdoor Recreation Coordinating Commission (Mary Alice Bivens)
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- ____ EPA-Regional Council (Richard Reavis)
- ____ Department of Economic Security (Jack Kronenfeld)
- ____ Soil Conservation Service (Mack Miller)
- ____ Other (specify)

Comments: Use additional sheets if necessary

Approve AS WRITTEN. NO OTHER COMMENTS
a.R.e.

COMMENT DOCUMENT K5

Reviewer's signature Alban R. Essbach Date 12/15/78

Title CHIEF, FISHERIES DIV., ARIZ. GAME + FISH Telephone 942-3000 X 212

5-17

DEC 14 1978

COMMENT SHEET FOR STATEWIDE
208 INTERIM OUTPUT REVIEW

SAI # 78-28-0002-02

COG: Maricopa Ass'n of Govts.

Reply due date January 9, 1979

Task # ____

Title Draft Environmental Assessment/Environmental Impact Statement on Point Source Metro Phoenix Alternatives

Return comments to:

State Clearinghouse
1700 W. Washington, Room 500
Phoenix, AZ 85007

Ms. Connie Astros
BWQC 208 Comment Coordinator
1740 West Adams, Room 200
Phoenix, AZ 85007

Reviewers:

- ____ MAG (Mark Frank)
- ____ PAG (Jack Bale)
- ____ DIST. IV (Terry Kearney)
- ____ CAAG (Lester Snow)
- ____ SEAGO (Roger Manning)
- ____ Health Dept. Services (Paul McClellan, Connie Astros, Bruce Scott, Jack Lindeman, and Harley Hiett)
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- ____ Department of Economic Security (Jack Kronenfeld)
- ____ Soil Conservation Service (Mack Miller)
- ____ Other (specify)

Comments: Use additional sheets if necessary

Our staff has reviewed this document for consistency with our current programs and anticipated long-term needs. In general, the report appears to be consistent with our anticipated programs.

There are no specific comments at this time.

COMMENT DOCUMENT K6

Reviewer's signature R. Bruce Scott Date January 12, 1979

Title Assistant Director, Arizona Dept. Health Services Telephone ____

DEC 14 1978

COMMENT SHEET FOR STATEWIDE
208 INTERIM OUTPUT REVIEW

SAI # 78-28-0002-02

COG: Maricopa Ass'n of Govts.

Reply due date January 9, 1979

Task # ______

Return comments to:

State Clearinghouse
1700 W. Washington, Room 500
Phoenix, AZ 85007

Title Draft Environmental Assessment/Environmental Impact Statement on Point Source Metro Phoenix Alternatives

Mr. Lester Snow, 208 Project Dir
Central Az. Assoc. of Gov'ts.
1810 Main, St., Drawer JJ
Florence, AZ 85232

Reviewers:

- ____ MAG (Mark Frank)
- ____ PAG (Jack Bale)
- ____ DIST. IV (Terry Kearney)
- ____ CAAG (Lester Snow)
- ____ SEAGO (Roger Manning)
- ____ Health Dept. Services (Paul McClellan, Connie Astros, Bruce Scott, Jack Lindeman, and Harley Hiett)
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- ____ EPA-Regional Council (Richard Reavis)
- ____ Department of Economic Security (Jack Kronenfeld)
- ____ Soil Conservation Service (Mack Miller)
- ____ Other (specify)

5-18

Comments: Use additional sheets if necessary

No Comment

COMMENT DOCUMENT K7

Reviewer's signature [signature]   Date 12-15-78

Title Regonal Planner Director   Telephone 868-5878

0126

COMMENT SHEET FOR STATEWIDE
208 INTERIM OUTPUT REVIEW

SAI # 78-28-0002-02

COG: Maricopa Assoc. of Gov'ts.

Reply due date January 9, 1979

Task # ______

Return comments to:

State Clearinghouse
1700 W. Washington, Room 505
Phoenix, AZ 85007

Title Draft Environmental Assessment/Environmental Impact Statement on Point Source Metro Phoenix Alternatives

John J. DeBolske, Exec. Dir.
Maricopa Ass'n of Governments
1820 W. Washington Street
Phoenix, AZ 85007

Reviewers:

- ____ MAG (Mark Frank)
- ____ PAG (Jack Bale)
- ____ DIST. IV (Terry Kearney)
- ____ CAAG (Lester Snow)
- ____ SEAGO (Roger Manning)
- ____ Health Dept. Services (Paul McClellan, Connie Astros, Bruce Scott, Jack Lindeman, and Harley Hiett)
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- ____ EPA-Regional Council (Richard Reavis)
- ____ Department of Economic Security (Jack Kronenfeld)
- ____ Soil Conservation Service (Mack Miller)
- ____ Other (specify)

Comments: Use additional sheets if necessary

FAVORABLE ACTION RECOMMENDED

COMMENT DOCUMENT K8

Reviewer's signature [signature]   Date 2/5/79

Title Staff Coordinator   Telephone 254-6308

DEC 14 1978

COMMENT SHEET FOR STATEWIDE
208 INTERIM OUTPUT REVIEW

SAI # 78-28-0002-02

COG: Maricopa Ass'n of Govts.

Reply due date January 9, 1979

Task # ___

Return comments to:

State Clearinghouse
1700 W. Washington, Room 500
Phoenix, AZ 85007

Title Draft Environmental Assessment/Environmental Impact Statement on Point Source Metro Phoenix Alternatives

Mr. Terry Kearney, 208 Project Dir
District IV Council of Gov'ts.
377 South Main St., Room 202
Yuma, AZ 85364

Reviewers:

- ___ MAG (Mark Frank)
- ___ PAG (Jack Bale)
- ✓ DIST. IV (Terry Kearney)
- ___ CAAG (Lester Snow)
- ___ SEAGO (Roger Manning)
- ___ Health Dept. Services (Paul McClellan, Connie Astros, Bruce Scott, Jack Lindeman, and Harley Hiett)
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- ___ EPA-Regional Council (Richard Reavis)
- ___ Department of Economic Security (Jack Kronenfeld)
- ___ Soil Conservation Service (Mack Miller)
- ___ Other (specify)

Comments: Use additional sheets if necessary

No Comment

RECEIVED
DEC 20 1978
MARICOPA COUNTY PLANNING DEPT.
BY ___

COMMENT DOCUMENT K9

Reviewer's signature Terry Kearney Date 12/15/78

Title Natural Resource Planner Telephone 782 1886

5-19

DEC 14 1978

COMMENT SHEET FOR STATEWIDE
208 INTERIM OUTPUT REVIEW

SAI # 78-28-0002-02

COG: Maricopa Ass'n of Govts.

Reply due date January 9, 1979

Task # ___

Return comments to:

State Clearinghouse
1700 W. Washington, Room 500
Phoenix, AZ 85007

Title Draft Environmental Assessment/Environmental Impact Statement on Point Source Metro Phoenix Alternatives

Mr. Kenneth A. McDonald, Cty.Mgr.
City of Tempe
P.O. Box 5002
Tempe, AZ 85281

Reviewers:

- ___ MAG (Mark Frank)
- ___ PAG (Jack Bale)
- ___ DIST. IV (Terry Kearney)
- ___ CAAG (Lester Snow)
- ___ SEAGO (Roger Manning)
- ___ Health Dept. Services (Paul McClellan, Connie Astros, Bruce Scott, Jack Lindeman, and Harley Hiett)
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- ___ EPA-Regional Council (Richard Reavis)
- ___ Department of Economic Security (Jack Kronenfeld)
- ___ Soil Conservation Service (Mack Miller)
- ___ Other (specify)

Comments: Use additional sheets if necessary

Looks good - Let's proceed. [illegible]

COMMENT DOCUMENT K10

Reviewer's signature [illegible] Date 12-30-78

Title City of Tempe Asst. Mgr. Telephone ___

GILA RIVER INDIAN COMMUNITY
SACATON, AZ. 85247

ADMINISTRATIVE OFFICES
P. O. BOX 97 - (602) 562-3311

January 11, 1979

The Honorable Charles Salem, Chairman
Maricopa Association of Governments
Water Quality Management Program
111 South Third Avenue, Room 300
Phoenix, Arizona 85003

Subject: DRAFT ENVIRONMENTAL IMPACT STATEMENT/MAG 208 WATER QUALITY MANAGEMENT PLAN AND DRAFT FINAL PLAN/MAG 208 WATER QUALITY MANAGEMENT PROGRAM

Dear Mayor Salem:

We appreciate the opportunity of reviewing the above subject publications, and submit the following documents and comments as representing the official position of Gila River Indian Community. Our comments are essentially limited to factors concerning two specific sites, the 91st Avenue and Chandler treatment plants, as they concern or impact this Community. For this reason, the review concentrates primarily on the Draft Environmental Impact Statement document, but should be considered as our formal statement on the 208 Program plan as well.

As of this date the Gila River Tribal Council has not taken formal action on the EIS, or on the Program as currently proposed. It is anticipated that such action will be forthcoming shortly; a copy of that documentation will be forwarded to you promptly for inclusion in the record.

Our review comments are attached in two sections for your consideration, and reflect the official Tribal position at this time, based upon available submitted data.

Thank you for the opportunity to participate, review and comment on the MAG 208 Program.

Very truly yours,
GILA RIVER INDIAN COMMUNITY

Alexander Lewis, Sr.
Governor

COMMENT DOCUMENT L

xc: Environmental Protection Agency
Region IX Hearing Office
215 Fremont Street
San Francisco, California 94105

Attachments:

91st Avenue Wastewater Treatment Plant
EIS Review Comments
Letter from Governor Lewis: July 13, 1978
Tribal Council Resolution GR-133-78 (September 20, 1978)
District-7 Resolution (June 29, 1978)

Chandler System
Notice of action by Tribal Resource Development Committee

COMMENT DOCUMENT L

GILA RIVER INDIAN COMMUNITY

SACATON, AZ. 85247

DEPARTMENT OF PHYSICAL RESOURCES

P.O. BOX G — (602) 562-3311
(602) 963-4323

1 91st AVENUE TREATMENT PLANT

Since this facility is scheduled for varying degrees of expansion in all four MAG alternatives, comments will be confined to impacts within the range of proposed capacities. Impact considerations are site-specific to existing and anticipated factors of serious and/or adverse environmental concern to Gila River Indian Community. Technical and service delivery questions do not benefit the Community and, therefore, are not addressed here. Analysis is based upon the format utilized in the Draft Environmental Impact Statement; thirteen environmental criteria (p. 4-4). Further relevant comments and recommendations follow the analysis. All comments are based solely on material contained in the Draft EIS and do not reflect data contained in other reports or conferences with MAG staff and consultants.

1. AIR QUALITY: Severe Adverse Impact

Severe odor problems emanating from the existing plant have been documented over a period of years. These have negatively affected a wide range of existing and proposed programs: hospital care, recreation, schools, elderly nutrition, housing standards, churches, a children's home and community service center. General degradation of the air quality has resulted, and plant expansion is therefore opposed by the local community affected. Anticipated fugitive dust and noise during construction is expected to compound the current problems in varying intensity, depending on direction of prevailing winds.

2. GEOLOGY/SOILS: No Adverse Impact

3. SURFACE WATER: No Adverse Impact

(No beneficial use to the Community. See comments under #8 - Public Health - concerning flood hazards).

4. GROUND WATER: Major Adverse Impact

Estimated total dissolved solids, expected to result in the vicinity of the plant site (1950 - 3250 mg/l), will result in potential long-term concentration of pollutants to the domestic water supply. The well location at 83rd Avenue, immediately north of Baseline Road, is approximately one mile from the plant site and outfall. Odor contamination of water supply already exists. Replenishment of ground water table is not a benefit in this area of existing high water table.

5. BIOLOGICAL RESOURCES: Major Negative Impact

Loss of approximately 100 acres of wetland-marsh habitat will irreversibly destroy an established area of traditional game bird hunting. Effect of possible ground water contamination on existing crop production has not been determined.

6. CULTURAL RESOURCES: No Adverse Impact

7. AESTHETIC: Severe Adverse Impact

Noxious odors from sludge drying beds, flies, mosquitoes, gnats and persistent overall degradation of environmental quality has seriously impacted the residential community and its supporting public services and facilities. Initial plant siting and construction apparently did not recognize the presence of a substantial residential community concentrated within the immediate vicinity: 115 dwelling units were identified by 1978 field count to be within an area severely impacted by vectors, odor and inferior water quality. Residents of the district consistently, repeatedly, and unanimously oppose further threat to the quality of the environment. The strength of local opposition to both existing conditions and proposed expansion cannot be overemphasized. Precise mitigation measures will have to be presented to address these impacts or public controvery can be expected to continue in intensity.

8. PUBLIC HEALTH: Severe Adverse Impact

Location of the existing plant within a designated floodplain makes it particularly vulnerable to flood conditions, when sewage is discharged into the Salt River channel. Absence of fencing, buffers, or any other protective security measures compounds the problem of litter, debris, and unregulated flow of effluent. Apparent failure of the present facility to meet and maintain required EPA effluent standards constitutes a critical health hazard, notably for children playing in the channel and for cattle drinking inadequately treated wastewater. Stagnant pools in the meanders of the river bed contribute to septic conditions and further the vector and odor problems. Human illness and livestock disease/death have been reported, but these impacts are not capable of positive documentation. Hazards are apparent in unrestricted pedestrian access to the outflow and effluent channel in the vicinity of the 91st Avenue crossing; protective fencing should be installed and warning signs erected. Inadequately treated sewage wastes are permitted to pond and stagnate upstream from the 91st Avenue roadbed due to blocked and/or inadequate culvert capacity; vegetation further impedes flow and encourages insect breeding in the vicinity. Channelization should be required to eliminate the meanders, and measures taken to ensure correct operation and maintenance of both outflow points and channel carrying capacity.

Further expansion of sludge drying beds to the south of the existing site must be vigorously opposed as contributing further to health and flood hazards. Proper flood plain management techniques are seriously lacking. Effluent standards for partial body contact must be met, in accordance with mandatory EPA limits.

9. LAND USE: Major Adverse Impact

Serious conflicts in land use result from proximity of the plant to an established residential community and its supporting public facilities. Further growth, especially in the area of critically-needed housing, is impeded. Strenuous objection is taken to statements in the Draft EIS (p. 4-18, lines 17-23): "minor impacts to local land use" is a careless understatement; "relocation of residents" is out of the question; and "financial compensation" is an unacceptable solution.

Utilization of Federal funds to expand the existing facility poses critical conflicts in proper utilization of public monies for incompatible land use projects.

Since Federal funding from various agencies supports a majority of on-going and proposed programs on Tribal land, this conflict is subject to serious criticism.

10. POPULATION: Serious Negative Impact

Plant expansion is not expected to induce population growth in District 7; rather, it will tend to inhibit new growth and development due to the undesirable environmental setting resulting from current plant impacts. The major criteria of population impact (p. 4-14) are as follows*:

a) Population in immediate proximity to plant: 680
b) Number of families: 151
c) Number of dwelling units: 115

Effects of the facility on the resident population are described elsewhere in this report.

It should be emphasized that this is a stable, permanent neighborhood community, established prior to construction of the existing plant. Since most persons reside on allotted land there is little, if any, opportunity or likelihood for relocation to escape adverse environmental impacts caused by non-Tribal projects.

11. PUBLIC FACILITIES AND SERVICES: Severe Adverse Impact

In addition to residents, the following program areas have consistently registered complaints regarding noxious air and water quality and excessive vectors:

Community Service Center
Churches (4)
Children's Home (20-25 residents)
Convalescent Home (76 beds)
Recreation areas (3)
Elderly Nutrition Program

A HUD - subsidized subdivision and park development fronting on Baseline Road has been impeded by failure to meet Federal Environmental quality standards in this area.

12. ECONOMIC ACTIVITY: Not Applicable

No economic or physical benefits would accrue to the Community, only the costs of environmental degradation. Location of the plant severely impacts the Community but does not serve it.

13. PUBLIC AND INSTITUTIONAL ACCEPTABILITY: Major Adverse Impact

As noted earlier opposition will probably continue until adequate mitigation of current impacts can be demonstrated. This can undoubtedly be accomplished by correct redesign, retrofit and proper operation and maintenance of the plant and

*Source: Population and Housing Census, Gila River Indian Community, December, 1978.

outflow channels. The attached Tribal Council Resolution GR-133-78 (September 20, 1978), requires a site-specific assessment and mitigation of the problems identified. This is supported further by a letter (also attached) from Governor Alexander Lewis, Sr., to Mayor Charles Salem. This portion of the project has been the focus of extensive public participation and review since August, 1977, involving the following agencies and groups:

Tribal Council
District-7 Community residents and program managers (Resolution attached)
Planning and Zoning Commission
Land Use Planning staff
Resource Development Committee
Economic Development Committee
Gila River Housing Authority
Pastor: Assembly of God Church
Office of the U.S. Attorney
Tribal legal counsel
Gila River Environmental Health

2 Recommendations:

1. The existing facility must be upgraded to meet EPA standards for secondary treatment, with adequate monitoring to maintain that level.

2. More detailed analysis is required of environmental impact factors to further identify and mitigate problem factors, especially odor and insect problems.

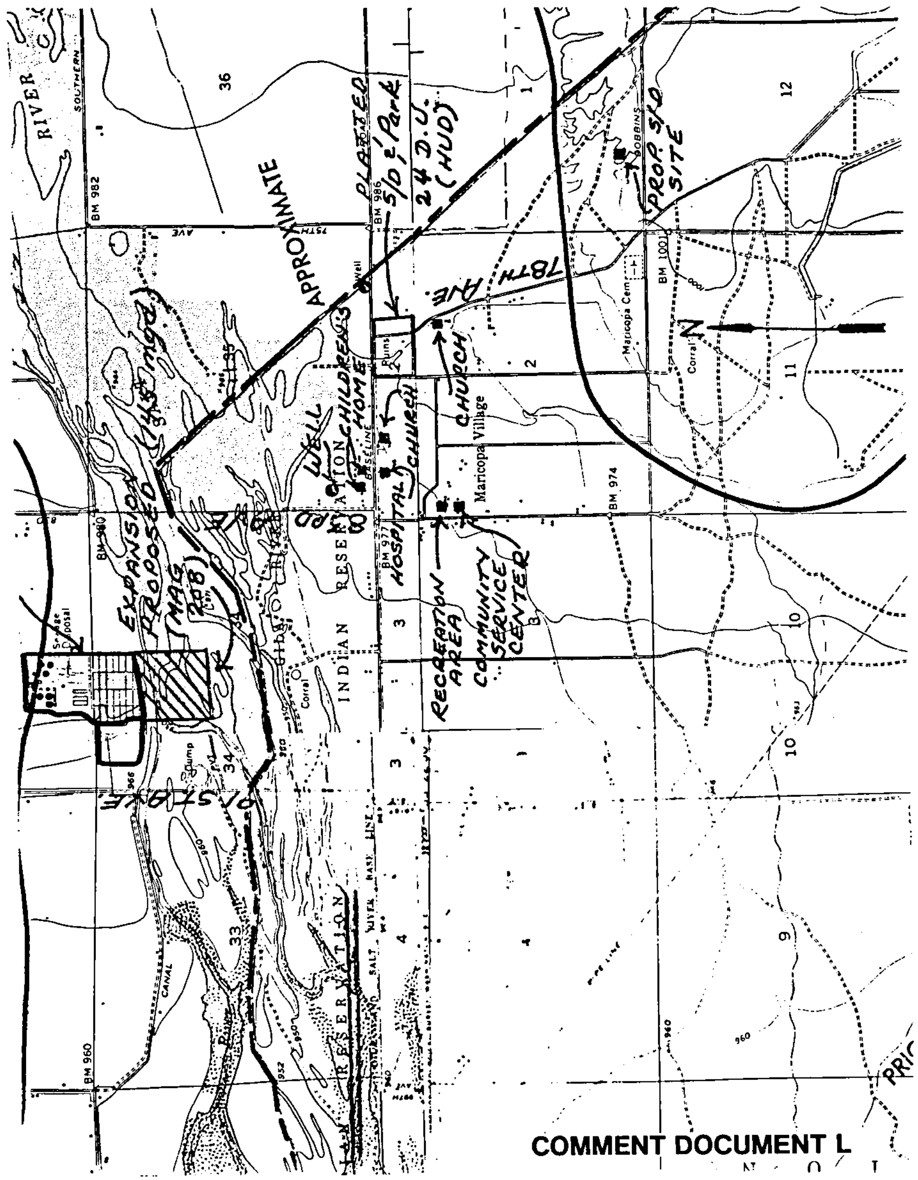
3. Engineering design modifications must be incorporated which demonstrate that adverse impacts have been recognized and prevented.

4. Since there is no economic or physical benefit accruing to the Tribe from this project, plant expansion should be deferred until acceptable safeguards are assured to protect the environmental quality of the Community.

5. Adequate buffers and security should be installed, such as vegetative screening, fencing and warning signs.

6. Siting of sludge treatment facilities, including drying beds, should be directed northerly and not encroach further into the floodplain or river bed toward Gila River Indian Community.

7. Outflow channels should be regularly maintained from excessive vegetation, and aligned to regulate flow and increase velocity. Culverts should be free of debris and sedimentation, especially at the crossing under the 91st Avenue roadbed, to improve carrying capacity and prevent ponding of effluent.



COMMENT DOCUMENT L

GILA RIVER INDIAN COMMUNITY

SACATON, AZ. 85247

DEPARTMENT OF PHYSICAL RESOURCES

P.O. BOX G — (602) 562-3311
(602) 963-4323

July 13, 1978

The Honorable Charles Salem, Mayor of Goodyear
Chairman, Maricopa Association of
Governments Regional Council
105 La Canada Boulevard
Goodyear, Arizona 85338

SUBJECT: MAG 208 Study

Dear Mayor Salem:

We would like to take this opportunity to inform the Regional Council that Gila River Indian Community is reviewing the proposed alternatives of the MAG 208 Program with interest and concern, and will continue to do so as the study progresses.

It seems appropriate at this time to offer several comments regarding the project in order that certain factors can be anticipated and addressed early in the planning process.

We refer you to the most recent publication submitted by John Carollo Engineers: "First Draft: Evaluation of Alternate Plans (Westside Planning Area)"; June, 1978; page 6-182. The concern of Gila River Indian Community residents and the Tribal Council has been demonstrated, over a long period of time, with considerably more strength of opposition than this report suggests. Consequently, we feel a more substantial, detailed study should be made of the potential negative impacts upon GRIC by the proposed expansion of the 91st. Avenue water treatment plant.

Concerning the Eastside Planning Area, Alternatives 2 & 4, which propose utilization of the Gila Drain and expansion of the Chandler treatment plant, you should be alerted to the fact that original contract documents for the channel right-of-way did not permit its use for drainage of effluent. Its further utilization and expansion should be considered only after legal determinations on this matter are made which are satisfactory to both Gila River Indian Community and Salt River Project.

The MAG staff, consultants and appropriate advisory groups should be aware of the serious concern of the Gila River Indian Community regarding what appears to be a critical lack of attention given in the study to mitigating the socioeconomic and environmental impacts of these proposed alternatives on Reservation land.

COMMENT DOCUMENT L

Thank you for the opportunity of commenting on the project at this time.

Very truly yours,

Alexander Lewis, Sr., Governor
Gila River Indian Community

xc: Jack DeBolske, Secretary, MAG
William Chase, Jr., 208 Project Manager, U.S Army Corps of Engineers

COMMENT DOCUMENT L

GILA RIVER INDIAN COMMUNITY
RESOLUTION GR-133-78

WHEREAS, the Maricopa Association of Governments (MAG) has been conducting an areawide 208 study to identify preferred wastewater collection and treatment alternatives for the Phoenix Metropolitan area; and

WHEREAS, an alternative is the proposed expansion of the existing 91st Avenue Treatment Plant which now adversely affects residents of the Gila River Indian Reservation, especially in District 7, by causing noxious ordors, by substantially contributing toward polluting the air quality of the area, and by compounding the existing health hazard caused by flies and mosquitoes; and

WHEREAS, the 91st Avenue Treatment Plant is potentially a hazard because of raw sewage contamination during flood conditions; and

WHEREAS, the 91st Avenue Treatment Plant has failed to meet Environmental Protection Agency minimum standards for secondary treatment of effluent; and

WHEREAS, since the northern boundary of the Gila River Indian Community has not yet been finally determined, the proposed expansion of the 91st Avenue Treatment Plant may encroach on Community land;

NOW, THEREFORE, BE IT RESOLVED:

1. The Gila River Indian Community opposed expansion of the 91st Avenue Treatment Plant as currently proposed by the MAG 208 Program, unless the environmental integrity of Community lands is protected;

2. The Gila River Indian Community recommends that the existing 91st Avenue Treatment be improved and upgraded to meet Environmental Protection Agency standards for secondary treatment, and that monitoring be instituted to insure that minimally required Environmental Protection Agency levels are complied with;

3. A formal environmental impact assessment should be undertaken to identify problem areas and suggest specific remedial methods to correct and alleviate the problems caused by the existing 91st Avenue Treatment Plant, and the proposed plant expansion, as each impacts the Gila River Indian Community.

COMMENT DOCUMENT L

GILA RIVER INDIAN COMMUNITY
Resolution GR-133-78
Page 2

CERTIFICATION

Pursuant to Authority contained in Article IV, Sec. 1 (a), (1), (4), (9), (12), (18) and Sec. 4 of the Amended Constitution and Bylaws of the Gila River Indian Community ratified by the Tribe, January 22, 1960 and approved by the Secretary of the Interior March 17, 1960, the foregoing resolution was adopted this 20th day of SEPTEMBER at a REGULAR Council meeting held in DISTRICT ONE, BLACKWATER, Arizona at which a quorum of 13 members were present by a vote of 13 FOR; 0 AGAINST; 0 ABSTAIN; 4 ABSENT; and 0 VACANCY.

GILA RIVER INDIAN COMMUNITY

Alexander Lewis Sr.
GOVERNOR

ATTEST:

Irma M. Enos
TRIBAL COUNCIL SECRETARY

COMMENT DOCUMENT L

GILA RIVER INDIAN COMMUNITY

SUBJECT: *Action by District Seven Community*

Special Meeting: *June 29, 1978 at 2:15 p.m.*
Mr. Mervin L. Thurman, Community Chairman, presided.

Excerpt from the official minutes:

"... The Community met with two representatives concerning the 91st Ave. sewer plant. The Community voted against the sewer expansion on 91st Ave. ...Kinds of problems created by the Treatment Plant: Insects, pests, and bad odor; also don't know where the boundary line is because of the last flooding (it was washed away). (Councilperson) Edena Anton commented that she lives on 79th Ave., but can still smell the bad odor...The domestic water well is right on the bank of the river.

The expansion would be disastrous all the way around. Frank Lowe commented that it will affect the housing for our District. Alex Sive commented on bad odor in water...Stanley Janis also agreed with Mr. Sive. Mervin Thurman: not healthy for the elderly and for children - bad odor could affect their lungs. Imogene Sundust commented she gets headaches from the odor, and that raw sewage flows and mixes with the Salt River. Mr. Shelde commented the City of Phoenix doesn't maintain what they have now. The foam from the riverbed runs onto the 91st Avenue road.

Roderick Sunn made a motion to oppose the expansion of the 91st Ave. Sewage Treatment Plant. Vernon Lee seconded the motion. All were in favor; none opposed; the motion was passed and carried...

(signed)

Denise Johnson ...."

COMMENT DOCUMENT L

GILA RIVER INDIAN COMMUNITY

RESOURCE DEVELOPMENT STANDING COMMITTEE

Regular Meeting: January 9, 1979

Members Present:
Arnold Charles, Chairman (Council Member)
Arnold Juan, Vice-Chairman (Council Member)
Anselm Shelde (Council Member)
Roy Thomas (Community Representative)
Phoebe Tracy (Council Member)

Notice of Committee Action: MAG 208 Program -(Chandler Plant)

After presentation of a staff report, there was lengthy discussion concerning the Committee's recommendation to the Tribal Council regarding their position on the proposed expansion of the Chandler sewage treatment plant. This matter was placed on the Resource Committee agenda in response to MAG 208 Program deadlines (January 15 and 17, 1979) for official Tribal comment on the alternatives presented in the Draft Environmental Impact Statement and Draft Final Plan - Water Management Program. Particular emphasis was given to the lack of firm data supporting proposed benefits accruing to Gila River Indian Community resulting from expansion; note was made of the potential for utilization of effluent by Tribal Farm operations, but it was not demonstrated that cost-benefits would be substantial enough to override environmental considerations. Comment was made that there had been no revenue to the Tribe from the existing plant, and contacts with officials in the City of Chandler had not resulted in an indication to renegotiate this matter. It was the consensus of the Committee that, in any case, there was insufficient information at the present upon which to base an affirmative recommendation. It was also noted that the Tribe now has staff capability for proper management of the existing plant site, and that the City of Chandler had failed to operate and maintain the plant at required standards on a consistent basis.

On motion by Mr. Shelde, seconded by Mr. Thomas, the committee voted unanimously to place the matter on the Tribal Council agenda for January 17, 1979, with a recommendation to disapprove the proposal. A resolution to that effect will be prepared for the Tribal Council.

After official action on the resolution by the Tribal Council, a copy is to be sent to the Maricopa Association of Governments and Environmental Protection Agency.

COMMENT DOCUMENT L

GILA RIVER INDIAN COMMUNITY
RESOLUTION GR-5-79

WHEREAS, in 1967 the City of Chandler leased 107 acres located on the Gila River Indian Reservation and has constructed a Sewage Treatment Plant; and

WHEREAS, the Maricopa Association of Governments (MAG) has prepared a Water Quality Management Plan and the Environmental Protection Agency (EPA) has prepared a Draft Environmental Impact Statement regarding sewer treatment alternatives for the greater Phoenix area, and the expansion of the Chandler Sewage Treatment Plant is one of those alternatives; and

WHEREAS, the Maricopa Association of Governments Regional Council is considering the endorsement of the expansion of the Chandler Sewage Treatment Plant; and

WHEREAS, MAG and EPA are requesting the position of the Gila River Indian Community regarding the possible expansion of the Chandler Treatment Plant to facilitate planning and engineering feasibility; and

WHEREAS, the Community Physical Resources Department has prepared a report concerning the proposed expansion of the Chandler Treatment Plant and has analyzed the possible benefits to the Community; and

WHEREAS, the Community does not and has not received any cash revenues from the Sewage Treatment Plant; and

WHEREAS, the proposed benefits to the Community, as outlined in the Draft Environmental Impact Statement, are outweighed by the adverse environmental and health impacts on the Community;

NOW, THEREFORE, BE IT RESOLVED, that the Gila River Indian Community opposes any future expansion of the Chandler Sewage Treatment Plant.

CERTIFICATION

Pursuant to authority contained in Article XV, Sec. 1 (a), (1), (9), (13), (19) and Sec. 4 of the amended Constitution and Bylaws of the Gila River Indian Community ratified by the Tribe, January 22, 1960, and approved by the Secretary of the Interior, March 17, 1960 the foregoing resolution was adopted this 17th day of JANUARY, at a REGULAR Council meeting held in DISTRICT THREE, SACATON, Arizona at which a quorum of 15 members were present by a vote of 13 FOR; 0 AGAINST; 2 ABSTAIN; 2 ABSENT; and 0 VACANCY.

COMMENT DOCUMENT L

GILA RIVER INDIAN COMMUNITY
Resolution GR-5-79
Page Two

GILA RIVER INDIAN COMMUNITY

[signature]
GOVERNOR

ATTEST:

[signature]
TRIBAL COUNCIL SECRETARY

COMMENT DOCUMENT L

(HE-152) 4

BY E.P.A
REGION IX
COMM. CENTER
'79

ARIZONA PUBLIC SERVICE COMPANY

P. O. BOX 21666 · PHOENIX, ARIZONA 85036

RUSSELL D. HULSE
VICE PRESIDENT

January 15, 1979

REGIONAL HEARING CLERK
JAN 1 1979

MAG 208 Water Quality Management Program
111 South Third Avenue
Phoenix, AZ 85003

United States Environmental Protection Agency
Region IX, Hearing Office
215 Fremont Street
San Francisco, CA 94105

RE: MAG 208 Water Quality Management Program
Draft Environmental Impact Statement
issued November 1978

Gentlemen:

On behalf of Arizona Public Service Company (APS), I would like to comment on two documents germaine to the provision of sewage effluent for condenser cooling at the Palo Verde Nuclear Generating Station (PVNGS); the Water Quality Management Plan - Final Draft prepared by the U.S. Army Corps of Engineers, Maricopa County and MAG member agencies and the Draft Environmental Assessment of the Point Source Alternatives for the Metro Area prepared by the U.S. Army Corps of Engineers. First, the water quality management plan.

In general, we believe the plan represents a noble effort to formulate a workable plan against a background of complex and confusing regulatory and procedural requirements. In this
1 light, we have only one major recommendation which is that the responsibility for setting of effluent standards for industries and monitoring of same be placed with the State Department of Health Services, as opposed to the MAG regional operating groups. Rather than fragmenting jurisdiction, we believe that the public interest is better served by vesting a single agency, Health Services in this instance, with this area of responsibility. Since Health Services is already involved in similar duties and responsibilities, the agency has the necessary experience and expertise to be the standard setter.

On the other hand, we support the plan's recommendation that the MAG regional operating groups be empowered to set appropriate user charges to recover construction and operation and maintenance costs.

COMMENT DOCUMENT M

2 As the management plan proceeds to implementation, I trust we will have the opportunity to provide procedural and technical input and we would ask that consideration be given to placing APS representatives on those committees that could affect Palo Verde and our other stations.

Regarding the draft environmental impact statement, we are offering some specific technical comments in a separate document, but we believe that some of these specific comments, as well as our general views on the statement, are important enough to warrant special attention here.

3 In our view, the statement does not follow generally accepted guidelines for the preparation of such documents. Among other things, important areas such as socio-economic considerations, secondary impacts, the impact on industry, and cost/benefit analysis need to be included. Moreover,
4 the draft is characterized by an over-abundance of subjective analysis and a dearth of empirical evidence to support such analysis. This weakness may stem from a failure to utilize all the environmental impact information available.

5 For example, the environmental report and preliminary safety analysis report prepared for submission to the Nuclear Regulatory Commission in support of our Palo Verde license application were clearly not used and are not referenced in the draft statement. The PVNGS environmental report alone consists of seven volumes of material, most of which was gathered in Maricopa County, on the impacts and benefits of this project. It seems to us that these documents would have been invaluable in the preparation of the MAG draft statement. For instance, the question of alternative sources of condenser cooling water for Palo Verde and the attendant environmental impacts (wet lands, etc.), were addressed in both reports, yet this information was not used in preparing the MAG statement.

6 As to specifics, the MAG statement is based on the assumption that the Palo Verde project will use the full 140,000 acre feet contracted for on an annual basis. This is not the case. The plant will only use the amount of sewage effluent actually needed from the 23rd and 91st Avenue treatment facilities, with rights to the contracted 140,000 acre feet.

COMMENT DOCUMENT M

Units 1 through 3 at Palo Verde will require an average of about 64,000 acre feet of effluent annually and a peak monthly requirement of about 6,550 acre feet. Even if Units 4 and 5 are built, total annual consumptive use will amount to 107,200 acre feet by 1990. It doesn't seem logical to base the impact statement on a figure that is over double the annual requirements of 1 through 3 and substantially in excess of Unit 1 through 5 requirements.

7 Additionally, the statement assumes use of effluent from the Tolleson and Reems Road plants which are not part of the 1973 agreement between the cities and APS and the Salt River Project (not ANPP as indicated in the statement). Such use would require further study and additional facilities, at a minimum.

8 As far as the agreements are concerned, we have not made any litigation threats as implied in the statement. Our position simply is that we have three vitally important nuclear units under construction with the first unit scheduled to go into operation in 1982. We proceeded with construction because, among other things, we had an agreement with the cities to provide the necessary condenser cooling sewage effluent. If Arizonans are to get the needed power, then we need to have the effluent. And since we are accountable for insuring reliable electric service, we will do everything we can to make sure that the contractual obligations are met.

9 One of the major questions raised in the MAG statement is the potential conflict between agriculture and industry regarding effluent use. The basic economics of sewage effluent use indicate that such a conflict could not arise because agricultural activities simply can't absorb the costs associated with effluent use. On the other hand, the Palo Verde project can make cost/effective use of this effluent. Power plant economics dictate that the impact of effluent use on the ultimate cost of power from Palo Verde is relatively small, while the impact on the end cost of agricultural products would be enormous. The question of alternative use economics was examined in June, 1978 by Management Research Inc., under contract to APS. Although this study focused on the use of effluent for Units 4 and 5 only, it concluded that such use would result in the highest tax benefits to the state and its communities from property, sales and income taxes. In short, economics clearly favor the Palo Verde station in relation to the other alternative uses.

COMMENT DOCUMENT M

10 Finally, we believe that the section in the statement concerning projected energy use is irrelevant in terms of the overall environmental impact of sewage effluent utilization. This area of inquiry is exceedingly complex and, in our judgement, generally beyond the ken of framers of non-energy related environmental impact statements.

I hope that these general observations, along with the specific comments we are submitting, will be useful in improving the point source environmental assessment. We stand ready to provide any further assistance that may be required.

Sincerely,

Russell D. Hulse

RUSSELL D. HULSE

RDH:tch

Attachment

ARIZONA PUBLIC SERVICE CO.

COMMENTS

ON

MARICOPA ASSOCIATION OF GOVERNMNETS

DRAFT ENVIRONMENTAL ASSESSMENTS

U.S. ENVIRONMENTAL PROTECTION AGENCY

DRAFT ENVIRONMENTAL IMPACT STATEMENT

ON

POINT SOURCE METRO PHOENIX ALTERNATIVE

FOR

MAG 208 WATER QUALITY MANAGEMENT PLAN

January 15, 1979

COMMENT DOCUMENT M

	Page	Line	Comments
11	2-4	16 to 19	Irrigated crops are not the only beneficial use of effluent.
12	2-5	6 to 7	Remove the parenthesis and words "Palo Verde Nuclear Generating Station".
13	2-11	2 to 7	The effluent will be used for the purpose of power plant condensor cooling and other system cooling, not reactor cooling.
14		22 to 24	Should read, "Effluent from the 23rd Avenue plant is discharged to an open lined ditch passing McDonald Farms, where an unmeasured amount of effluent may be diverted for irrigation."
15	2-25	23 to 26	Environmental issues have been much more complex. Additional concerns in the areas of socioeconomics, land use, impacts on industry, and secondary impacts do not appear to be addressed.
16	2-30	1	Another basic Social and Economic Issue not listed here is an item dealing with the effect of the proposal on industry. There is no baseline established in regard to industry and the potential use of effluent.
17	3-72	1	Section 3.1.11 Land Use is extremely brief for such an active area of concern, the reader cannot grasp what is taking place and what the baseline condition is.
	3-80	6	This section on Energy does not seem to contribute anything to the report; or to the subject matter at hand, but be that as it may, the next few comments are made to help clarify the section.

COMMENT DOCUMENT M

	Page	Line	Comments
19	3-80	10	SRP does not rely on hydroelectric power, it is a fossil-fuel based utility.
20		12	PVNGS is a three unit plant with each unit rated at 1270 MW; this is a clarification.
21		20	The three fossil-fueled plants are not a part of PVNGS or ANPP and should be another paragraph. It should also be clarified that they are not being constructed in the study area.
22	3-133	19	This "Energy" section is very inadequate and creates more inconsistencies, and we suggest that it be stricken completely. However, in an attempt to clarify what does exist in this section, we offer the following comments.
23		24	The growth rate of U.S. electricity consumption for 1977 was 4.5%. APS's projected annual growth does not decline to this level until 1990.
24	3-134	7	The natural gas supply is projected to be good, not dwindling as suggested here; however, price will rise which will impact consumption negatively.
25		18	Cholla #5 has been delayed indefinitely, and will not be available in 1985.
26	3-135	2	The statement "Energy demand will continue to increase because of urban sprawl..." is true to a limited extent. There are many other factors involved that are more influential, i.e., increasing population.
27	4-31	3	This paragraph needs to be corrected to indicate that Multi-Cities who have constructed 23rd and 91st Avenue sewage treatment works have contracted with APS and SRP for the sale of effluent up to the amount of 140,000 AF, to be used for

COMMENT DOCUMENT M

	Page	Line	Comments
	4-31	3	(continued) condensor cooling at the Palo Verde Nuclear Generating Station (PVNGS) or any facility which APS or SRP chooses.
28		9 and 10	The choice to use sewage effluent was made in the late 1960's and early 1970's after considerable study, consequently the design of the station was based on effluent use after the contractual arrangements were consummated in 1973. Potential alternative sources for cooling water present today are either too poor in quality; in sufficient quantities; or, in the case of groundwater, too precious a commodity to use for cooling purposes in this environmental setting.
29	4-48	21	Neither APS nor SRP have contractual agreements or facilities presently available to accept future flows from the enlarged Tolleson plant. Considerable study would have to be done before this concept could become a reality. This statement, as written, may give the reader an improper picture.
30	4-51	12 to 14	PVNGS will take only the amount of effluent needed from 23rd and 91st Avenue to run the plant, with rights to the contracted amount. The remaining effluent may be disposed of by the cities in any manner it deems fit.

	Page	Line	Comments
31	4-54	17 to 19	See page 4-51 comment, it also applies to the proposed Reems Road facility.
32	4-58 4-59	26 1 and 2	See page 4-51 comment. Additionally, there does not presently exist a Reems Road plant, hence, there is no sale of effluent. We do not see the loss of something which doesn't exist being an adverse impact attributable to PVNGS or any other facility for that matter.
33	4-60	11	Should read, "This <u>may</u> occur in the mid-1980's when flows at 91st Avenue <u>may</u> become inadequate to meet...."
34	4-63	25	The use of effluent by PVNGS will not necessarily eliminate the discharge of effluent from the 23rd Avenue plant to the Gila River. Palo Verde will use or take delivery of only that amount of effluent necessary to operate, potentially up to the contracted amount.
35	4-64	5 to 11	The contractual arrangements for sewage effluent from 23rd Avenue and 91st Avenue are more complex than the reader is lead to believe here. We do not believe the use of effluent is in conflict with any agriculture interest or farmer, see comment 4-74.
36	4-71	10	We do not understand how the export of effluent to PVNGS will have an adverse impact on groundwater quantity in the Salt River Valley.

	Page	Line	Comments
37	4-74	23	In the assessment of alternate sources of water for PVNGS, (which took place in the early 1970's) there were waters available that presented a lesser expense to the utilities. However, we are also fully aware of the restrictions on water availability in the state. Therefore, PVNGS is using a relatively poor grade of water to produce a product which has tremendous economic benefit. To do so, we must transport and and treat the effluent at an expense of approximately $600 an acre foot. We can do this because the costs of the water are not a major component of the cost of the product. Other processes, such as agriculture cannot afford the large cost of treating and transporting water because it is one, if not the major, component in their cost of production. Therefore, after considering Arizona's plight in regard to water use and the availability of sewage effluent, we proceeded into contractual agreements with the cities. (See comment 4-31.)
38	4-75	1	See comment on page 4-74.
39	4-98	16	The use of effluent by APS and SRP does not depend on any "resolution of claims". Contractual obligations have been outlined in agreements with the Multi-Cities that are involved in the 23rd and 91st Avenue plants, and the Buckeye Irrigation Company.

COMMENT DOCUMENT M

	Page	Line	Comments
40	4-98	23	Should read "Some loss of wet lands may temporarily occur in the Salt River bed when effluent is diverted to PVNGS." (Also see comment 4-51.)
41	4-135	19	This fails to address the economics of using effluent in crop production, see comment 4-74.
42	4-166	5 to 7	APS and SRP do not believe this is the case, after considerable study and analysis.
43		14	APS has expressed interest in additional amounts of effluent for peak generation periods during summer months, not to support additional units past the number five, currently being considered.
44		15	APS and SRP have indicated that they would pursue every possible means to preserve the current contractual obligations and agreements regarding sewage effluent, in which they are involved.
45	4-171	13 to 19	The economics of effluent use by agriculture and the costs of effluent has not been presented. We do not believe the planned treatment facilities will "tend to reduce the cost of irrigation water", see comment 4-74.
46	4-176	2 to 8	See comments 2-11, 4-31, 4-63, 4-74.
47	4-177	2 to 15	APS has <u>not assumed</u> the availability of effluent for use at PVNGS. After considerable study contracted for the amount needed to cool power plant condensors and other systems not nuclear

COMMENT DOCUMENT M

	Page	Line	Comments
	4-177	2 to 15	(continued) reactors. In regard to our study of alternate sources of water, see earlier comment 4-31.
48	4-180	18	APS and SRP have secured effluent for PVNGS.
49		20	APS does not find itself in conflict with the agricultural community, see additional comments 4-74.
50	4-183	Table 4-31	APS did not threaten litigation, we suggested that all available means would be explored in order to supply PVNGS with an adequate supply of waste water under existing contracts.
51	4-184	Table 4-32	See above comment.
52	5-3	20	Delete "probably", the Buckeye Irrigation Company will receive 30,000 AF of effluent annually from the pipeline.
53	5-4	2	We do not believe that all flows to the riverbed will be eliminated. The Arizona Game and Fish Department has a contractual arrangement for delivery of 7300 AF.

TH:tch

1-12-79

COMMENT DOCUMENT M

Exhibit 6
HE-152
15 Jan 79

RECEIVED
E.P.A. REGION IX
JAN 15 10 21 AM '79

JOHN S. SCHAPER
ATTORNEY AT LAW
218 EAST LEXINGTON AVENUE
PHOENIX, ARIZONA 85012
TELEPHONE 602/263-5326

January 11, 1979

MAG 208 Water Quality Management Program
111 South Third Avenue
Phoenix, Arizona 85003

United States Environmental Protection Agency
Region IX, Hearing Office
215 Fremont Street
San Francisco, California 94105

Re: MAG 208 Water Quality Management Program
Draft Environmental Impact Statement
issued November 1978

Gentlemen:

This office represents the Buckeye Irrigation Company and the Buckeye Water Conservation and Drainage District of Buckeye, Arizona. On behalf of those organizations, I have been requested to submit comments concerning the MAG 208 Plan issued in December of 1978, and the Draft Environmental Impact Statement concerning MAG 208 Plan issued in November of 1978. Those comments are contained in the Memorandum attached hereto.

The Buckeye Irrigation Company is a nonprofit mutual corporation owned and operated by farmers whose lands are within the Buckeye Water Conservation and Drainage District, and irrigated with water delivered through the Buckeye Canal and related facilities. The Buckeye Irrigation Company was organized in 1907 under the laws of the Arizona Territory, and is a successor to prior canal campanies which built or operated the original irrigation facilities in the Buckeye Valley. The Buckeye Water Conservation and Drainage District was organized as a municipal corporation in 1922 under the laws of the State of Arizona. These two entities have responsibility for providing irrigation water and drainage facilities for approximately 20,000 acres of land on the north side of the Gila River, west of the confluence of the Gila and the Agua Fria River.

1 Unfortunately, the limitations of time have made it impossible to fully analyze and comment upon the voluminous data contained in the MAG 208 Plan and in the Environmental Impact Statement. Further, a lack of access to supporting studies

COMMENT DOCUMENT N

MAG 208 Water Quality Management Program
United States Environmental Protection Agency
January 11, 1979
Page 2

and reports has prevented an evaluation of the validity of various assumptions and conclusions which are contained within the Plan and the Draft EIS. Therefore, the enclosed Memorandum does not purport to deal fully with all of the matters discussed in the Plan and the EIS which may be of interest to the Buckeye Irrigation Company and the Buckeye Water Conservation and Drainage District.

It is requested that this communication and the attached comments be reproduced in the final Environmental Impact Statement relating to the MAG 208 Water Quality Management Plan.

Very truly yours,

John S. Schaper

JSS:cfv
xc: Leonard C. Halpenny
Wilbur W. Weigold

MEMORANDUM

Re: Draft Final Plan of MAG 208 Water Quality Management Program; and Draft Environmental Impact Statement for MAG 208 Water Quality Management Plan

I. Reuse of Sewage Effluent.

A. Surface Water

The term, "surface water," is used throughout the Plan and the DEIS to refer to waters flowing within the channels of natural watercourses. "Surface water" has a significantly different legal meaning in the State of Arizona. However, for purposes of the following comments, it is assumed that "surface water" refers to effluent from a sewage treatment facility which has not been lost to evaporation or groundwater recharge, or to other water resources exclusive of groundwater.

1. The Interest of the Buckeye Irrigation Company.

Effluent from the 91st Avenue Plant has been diverted from the Gila River, along with other stream flows, at the headgate of the Buckeye Canal located approximately six miles west of the treatment facility for over 15 years. (DEIS Fig. 3-4) The effluent and other stream flows are then mixed with groundwater pumped into the Buckeye Canal, and delivered for the irrigation of crops such as cotton, alfalfa, maize,
2 safflower, barley and wheat. Contrary to the impression given by the DEIS (Fig. 3-4), the Buckeye Canal does not end at Jackrabbit Road, but travels to, and is siphoned under the Hassayampa River.

3 The Plan (IV-2) contains erroneous conclusions as to the percentage of effluent discharged into the Salt River and actually diverted downstream into the Buckeye Canal. Presumably, the conclusions resulted from a failure to account for deliveries to the Buckeye Canal from the Salt River Project pursuant to a Decree entered in No. 30869-B in the Maricopa County Superior Court. The correct data indicate that between 55% and 65% of the total effluent from the 23rd Avenue and 91st Avenue facilities is diverted for irrigation through the Buckeye Canal. Channel losses account for the balance, except for small quantities which may be bypassed when the Buckeye Canal is drained, or when flows in the Gila River exceed the capacity of the Buckeye headgate.

In the early 1960s, the Buckeye Irrigation Company entered into negotiations with the City of Phoenix to insure the availability of effluent for irrigation purposes. After more than seven years of discussion and litigation, a contract was executed under which the City of Phoenix agreed to make 30,000 a.ft. of effluent available annually at 91st Avenue for 40 years in exchange for payment of a price per acre-foot based upon the price to be paid for water in the Salt River Project, and an agreement not to prosecute a pending suit to enjoin the storage of water by the City of Phoenix at Horseshoe Dam.

4 A conclusion appears in the DEIS that the City of Phoenix owns all waste water within the sewage system; has the right to use and sell such water; that a purchaser of effluent acquires title to it at the point of purchase; and that a discharge of effluent to a river allows comingling with State waters and makes the effluent subject to appropriation. (DEIS 3-29,30)

The "ownership" of waste water has never been resolved by judicial decision in Arizona. It has been generally assumed, however, that a municipality has the right to sell effluent so long as the purchaser uses it for reasonable and beneficial purposes. Whether a purchaser acquires "ownership" of effluent is debatable.

Clearly, effluent discharged into the bed of a natural watercourse, whether or not it is then comingled with other water, becomes subject to the laws of prior appropriation of the State of Arizona under A.R.S. § 45-101, and is no longer subject to any rights of ownership or recapture by a municipality. The rights of the Buckeye Irrigation Company to divert and use effluent in the Gila River exist by virtue of prior appropriation for land under the Buckeye Canal, as discussed more fully in the following section.

2. Judicial Decrees and Jurisdiction Over Effluent.

References appear in the DEIS to the Kent Decree and the
5 Globe Equity or Gila Decree, both of which adjudicated water rights obtained by prior appripriation in Arizona. (DEIS 3-29,30) The Kent Decree established priorities for waters from the Salt River diverted at what was formerly Joint Head Dam and Granite Reef Dam. The Kent Decree has no relationship to the effluent produced from any of the plants referred to in the Plan or the DEIS. The Globe Equity Decree adjudicated the rights to Gila River waters at various diversion points in Arizona and New Mexico, none of which are within Maricopa County. The Decree has nothing to do with the rights of any persons to water from any sewage treatment plants in Maricopa County.

In 1917, a Decree was entered in the Maricopa County Superior Court in No. 7589, Benson vs. Allison and Four Hundred Fifty Four Others, which established rights and priorities for the diversion of flows in the Salt and Gila River for the irrigation of lands under the St. John's Canal, the Buckeye Canal, and other facilities downstream from Joint Head Dam. 19,837.5 acres under the Buckeye Canal were determined to have water rights, with priorities dating from 1887 to 1915. It is on the basis of this Decree that lands in the Buckeye Valley are entitled to divert and use effluent flowing in the Gila River.

Under the Benson-Allison Decree, the Superior Court retained jurisdiction over the waters subject to appropriation; and the uses of any waters in the Salt and Gila Rivers below Joint Head Dam, including effluent, are subject to such judicial supervision.

Under § 101 of the Federal Water Pollution Control Act (33 U.S.C. § 1251), Congress has specifically expressed the intent that local control over water rights, and rights to water established pursuant to local law, are not to be abrogated or impaired. Any provisions of the Plan or the DEIS inconsistent with such intent, and purporting to suggest or require allocations of effluent inconsistent with existing water rights are inappropriate.

3. Regulation of Effluent Reuse.

The Buckeye Irrigation Company has diverted and distributed effluent flowing in the Gila River for the irrigation of crops consistent with State regulations, and a Health Department permit which was issued August 26, 1964.

6 The DEIS suggests that any consideration for reuse of effluent would require further examination of "costs, storage needed for optimum operation, possible water trading, contractual agreements, limitations on types of crops, and the necessity for controlled access to the fields." (DEIS 2-5,6) It is submitted that neither the EPA or any local agency in Arizona has authority under the Federal Water Pollution Control Act to involve itself in such matters as contractual agreements for effluent use, crop limitations, control of access to irrigated fields, or the desirability or need for the storage of effluent for irrigation purposes. As previously noted, the Federal Water Pollution Control Act makes it clear that the allocation and distribution of water resources is not a matter of Federal concern. Further there is nothing in the statutes of Arizona which would purport to give the State Water Quality Control Council any power to regulate agricultural use other than by limiting the application of effluent upon certain crops.

7 In the same context, it is noted that the Plan and the DEIS both make reference to the "Tributary Rule" as being applicable to the portions of the Salt and Gila Rivers upstream from Painted Rock Dam for which no specific standards have been adopted by the State Water Quality Control Council. (DEIS 2-28; DEIS 5-1; DEIS 3-15) The regulation to which reference is made, A.C.R.R. 9-21-205 states:

> "A. The primary and incidental beneficial uses of surface waters in streams, and lakes including their tributaries unless otherwise designated includes but are not limited to those shown in the tables attached to this article as Appendices 1 through 9."

The implication that this regulation was intended to impose the standards for Painted Rock Dam to the Salt River is entirely unjustified.

8 Similarly unjustified is the purported regulation of the Maricopa County Department of Health Services concerning the period of time during which a contract must be entered into for the reuse of effluent from a sewage treatment facility in order for the contract to be valid. A local Department of Health Services has no authority to regulate the time period during which a private contract is to be maintained in effect, and such a regulation cannot be recognized as valid.

It should also be recognized that the authority of the State of Arizona, or of any county or municipal regulatory agency to regulate water pollution is limited by the provisions of A.R.S. § 36-1857 B, which prohibits the State Water Quality Control Council from adopting any water quality standards which would require any appropriator, including the owners of land under the Buckeye Canal, from ceasing the diversion or storage of any waters from any natural watercourse for the purpose of controlling pollution. Any provisions or suggestion in either the Plan or the DEIS inconsistent with the statute cannot be of any effect.

4. Reuse for Palo Verde Nuclear Generating Station.

The DEIS suggests that the use of effluent for PVNGS must
9 necessarily have an adverse effect upon agricultural use of effluent west of the Agua Fria River. (DEIS 4-75,176) This contention assumes that effluent production from 23rd Avenue and 91st Avenue will be insufficient in the future to meet the requirements of the Buckeye Irrigation Company. That assumption appears to be based upon speculation concerning population trends in the future, and the quantities of effluent which will be produced from 91st Avenue. The validity of such assumptions is doubtful.

COMMENT DOCUMENT N

On November 14, 1977, in a letter to Charles H. Salem, Chairman of the MAG Regional Council, it was explained that the potential for effluent reuse in the Buckeye Valley is limited by the need to maintain a hydrologic balance, and that it does not appear reasonable to distribute more than 80,000 a.ft. per year of effluent through the Buckeye system, including the 30,000 a.ft. per annum referred to in the contract between the Buckeye Irrigation Company and the City of Phoenix.

On the basis of currently available projections concerning the effluent to be produced by the plants referred to in the 208 Plan, it appears that the commitment of effluent to PVNGS can be met without seriously jeopardizing agricultural irrigation through the use of effluent in the Buckeye Valley. Therefore, it is not appropriate to conclude that there is at this time a conflict between agricultural users and PVNGS as has been suggested. (DEIS 4-180)

B. Groundwater.

Both the Plan and the DEIS contain detailed discussions of the effect of effluent upon the quality and quantities of groundwater, particularly in relation to the 23rd Avenue and 91st Avenue facilities.

The effect of groundwater recharge produced by sewage
10 effluent may be an appropriate subject for consideration in an environmental impact statement. However, the control of groundwater quality is not a matter within the jurisdiction of EPA under the Federal Water Pollution Control Act. The Act contemplates the prevention of pollution of "navigable waters" of the United States. 33 U.S.C. § 1251(a) "Navigable waters," by EPA's own definition, do not include groundwater not tributary to lakes, rivers and streams. 40 C.F.R. § 125.1(p).

Nothing in Section 208 provides a basis for groundwater regulation, or specifies that a program of groundwater quality monitoring is either necessary or appropriate in the formulation of a 208 plan. See: 33 U.S.C. § 1288; 40 C.F.R. § 131.11.

It is recognized that the Water Quality Control Council of the State of Arizona does have responsibility for the establishment of groundwater quality standards, pursuant to A.R.S. § 36-1857. That responsibility should not be assumed by or delegated to EPA or to local agencies acting under § 208. MAG should not beomce involved in programs to monitor groundwater quality, and should leave such matters to the State Department of Health Services and the Water Quality Control Council, to the Arizona Water Commission, and to other agencies currently having responsibilities in this area.

COMMENT DOCUMENT N

1. Effluent Recharge and Groundwater Quality.

11 Various references appear in the Plan and the DEIS relative to the effect of effluent upon groundwater quality in the Buckeye Valley. Specific reference is made in the DEIS to the conclusion that sewage effluent has resulted in a reduction in salinity and an increase in nitrates or nitrogen in groundwater used to irrigate land under the Buckeye Canal. (DEIS 3-40 et seq.; Plan IV-18 et seq.) Available data do not compel the conclusions reached.

There is no question that groundwater from wells within the Buckeye Water Conservation and Drainage District has a salinity content which is substantially higher than that of effluent produced by the 23rd Avenue and 91st Avenue plants. The dilution of groundwater with effluent in the Buckeye Canal does, therefore, produce a desirable reduction in the salinity of irrigation water delivered to farms in the Buckeye Valley. However, the effect of effluent upon groundwater in this area remains doubtful.

During the ten-year period between 1965 and 1974, approximately 750,000 a.ft. of effluent were discharged to the Salt and Gila Rivers from 23rd Avenue and 91st Avenue. During the same period, the total dissolved solids produced by wells in the Buckeye Valley increased from 3,456 ppm to 3,733 ppm. During the same period, there was a significant rise in water levels in wells throughout the Buckeye Valley, indicating substantial recharge. While the effluent undoubtedly contributed to the recharge, it does not appear that during the period in question there was any significant water quality improvement produced by effluent recharge.

Groundwater salinity in the Buckeye Valley has decreased somewhat since 1975. Much of the decrease must be attributed to recharge from the nearly 1,250,000 a.ft. of water which flowed into the Salt River Valley at Granite Reef Dam in 1973, and moved west through the Buckeye Valley in the Gila River.

The Plan and the DEIS also conclude that sewage effluent has increased nitrate levels in the groundwater west of the Agua Fria River. Again, data concerning this are inconclusive. Records of the Buckeye Irrigation Company indicate that nitrate levels in Buckeye Valley groundwater were higher than nitrate levels in effluent in the 1960s. Naturally occurring nitrates in groundwater in the western portion of the Buckeye Valley are significantly higher than those in sewage effluent. (See: DEIS Fig. 3-10) Finally, much of the recharge from effluent discharged into the Salt River appears to move in a northerly direction, rather than to the west, and affects groundwater

quality in areas influenced by the cone of depression north of Litchfield Park rather than quality in the Buckeye Valley.

A study by the University of Arizona concerning the effect of the use of effluent for agricultural irrigation in the Buckeye Water Conservation and Drainage District has reached no final or firm conclusions. Whether the chemical properties of effluent have a beneficial or detrimental effect on groundwater for agricultural use remains a subject of investigation and discussion.

2. Groundwater Management or Planning.

12 A recommendation is made in the Plan for consideration of such things as canal lining, well construction, altered pumping practices, and various other hydrologic evaluations. (See: Plan VI-12,19,22-23) § 208 does not contemplate provisions in a plan which would have any bearing upon the conservation, use, management, or control of groundwater. On the contrary, and as previously noted, the Federal Water Pollution Control Act makes it clear that the management of water resources, and the rights to quantities of water established by State law are matters which are not within the purview of § 208, or any other provision of the Federal law.

II. The Proposed Reems Road Facility.

13 DEIS Figure 4-12 contains a diagram of the proposed Reems Road Sewage Treatment Plant, and what appears to be a scheme for use of effluent from that plant for the irrigation of lands south of the Buckeye Canal and east of the South Extension Canal.

The use of effluent from the Reems Road plant for irrigation purposes is compatible with current effluent use from 91st Avenue for the irrigation of land located under the Buckeye Canal. However, the planned use of such effluent for the irrigation of land which has no history of irrigation, no water rights, and which is totally unsuitable for irrigation, is not justified. The land shown in the diagram in Figure 4-12 is located primarily in the bed of the Gila River, and at the time of the preparation of this Memorandum was under water.

The use of effluent to bring new desert land into agricultural production is inconsistent with recognized conservation concepts in Arizona as well as various laws intended to limit the use of water resources for the development of previously unfarmed properties.

It would also appear to be economically foolhardy to develop a system for transporting effluent a substantial distance from the point of discharge at the Reems Road plant for the irrigation of currently uncultivated land, when the effluent could be discharged at the plant into the Buckeye Canal and used for irrigation of lands now being farmed.

III. Biological Considerations.

A. The Salt River Channel.

14 Concern is expressed in the DEIS over the possible elimination of phreatophyte growth in the channel of the Salt River downstream from 91st Avenue as a result of the pipeline for conveyance of effluent for PVNGS and the irrigation of lands under the Buckeye Canal. The conclusions reached in the DEIS are completely inconsistent with the conclusions reached in the final Environmental Statement issued in September of 1975 in connection with the construction of Palo Verde Nuclear Generating Station Units 1, 2 and 3.

The conclusions reached in the DEIS also appear to be based entirely upon projected effluent discharges from 23rd and 91st Avenue. However, the data upon which the conclusions seem to be based are not available in the DEIS. Obviously, there is a direct relationship between the accuracy of the predicted effluent supply and the effect upon the downstream biological environment in the Salt River, as well as the effect upon supplies available to agricultural reusers. Any conclusions in this regard should be based upon the best available projections by the municipalities operating the plants, a study of other available water supplies, such as those entering the Salt River on the south side, water supplies in the Gila River which are not accounted for in the DEIS, and studies of the effect on phreatophytes of a decrease of currently available water. No references appear in the DEIS to support the conclusion reached. (See e.g. DEIS 4-71)

B. Flood Control Considerations.

15 The Draft Environmental Impact Statement is totally devoid of any mention of the effect on flood hazards, flood control, and related problems resulting from the removal of effluent from the channels of the Salt River below 91st Avenue.

The proliferation of phreatophytes sustained by effluent flows in the Salt River has resulted in substantial silting and changes in elevations and locations of river channels downstream from 91st Avenue. As a result, there has been serious flooding of properties north of the river in 1978

which would not have otherwise occurred. This is a problem which has been studied by the Maricopa County Flood Control District, and which has apparently been ignored totally in the preparation of the Draft Environmental Impact Statement. Clearly, the removal of some phreatophytes from the river by the elimination of some effluent, or by the channelization of effluent, would greatly reduce flood hazards, as well as the resulting economic burden placed upon Federal, State and local gorvernments to provide flood relief, particularly in the Holly Acres area.

(HE-152) 5

David E. Creighton, Jr., P.E.
P. O. Box 1548
Phoenix, Arizona 85001

REGIONAL HEARING CLERK
JAN 1 · 1979

January 15, 1979

Maricopa Association of Governments
Water Quality Management Program
111 South Third Avenue, Room 300
Phoenix, Arizona 85003

and

Environmental Protection Agency
Region IX, Hearing Office
215 Fremont Street
San Francisco, California 94105

Gentlemen:

The review of the undated, unnumbered Draft EIS for the MAG 208 Urban Quality Management Plan has prompted extensive comments.

Notice of availability of this DES appeared in the Federal Register for December 4, 1978 to start the 45-day review process which will close nominally on January 19, 1979.

As with any controversial topic, the attempt to prepare a comprehensive environmental statement embracing land use planning control through air and water quality regulations and Federal funding for studies and construction requires an encyclopedic and coordinated information process.

This DES is a start in the process which places emphasis on the wastewater element. The extent of the effort documents and displays a valiant effort to re-invent the wheel by personnel inadequately familiar with the region which they are attempting to address and describe.

My more detailed written comments will be submitted for inclusion in the record and to partially assist in revising efforts to produce an adequate Final EIS.

Sincerely,

David E. Creighton, Jr.

COMMENT DOCUMENT O

(HE-152) 11

David E. Creighton, Jr., P.E.
P. O. Box 1548
Phoenix, Arizona 85001

January 19, 1979

Maricopa Association of Governments
Water Quality Management Program
111 South Third Avenue, Room 300
Phoenix, Arizona 85003

and

Environmental Protection Agency
Region IX, Hearing Office
215 Fremont Street
San Francisco, California 94105

Gentlemen:

These are my additional comments referred to in my short January 15, 1979 comments on the MAG 208 Point Source Phoenix Metro Alternatives. Please provide me with a copy of any supplements to the Draft EIS which may be prepared and the Final Environmental Statement.

1 1. Page 1-12, Lines 1-7. Two copies of the background and referenced material with one copy in the Los Angeles, California USCE office and one copy at the MAG Phoenix office which are not available over weekends and during non-office hours hardly comports with CEQ's "No material may be incorporated by reference unless it is reasonably available for inspection by potentially interested persons within the time allowed for comment". A public or University Library which has extended open hours would be a reasonable and adequate reference location to comply with the "reasonably available" guidance.

2 2. Page 2-32, Lines 9-12. The effectiveness and the role of the Arizona Groundwater Code in proscribing the development of new agricultural development on non-Indian reservation lands appears misunderstood or forgotten by the writers due to the complexity of the subject attempted. The Indian lands have no such restriction on new agricultural development.

3 3. Figure 2-1. Are there no WWTP facilities for Fountain Hills (organized sanitary district), Rio Verde, or Carefree areas?

4 4. Page 2-33. Equity Distribution of Benefits and Costs - - and subsequent non-treatment of program capital and annual costs leaves a gaping void in the total socioeconomic presentation. The omission of measurement data on the economic efficiency of a major public works program funded to large extent by Federal funds leaves an environmental statement as inadequate and deficient as omission or other salient environmental components. The impacts of a public works capital improvement program costing about $200,000,000 with annual O&M costs and their impact upon local government entities, the taxpayers and utility system users through rates and fees cannot be divorced from the socioeconomic environment.

5 5. Figure 3-1. "Morman" is a common misspelling for Mormon Flat.

6. Page 3-6, Lines 18-19. An inverted emphasis is used. The soils are such that most, except for very rocky and sandy soils, are suitable and highly productive for cropland if an adequate water supply for irrigation is available. An agency familiar with irrigated agriculture in arid lands would be a good reference instead of USCE.

COMMENT DOCUMENT O

6 7. Figure 3-3. An additional area of fissuring crossing the south study area boundary east of Chandler Heights should be noted on platted subdivision lands.

7 8. Figure 3-4. The "Airline Dist" Canal shown is a part of the Roosevelt Irrigation District groundwater collection system, not a separate unconnected canal. The RID CC-2 collecting canal system east of the Agua Fria and New Rivers should be added. With the excavation, concrete, and right-of-way fencing in place for the Granite Reef Aqueduct of the Central Arizona Project in most of the Phoenix area, "proposed" does not appear appropriate in the legend. Cave Creek Dam or New Cave Creek Dam should be identified. The five recreation lakes artificially maintained on dry desert plains by pumped groundwater do not appear appropriate to be identified as perennial water bodies.

8 9. Page 3-10, Line 10. Add Scottsdale to the list of cities supplied M&I water by SRP.

9 Line 22. Revise the "25%" figure for the final report and associate it with a time frame.

10 10. Pages 3-10 thru 14, and Figure 3-5. The section on flooding requires updating in the Final Statement to reflect the flooding from flows in 1966, 1968, 1973, as well as the December 1978, January 1979, and possibly later spring 1979 floods, with added reference to the Cave Creek and Agua Fria River flooding and damage. The December 1978 flooding also covered portions of the Gila River Indian Reservation (hazard areas not shown on Fig. 3-5). A tabulation of the flooding events between 1965 and present would present a more comprehensible picture of the situation being touted for groundwater recharge.

11 11. Page 3-15, Line 1. The use of "emergency" to embrace standard operations for years when the snow-melt runoff (1941) exceeds storage capacity is a misleading impression put forth by newcomers not versed in arid land hydrology.

12 12. Page 3-19, Lines 21-23. An updated status of the agreement reached will be expected in the final statement.

13 13. Page 3-20, Lines 5-6. If fish and wildlife enhancement is being effected, the fish and wildlife agencies should be contributing funds or cost allocation benefits to the project under stated Equity principle (pp 2-33-34). The principles of public works cost allocations and requirements to conform to the Fish and Wildlife Coordination Act and the Federal Water Project Recreation Act should be as applicable to EPA grant and assistance programs as to other public works programs.

14 14. Page 3-27, Lines 9-22. With the extensive 12 year research activities of USDA Water Conservation Laboratory, it appears that the emphasis of this paragraph is on the wrong foot, BWQC and USGS are the "However" agencies, not USDA. A higher degree of intellectual integrity and candor is suggested.

15 15. Page 3-30, Line 9. The use of "reclamation" for the subjugation of desert lands to irrigation appears misleading.

COMMENT DOCUMENT O

16 16. Pages 3-30-31. Gila Decree. This should be reexamined to state that the 50,546 acres of San Carlos Indian Irrigation Project lands on the Gila River Indian Reservation are in addition to the acreage in the Gila Crossing District which are also recognized in the Decree (Globe Equity No. 59) and which are also within the 208 Project Study Area. The San Carlos Indian Irrigation Project nominally provides water for a decreed acreage of 102,090 acres. The decreed acreage does not mean that all has been developed for irrigation.

17 17. Figure 3-6, Legend. The third depth symbol must be "over 200 feet" — 200 feet implies a depth not greater than as used which is grossly incorrect.

18 18. Page 3-33, Lines 9-11. Sentence as written is misleading or inaccurate depending upon whether use of water from the reservoirs is understood as in lieu of groundwater, or how the surface water is retained in the groundwater basins. Clarify.

Lines 15-16. The use of "West Basin" and "East Basin" on Figure 3-6 would assist understanding.

19 19. Page 3-56, Lines 14-22. The riparian vegetation, altitude characterization, and general description is misleading for the study area as defined and as shown on Figure 3-12. The omission of the marshy habitat areas which developed following the availability of wastewater and hydraulic control structures is completely ignored but is a serious and controversial issue to organizations such as the Audubon Society.

Lines 23-24, and Figure 3-12. With the implication that the Phoenix
20 metropolitan area and the interior portion of the Salt River Project areas of urban and croplands are either saltbush, or creosote-bursage is extremely misleading. As habitat descriptors, the urban and cropland use is an accurate biotic descriptor for present conditions. The cropland delineation on the Gila River I.R. needs to be revised. The University of Arizona Cropland Atlas would be a reasonably accurate source from which to revise the major errors of Figure 3-12. A qualification that prior to about 1868 it is believed to have been as shown would be some improvement, but would not improve professional credibility.

21 20. Page 3-58, Line 19. The overly simplified description and interpretation is typical of that expected from a humid area origin casual observer-interpreter as shown by the "While animals ...." introduction. This is another indication of the analysis and planning by immigrant persons not familiar with the territory and orienting their planning efforts and goals to force a conformity of arid lands to humid area backgrounds, training and experience, and an unwillingness to learn and understand their new area. The classification of riparian habitats in Arizona is complex, difficult and confusing when a single generality is applied to cover from desert wash riparian through streamside to marsh. No clarification has been provided in this document.

Lines 20-26. Greattailed Grackle and Starling populations should be associated with the cropland also.

22 21. Page 3-63, Lines 23-25. An off reservation Indian clustering would probably be discernible between the Phoenix Indian School-Indian Hospital and the downtown area in addition to the dispersed element.

COMMENT DOCUMENT O

23 22. Page 3-65, Line 11. Standard Federal Regions for Arizona are predominantly located in San Francisco, California. A lax semantic use of "regional" should be clarified for the Federal agencies.

24 23. Figure 3-15 shows only 6 general aviation airports in addition to the mentioned SkyHarbor, not the seven as stated (page 3-75, line 20).

25 24. Page 3-77, Line 14. Scottsdale should be added to the list.

26 25. Table 3-20. Footnote "d" should be supplemented to apply to Scottsdale also.

27 26. Page 3-79, Lines 10-13. Lands without surface water rights receiving irrigation water from SRP is questioned.
Lines 18-23. The pumping of about 150,000 AF/yr. by RID from within the SRP appears more significant than a non-productive contract for the 23rd Avenue WWTP effluent.

28 27. Page 3-80, Lines 9-11. It appears that the hydro-fossil fuel mix for the SRP system is not properly or correctly understood and presented. For an SRP system load of about 1732 MW in 1976, the SRP system of conventional and pumped-storage hydro was approximately 242 MW. The remainder was supplied from owned fossil fuel, and purchased fossil fuel generation, and purchased Federal Colorado River hydro generation.

29 28. Page 3-122, Lines 12-18. The projected decline in water demand is discussed and presented in a manner indicating that irrigated agriculture will decline not from urban encroachment, usurpation and possible condemnation but through obsolescence of need for agriculture and in derogation for the need and national goals to maintain the continued production of prime agricultural lands.

30 29. Page 3-125, Lines 8-14. The elimination of groundwater overdraft on the basis of the discussion presented and compared with the studies for the Arizona Groundwater Study Commission does not appear realistic.

31 30. Page 4-9, Line 21. The inadequacy of the riparian discussion on pages 3-56, 52, 59, and Figure 3-12 is further confused by the indicated weighting factor of "Riparian woodland".

32 31. Pages 4-10, 12, and Figure 4-2. With the furor raised by archeological protagonists to public works programs, especially the Papago Freeway, the indicated moderate sensitivity for the Moreland Corridor area and the undoubtedly overstated gross area of the Salt River and Fort McDowell Indian Reservations and the upstream segments of the 5 mile wide and archeologically unsurveyed to comparable intensity areas discloses the apparent biases developed and espoused by program opponents. Also compare Figures 4-2 and 4-3 for logic reasonableness and lack of comment on the cultural resource potential.

33 32. Pages 4-16,17, Lines 20-26. The mislabelled saltbush, and creosote-bursage biotic communities on Figure 3-12 for cropland and urban (commercial-residential) has a carryover in the analysis here and the confusing insertion of increases in cropland habitat for an area stated to decline by 236,800 acres (without condition) or 185,400 acres (with conditions) (page 3-104).

COMMENT DOCUMENT O

34 33. Page 4-23, Option 2, and Figure 4-3, indicates a lack of adequate coordination in locating the overland flowsite over the top of the CAP Granite Reef Aqueduct alinement segment in Sections 4,5,and 6 on the approximate 1500 foot contour. The omission of the Bureau of Reclamation from Section 6.2.1 (page 6-7) and the active information process could have eliminated many inadequacies in the report.

35 34. Page 4-28, Line 8. Figure 4-1 did not surface for review even after much searching. Possibly a collating error.
36 Lines 12-16. Wetland creation would be a benefit, not the opportunity which could be chimerical to fulfillment and biological effectiveness.

37 35. Page 4-30, Line 18. Section 9.33 apparently is an inadvertant reference error.

38 36. Page 4-32, Lines 2-5. The developed and active agricultural lands directly adjacent to subdivisions in Scottsdale are irrigated from SRP transported water. A confusion of the Pima Road area south of the Arizona Canal and McCormick Ranch is possible.

39 37. Page 4-46, Line 8. "southwest" was probably meant rather than "southeast".

40 38. Page 4-107, Alternative 3 & 4. Northeast Plant - Option 2 location is in conflict with the CAP Granite Reef Aqueduct, Reach 12.

41 39. Page 4-120, Lines 13-14. The wetland marsh habitat of pages 4-92 Biological Resources has become woodland riparian habitat. There is a difference. This confusion of "riparian" habitat should be straightened out especially in the minds of all environmental statement writers and editors.

42 40. Pages 4-132-137. The extensive discussion on a very minor 2,100 to 5,500 acres of irrigated agriculture which could be supported by treated effluent gives a misleading impression conserning the preservation of irrigated agriculture when the significant preservation step would be in the form of agricultural zoning protection and the guided dispersal of population to the non-arable rock mountain masses and the desert peripheral band. For overall importance, the portion appears to be a shallow and diversionary puffery.

43 41. Pages 4-155 - 160, Tables 4-6 to 4-9, 4-18 to 21. Agricultural land is not per se wetlands in meaning or biological productivity particularly with the crops indicated. Wetlands should not be used meaninglessly as a buzzword but should describe a biologically active habitat area to be occupied effectively by aquatic oriented plants and wildlife. In such a use the potential water consumption would reduce the agricultural or industrial water reuse potential of the effluent.

COMMENT DOCUMENT O

44 42. Pages 4-166 and 4-177. At this location and several others throughout the report the heavy and coercive hand of threatened special interest litigation to negate and abort conclusions arrived at on the basis of public service and civil works design, economics, and environmental factors makes a mockery of the public participation and local planning guidance and control of public programs. With a very sizable capacity of the ANPP shheduled and planned for Southern California demands, the intrusion of California environmental, water, and power supply problems should not be allowed to govern actions for the benefit of Salt River Valley residents. An alternative water supply for ANPP for the California allocated power production should be transferred from California to central Arizona through the Granite Reef Aqueduct by transfer of an adequate quantity of Colorado River water. A precedent on Colorado River water use transfer was established by agreements for the SunDesert Plant at Blythe. With this principle established, the remaining negotiable factor of which side of the Colorado River the location of the use will be is not insurmountable.

45 43. Page 4-167, Table 4-22. Earlier portions of the report indicate that Roosevelt Irrigation District should be shown instead of RWCD.

46 44. Page 4-180, Line 10. Add a "4)" to identify the ANPP consortium.

Sincerely,

David E. Creighton, Jr.

COMMENT DOCUMENT O

ORME LEWIS, JR.
CAMEL SQUARE
4350 EAST CAMELBACK ROAD
PHOENIX, ARIZONA 85018
602/959-3949

December 21, 1978

Mr. Mark Frank
Maricopa County Association of Governments
111 South Third Avenue
Phoenix, AZ 85003

Dear Mr FranK:

1 Reference section "2-6" of the MAG DEA on Point Source Metro Phoenix Altertives I suggest that the paragraph cosnidering "residual wastes" needs claraflcation.

May I suggest that futher discussion with the approrpriate offcials of the 23rd and 91st Avenue Sewage Treatmenet Plants is called for due to the apparant error with respect to the dewatering process. It is our expereince that the bulk of the material is in fact dewatered below 25%. Sludge does accordingly meet the terms of the "contract" and is being presently being disposed of through the contract which in part permits the stockpiling of the dried sludge on City of Phoenix property. From our perspective this method of disposal should continue to be a viable altetive for both parties.

We hope that this clarification is helpful in revising the draft EIS.

Sincerely,

COMMENT DOCUMENT P

Maricopa Association of Governments
Water Quality Management Program
111 South Third Avenue, Room 300
Phoenix, Arizona 85003

AND

U.S. Environmental Protection Agency
Region IX, Hearing Office
215 Fremont Street
San Francisco, CA 94105

RE: Draft Environmental Assessment/Environmental Impact Statement and Draft MAG 208 Water Quality Management Plan

Dear Hearing Officer:

As a planner who has been involved in the MAG 208 planning effort, I feel that the program has produced a workable plan for an area that is growing with unparalleled speed. Given the mushrooming population, a five year scope of construction based upon a twenty year plan is quite feasible and implementable.

The final plan is perhaps not the best, nor is it the worst that could have been formulated, given our human condition of achievement is spite of ourselves. There are elements that perhaps could have, and should have been brought forth within the planning effort. Certain elements encompassing effluent nutrient quality and agricultural reuse, the salt content in cooling water for the Palo Verde Nuclear Generating Station, the possible loss of a riparian habitat downstream of the 91st Avenue Wastewater Treatment Plant, the Central Arizona Project and domestic water degradation, and flood control are key issues that must be addressed in any continuing process. Many months ago, when I was active in the Program, I attempted to bring these issues out to the public, as I felt I had to. As one of my superiors had put it, my job was to be that of "devil's advocate". However, I'm pleased that these issues have finally been brought forth.

1 There is one issue which has not come out, but which was brought up numerous times at staff level some time back. This issue, which the MAG 208 Plan has largely ignored is that portion of the wastewater treatment process that has energy production potential. I refer to the biogas which is currently being flared off at the conventional wastewater treatment plants. Presently, the 91st Avenue wastewater treatment plant flares between 500,000 and 900,000 cubic feet of this biogas per day, which has a methane rating of 60 to 75 per cent. This is a resource which should be part of any overall wastewater plan.

Another aspect of integrating energy production into continuing 208 planning, involves the study of an advanced treatment technology which is particularly suited to the MAG region based on climatic factors. This technology utilizes Vascular Aquatic Plants as a biological wastewater treatment process, and in turn, provides a source material for large scale biogas production. The idea of producing usable heat energy from plant matter has grown in importance in recent years as the search for renewable energy resources has intensified. Bioconversion of plant material into energy is a solar energy application utilizing natural photosynthesis to convert solar radiation into a usable form. Dr. Carl Hodges and his associates at the Environmental Research Laboratory, University of Arizona, has done extensive research in recent years on bioconversion of plant material. What is a relatively new concept is that of growing a plant for both its wastewater treatment qualities and its energy potential.

COMMENT DOCUMENT Q

In 1975, the National Aeronautics and Space Administration at their National Space Technology Laboratories in Bay St. Louis, Mississippi under the guidance of Dr. B.C. Woverton began investigating the application of vascular aquatic plants for recycling wastes and providing energy in extended manned space missions. They found that the water hyacinth (Eichhornia crassipes) is extremely effective when used as a natural biological filtration system, absorbing and metabolizing heavy metals, phenols, nitrates, phosphates, and radioactive substances. In tests at their facilities, they found that this advanced, inovative technology can meet the Environmental Protection Agency's stringent 1985 water quality goal of zero discharge of pollutants into receiving waters, at a fraction of the cost of more conventional wastewater treatment technologies, or even the non-conventional land treatment methods.

The water hyacinth is believed to be the most prolific plant on earth, producing up to 800 pounds dry weight of plant matter per acre per day. For more than 75 years this plant has been considered a pest, growing in unrestricted abundance in the southern part of the United States, clogging waterways and lakes. However, this plant is well-suited for the production of biogas through anaerobic decomposition, producing up to 4800 cubic feet of biogas per day on one acre of wastewater effluent. The resulting biogas contains up to 95% methane, with little of the hydrogen sulfide that is present in the biogas produced in the sludge digestion process.

In the MAG region, this type of biological treatment should be considered in a continuing 208 process. Although the Federal guidelines from the EPA do not stipulate that energy potential is a desireable benefit, there are precidents toward this stipulation. Those guidelines do stipulate and encourage other benefits to be included in wastewater management such as the reuse of effluent and certain recreational benefits. In addition, if an inovative or non-conventional technique is used in wastewater treatment, local governments can be funded up to 85% of the cost by the Federal government, instead of just 75%, as will be funded in the MAG 208 plan. Unless bioconversion is advocated and given incentives by the EPA, the wastewater planners and engineers may be locked out of exploring this possibility.

In order to achieve implementation, the policy must be consistant and comprehensive at the federal level. It is understandable that EPA hasn't mandated guidelines for bioconversion, because they are not in the energy business (yet conventional sewage treatment plants burn off many thousands of cubic feet of biogas from digested sewage sludge daily). The Department of Energy is supporting the search for renewable energy, yet it appears they have not correlated their activities with the waste water treatment process as a source for experimenting with bioconversion. It seems that DOE and EPA should get together and discuss a program of mutual interest. EPA already has an implementation network built up through the various Councils of Government throughout the U.S. (Arizona has five COGs).

Perhaps in the final analysis, public awareness and official implementation policy will catch up to technological advances as the information and communication revolution spreads. By utilizing a more comprehensive approach in solving the problems associated with wastewater treatment, the treated effluent can be of a quality that will meet State and Federal water quality standards, with a useful by-product produced to help satisfy our Nation's clean energy needs.

Respectfully,

Thomas S. Rothweiler

Thomas S. Rothweiler
409 W. Pebble Beach Drive
Tempe, Arizona 85282

COMMENT DOCUMENT Q

PUBLIC HEARING BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION IX, IN THE MATTER OF DRAFT ENVIRONMENTAL IMPACT STATEMENT AND ASSESSMENT ON THE POINT SOURCE METRO PHOENIX ALTERNATIVES FOR THE MARICOPA ASSOCIATION OF GOVERNMENTS WATER QUALITY MANAGEMENT PLAN, JANUARY 15, 1979

SPEAKER: ADRON W. REICHERT

I'm Adron Reichert speaking for the Holly Acres Flood Control Association.

There has been confusion about our location so I'll try once more. We are representing that area from Ninety-first Avenue west to Bullard Avenue along the Salt and Gila Rivers. Or, much better described by our passing friends as "those damned fools who live in the flood plain at the confluence of the Salt, Gila and Agua Fria Rivers."

Just to set the record straight, from people who have lived in this flood plain, to their knowledge, lands that were flooded in March and December of 1978 were never flooded in the fifty-seven years since 1921.

Also, stories related to them, it was in the 1890s that our area was flooded along with much of Phoenix.

In 1941 when the flood waters at the Central Avenue bridge raised to the bridge rail heights, our area was not flooded but much of Phoenix was. I didn't see it, but as I remember, the rotunda of the Arizona State Capitol had a water depth of about three feet. Lands and homes along the Twenty-third, Nineteenth and Seventeenth Avenues in Phoenix were flooded.

I don't remember the human pride referring to the residents and farmers who lived in those areas as "those damned fools that live in the flood plain," or "Who was that fool who built the State Capitol in a recognized flood plain."

But if it will help to pinpoint our location, yes, we are those fools. Fools enough to think that our pleading to the MAG 208 Regional Council would be considered. That the effluent discharge by the Ninety-first Avenue sewage treatment plant to the Salt River would be removed as soon as possible. The massive -- thus controlling the massive artificial vegetative growth that pushed the water out of the river channels into our homes and onto our lands twice in one year.

And it has a pretty possibility of happening again this year.

Fools enough to believe that the game and the wild-lifers would realize our sincere plea that we wanted to work with them, that some of the growth would be removed to provide smooth water passage and yet enough room for the birds and wildlife.

Fools enough to believe that City and County officials would hear our pleas.

Number one, that the dry river beds are not the location for sanitary landfills so that paper and plastic, trash, leaves, limbs, stumps and garbage that the flood waters would bring that catch in the vegetative growth along with sand and silt building islands and forcing water flows out of established channels.

Not to build elevated roadways with culverts to carry sewage effluent during peak loads, thus creating ponding and establish even additional growth in the stream bed.

Not to stockpile. Plea number two. Not to stockpile large amounts of sand and gravel in the stream bed to be used for road construction and road maintenance.

Fools enough to believe that the laws and regulations developed by our government agencies will be regulated.

Example. Paragraph 311 and Paragraph 10-2 of the 1975 Flood Plane Regulations for the unincorporated areas in Maricopa County of the State of Arizona.

First, Paragraph 311. And I'm quoting. "The definition of obstruction. Any dam, wall, warf, embankment, levy, dike, pile, abutment, protection, evacuation channels, rectification, bridge, conduit, culvert, building, wire, fence, rock, gravel, refuse, fill, structure, vegetation, and other material in, along, across or projecting into any channel, water course, lake or regulatory flood hazard area which may impede, retard, or change the direction of the flow of the water, either in itself or by catching or collecting debris

carried by such water or that's placed where the flow of the water may carry the same downstream to damage of life and property." Unquote.

And Paragraph 10-2, I quote again, "It is unlawful for any person, firm or corporation to divert, retard or obstruct the flow of waters in any water course whenever it creates a hazard to life or property without first securing written authorization required by this regulation, Section 45-2345 of the Arizona Revised Statutes. Any person, firm or corporation violating the above provisions shall be guilty of a misdeamor and upon conviction thereof shall be punishable as described by law." Unquote.

We were fools enough to believe the human conscience process rather than the legal process of the courts.

1 As this meeting being the last public meeting of this phase of the MAG 208 Program, our association committee requests that a spokesman of the regional council meet with our committee and explain why the Ninety-first Avenue effluent cannot be programmed to be removed from the stream bed and why it has been seemingly a sacred cow.

You may point out to us that the MAG 208 Program is a water quality management plan and not a flood control plan. Please believe us. Management or the lack of management of the effluent of the Ninety-first Avenue sewage treatment plant is our flood problem. No fooling.

PUBLIC HEARING BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION IX, IN THE MATTER OF DRAFT ENVIRONMENTAL IMPACT STATEMENT AND ASSESSMENT ON THE POINT SOURCE METRO PHOENIX ALTERNATIVES FOR THE MARICOPA ASSOCIATION OF GOVERNMENTS WATER QUALITY MANAGEMENT PLAN, JANUARY 15, 1979

SPEAKER: GILBERT T. VENABLE

MR. VENABLE: My name is Gilbert Venable. I'm an attorney and I'm speaking on behalf of the Citizens Concerned About The Project ~~in~~ and the Maricopa Audubon Society.

First I would like to commend the report on giving some attention to ways for reuse, for irrigating agriculture. And we commend those portions of it.

1 But overall, the plan seems to be designed on the premise that its major function is to provide food and water to the Palo Verde Nuclear Power Plant. We find ourselves almost in unison with comments from Russell Hulse of Arizona Public Service on the point that that much water is not needed for the first three units and alternatives which we feel are important to be considered for the overall economic and social welfare of the Valley have been eliminated due to the overridance by such a large source of water at the new treatment plant.

2 We point particularly to the elimination of two of the alternatives which should have been given serious consideration and should have had careful consideration given to the social and economic impact which we feel just as APS did have not been given adequate study and report.

COMMENT DOCUMENT S

One of these is the Forty-eighth Avenue -- Forty-eighth Street plant, rather, which could supply water for the Rio Salado Project. And the impact of that on our entire urban form, I think, are of tremendous consequence and really need to be evaluated economically.

The other elimination which we are quite concerned about is the One Hundred Fifteenth Avenue plant and Agua Fria River area plants with regard to the ultimate depletion in groundwater in the area of Deer Farms which is drawing in high salt pollution from other areas.

And we feel that if water -- if wastewater would be made available in that area for agricultural reuse, it would tend to stop the flow of these high salt waters into that area and to decrease the problem of groundwater depletion and groundwater pollution which is occurring in that area.

The other two comments which I would like to make are that while the plan addresses what might be considered a traditional point of view on wastewater treatments, it has not looked at the relationship between wastewater treatment and the wastewater planning
3 and flood control planning alternatives on the Salt, Verde, Gila and Agua Fria Rivers.

Just to take one very obvious example, when those rivers flood, they tend to flood out some of the existing plant salts and causes some damage.

COMMENT DOCUMENT S

There also are a variety of other water problems, say nothing of economic problems associated with that flooding. And we think this should be given much more thorough study.

4 Similarly, the report does not deal adequately with the impact on water quality which -- and on wastewater alternatives which will accompany the delivery of Central Arizona Project water to the Valley if the Project gets completed.

CAP water is high in sulfates and high in TDS, total dissolved solids. And this water, if it is delivered, may be suitable for certain uses but not for other uses.

For example, it would not be a very desirable source of water for domestic water supply.

And we feel that not enough attention has been given to what quality water is used for what purpose.

For example, if the Palo Verde Nuclear Power Plant is to be built, it may well be able to utilize groundwater which is presently in the vicinity of the plant rather than utilizing the wastewater effluent from the City of Phoenix which is high in nutrients and seems to be ideally suited for agricultural irrigation.

So those are several areas which we feel have not been adequately studied, and we'd second the remarks of APS that more thorough attention be given to the economic and social impact and that real cost figures should be put on the elimination of some of the alternatives which have been eliminated seemingly without any analysis.

COMMENT DOCUMENT S

5.3 RESPONSES TO COMMENTS

5.3.1 RESPONSE TO THE ADVISORY COUNCIL ON HISTORIC PRESERVATION (COMMENT DOCUMENT A)

Comment	Response
1	Historic resources in the metro Phoenix area were inventoried in a report prepared for the U.S. Army Corps of Engineers by the State Historic Preservation Officer (Hall, 1977). Proposed projects in the wastewater management plan were reviewed by the Acting State Historic Preservation Office in 1979, and no historic resources on the State inventory or on the National Register of Historic Places were identified as being affected by the plan. See FEIS pp. 3-16 - 3-17, 4-47.

5.3.2 RESPONSE TO THE FEDERAL ENERGY REGULATORY COMMISSION (COMMENT DOCUMENT B)

Comment	Response
1	The correct name of the agency has been used in the listing on p. v of the FEIS.

5.3.3 RESPONSES TO THE U.S. DEPARTMENT OF THE INTERIOR, OFFICE OF THE SECRETARY (COMMENT DOCUMENT D)

Comment	Response
1	Assessment of impacts without Central Arizona Project water is beyond the scope of this EIS, although EPA believes such an analysis would be very worthwhile.
2	See discussion on pp. 4-16 - 4-25 of the FEIS. Riparian communities in the Gila River do not depend entirely on effluent from wastewater treatment plants as a source of water and are less likely to be affected by decreased flows of effluent than is the stretch of the Salt River from 91st Avenue to 115th Avenue. The probable loss of some riparian habitat in this stretch of the Salt River would be offset by the creation of wetlands due to effluent reuse systems under the selected plan. As noted in this comment, careful design and management of these created wetlands are required to establish useful habitat.
3	See pp. 3-11 and pp. 4-17 - 4-18 of the FEIS.

5.3.4 RESPONSES TO THE U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE (COMMENT DOCUMENT E)

Comment	Response
1	A cost summary of the proposed plan is provided on pp. 2-32 - 2-38 of the FEIS. Detailed cost data appear in the Point Source Final Plan (MAG 208 Program, 1979b) and in the Conventional Treatment Design and Cost Appendix (Morris, Clester, Abegglen and Associates, and STRAAM Engineering, 1979).
2	While it is correct that irrigated agricultural land declines under all the project alternatives assessed in the DEIS, these alternatives support growth patterns that reduce the conversion of agricultural lands, compared to the conversions that would result without the project. This comparison is made on pp. 4-56 - 4-60 of the FEIS. The development of alternative land use plans to minimize the conversion of agricultural land is beyond the scope of this EIS.
3	The higher level of effluent quality for the Northeast facility (Alternatives 3 and 4) was a requirement for locating the facility on Salt River Indian Community lands.
4	Baseline information on soils in the study area was presented concisely in the DEIS. Few impacts to soils were identified in the environmental assessment. Soils are also discussed very briefly in the FEIS, and proper reference to the U.S. Department of Agriculture, Soil Conservation Service, is provided (p. 3-2).
5	The overland flow site for the Northeast facility was part of the land application treatment method, rather than a reuse for effluent. Land application permits recovery of the treated effluent, which may then be used for irrigation or other purposes.
6	Figure 4-5 of the DEIS was incorrect. Effluent from the Northeast facility would have been of sufficient quality for unrestricted agricultural use.

RESPONSES TO COMMENT DOCUMENT E, CONT.

7 The statement on export of salts referred to the Salt River Valley as a whole. This is an incidental side effect of the export of effluent from the Valley for use at the Palo Verde Nuclear Generating Station (see FEIS, p. 4-12). The statement concerning decreased salinity of ground water in the Buckeye Irrigation District (DEIS, p. 4-70) was derived from the ground water quality study by Kenneth D. Schmidt (1978) for the U.S. Army Corps of Engineers. Schmidt concludes that decreasing salinity in the Buckeye Irrigation District is a result of the use of wastewater effluent for irrigation. Effluent is of relatively less salinity than is ground water in the District.

5.3.5 RESPONSES TO THE ARIZONA DEPARTMENT OF TRANSPORTATION (COMMENT DOCUMENT G)

Comment	Response
1	Impacts of growth on transportation are presented in Section 4.3.6 (pp. 4-60, 4-66) of the FEIS.
2	Air quality impacts of the selected plan are presented in Section 4.2.2 (pp. 4-12 - 4-15) of the FEIS. Air quality in the Phoenix area in the future is described in Section 4.3.9 (pp. 4-69 - 4-71). No significant impacts to air quality are attributable directly to the 208 plan. Both the air quality Nonattainment Area Plan for the Phoenix area and the MAG 208 Plan are based on population projections and land use patterns established in the MAG <u>Guide for Regional Development, Transportation, and Housing</u> (1978). The 208 plan does not support any significant changes in growth in the metro area, and the plan is fully compatible with the Nonattainment Area Plan. Methods and models for estimating changes in air quality appear in the Technical Appendix to the Nonattainment Area Plan (Arizona Department of Health Services, 1978a).
3	Assessment of impacts to cultural resources was as detailed as possible for the planning level of the EIS. The potential for impacts to archaeological resources is expressed in the FEIS as the number of miles of interceptor lines that will cross archaeological sensitivity zones identified in a report by the Office of Cultural Resource Management, Department of Anthropology, Arizona State University (Burton, 1977). The EIS does not claim archaeological clearance for the individual facilities

RESPONSES TO COMMENT DOCUMENT G, CONT.

3 cont. (see DEIS, p. 4-12; FEIS, p. 4-45). Each facility will be required to complete a detailed archaeological reconnaissance to qualify for funds under Section 201 of the Clean Water Act. No historic sites have been identified in the areas of interceptor or facility construction or expansion (see Response 1, Comment Document A).

4 The sentence quoted in this comment is from the methodology section of the DEIS (Section 4.1). Impacts of the alternatives on population, land use, water quality, and ten other environmental categories were assessed in the DEIS by facility in Section 4.2 and by alternative in Section 4.3.

5.3.6 RESPONSE TO THE ARIZONA GAME AND FISH DEPARTMENT, PLANNING AND EVALUATION BRANCH (COMMENT DOCUMENT H)

Comment	Response
1	Impacts of reduced flows in the Salt River are discussed on pp. 4-19 - 4-25 of the FEIS. Under all water diversion projections, the allocation of 7,300 acre-feet of treated effluent to the Game and Fish Department for support of the wildlife management area at 115th Avenue is assumed to be a first commitment of the cities. EPA will certainly support protection of riparian habitat in its actions. (See Appendix C of the FEIS.)

5.3.7 RESPONSES TO THE ARIZONA STATE LAND DEPARTMENT (COMMENT DOCUMENT I)

Comment	Response
1	Painted Rock Lake is approximately 70 miles in a straight line from the 91st Avenue treatment plant but approximately 100 miles "as the river flows."
2-5	These portions of the DEIS have been condensed or eliminated. See Section 3.1 of the FEIS (pp. 3-3 - 3-17).

5.3.8 RESPONSES TO THE ARIZONA WATER COMMISSION (COMMENT DOCUMENT J)

Comment	Response
1	Current and Expected Water Supplies and Demands and Groundwater Conditions (Arizona Water Commission, 1978) has been used in the FEIS. See pp. 3-2 - 3-8, 3-18 - 3-29.
2	See pp. 4-72 - 4-73 for a comparison of water resources under with-project and without-project conditions. The without-project conditions are condensed from the DEIS and indicate that ground water overdraft would be reduced.
3	See p. 2-10 of the FEIS for provisions of the Consent Decree between the City of Phoenix and the U.S. Environmental Protection Agency.
4	This change has been incorporated into Table 3-1, pp. 3-21 - 3-22 of the FEIS.
5	A statement to this effect may be found on p. 3-20, l. 17-20, of the DEIS. See also p. 3-20 of the FEIS.
6	The difference between the area of the Salt River Valley and the study area is noted on p. 3-2 and 3-26 of the FEIS.
7	Figure 3-6 has not been reprinted in the FEIS.
8,9	In keeping with these comments, the discussion of trends in salinity and nitrate in the FEIS (pp. 3-27 - 3-29) does not attribute changes in concentrations to single causes.
10	The passage in question has not been reprinted in the FEIS. The error in the DEIS concerning ownership of ground water is acknowledged.
11	The passage in question has been revised for the FEIS; see p. 3-26.
12	The passage in question has been revised for the FEIS; see p. 3-14.
13	The estimated municipal and industrial water withdrawal of 340 gpcd in 1975 is given on p. 3-18 of the FEIS.

Comment	Response
14	Arizona Water Commission projections of Salt-Verde flows are provided on pp. 4-71 - 4-72 of the FEIS.
15	Revised estimates of ground water quality under without-project conditions are presented on p. 4-73 of the FEIS.
16	The passages in question were not reprinted in the FEIS. The errors cited are acknowledged.
17	Both the DEIS and FEIS state that ground water quality problems associated with effluent reuse could occur without proper mitigation. The problems are avoidable and therefore unlikely. Potential impacts of effluent reuse are described to ensure that entities preparing facility plans will be aware of these impacts and take steps to mitigate impacts, including monitoring of ground water quality underlying reuse sites and use of conservative loadings of nitrogen in irrigation waters. See FEIS, pp. 4-8 - 4-11.
18	The assumption in the DEIS passage in question was that the export of effluent to the Palo Verde Nuclear Generating Station would reduce the amount of surface water (i.e., effluent) imported for irrigation in the Buckeye Irrigation District. This impact has not been included in the FEIS, because the full effects of Palo Verde's effluent diversions on the District's effluent use are not known. At a minimum, the District will take 30,000 af/yr of effluent through the ANPP pipeline, but diversions of flows in the river may also continue to occur at the Buckeye Heading, depending upon the availability of flows.
19	The FEIS expands the analysis of impacts associated with the sale and transportation of effluent to the Palo Verde Nuclear Generating Station. See FEIS pp. 4-19 - 4-25, 4-31 - 4-36, and Appendix C.
20	This passage has not been included in the FEIS, and the error cited in the comment is acknowledged.

RESPONSES TO COMMENT DOCUMENT J, CONT.

Comment	Response
21	Information in Appendix C of the FEIS indicates that flows from the 91st Avenue and 23rd Avenue plants may be sufficient to meet the needs of Palo Verde Nuclear Generating Station Units 1 through 4, but appear to be inadequate to meet peak needs of Units 1 through 5. See Appendix C.
22	See pp. 4-31 - 4-36 of the FEIS for a discussion of the effects of use of effluent for energy production and agricultural irrigation.
23	The contract for effluent was negotiated in 1973 by the Arizona Public Service Company/Salt River Project and the Multi-City Partners using population and effluent flow projections considerably higher than those used in the MAG 208 Program. See Appendix C for a discussion of flow availability.

5.3.9 RESPONSE TO ARIZONA DEPARTMENT OF ECONOMIC SECURITY (COMMENT DOCUMENT K1)

Comment	Response
1	Revised population projections by the Department of Economic Security will be used in 208 plan updates.

5.3.10 RESPONSES TO THE GILA RIVER INDIAN COMMUNITY (COMMENT DOCUMENT L)

Comment	Response
1	Impacts of the 91st Avenue treatment plant to the Gila River Indian Community were identified in the DEIS (pp. 4-72 - 4-74) and the FEIS (p. 4-29). The impacts are essentially the same as those listed in this comment. The degree of adversity assigned to the impacts in the EIS is not as great as indicated in the comment because of the regional perspective used in the EIS. Impacts of the 91st Avenue and 23rd Avenue treatment plants will be assessed in greater detail in the facility plans that are being prepared by the City of Phoenix.

RESPONSES TO COMMENT DOCUMENT L, CONTINUED

Comment	Response
2	The recommendations for mitigation supplied in this comment by the Gila River Indian Community have been used by EPA to develop the plans of study for the City of Phoenix's analysis of the 91st Avenue and 23rd Avenue treatment plants. This planning effort, which is now underway, provides an opportunity for the Community and other members of the public to express their opinions on the proposed expansion of the treatment plants. Any comments will have to be addressed during the planning process. EPA encourages full participation in the process.

With regard to specific recommendations, we have the following comments:

(1) EPA is requiring upgrading of the treatment plant and has provided money to assist in improving plant performance.

(2) These impacts are being assessed more fully in the detailed planning being done by the City of Phoenix for the 91st Avenue facility.

(3) The City of Phoenix is required to study and develop measures to minimize any adverse impacts of plant construction or operation.

(4) EPA will not issue any grant funds until environmental impacts in the area of the plant are eliminated or minimized.

(5) Mitigation of adverse impacts must be developed in the facility plan being prepared by the City of Phoenix.

(6) Sludge treatment facilities will not be permitted to be located in the riverbed or where floods might damage them.

(7) This recommendation has been referred to the City of Phoenix for study and appropriate action.

5.3.11 RESPONSES TO ARIZONA PUBLIC SERVICE (COMMENT DOCUMENT M)

Comment	Response
1	The setting of effluent standards and the monitoring of these standards for industries discharging directly to surface waters is the responsibility of the Bureau of Water Quality Control (in the Arizona Department of Health Services) and the Water Quality Control Council. Under the 208 plan, subregional operating groups (SROG's) are to be responsible for the setting and monitoring of discharge standards for industries connected to their wastewater treatment plants. These discharge standards are commonly called pretreatment requirements. Individual SROG's may elect to seek assistance of the Bureau of Water Quality Control in setting and monitoring these requirements.
2	Representatives of Arizona Public Service have served on MAG 208 advisory groups in the past, and a representative has been asked to serve on the 208 Water Quality Policy Advisory Committee, which will assist the Regional Council in water quality planning.
3	The DEIS was prepared according to the Water Resources Council Principles and Standards, National Environmental Policy Act, and Related Policies (33 CFR 290-294, and 393, Federal Register, Vol. 43(135): 30222-30254, July 13, 1978) and Environmental Protection Agency Preparation of Environmental Impact Statements Final Regulations (40 CFR 6, Federal Register, Vol. 40(72): 16814-16827, April 14, 1975). The FEIS was prepared according to Council on Environmental Quality National Environmental Policy Act Implementation of Procedural Provisions; Final Regulations (40 CFR 1500-1508, Federal Register, Vol. 43(230): 55978-56007, November 29, 1978).
	Socioeconomic considerations were included in the DEIS. Important socioeconomic issues were discussed on pp. 2-30 to 2-34 of the DEIS. The existing socioeconomic setting was described on pp. 3-59 to 3-80. Future socioeconomic conditions under the No Action Alternative were described on pp. 3-89 to 3-117. Socioeconomic impacts of the treatment facilities were included in Section 4.2 of the DEIS; socioeconomic impacts of the alternatives were included in Section 4.3. The major part of Chapter 5, Issues to be Resolved, was devoted to socioeconomic

Comment	Response
3 cont.	considerations (pp. 5-5 to 5-13). In the FEIS, socio-economic impacts of the selected plan may be found on pp. 4-25 to 4-45.
	Secondary impacts were assessed in the DEIS, but they were not separated from primary impacts by heading. Most of the impacts described in air quality, land use, population, public facilities and services, and economic activity (see Sections 4.2 and 4.3 of the DEIS) were secondary impacts. Secondary impacts of growth have been treated separately in the FEIS (see Section 4.3 of the FEIS).
	Impacts to industry were carefully considered during the initial phases of the 208 planning process. With the exception of provision of cooling water for the Palo Verde Nuclear Generating Station, no significant impacts to industry were identified. These impacts are discussed on pp. 4-33 to 4-36 of the FEIS.
	A cost/benefit analysis was not included in the EIS because (1) the proposed plan is a generalized program not amenable to cost/benefit analysis, and (2) wastewater treatment facilities are evaluated by EPA on a cost-effectiveness rather than a cost/benefit basis in accordance with regulations. The cost-effectiveness analysis determines the present worth of the resources to be applied to the waste management system. Social, environmental, and other nonmonetary costs are accounted for in the analysis in a descriptive sense. Alternatives having the lowest total resource cost are considered to be the most cost-effective, assuming that minimum treatment levels are met. Costs of the four areawide alternatives are shown on p. 2-77, and costs of the selected plan on pp. 2-32 - 2-38.
4	The EIS is a plan or "program" statement, which provides for more detailed environmental analyses to take place later on in the wastewater planning process, i.e., when detailed facility plans are developed. In general, the detail of an EIS is commensurate with the detail of the action being assessed. This EIS does not have the level of detail of an EIS on a designed facility because 208

Comment	Response
4 cont.	planning does not include design specifications for wastewater treatment facilities proposed under the plan. These specifications will be developed in 201 plans or other detailed local planning. Environmental assessments prepared for facilities will be required to provide analyses of impacts commensurate with the level of detail of the facility plans. This EIS does offer generic assessments of proposed actions for the major facilities (DEIS, Section 4.2; FEIS, Fig. 4-1). These assessments are limited by the preliminary nature of the facility planning but are provided to give direction to the project-specific studies.
5	The environmental report and environmental statement for Units 1, 2, and 3 of the Palo Verde Nuclear Generating Station (U.S. Nuclear Regulatory Commission, 1975) were accessed during the 208 study. Details of pipeline delivery operations did not appear in these reports, and flow projections, flow stagings, and makeup water demands for the station were less current than more recent data available from other sources. For these reasons, the environmental data prepared for the station were not cited in the DEIS, although the documents had been consulted. In the FEIS, the Palo Verde Units 1, 2, and 3 Environmental Statement is cited (see pp. 2-45, 4-23, and Appendix C), as is the Units 4 and 5 Environmental Statement (p. 4-23). In addition, a report by Management Research, Inc. (1978), prepared for Arizona Public Service on economic benefits of reuse of effluent was found to be a valuable resource for the FEIS (see p. 3-37, 4-33.
6	The assumption used in the DEIS was that the full amount of effluent optioned under contract by APS/SRP (140,000 af/yr) would be used. As noted in APS comment 27, the contract with the Cities provides that up to 140,000 af/yr of effluent, if available, will be supplied by the 91st Avenue and 23rd Avenue plants for use as cooling water in the generation of electrical power at any site chosen by the utilities. Thus, the amount of effluent that is to be provided is not necessarily tied to Palo Verde requirements, according to the contract.

Comment	Response
6 cont.	For the FEIS, an effort was made to describe the potential range of effluent consumption under the contract with APS/SRP. This range includes Palo Verde's annual needs and low and high peak monthly requirements, as well as the potential for the ultimate annual demand of 140,000 af/yr. The basic elements of the contract are described on p. 2-45 of the FEIS, and an analysis of available flows vs. commitments of effluent is provided in Appendix C. The major part of the analysis in Appendix C was prepared by the U.S. Army Corps of Engineers for the MAG 208 Study prior to publication of the DEIS and formed the basis for meetings with APS, representatives of the Multi-City Partners, representatives of affected agricultural groups, and the entire MAG 208 advisory group structure. Appendix C concludes that, while the annual needs of Palo Verde Units 1 through 5 are projected to be approximately 107,000 af/yr of effluent, these units' peak monthly flow needs are expected to require the entire 140,000 af/yr flow <u>rate</u> by 1988 or 1990. It is likely that the entire flow rate will not be sufficient to meet the peak demands of all five units, as APS comment 43 suggests.
7	Both the DEIS and FEIS assume that APS/SRP may act to secure additional effluent from the Tolleson and proposed Reems Road plants if not enough effluent is available from the 91st Avenue and 23rd Avenue plants to fulfill the contractual requirements. Effluent availability from the 91st Avenue and 23rd Avenue plants is presented in Appendix C. Effluent reuse options for the Tolleson plant are presented on FEIS p. 2-55; options for the proposed Reems Road plant are described on p. 2-57.
8	It is understood that APS/SRP will take the steps required to ensure that contractual commitments for effluent are met. This position has been stated in correspondence and is reinforced by this comment. If steps short of legal action were not successful, it is assumed that APS/SRP might engage in litigation. In the FEIS, the position of the utilities is expressed as "vigorous opposition" to the alternatives that included the proposed Northeast facility (see p. 2-79).

RESPONSES TO COMMENT DOCUMENT M, CONT.

Comment	Response

9 EPA does not agree that there is no conflict between agricultural and industrial interests over effluent. The commenter argues that there can be no conflict because (1) agriculture cannot afford to use sewage effluent, and (2) industry (specifically the Palo Verde Nuclear Generating Station) can. The MAG 208 Program identified numerous instances within the planning area where sewage effluent from the 23rd Avenue, 91st Avenue, Tolleson, Mesa, and other treatment plants is currently being used to irrigate crops economically. Furthermore, interest has been expressed by a number of entities--including Bogle Farms and Gila River Farms--in receiving effluent at the projected cost of delivering it to their operations. This evidence indicates that agricultural interests are capable of bearing the cost of using effluent. The implication that a conflict cannot occur because industry can always out-price agriculture for supplies of effluent is also rejected because ability to pay is not the only determinant of regional benefits. Finally, the fact that demand for effluent exceeds supply (see FEIS pp. 4-33 - 4-36) indicates that there is at least the potential for conflict among competing interests.

This comment also presents an argument for reuse of effluent at Palo Verde based entirely on economics. EPA acknowledges that effluent reuse at Palo Verde may represent a beneficial economic impact (see DEIS p. 4-74, p. 107; FEIS p. 4-33), but the range of issues and problems involved in evaluating competing effluent reuses is far too complex to be resolved through economic analysis alone. Other considerations--such as the effect of the reuse on water supply and on the conversion of agricultural lands to urban uses--were used to evaluate reuses in the MAG 208 Program. These and other criteria were used in describing impacts of effluent reuses in this EIS (see FEIS pp. 4-31 - 4-36).

It should be emphasized that the commitment of effluent to Palo Verde was made prior to the 208 study and was not an option chosen as part of the planning process. However, this commitment is now part of the selected plan. In presenting the impacts of the plan, both the beneficial and adverse impacts of reuse of effluent at

Comment	Response
9 cont.	Palo Verde have been presented. It was not the intent of the EIS to present the relative merits of agricultural reuse vs. industrial reuse. Both interests are served by reuses in the selected plan. However, the commitment of effluent to any one reuse involves the trade-off of benefits that could occur with a different reuse. In particular, the commitment of effluent to Palo Verde in lieu of agricultural reuse within the study area means that agricultural needs will be met with other sources of water, and the potential for reuse of effluent to help conserve resources in the Phoenix area cannot be taken advantage of fully. In short, use of effluent at Palo Verde may serve to increase energy production, but it also appears to exacerbate a water supply problem that the MAG 208 program has attempted to help remedy.
10	Energy use is related to wastewater management planning by population growth. The provision of wastewater treatment service supports growth, and this growth results in increased energy consumption. Secondary impacts of growth as they relate to energy consumption are discussed in Section 4.3 of the FEIS (pp. 4-74 - 4-77).
11	See FEIS pp. 4-31 - 4-38 for a discussion of impacts of effluent reuses.
12	The only viable industrial use of effluent identified in the MAG 208 Program was use by the Palo Verde Nuclear Generating Station.
13	The FEIS indicates that effluent will be used as makeup cooling water at Palo Verde (p. 2-45).
14	See p. 2-19 of the FEIS for this correction.
15	The DEIS passage in question concerned the environmental categories that were used to narrow the large array of alternatives to the small array in early 1977. Socioeconomic impacts, including land use and industry impacts, and secondary impacts were assessed in the DEIS. See the response to APS comment 3.

Comment	Response
16	This section of the DEIS discussed the most important environmental issues that had developed over the course of the 208 study. Only a few of the socioeconomic impacts described in later chapters of the DEIS were focused upon in this section. No baseline was established in regard to industry or any other element in this section because the baseline was described in another part of the report (Chapter 3).
17	The section on land use has been expanded in the FEIS (see pp. 3-47 - 3-49).
18	The section on energy was included in the DEIS to provide sufficient background information to understand the impacts in this area. A more detailed discussion of energy consumption and its relationship to the proposed plan's support of growth is provided in the FEIS (see pp. 4-74 - 4-77). The DEIS passage in question has been corrected and condensed; see FEIS p. 3-14.
19,20, 21	The description of existing energy conditions in the Phoenix area has been corrected and briefly summarized in the FEIS (see p. 3-14).
22,23, 24,25, 26	This section has been changed in the FEIS to focus on projected energy consumption (see FEIS pp. 4-74 - 4-77).
27	The DEIS statement in question is correct as it stands. The proposed Northeast plant (included in Alternatives 3 and 4) was vigorously opposed by APS/SRP because the plant would divert flows from the 91st Avenue plant and reduce the amount of effluent available to meet the commitment of up to 140,000 af/yr to APS/SRP. See FEIS Appendix C.
28	The DEIS text does not disagree with this comment.
29	See response to APS comment 7.

Comment	Response
30	As indicated in APS comment 27, the contract between APS/SRP and the Cities provides that up to 140,000 af/yr of optioned effluent may be used for the purpose of generating electricity at any generating station of the utilities wherever located (see Part 6.4 of Agreement No. 13904, Option and Purchase of Effluent). Assuming that only the amount of effluent required by the Palo Verde Nuclear Generating Station is to be supplied in fulfillment of the contract, the disposition of remaining effluent is not as simple as indicated in this comment. The contract with APS/SRP places severe restrictions and limitations on the potential for reuse of any portion of the 140,000 af/yr of optioned effluent. The effluent that is available on an interim basis must be held available for use by APS/SRP, even though the Cities may wish to use it elsewhere. Construction of special treatment facilities for short-term use of effluent is not sound fiscally. Therefore, the wastewater must be transported and treated at a location where it can be delivered to APS/SRP on demand. This generally means the 91st Avenue plant. The options for development of new uses of effluent there are limited by the location and the uncertain duration of availability.
31	See response to APS comment 7.
32	See response to APS comment 7.
33	Under the contract between APS/SRP and the Cities, effluent from the 23rd Avenue plant is to be made available if flows from the 91st Avenue plant are not sufficient to meet demands. The analysis of flow vs. commitments of effluent in FEIS Appendix C shows that, even under the most optimistic assumptions, flows from the 91st Avenue plant will be inadequate to meet Palo Verde's peak flow needs by 1986 (high estimate of needs) or 1988 (low estimate of needs).
34	Flows from the 23rd Avenue plant will probably need to be diverted through the pipeline to the Palo Verde plant to augment supplies from the 91st Avenue plant as early as 1986 (see Appendix C). Flow projections indicate that

Comment	Response
34 cont.	23rd Avenue effluent will be required to supply peak flow needs to the year 2000. Although discharges from the 23rd Avenue plant to the Salt River will not be eliminated, they will be significantly reduced (see FEIS pp. 4-19 - 4-23).
35	Impacts of effluent reuse for agricultural irrigation and power production are discussed on FEIS pp. 4-31 - 4-36. See also response to APS comment 9.
36	By exporting effluent outside the study area, the amount of water available to recharge the aquifer through infiltration-percolation is reduced. The net effect is a reduction in ground water quantity in the Salt River Valley.
37	The DEIS text does not disagree with this comment. See FEIS pp. 4-31 - 4-36 and response to APS comment 9.
38	See FEIS pp. 4-31 - 4-36 and response to APS comment 9.
39	The DEIS text was in partial error. Claims for 91st Avenue effluent are fully resolved through contractual agreements. However, the amount and legal status of the use of effluent from the 23rd Avenue plant by McDonald Farms is currently unknown. It is possible that the Farms has a right to effluent prior to either APS/SRP's or Roosevelt Irrigation District's rights.
40	Effects of reduced discharges to the Salt River are discussed on FEIS pp. 4-19 - 4-25.
41	Use of effluent for near-site agricultural irrigation of restricted crops was identified as very cost-effective and environmentally beneficial in MAG 208 studies (see Potential Reuse Options for Wastewater Effluent and Residual Solids, U.S. Army Corps of Engineers, 1977). See also response to APS comment 9.

RESPONSES TO COMMENT DOCUMENT M, CONT.

Comment	Response
42	According to the analysis of effluent flows and commitments in Appendix C, total flows from 91st Avenue and 23rd Avenue will be approximately equal to the flow rate required to meet peak needs of four units at Palo Verde under the high estimate of needs. This analysis does not take into consideration peak needs of the Buckeye Irrigation District, losses of effluent due to evaporation, or the inability of Palo Verde to utilize all the effluent available if effluent quality does not meet on-site treatment requirements at the plant.
43	According to Management Research, Inc. (1978), APS requested an additional 50,000 af/yr of effluent from the 91st Avenue and 23rd Avenue plants. This would bring the total amount of effluent committed to APS/SRP to over 190,000 af/yr. This is a flow rate of 34,000 af/yr over that required under the high estimate of peak monthly demand for all five units as indicated by APS (1978); 59,000 af/yr over the rate for the low estimate of peak monthly demand for the five units; and 83,000 af/yr over the current estimate of the total annual needs of the five units (see Appendix C). Because of these excess volumes of effluent, the conclusion was drawn that ANPP was considering the construction of more than the five units currently planned.
44	See response to APS comment 8.
45	See response to APS comment 9 and FEIS pp. 4-31 - 4-36.
46	See response to APS comment 9 and FEIS pp. 4-31 - 4-36.
47	This DEIS statement was in error. The FEIS describes the contractual nature of the commitment of effluent explicitly (see p. 2-45).
48	The DEIS text in question is not in conflict with this comment.
49	See response to APS comment 9.
50	See response to APS comment 8.

RESPONSES TO COMMENT DOCUMENT M, CONT.

Comment	Response
51	See response to APS comment 8.
52	See FEIS p. 4-20 for this correction.
53	Both the DEIS and FEIS assume that, at a minimum, 7,300 af/yr of effluent will be discharged to the Salt River in fulfillment of the contract with the Arizona Game and Fish Department.

5.3.12 RESPONSES TO JOHN S. SCHAPER (COMMENT DOCUMENT N)

Comment	Response
1	Access to materials prepared in the MAG 208 Program was provided by establishing information depositories in over 50 public libraries and other appropriate public locations. See p. ix of the FEIS for a partial listing of the Phoenix area information depositories.
2	DEIS Figure 3-4 has been revised and may be found in the FEIS as Figure 3-2 (p. 3-5).
3	See pp. IV-1 - IV-2 in the Final Plan for a revision of the passage concerning diversion of effluent by the Buckeye Irrigation Company.
4	It is acknowledged that rights to municipal effluent remain somewhat obscure. The DEIS passage in question has not been reprinted in the FEIS. See p. 3-42 of the FEIS for a statement concerning the Buckeye Irrigation Company's rights to divert and use effluent in the Gila River.
5	The DEIS section describing the Kent and Gila Decrees has not been reprinted in the FEIS. See p. 3-42 of the FEIS for a short description of the Benson-Allison Decree.
6	Reuse considerations listed on DEIS pp. 2-5 - 2-6 are related to on-site or near-site irrigation with effluent from new or expanded treatment facilities. In particular, these considerations are important for the Reems

Comment	Response
6 cont.	Road, Gilbert (north and south), and Chandler plants. The considerations would not affect the existing arrangement with the Buckeye Irrigation Company for use of effluent from the 91st Avenue and 23rd Avenue treatment plants. EPA does not propose to become involved in the issues cited except to approve local plans and arrangements for reuse of effluent. For EPA to approve local actions, these actions must provide adequate protection for water quality and must be legally sound. EPA is not proposing, by approving the MAG 208 Water Quality Management Plan, to become involved in allocation and distribution of water resources. Any such arrangements would have to be made by local entities.
7	The following explains the derivation of the "tributary rule" from Arizona surface water quality regulations. (1) Article 2, "Water Quality Standards," at R-21-201 entitled "Scope," states that: "These Water Quality Standards apply to all surface waters of the State except those wholly private waters closed to all public uses and not discharging into or polluting any other waters of the State. Waste from municipal, industrial, or any other type of man's activity shall not degrade the water quality of the surface waters beyond the limits prescribed by the Water Quality Standards. The Standards are designed to protect the surface waters for the designated uses." (2) "Surface waters" is defined at R9-21-203 A.5. (Definitions) as "waters of the State but excludes ground water. . . ." (3) R9-21-205, "Surface Water Beneficial Uses in Arizona," at Part A, states that "The primary and incidental beneficial uses of surface waters in streams, and lakes <u>including their tributaries</u> unless otherwise designated includes . . . those shown in the tables attached to this article as appendices 1 through 9." [Emphasis added]

Comment

Response

(4) An examination of Appendix 6 reveals that the Salt River below Granite Reef Dam is not specifically designated; therefore, the appropriate water quality standards (WQS) on the Salt River below Granite Reef Dam and the Gila River, from its confluence with the Salt River to Painted Rock Lake, are:

(a) those WQS applicable generally to all surface waters of the State by R9-21-206, "General Standards Applicable to all Surface Waters," and R9-21-207, "Specific Standards Applicable to all Surface Waters," and

(b) the WQS specifically designated for Painted Rock Lake in Appendix 6, because the Salt River is a tributary to Painted Rock Lake via the Gila River, i.e., it is the first body of water downstream which has specifically designated uses, and WQS are intended to protect downstream uses.

(5) By Appendix 6, the designated uses of Painted Rock Lake are as follows:

Primary Use:	Flood Control
Incidental Use:	Partial Body Contact Warm Water Fishery Agriculture Aquatic Life and Wildlife Aesthetics

In addition, new surface water quality standards proposed by the Bureau of Water Quality Control are expected to replace existing standards by Fall of 1979. The new standards provide specific designated beneficial uses for the segments of the Middle Gila Basin that were not previously so designated and were, therefore, under the "tributary rule." The effect of the new standards is to clearly establish the highest protected use of Painted Rock Lake (partial body contact) as the highest protected use for the segments of the Middle Gila in question, with the same numerical criteria.

Comment	Response
8	While the Maricopa County Department of Health Services has no direct authority to regulate the time period during which a contract for reuse of sewage effluent is to be maintained, the Department can, and will, withhold approval of a treatment facility that does not provide for a guaranteed, approved reuse for the time period during which the plant will operate.
9	The DEIS and FEIS conclusions that not enough effluent may be available to supply the needs of the Buckeye Irrigation District and the Palo Verde Nuclear Generating Station are based upon an analysis of flows vs. commitments provided in FEIS Appendix C. Flow projections in Appendix C were prepared on the basis of Arizona Department of Economic Security (DES) population projections, MAG population allocations within Maricopa County, wastewater unit flows developed in the MAG 208 Program, and waste flow reduction projections also developed in the MAG 208 Program. These effluent flow projections are approximately 25 percent lower in the year 2000 than those developed by the City of Phoenix and supplied to Arizona Public Service when the contract for sale of effluent was negotiated in 1973.

The difference in the projections stems from at least two sources:

(1) DES population projections are lower than the projections made by the Cities in the Multi-City Agreement in the early 1970's. DES projections were used in the MAG 208 Program in compliance with Executive Order 77-5, which designated DES as the official population projection and estimating agency for the State of Arizona. DES was so designated because of the Department's past performance in accuracy of projections. It is expected that DES population projections will be adjusted upward slightly for the next few years due to unusually rapid growth in the Phoenix area, but the longer range (year 2000) projections are still considered to be accurate.

Comment	Response
9 cont.	(2) MAG effluent flow projections include flow reductions of approximately 10 percent over the next 20 years. If the current MAG waste flow reduction program is successful, it will result in an even greater flow reduction of about 15 percent over the next 3 years. Information pertinent to questions raised in this comment is presented in Appendix C and FEIS pp. 4-19 - 4-23 and 4-31 - 4-36.
10	Although ground water regulation is, without question, the responsibility of the State, it is also true that Section 208 of PL 95-217 does provide for EPA's involvement in the analysis and development of controls for protection of ground water quality. Section 208 (b) (2) (k) provides authorization for the study of ground water pollution and the development of control measures, as follows: "(2) Any plan prepared under such process shall include, but not be limited to . . . (k) a process to control the disposal of pollutants on land or in subsurface excavations within such area to protect ground and surface water quality." The control measures will be developed by the State, MAG, and local entities.
11	Ground water data used in the DEIS, FEIS, and the 208 Plan consisted of long-term records on the chemical quality of water from wells in the Buckeye Irrigation District and from other wells. For a more complete presentation of the data, see Groundwater Quality in the Major Basins of Maricopa County (K. D. Schmidt, 1978) and Nonpoint Sources of Groundwater Pollution, Final Report (MAG 208 Program, 1979). The conclusion on decreasing salinity in well water in the Buckeye Irrigation District was based on interpretation of water quality hydrographs prepared for each Buckeye Irrigation District well. This allowed consideration of all analyses and annual variations. Such information is more definitive than comparing only two analyses per well, as was apparently done for this comment. Also, electrical conductivity--which was the method of measurement used in the MAG 208 studies--is probably a more accurate parameter than is total dissolved solids. Both were examined in the 208 ground water study.

RESPONSES TO COMMENT DOCUMENT N, CONT.

Comment	Response
11 cont.	The commenter compares total dissolved solids in well water in the Buckeye Irrigation District between 1965 and 1974. The MAG 208 ground water study (Schmidt, 1978) evaluated salinity as expressed in electrical conductivity from the late 1960's through 1978. Although the flood of 1973 may have decreased salinity to a degree, the water quality hydrographs show that the decrease started in the late 1960's. Accompanying increases in nitrate are not explained by the theory that flooding was responsible for decreased salinity.
	The basis for the conclusion on increases in nitrate content was interpretation of water quality hydrographs prepared for each well in the Buckeye Irrigation District, Roosevelt Irrigation District, and Goodyear Farms area. To compare nitrogen levels in ground water with those in sewage effluent, the total nitrogen content of the sewage effluent must be utilized, not nitrate. Nitrogen in sewage effluent occurs primarily in the ammonia and organic forms. Some losses of nitrogen can occur as the effluent is applied to land, through processes such as crop uptake and denitrification. The total nitrogen content of the effluent has usually exceeded 30 mg/l, which is the equivalent of more than 130 mg/l of nitrate. Thus, the total nitrogen content of the effluent was much greater than that of ground water east of Buckeye prior to the late 1960's. No mention was made in the DEIS of nitrate increases in ground water west of Buckeye. Lastly, much of the effluent is mixed with well water and applied to farmland, from which return flow occurs. This is a more significant source of recharge in the Buckeye area than is effluent in the stream channel.
	Ground water quality in the metro area is described on pp. 3-27 - 3-29 of the FEIS, ground water impacts of the selected plan on pp. 4-8 - 4-12, and ground water impacts of growth on pp. 4-72 - 4-73.
12	In regard to the Clean Water Act (Section 208) and the management of sources of ground water pollution, see responses to comments 6 and 10 (Comment Document N).

Comment | Response

12 cont. In regard to management of water resources, the interpretation of the Act reflected in this comment is erroneous. EPA's Counsel has concluded as follows on this matter:

"It is obvious that Congress did not intend to prohibit EPA from taking such measures as may be necessary to protect water quality. It is noteworthy that the 1977 Amendments left untouched both §301(b)(1)(C), which requires without exception that point source discharges be controlled to meet water quality standards, and §101 (a) (2), which declares the national 'fishable, swimmable' water quality goal.

"It is also noteworthy that §510(2), which Congress expressly declined to change, provides that States' water rights are not to be impaired 'except as expressly provided in this Act.' Thus . . . the requirements of water quality standards, §402 and §404 permits, and §208 plans may incidentally affect water rights and usages without running afoul of §101(g) and §510(2)."

In addition to these considerations, it should be noted that the 1977 Amendments require EPA to provide to Congress "recommendations concerning the policy . . . of the Act to improve coordination of efforts to reduce and eliminate pollution in concert with programs for managing water resources" §102(d)).

13 The area designated for agricultural reuse of effluent from the Reems Road plant in Figure 4-12 of the DEIS was improperly drawn. Approximately 690 acres of farmland currently under cultivation exist in an irregularly shaped area between the Buckeye Canal and the Gila River, west of Sarival Road. This area would be adequate to utilize all the effluent expected from the initial phase of the Reems Road plant under the cropping patterns proposed (see Table 4-7, p. 4-32 of the FEIS). Most of this area is classified as prime farmland or other farmland by the U.S. Soil Conservation Service.

The additional effluent produced by increased flows at the Reems Road facility could, with limited pumping, be utilized in the area north of the Buckeye Canal. For purposes of estimating costs of construction and site acquisition, a lagoon treatment process for the Reems

Comment	Response
13 cont.	Road plant was assumed. Effluent from a lagoon system would not meet EPA requirements for discharge to a receiving stream (the Gila River or the Buckeye Irrigation Canal, which empties into a receiving stream). Therefore, near-site restricted agricultural reuse of effluent will be required for the facility to be developed with the lagoon system. A more advanced treatment system would allow for direct discharge or off-site agricultural use. These options for the Reems Road plant, presented on FEIS p. 2-57, will be studied further in detailed facility planning.
14	Flow projections developed in the MAG 208 Program are not as great as those assumed in the <u>Palo Verde Nuclear Generating Station Units 1, 2, and 3 Final Environmental Statement</u> (U.S. Nuclear Regulatory Commission, 1975). The Palo Verde ES apparently used population projections and future flows supplied by the municipalities that share in the operation of the 91st Avenue and 23rd Avenue treatment plants. The MAG 208 Program developed flow estimates on the basis of population projections from the Arizona Department of Economic Security, the designated State planning agency. See also response to comment 9 (Comment Document N). The FEIS concludes that some changes in riparian vegetation along the reach of the Salt River from 91st Avenue to 115th Avenue will probably occur due to reduced effluent discharges (see pp. 4-19 - 4-25). To predict specific riparian community changes between 91st Avenue and 115th Avenue will require field investigations to track and quantify the movement of effluent and to establish transpiration requirements for vegetation in the wildlife management area and along the reach from 91st Avenue to 115th Avenue. Riparian communities between 115th Avenue and the Buckeye Heading receive additional flows in the form of tailwaters from irrigation occurring on both sides of the Salt River and deliveries of surface water from the Salt River Project just upstream of the confluence of the Agua Fria and Gila Rivers. Thus, riparian communities downstream of 115th Avenue are not totally dependent on

RESPONSES TO COMMENT DOCUMENT N, CONT.

Comment	Response
14 cont.	wastewater flows. However, a reduction in flows will probably result in some changes to the biotic communities downstream of 115th Avenue. Changes in densities, production, and vigor of existing species and introduction of new species may result. These changes would be more explicit in areas just downstream of 115th Avenue and diminish further downstream as other sources of water are introduced into the stream reaches.
15	Flood control considerations are mentioned in the FEIS (p. 4-25), but an investigation of the relationship between flooding and changes in riparian communities downstream from the 91st Avenue plant is beyond the scope of this EIS. This problem is being studied by the Central Arizona Water Control Study, which is being conducted by the U.S. Army Corps of Engineers and the U.S. Bureau of Reclamation.

5.3.13 RESPONSES TO DAVID E. CREIGHTON (COMMENT DOCUMENT O)

Comment	Response
1	Supporting documents for the EIS are available at over 50 locations in the Phoenix area. A partial list of 208 information depositories is provided on FEIS p. ix.
2	The DEIS text in question is not in conflict with this comment.
3	This figure has been revised for the FEIS (see Figure 2-2, p. 2-13).
4	Costs of the selected plan are presented on FEIS pp. 2-32 - 2-38. A cost/benefit analysis was not included in the EIS because (1) the selected plan is a generalized program not amenable to cost/benefit analysis, and (2) wastewater treatment facilities are evaluated by EPA on a cost-effectiveness rather than a cost/benefit basis. See also response to comment 3, Comment Document M.
	A more detailed cost analysis will be provided as part of 201 facility plans, or other detailed plans. These plans will include refined estimates of capital and operation

RESPONSES TO COMMENT DOCUMENT O, CONT.

Comment	Response
4 cont.	and maintenance costs, as well as expected costs per residential, commercial, and industrial user served. The distribution of these costs will have to be determined by the subregional operating groups (SROG's) responsible for coordination, operation, and planning in designated wastewater service areas.
5	This error has been corrected on Figure 3-1, FEIS p. 3-3.
6	Figure 3-3 has not been reprinted in the FEIS.
7	DEIS Figure 3-4 has been reprinted in the FEIS as Figure 3-2 (p. 3-5).
8	This correction may be found on p. 3-7 of the FEIS.
9	The CAP is described breifly on FEIS p. 3-18.
10	Since the EIS is not on a flood control project, the presentation of data on flooding has not been expanded (see FEIS pp. 3-19 - 3-20).
11	This passage has been deleted from the FEIS.
12	The provisions of the Consent Decree are briefly related on p. 2-10 of the FEIS.
13,14, 15	No response required.
16	The section describing the Gila Decree has not been reprinted in the FEIS.
17	Figure 3-6 has not been reprinted in the FEIS.
18	This statement has not been included in the FEIS.
19,20, 21	DEIS Figure 3-12 showed potential vegetation in the Phoenix area. This figure has not been reprinted in the FEIS. For this EIS, the term "riparian" was chosen to indicate vegetation associated with a water source other than precipitation. It is acknowledged that many more

Comment	Response
19,20, 21 cont.	distinctions could be made within the category to characterize particular kinds of riparian vegetation, but the choice was made to simplify the description for purposes of this programmatic EIS.
22,23	No response required.
24	Figure 3-15 has not been reprinted in the FEIS. See p. 3-13 of the FEIS for the correct number of airports in the metro area.
25	This correction may be found on p. 3-15 of the FEIS.
26	Table 3-20 has not been included in the FEIS.
27	This passage has not been reprinted in the FEIS.
28	The section on energy has been corrected and summarized in the FEIS (see p. 3-14).
29	The projected decline in water demand under the No Action Alternative was attributed in the DEIS to a dispersed growth pattern that would cause a greater conversion of agricultural land to urban uses than would the MAG regional growth plan--in other words, "urban encroachment," as indicated in this comment.
30	The elimination of ground water overdraft under the No Action Alternative was projected in the DEIS on the basis of population distribution and land use assumptions quite different from those assumed by the Arizona Water Commission (see DEIS Sections 3.2.2 and 3.2.3 for these assumptions). In brief, the No Action Alternative assumed a greater distribution of population in a low-density pattern in the Phoenix area, leading to a greater conversion of agricultural land to urban uses. In general, urban uses require less water than agricultural uses. Ground water overdraft would be less under the No Action Alternative because the decline in irrigated acreage combined with a wide dispersal of urban population would lead to lower rates of water use.

Comment	Response
30 cont.	Although no new analysis of ground water quantity under without-project conditions was done, the presentation of these impacts in the FEIS was condensed to indicate only that ground water overdraft would be reduced rather than eliminated (see FEIS p. 4-73).
31	See response to comment 20, this comment document.
32	Assessment of impacts to cultural resources was as detailed as possible for the planning level of the EIS. The potential for impacts to archaeological resources is expressed in the FEIS as the number of miles of interceptor lines that will cross archaeological sensitivity zones identified in a report by the Office of Cultural Resource Management, Department of Anthropology, Arizona State University (Burton, 1977). The map shown on Figure 4-2 of the DEIS was taken from this report. The EIS does not claim to provide archaeological clearance for the individual facilities (see DEIS, p. 4-12; FEIS, p. 4-47). Each facility will be required to have completed a detailed archaeological reconnaissance to qualify for funds under Section 201 of the Clean Water Act.
33	The DEIS passage in question concerned the minor direct effects of facility construction and operation on biological resources. Although some natural habitat would be lost because of construction of some facilities, all of the alternatives provided for reuse of effluent for agricultural irrigation and thus supported agriculture through maintaining cropland habitat. Conversion of agricultural lands to urban uses as a result of population growth is discussed in the FEIS (see pp. 4-60, 4-64).
34	It is acknowledged that a portion of the overland flow site for the Northeast facility would be in the project path of the Granite Reef Aqueduct. This inconsistency would require modification of this option for this facility, should the facility be reintroduced into the regional wastewater treatment plan in the future.
35	Figure 4-1 (both DEIS and FEIS) is a large matrix showing environmental effects of facilities. It may be found at the back of the documents.

RESPONSES TO COMMENT DOCUMENT O, CONT.

Comment	Response
36	In the context of planning, opportunities for improving the environment are considered benefits.
37	The error is acknowledged.
38	The error is acknowledged.
39	The error is acknowledged.
40	See response to comment 34 (this comment document).
41	See response to comment 20 (this comment document).
42	Assessment of alternatives that would redistribute population to preserve agricultural land is beyond the scope of this EIS. See response to comment 2 from the U.S. Department of Agriculture Soil Conservation Service (Comment Document E).
43	Page 4-155, lines 8 and 9, of the DEIS make clear that the term "wetlands" refers to impoundments associated with certain types of wastewater treatment and with the storage of effluent for irrigation. Pages 4-155 and 4-160 of the DEIS point out that recreational possibilities that may be developed using these impoundments require the appropriate institutional framework and physical design. These statements have been expanded in the FEIS to clarify the fact that creation of recreational opportunities at the facilities depends upon arrangements that ensure that biological resources are properly developed at the lagoons and storage ponds (see FEIS, p. 4-18). The development of recreational opportunities at the facilities will be addressed in detailed facility planning.
44	The contract for effluent was negotiated in 1973, prior to the MAG 208 study, and was accepted by the study as an existing condition. EPA has asked the Nuclear Regulatory Commission to ensure that PVNGS uses only the minimum amount of effluent necessary.
45	This error in the DEIS is acknowledged.
46	This error in the DEIS is acknowledged.

5.3.14 RESPONSE TO ORME LEWIS, Jr. (COMMENT DOCUMENT P)

Comment	Response
1	The DEIS passage has been corrected. see p. 2-44 of the FEIS.

5.3.15 RESPONSE TO THOMAS S. ROTHWEILER (COMMENT DOCUMENT Q)

Comment	Response
1	Methane gas from the sludge digesters at the 91st Avenue and 23rd Avenue plants is being largely wasted at this time. However, studies are now being conducted to determine if the excess gas can be used for power generation as well as in-plant process heating needs.

5.3.16 RESPONSE TO ADRON W. REICHERT (COMMENT DOCUMENT R)

Comment	Response
1	Representatives of MAG have met with members of the Holly Acres Flood Control Association since the January 15, 1979, Public Hearing. Although much of the effluent from the 91st Avenue treatment plant will be diverted from the riverbed when units at the Palo Verde Nuclear Generating Station go on-line, some discharge to the river will continue. The City of Phoenix has a continuing commitment to the Arizona Game and Fish Department for the supply of 7,300 af/yr of effluent to support the wildlife management area near 115th Avenue. The disposition of effluent will be studied in the 201 facility plan for residuals management. This plan was rescoped to include the study of disposal of effluent as a response to comments from the Holly Acres Flood Control Association. Other studies underway will also have a bearing on this issue. Channel clearing has been approved by the Maricopa County Flood Control District, but an environmental assessment must be completed before clearing can commence. The effects of phreatophyte growth in the Salt-Gila system downstream from 91st Avenue are being studied by the Central Arizona Water Control Study.

5.3.17 RESPONSES TO GILBERT T. VENABLE (COMMENT DOCUMENT S)

Comment	Response
1	The contract for sale of effluent to Arizona Public Service/Salt River Project for use at the Palo Verde Nuclear Generating Station was negotiated in 1973, prior to the MAG 208 Program. Any changes in the contract would require legal action. EPA has asked the Nuclear Regulatory Commission to ensure that PVNGS uses only the minimum amount of effluent necessary.
2	The 48th Street plant was voted down by the MAG Regional Council because of uncertainty about the Rio Salado Project, difficulty in negotiating with the Salt River Project, and the possibility of future odor and nuisance problems. The Northwest plant was voted down because Sun City West decided to construct its own plant, and Luke Air Force Base, El Mirage, and Surprise decided to tie into the 91st Avenue plant. See Section 2.3 of the DEIS for a discussion of the refinement of alternatives.
3	Flood control issues are being studied currently by a number of local, State, and Federal agencies. The 208 study does not have a mandate to study flooding or develop flood control measures. However, EPA and MAG will work with agencies with direct flood control responsibility and authority to ensure maximum protection of water quality.
4	The evaluation of the effects of the importation of Central Arizona Project water into the study area is beyond the scope of the MAG 208 Program. EPA has consistently urged the U.S. Bureau of Reclamation to fully address the water quality impacts of the CAP in its EIS's and planning.

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Glossary

GLOSSARY OF TERMS AND ABBREVIATIONS

The following terms and/or abbreviations are meant to reflect word meanings as they appear in the context of the main body of this report.

AAG - Agricultural Advisory Group (organized for the MAG 208 Water Quality Management Program).

ACRE-FOOT - The quantity of water required to cover one acre of land to a depth of one foot. Equivalent to 43,560 cubic feet or 326,000 gallons.

ACTIVATED SLUDGE - Process that removes organic matter from sewage by saturating it with air and adding biologically active sludge.

ADHS - Arizona Department of Health Services.

ADOT - Arizona Department of Transportation.

ADSORPTION - An advanced way of treating wastes in which carbon removes organic matter from wastewater.

ADVANCED WASTEWATER TREATMENT (AWT) - Additional sewage treatement steps beyond primary and secondary treatment to remove organic or inorganic compounds. Usually, additional biochemical oxygen demand and suspended solids are removed, and nutrients (such as phosphorus, nitrogen, and potassium) are taken out. AWT is also known as tertiary treatment.

AERATION TANK - A chamber for injecting air into wastewater. The addition of oxygen breaks down organic wastes by bacterial action.

AEROBIC - Living or active in the presence of free oxygen.

AESTHETICS - Of or pertaining to the beautiful; pleasing to the senses.

ALLUVIUM - Material deposited by running water; alluvial deposits usually result from the action of rivers.

ALTERNATIVE - A choice. In this report, alternatives are differing wastewater treatment management plans for metro Phoenix.

ANAEROBIC - Living or active in the absence of free oxygen.

ANAEROBIC DIGESTER - In wastewater treatment, a type of equipment used to decompose (digest) sludge in the absence of oxygen. Volatile organic material is reduced to methane gas by microbial activity in the digester.

ANPP - Arizona Nuclear Power Project, an energy consortium that will construct and operate the Palo Verde Nuclear Generating Station near Buckeye, Arizona.

AQUATIC - Consisting of or pertaining to water.

AQUIFER - A porous, underground, water-bearing geologic formation. The term is generally restricted to formations capable of yielding an appreciable supply of water.

BACTERIA - Small, living organisms. In wastewater treatment, bacteria consume organic constituents in sewage.

BENTHIC ORGANISMS - Organisms that live on the bottoms of water bodies.

BIOTIC COMMUNITY - An assemblage of populations (plant and animal) occupying a particular area or physical habitat.

BOD - Biochemical oxygen demand. The amount of dissolved oxygen required for the decomposition of organic matter in water. BOD is used as a measure to determine the efficiency of a sewage treatment plant or to determine the potential of effluent to degrade a stream. The lower the BOD measurement, the cleaner the effluent.

BUFFER ZONE - An area used to separate components of a sewage treatment system from the public, e.g., a land strip around a treatment plant.

BWQC - Bureau of Water Quality Control (in the Arizona Department of Health Services).

CAG - Citizen Advisory Group (organized for the MAG 208 Water Quality Management Program).

CAP - Central Arizona Project, a Bureau of Reclamation project to bring Colorado River water into central and southern Arizona via aqueduct.

CAPM ZONES - Community Aggregate Planning Model zones. These zones are smaller than census tracts and are used to allocate population within municipal planning areas.

CARCINOGENS - Substances or agents producing or inciting cancer.

CFS - Cubic feet per second. A unit of measure used to describe volume of streamflow, equal to 1 cubic foot in 1 second (also called "second-foot").

CHLORIDE - A major constituent of common table salt. Excessive concentrations of chloride in drinking water impart a salty taste.

CHLORINATION - Process of combining or treating with chloride or a chlorine compound in order to destroy harmful microorganisms.

CHROMIUM - A blue-white metallic element occurring in nature and as a by-product of several industrial operations.

CLARIFIER - A component of a treatment plant, consisting of one or more tanks that contain partially treated wastewater, in which sewage is allowed to settle out.

Clean Water Act - PL 95-217, which amends the Federal Water Pollution Control Act of 1972 (PL 92-500).

CO - Carbon monoxide. A very toxic, colorless, and odorless gas; one product of combustion of gasoline in automobile engines.

COLLECTOR LINES - Sewers that collect wastewater from residences and commercial establishments and convey it to interceptor sewers, where it is carried to wastewater treatment plants.

CONFLUENCE - The point at which a tributary converges into or joins the main stream.

CONSUMPTIVE USE - The measure of the amount of water removed from the water supply system; synonymous with "depletion".

CONVEYANCE LINE - Structure to transport treated wastewater from point of discharge at plant outfall to reuse location.

COOLING WATER - Water used to dissipate waste heat from generators, particularly in nuclear or fossil-fueled electric generating stations.

CREOSOTEBUSH - Low, woody plant with numerous branches near ground level, characteristic of desert areas.

DECIDUOUS - Refers to plants that lose their leaves regularly each year.

DEIS - Draft environmental impact statement.

DEMOGRAPHY - Study of population and population changes.

DENSITY - Demographic term referring to the number of people in a specified area.

DEPENDABLE SUPPLY - The estimated amount of water that can be depleted annually without lowering storage levels in either surface or ground water reservoirs over a long period of time.

DEPLETION - The measure of the amount of water removed from the water supply system for a use; synonymous with "consumptive use".

DEWATERING - Process where sewage is reduced in volume by removing a portion of its water content.

DIGESTED SLUDGE - Sludge in which the major portion of bio-organic material has been decomposed.

DIGESTION - Process that takes place in tanks whereby sludge decomposes, resulting in partial gasification, liquification, and mineralization of pollutants.

DOWN FAULTING - A fracture zone in the earth where downward displacement has occurred parallel to the fracture.

ECOLOGY - The totality or pattern of relations between organisms and their environment.

EFFLUENT - The liquid that comes out of a wastewater treatment plant after completion of the treatment process.

EIS - Environmental impact statement.

ELECTRODIALYSIS - Process used to remove particulates from water or sewage effluent.

EMISSIONS - Substances discharged into the air.

ENVIRONMENT - "That which surrounds." This all-embracing term generally includes natural (physical and biological) elements and human (socioeconomic and cultural) elements.

ENVIRONMENTAL ASSESSMENT - A study to determine harmful or beneficial changes to the human and natural environmental system resulting directly or indirectly from changes caused by an action.

ENVIRONMENTAL IMPACT - Effect upon the physical, biological, socioeconomic, and cultural elements of an area produced by an action.

ENVIRONMENTAL IMPACT STATEMENT (EIS) - A report issued by a Federal agency responsible for a major action that assesses the action's impact on the environment.

EPHEMERAL STREAM - A stream that flows only during and following a period of rainfall.

EVAPORATION - The process of converting a liquid to a vapor.

EVAPOTRANSPIRATION - The process of converting liquid (such as precipitation) to vapor in the air through direct evaporation from the ground surface or by transpiration of vegetation. (See EVAPORATION and TRANSPIRATION).

FACIES - A rock or group of rocks that differs from comparable rocks, as in composition, age, or fossil content.

FAUNA - Animals or animal life.

FECAL COLIFORM - Bacteria associated with the human digestive tract. The number of these bacteria in a given volume of water is used as indicator for the acceptable bacterial level in a water source.

FEIS - Final environmental impact statement.

FLOCCULATION - Process by which clumps of solids in sewage are increased in size. A chemical, or flocculant, is added to the sewage to produce aggregate or compound masses of particles. These aggregates then settle to the bottom and may be removed for further treatment or disposal.

FLOOD PLAIN - The land area adjoining a river, stream, or watercourse that has been or may be covered by floodwater.

FLORA - Plants of a given region.

FUGITIVE DUST - Dust and soil particles carried by winds.

GPCPD - Gallons per capita per day. A measure of consumptive water use.

GROUND WATER - The body of water beneath the surface of the ground, found in aquifers. It is made up primarily of water that has seeped down from the surface.

HABITAT - The environment in which the life needs of a plant or animal are supplied.

HYDROLOGY - A science dealing with the properties, distribution, and circulation of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere.

IMPOUNDMENT - A basin or other area surrounded by physical structure(s) in which water is contained.

INFILTRATION - The penetration of water through the ground's surface into subsurface soil.

INFLUENT - Sewage flowing into a treatment plant.

INTERCEPTOR LINES - Sewers in a system that control the flow of sewage to the treatment plant. In a storm they allow some of the sewage to flow directly into the receiving stream, protecting the treatment plant from being overloaded in case of a sudden surge of water into the sewers. Interceptors also collect the flows from main and trunk sewers and carry them to the points of treatment.

INTERMITTENT STREAM - A stream that flows only during part of the year, in contrast with perennial streams, which flow all year, and ephemeral streams, which carry only stormflows.

INVERSION - An increase in air temperature with an increase in altitude. An event associated with air pollution.

LAGOON - A shallow, artificial pool or pond for processing sewage, usually by aerating the wastewater. (See AERATION).

LAND APPLICATION - Discharge of wastewater effluent onto the earth, with recapture of the land-treated effluent from ground water for reuse.

LEACH - An action which separates soluble components, such as salts, out of a medium, such as soil, by the action of percolating water.

LEACHATE - The liquid, including chemical components, which is a product of the leaching process.

MAG - Maricopa Association of Governments.

MAG-TPO - Maricopa Association of Governments--Transportation and Planning Office.

MATRIX - A figure, consisting of rows and columns, which portrays information where items in rows and items in columns interact.

MGL - Milligams per liter.

MITIGATE - To alleviate or modify adverse or negative impacts resulting from a specific action.

MITIGATIVE MEASURE - A step taken to moderate the severity of the effects of a proposed action.

MIXED-MEDIA FILTER - That component of a treatment plant which further upgrades secondary-treated wastewater through advanced physico-chemical processes.

MULTI-CITY SEWER AGREEMENT - An agreement among the Cities of Phoenix, Scottsdale, Mesa, Tempe, and Glendale, entered into in 1967 to build and operate a joint wastewater treatment system.

NONATTAINMENT AREA PLAN - A plan required under the Clean Air Act Amendments of 1977 for areas that have air quality problems with certain pollutants. The plan identifies control strategies that will result in the areas' meeting National Ambient Air Quality Standards by 1982.

NEPA - National Environmental Policy Act (1969).

NONCONSUMPTIVE USE - Water use that does not reduce the water supply available for other purposes. Examples of nonconsumptive water use are: generation of hydroelectric power, fishing, boating, and swimming.

NONPOINT SOURCE - Generalized discharge of waste into a water system. Examples are: street runoff, agricultural irrigation return flow, etc.

NPDES - National Pollution Discharge Elimination System. An environmental program, administered by EPA, in accordance with the Federal Water Pollution Control Act (PL 92-500), as amended, to control discharge of wastes into waters of the United States.

OUTFALL - The outlet of a river, stream, lake, drain, or sewer.

OVERDRAFT - Term used to identify ground water supplies when more ground water is being pumped and used from an area than is returned to replenish the ground water in the area. The difference between consumptive use and dependable supply.

OXIDATION - Addition of oxygen which breaks down organic wastes or chemicals in sewage by bacterial and chemical means.

OZONE - A major component of photochemical smog.

PACKAGE TREATMENT PLANT - A small wastewater treatment plant partially or completely preassembled by a manufacturer and shipped to the designated location. Most package plants provide secondary treatment.

PALOVERDE - A desert tree that is characterized by small leaves, thorns, and blue-green to yellow-green new growth.

PARTIAL BODY CONTACT - A level of water quality where the human body may come in direct contact with the water, but normally not to the point of complete submergence. Sensory organs will not be exposed to water of this quality.

PARTICULATE - Of or pertaining to particles, or occurring as minute particles.

PERCOLATION - Movement of water through subsurface soil layers, usually continuing downward to the ground water table.

PERMEABILITY - The capacity of a soil to transmit a fluid.

PHREATOPHYTES - Plants with extensive root systems that are dependent upon ground water. In the Phoenix area, salt cedar is the dominant phreatophyte. Salt cedar proliferates in areas where the water table is close to the land surface and cannot exist, unless irrigated, in places where the depth to water table is much greater than about 15 feet.

PL 92-500 - Water Pollution Control Act Amendments of 1972. An act passed by the Congress of the United States and signed by the President, to control pollution of the Nation's waters and improve its quality.

PL 95-217 - Amendments to the Federal Water Pollution Control Act of 1972. PL 95-217 is known as the Clean Water Act.

POTABLE WATER - Drinkable water.

POINT SOURCE - A stationary, readily identifiable source of pollution.

PPM - Parts per million.

PRIMARY TREATMENT - Level of wastewater treatment that removes pollutants that will settle, such as the heavier suspended solids, or float, such as grease. Primary treatment will typically remove about 60 percent of suspended solids and about 35 percent of the biochemical oxygen demand.

PROCESS TRAIN - The order in which sewage is treated as it flows through a treatment plant.

RECHARGE - Process by which water is absorbed and added to the ground water aquifer, either directly into a particular water-bearing formation, or indirectly by way of another formation.

RIO SALADO PROJECT - A floodplain reclamation proposal for the Salt River bed and adjacent lands in the Phoenix area.

RIPARIAN - Pertaining to the banks of a body of water.

RIVERINE - Living or situated on the banks of a river.

SECONDARY TREATMENT - Level of treatment that oxidizes the biochemical oxygen demand (BOD) that escapes the primary process and provides added removal of suspended solids (SS). Oxidation is typically achieved by biological processes, either in a trickling filter or in an activated sludge process. Collectively, primary and secondary treatment remove approximately 85 percent of the BOD and SS. Current national water quality standards require a minimum secondary level of treatment for municipal wastewater treatment plants.

SEDIMENTATION TANK - Chamber in which suspended solids (SS) are removed from sewage. In a sedimentation tank, solids settle to the bottom or float on the top of the wastewater. The floating material is skimmed off the top and the solids on the bottom are pumped out of the tank for incineration, digestion, filtration, or other means of disposal.

SEPTIC TANK - A method of treating sewage, characterized by an underground tank, usually concrete, to which sewage is discharged and digested. Septic tanks are normally used in rural areas to treat sewage from a small group of people, for example, a family.

SEWAGE - Wastewater that flows in sewers from residential, commercial, and industrial establishments to wastewater treatment plants.

SEWER - Pipe, conduit, or other physical facility used to carry wastewater.

SEWERAGE - System of sewers; physical facilities employed to transport, treat, and discharge sewage.

SEWER DISTRICT - Semiautonomous governmental unit whose purpose is the provision of sewerge or a special assessment district within which sewerage facilities are provided to residents.

SHARD (also SHERD) - Fragments of pottery vessels found on sites from previous cultures.

SITE-SPECIFIC - Pertaining only to individual areas; in this report the term refers to impacts.

SLUDGE - Solid matter in sewage that settles to the bottom, floats, or becomes suspended in sedimentation tanks during wastewater treatment. Sludge must be disposed of by filtration and incineration or by transport to appropriate disposal sites.

SLUDGE DRYING BEDS - Large shallow beds scooped out of the ground and into which digested sludge is placed for dewatering.

SROG - Subregional operating group. Three multiple-member and five single-member SROG's are being formed under MAG to manage and operate the wastewater treatment system in Maricopa County.

STREAM BED - Channel that contains the stream's waters: all the space ordinarily covered by water and lying between the lands on each side of the stream.

SUBSIDENCE - Settling of the surface of the ground to a new level.

SUSPENDED SOLIDS - Solids that are not in true solution and can be removed by filtration.

TAILWATER - Irrigation water that drains from the field at the lower end or remains in an irrigation canal downstream from the last field normally served.

TDS - Total dissolved solids. The chemicals in true solution in water, usually expressed in milligrams per liter (mg/l) or parts per million (ppm).

TERRESTRIAL - Consisting of or pertaining to the land.

TERTIARY TREATMENT - Advanced wastewater treatment (AWT). Additional sewage treatment steps beyond primary and secondary treatment to remove organic or inorganic compounds. Usually, additional BOD and SS are removed, and nutrients (such as phosphorus, nitrogen, and potassium) are taken out.

TOPOGRAPHY - Physical features of a district or region such as are represented on maps.

TRANSPIRATION - The process of passing off liquid through a living membrane in the form of vapor.

TRICKLING FILTER - Usually a bed of rocks or stones over which sewage is trickled and where bacteria break down organic wastes.

TSP - Total suspended particulates. An air quality term used to denote a quantity of matter, such as dust or sand, in a given volume of air.

208 PLAN - An areawide waste treatment management plan developed under Section 208 of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) and the Clean Water Act of 1977 (PL 95-217).

201 PLAN - A plan developed under Section 201 of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) and the Clean Water Act of 1977 (PL 95-217) for constructing and operating wastewater treatment facilities.

UNDERFLOW - Part of the flow of a stream that is immediately below the surface of the ground, usually in sand and gravel.

UPLIFTING - Elevation of any extensive part of the earth's surface relative to some other parts.

VECTOR - A disease-transmitting organism, such as the mosquito.

VOLATILIZATION - A process whereby a liquid is caused to atomize or evaporate quickly.

WASTEWATER - Any water derived from one or more previous uses.

WASTEWATER TREATMENT PLANT - A facility consisting of a series of tanks, screens, filters, and other components that process wastewater so that pollutants are removed.

WATER SUPPLY - A volume of water that is ready for use, either in its natural state or through treatment.

WATER TABLE - The upper limit of the portion of the ground wholly saturated with water.

WITHDRAWAL - The process of capturing or acquiring water either by diversion from a surface water source or by pumping from the ground water basin.

WQCC - Arizona Water Quality Control Council.

Appendices

APPENDICES

A PERTINENT NUMERICAL CRITERIA FOR EXISTING AND PROPOSED ARIZONA SURFACE WATER QUALITY STANDARDS

B ARIZONA DEPARTMENT OF HEALTH SERVICES REGULATIONS FOR RECLAIMED WASTES

C WASTEWATER FLOWS FROM THE 91ST AND 23RD AVENUE TREATMENT PLANTS VS. EXISTING COMMITMENTS AND OTHER CLAIMS ON EFFLUENT FOR REUSE

D ADVISORY GROUP RECOMMENDATIONS AND MAG REGIONAL COUNCIL RESOLUTIONS CONCERNING SELECTED PLAN

E MEMORANDUM OF AGREEMENT BETWEEN THE MARICOPA ASSOCIATION OF GOVERNMENTS AND THE ARIZONA DEPARTMENT OF HEALTH SERVICES BUREAU OF AIR QUALITY CONTROL

APPENDIX A

PERTINENT NUMERICAL CRITERIA FOR EXISTING AND PROPOSED ARIZONA SURFACE WATER QUALITY STANDARDS

FROM EXISTING (JUNE 1979) STANDARDS:

SUMMARY OF ARIZONA WATER QUALITY CRITERIA
FOR DESIGNATED BENEFICIAL USE STANDARDS

Standard	Full Body Contact	Partial Body Contact	Domestic & Industrial Water Supply	Cold Water Fishery	Warm Water Fishery	Agriculture	Aquatic Life & Wildlife
			Fecal Coliforms (No./100 ml)				
Geometric mean	200	1,000	1,000	1,000	1,000	1,000	1,000
90% value (for 5 samples over 30 days)	400	2,000	2,000	2,000	2,000	2,000	2,000
			pH				
Range	6.5-8.6	6.5-8.6	None	6.5-8.6	6.5-8.6	None	6.5-8.6
Maximum change	± 0.5	± 0.5	None	± 0.5	± 0.5	None	± 0.5
			Turbidity (JTU)				
Streams	Lowest practicable value (LPV)		None	10	50	None	LPV
Lakes	LPV		None	25	10	None	LPV
			Dissolved Oxygen (mg/1)				
Minimum	None	None	None	6.0	6.0	None	None
			Temperature (°F)				
Maximum change	5°	5°	None	2°	5°	None	No temp. interference
Maximum	93°	93°	None	55°(wint.) 70°(summ.)	93°	None	No temp. interference

Standard	Full Body Contact	Partial Body Contact	Domestic & Industrial Water Supply	Cold Water Fishery	Warm Water Fishery	Agriculture	Aquatic Life & Wildlife
			Toxics (mg/1)				
Arsenic	0.050	0.050	0.050	0.050	0.050	None	0.050
Barium	1.000	1.000	1.000	0.500	0.500	None	0.500
Boron	None	None	None	None	None	1.000	None
Cadmium	0.010	0.010	0.010	0.010	0.010	None	0.010
Chromium (hexavalent)	0.050	0.050	0.050	0.050	0.050	None	0.050
Copper	1.000	1.000	1.000	0.050	0.050	None	0.050
Cyanide	0.200	0.200	0.200	0.100	0.100	None	0.100
Mercury	0.005	0.005	0.005	0.005	0.005	None	0.005
Lead	0.050	0.050	0.050	0.050	0.050	None	0.050
Phenol	0.001	0.001	0.001	0.001	0.001	None	0.001
Selenium	0.010	0.010	0.010	0.010	0.010	None	0.010
Silver	0.050	0.050	0.050	0.050	0.050	None	0.050
Zinc	5.000	5.000	5.000	0.500	0.500	None	0.500

FROM PROPOSED (JUNE 1979) STANDARDS:

R9-21-209

TABLE I. SPECIFIC STANDARDS FOR PROTECTED USES

PARAMETER	PROTECTED USES						
	DOMESTIC WATER SOURCE	RECREATION		AQUATIC AND WILDLIFE	AGRICULTURAL		RIPARIAN HABITAT
		FULL BODY	PARTIAL BODY		IRRIGATION	LIVESTOCK WATERING	
FECAL COLIFORM[a] (UNITS / 100 ml)							
1. GEOMETRIC MEAN (5 SAMPLE MINIMUM)	1000	200	1000	1000	1000	1000	1000
2. 10% OF SAMPLES FOR 30 DAY PERIOD SHALL NOT EXCEED	2000	400	2000	2000	2000	2000	2000
3. SINGLE SAMPLE SHALL NOT EXCEED	4000	800	4000	4000	4000	4000	4000
pH[f]							
1. MAXIMUM	NS	9.0	9.0	9.0	9.0	9.0	9.0
2. MINIMUM	NS	6.5	6.5	6.5	4.5	6.5	6.5
3. MAXIMUM CHANGE DUE TO WASTE DISCHARGE	NS	0.5	0.5	0.5	NS	NS	NS
TRACE SUBSTANCES[f] (MAXIMUM, MG/L)							
ARSENIC (AS As)	0.050 D	0.050 D	---[b]	0.050 D	2.000 T	0.200 T	0.0500
BARIUM (AS Ba)	1.000 D	1.000 D	---[b]	NS	NS	NS	NS
BORON (AS B)	NS	NS	---[b]	NS	1.000 T	NS	NS
CADMIUM (AS Cd)	0.010 T	0.010 T	---[b]	0.010 D[c]	0.050 T	0.050 T	0.0100
CHROMIUM (AS Cr, HEXAVALENT & TRIVALENT)	0.050 D	0.050 D	---[b]	0.050 D	1.000 T	1.000 T	0.0500
COPPER (AS Cu)	1.000 D	NS	---[b]	0.050 D	5.000 T	0.500 T	0.0500T
LEAD (AS Pb)	0.050 D	0.050 D	---[b]	LESS THAN 0.050 D[e]	10.000 T	0.100 T	less than 0.050 D[e]
MANGANESE (AS Mn)	NS	NS	---[b]	NS	10.000 T	NS	NS
MERCURY (AS Hg)	0.002 T	0.002 T	---[b]	LESS THAN 0.002 T[e]	---[b]	0.010 T	less than 0.002 T[e]
SELENIUM (AS Se)	0.010 D	0.010 D	---[b]	0.050 T	0.020 T	0.050 T	0.050 T
SILVER (AS Ag)	0.050 D	0.050 D	---[b]	0.050 D	NS	NS	0.050 D
ZINC (AS Zn)	5.000 D	NS	---[b]	0.500 D	10.000 T	25.00 T	25.00 D
AMMONIA (AS UN-IONIZED NH_3)	NS	NS	NS	0.020	NS	NS	NS
CYANIDES (AS CYANIDE ION & COMPLEXES)	0.200	0.200	---[b]	LESS THAN 0.020[e]	NS	0.200	0.200
PHENOLICS	0.005	0.005	---[b]	0.005	NS	0.005	0.005
SULFIDES (TOTAL)	NS	NS	NS	LESS THAN 0.100[e]	NS	NS	NS

NOTES

a. For limits applicable to effluent dominated streams, see Table II. For limits applicable to direct wastewater re-use, see A.C.R.R. R9-20-400's.
b. too little is known about adverse health effects for this use to adequately select a number.
c. for cold water fishery habitat, maximum cadmium concentration is 0.001 mg/l.
d. abbreviations used in this table: NS = NO STANDARD, T = TOTAL TRACE SUBSTANCE, D = DISSOLVED FRACTION
e. The maximum concentration for this use is set at the current minimum level of detection. The maximum concentration necessary to adequately protect this use is lower.
f. Applies also to effluent dominated streams.

PROPOSED (JUNE 1979) STANDARDS, CONT.

R9-21-209

TABLE I. SPECIFIC STANDARDS FOR PROTECTED USES - contd

PARAMETER	PROTECTED USES					
	DOMESTIC WATER SOURCE	RECREATION	AQUATIC AND WILDLIFE		AGRICULTURAL	RIPARIAN HABITAT
		FULL AND PARTIAL BODY	WARM WATER FISHERY HABITAT	COLD WATER FISHERY HABITAT	IRRIGATION AND LIVESTOCK WATERING	
TEMPERATURE[f, h] HEAT ADDED BY A DISCHARGE OR COMBINATION OF DISCHARGES SHALL NOT RAISE THE NATURAL AMBIENT WATER TEMPERATURE MORE THAN ______ DEGREES CELSIUS	NS	3	3	1	NS	NS
TURBIDITY[f, i] THE RESULTS OF THE ACTIVITIES OF MAN SHALL NOT CAUSE THE TURBIDITY TO EXCEED ______ JACKSON TURBIDITY UNITS IN:						
STREAMS -	NS	50	50	10	NS	NS
LAKES -	NS	25	25	10	NS	NS
DISSOLVED OXYGEN[g] THE RESULTS OF THE ACTIVITIES OF MAN SHALL NOT LOWER THE DISSOLVED OXYGEN CONCENTRATION TO LESS THAN ______ MG/L	NS	6	6	6	NS	NS

NOTES

f. applies also to effluent dominated streams.

g. does not apply to effluent dominated streams; see Table II for dissolved oxygen standards applicable to effluent dominated streams.

h. temperature standard not applicable to impoundments owned by a firm or individual for the express purpose of providing or receiving heat wastes.

i. standards are applicable to turbidity caused by activities including, but not limited to, construction, mining, logging, agriculture, and other similar non-point sources.

j. abbreviations used in this table: NS = NO STANDARD

PROPOSED (JUNE 1979) STANDARDS, CONT.

R9-21-209

TABLE II. SPECIFIC STANDARDS FOR EFFLUENT DOMINATED STREAMS

PARAMETER	PROTECTED USES (USE AS DOMESTIC WATER SOURCE IS PROHIBITED)						
	RIPARIAN HABITAT	RECREATION		AQUATIC AND WILDLIFE	AGRICULTURAL		
		FULL BODY	PARTIAL BODY		IRRIGATION	LIVESTOCK WATERING DAIRY	NON-DAIRY
FECAL COLIFORM (UNITS / 100 ml) GEOMETRIC MEAN (5 SAMPLE MINIMUM) SHALL NOT EXCEED:	1000	200	1000	1000	note b	200	1000
ENTERIC VIRUS, GEOMETRIC MEAN (5 SAMPLE MINIMUM) SHALL NOT EXCEED	NS	1 PFU/40 LITER[e]	125 PFU/40 LITER	NS	1 PFU/40 LITER[ae]	NS	NS
ASCARIS LUMBRICOIDES EGGS (ROUNDWORM)	NS	NONE DETECTABLE[e]	NS	NS	NONE DETECTABLE[ae]	NS	NS
ENTAMOEBA HISTOLYTICA	NS	NONE DETECTABLE[e]	NS	NS	NONE DETECTABLE[ae]	NS	NS
TAENIARHYNCHUS SAGINATUS EGGS (COMMON LARGE TAPEWORM)	NS	NS	NS	NS	NS	NONE DETECTABLE	NONE DETECTABLE
DISSOLVED OXYGEN THE RESULTS OF THE ACTIVITY OF MAN SHALL NOT LOWER THE DISSOLVED OXYGEN CONCENTRATION TO LESS THAN ___MG/L	1	6	1	6	NS	NS	NS
pH, Trace Substances, Temperature, Turbidity	GIVEN IN TABLE I	GIVEN IN TABLE I	GIVEN IN TABLE I	GIVEN IN TABLE I	GIVEN IN TABLE I	GIVEN IN TABLE I	GIVEN IN TABLE I

NOTES
a. standard applicable only when use is irrigating food crops to be consumed in raw or natural state.
b. fecal coliform standards for this use are in accordance with A.C.R.R. Title 9, Chapter 20, Article 4 (re-use).
c. "none detectable" means no pathogenic microorganisms observed during examination of a water sample by a microbiologist or other qualified person.
d. abbreviations used in this table: NS = NO STANDARD, PFU = PLAQUE FORMING UNITS

e. in order to meet these stream standards in effluent dominated streams, disinfection to 2.2 fecal coliform units/100 ml or advanced wastewater treatment may be necessary for secondary effluent.

APPENDIX B

ARIZONA DEPARTMENT OF HEALTH SERVICES REGULATIONS FOR RECLAIMED WASTES

CHAPTER 20

WATER POLLUTION CONTROL

ARTICLE 1. RESERVED

ARTICLE 2. RESERVED

ARTICLE 3. RESERVED

ARTICLE 4. RECLAIMED WASTES

Sec.

ARTICLE 5. CLASSIFICATION OF TREATMENT PLANTS AND CERTIFICATION OF OPERATORS

ARTICLE 1. RESERVED

ARTICLE 2. RESERVED

ARTICLE 3. RESERVED

ARTICLE 4. RECLAIMED WASTES

R9-20- 01.
Reserved
R9-20-400.

R9-20-401. Legal authority

The regulations in this article are adopted pursuant to the authority granted by A.R.S. §§ 36-1854.3 and 36-1857.

Added Reg. 1-72.

R9-20-402. Policy

The regulations in this article govern the direct reuse of reclaimed wastes, and all waste discharges into the waters of the State shall be in compliance with the "Water Quality Standards for Surface Waters in Arizona".

Added Reg. 1-72.

R9-20-403. Applicability

A. The direct reuse of wastes originally containing human or animal wastes is prohibited unless such wastes comply with the standards in this article.

B. Nothing in this article shall be construed as an exemption from other applicable Rules and Regulations of the Arizona State Department of Health including but not limited to R9-8-249.

Added Reg. 1-72.

R9-20-404. Secondary treatment

All wastes shall receive a minimum of secondary treatment or its equivalent before they are used for any of the following purposes:

A. Irrigation of fibrous or forage crops not intended for human consumption.

B. Irrigation of orchard crops by methods which do not result in direct application of water to fruit or foliage

C. Watering of farm animals other than producing dairy animals.

Added Reg. 1-72.

R9-20-405. Secondary treatment and disinfection

A. All wastes shall receive a minimum of secondary treatment or its equivalent and disinfection before they are used for any of the following purposes:

1. Irrigation of any food crop where the product is subjected to physical or chemical processing sufficient to destroy pathogenic organisms.

2. Irrigation of orchard crops by methods which involve direct application of water to fruit or foliage.

3. Irrigation of golf courses, cemeteries and similar areas.

4. Watering of producing dairy animals.

5. To provide a substantial portion of the water supply in any impoundment used for aesthetic enjoyment or for purposes involving only secondary contact recreation.

B. Following treatment specified in A. above, the monthly arithmetic average density of the coliform group of bacteria in the effluent shall not exceed 5,000 per 100 milliliters and the monthly arithmetic average density of fecal coliforms shall not exceed 1,000 per 100 milliliters. Both of these limits shall be an average of at least two consecutive samples examined per month during the irrigation season, and any one sample examined in any one month shall not exceed a coliform group density of more than 20,000 per 100 milliliters, or a fecal coliform density of more than 4,000 per 100 milliliters.

Added Reg. 1-72.

R9-20-406. Tertiary treatment and disinfection

A. All wastes shall receive a minimum of secondary treatment or its equivalent followed by tertiary treatment and disinfection unless tertiary treatment effects disinfection before they are used for any of the following purposes:

1. To provide a substantial portion of the water supply in any impoundment used for primary contact recreation.

2. Irrigation of school grounds, playgrounds, lawns, parks or any other area where children are expected to congregate or play.

3. Irrigation of food crops which may be consumed in their raw or natural state.

B. Following the treatment specified in A. above, the effluent shall not contain more than 10 mg/1 of 5 day BOD, 10 mg/1 of suspended solids and 200 fecal coliform per 100 milliliters. When the arithmetic average of five consecutive daily samples taken over a period not exceeding fifteen days is greater than the values given above for BOD or suspended solids or when the arithmetic average of five consecutive daily samples taken over a period not exceeding fifteen days is greater than the value given above for fecal coliform, use of the effluent shall cease immediately upon notification by the Department. The use of such effluent shall not resume until the values of five consecutive daily samples taken over a period not exceeding fifteen days meet the requirements for BOD, suspended solids and fecal coliform listed above.

Added Reg. 1-72.

R9-20-407. General requirements for industrial uses

Reclaimed wastes used for industrial purposes shall have received a minimum of secondary treatment, or its equivalent.

Added Reg. 1-72.

R9-20-408. Other requirements for industrial uses

The variety of industrial uses is so extensive that establishing specific criteria governing all uses is not possible. Each industrial use will be considered on an individual basis. In fixing such treatment requirements and quality criteria the Department shall give consideration but not be limited to:

1. The degree of potential contact with the reclaimed wastes by the general public.
2. The degree of potential contamination of the products or by-products being produced or handled in the industrial process.

Added Reg. 1-72.

APPENDIX C

WASTEWATER FLOWS FROM THE 91ST AND 23RD AVENUE TREATMENT PLANTS VS. EXISTING COMMITMENTS AND OTHER CLAIMS ON EFFLUENT FOR REUSE

Prepared by

U.S. Army Corps of Engineers
Phoenix Urban Study Office

and

U.S. Environmental Protection Agency
Region IX

FLOWS FROM 23RD AND 91ST AVENUE TREATMENT PLANTS

The amount of effluent available from the 23rd and 91st Avenue treatment plants for the period 1980 to the year 2000 has been estimated as shown in the following table.

TABLE C-1

FLOWS FROM 23RD AVENUE AND 91ST AVENUE PLANTS
1980 - 2000 (in mgd)

	1980	1983	1985	1990	1995	2000
91st Avenue	84.5	98.0	102.9	113.7	124.3	137.0
23rd Avenue	36.5	36.4	36.4	36.4	36.7	37.2
TOTAL	121.0	134.4	139.3	150.1	161.0	174.2

These estimates of flows were prepared on the basis of Arizona Department of Economic Security (DES) population projections, population allocations within Maricopa County made by the Maricopa Association of Governments (MAG), wastewater unit flows developed in the MAG 208 Water Quality Management Program (MAG 208 Program), and waste flow reduction projections also developed in the MAG 208 Program. The figures in the table reflect the long-range MAG flow reduction goals of about 10 percent by the year 2000.

Population forecasts will be adjusted yearly and reflected in MAG 208 Plan updates. It is expected that they will be adjusted slightly upward for the next few years due to unusually rapid growth in the area. However, the longer range (year 2000) forecasts are still considered to be accurate.

The 1983 flows in the table represent the addition of the El Mirage (.4 mgd), Surprise (.4 mgd), Luke AFB (1.5 mgd), Guadalupe (.5 mgd), and Gilbert (.1 mgd) flows to the 91st Avenue plant, along with the 3.3 mgd flows from Mesa due to the abandonment of the Mesa treatment plant.

EFFLUENT COMMITMENTS

Effluent from the 23rd Avenue treatment plant is currently discharged to a canal which empties into the Salt River. An undetermined amount of effluent is taken up from the canal for use by McDonald Farms, a private farming operation. The Roosevelt Irrigation District has an option for 20,000 af/yr of 23rd Avenue plant effluent, provided that: (1) it meets standards for unrestricted agricultural irrigation, (2) it can be economically transported to the district's existing canal system, and (3) it is not required as cooling water for the Palo Verde Nuclear Generating Station, as described below.

Effluent from the 91st Avenue plant is committed for use as cooling water at the Palo Verde Nuclear Generating Station (up to 140,000 af/yr), to the Buckeye Irrigation Company for restricted agricultural irrigation (30,000 af/yr), and to the Arizona Game and Fish Department for maintenance of a wildlife management area in the Salt River bed near 115th Avenue (7,300 af/yr). A commitment of 1,200 af/yr to the U.S. Water Conservation Laboratory was cancelled when the laboratory's research facilities at Flushing Meadows were washed out by flood waters in 1978.

The contract for sale of effluent for use at the Palo Verde Nuclear Generating Station was negotiated in 1973 between the cities in the Multi-City Sewer Agreement and the Arizona Public Service Company (APS) and the Salt River Project (SRP). APS is the project manager for the station, and the project is known as the Arizona Nuclear Power Project (ANPP).

The commitment for the sale of effluent to ANPP is secondary to prior commitments of effluent to the Buckeye Irrigation Company and the Arizona Game and Fish Department. On the other hand, the agreement between the City of Phoenix and the Roosevelt Irrigation District is clearly secondary to the agreement with ANPP. The amount and legal status of the use of effluent from the 23rd Avenue plant by McDonald Farms is currently unknown. It is possible that the Farms has a right to effluent prior to either ANPP's or Roosevelt Irrigation District's rights.

The amount of effluent optioned in the ANPP contract is 140,000 af/yr. If the amount of effluent at the 91st Avenue plant is insufficient to meet the requirements of the commitment, then the contract calls for use of effluent from the 23rd Avenue treatment plant. The contract requires the cities to deliver to

ANPP, after first satisfying the prior commitments to the Buckeye Irrigation District and the Arizona Game and Fish Department, all of the effluent available at the 91st and 23rd Avenue plants up to the maximum amount of 140,000 af/yr. The contract expressly disclaims any warranty that 140,000 acre-feet of effluent will become available at any time or in any year. However, whenever that quantity does become available, the cities are required to deliver such amount, according to the contract.

The contract also commits the cities not to install any new treatment plants that will impair the ability of the cities to deliver the amount of effluent optioned to ANPP. The contract exempts from this commitment the new treatment facilities planned for installation in the Gila and lower Litchfield tributary basins, as identified and described in the Wastewater Report for the Valley Metropolitan Area of Phoenix, Arizona (John Carollo Engineers, 1968). These treatment plants are known as the Chandler and Reems Road plants in the selected 208 wastewater management plan.

Development of a Northeast plant was vigorously opposed by APS and SRP because it would impair the ability of the cities to meet the effluent commitment as specified in the ANPP contract. APS and SRP indicated that they would oppose development of the plant until such time as "(i) the capacity of the 91st Avenue and 23rd Avenue Plants has been expanded to permit fulfillment of all outstanding commitments for delivery of wastewater effluent from such plants and (ii) effluent flows are sufficient to meet such commitments" (Arizona Public Service and Salt River Project, 1978). Regarding the Tolleson plant, APS and SRP stated that they were opposed to the temporary diversion of flows from Glendale and Sun City East unless they could "obtain either an assurance that such diversion will not become permanent or a right to acquire wastewater effluent from the Tolleson plant equivalent to that diverted from the 91st Avenue Plant. . ." (Arizona Public Service and Salt River Project, 1978). However, the contract does not preclude expansion of plants such as that at Tolleson.

The option on the effluent, as agreed to in the 1973 contract, was exercised in mid-1976, when the Palo Verde Nuclear Generating Station Units 1, 2, and 3 received construction permits from the U.S. Nuclear Regulatory Commission. Actual delivery of effluent for cooling water will not take place until 1982 when the first unit at Palo Verde is scheduled to go on line. The second unit is scheduled to go on line in 1984 and the third in 1986. Approval is being sought for two additional units. If approved, the fourth unit would go on line in 1988 and the fifth in 1990.

Each unit at Palo Verde is estimated to require 21,400 af/yr of effluent. Three units would require 64,200 af/yr of effluent, and all five units would require 107,000 af/yr. During the summer months when atmospheric conditions result in highest evaporation rates, the peak requirements for cooling water are estimated to range from 2,200 to 2,600 af/mo.

These estimates of water use per unit at Palo Verde were furnished to the MAG 208 Program on August 10, 1978, by E. E. Van Brunt, APS Vice President and ANPP Project Director. More recent estimates of annual use in the Draft Environmental Statement Related to Construction of Palo Verde Nuclear Generating Station Units 4 and 5 (U.S. Nuclear Regulatory Commission, 1979) vary from 21,300 to 23,500 af/yr per unit (106,500 to 117,500 af/yr for 5 units). It was not felt that this analysis, which assumes 21,400 af/yr per unit or 107,000 af/yr for 5 units, needed to be revised, as the estimates that were used were relatively conservative. The basic conclusions of the analysis would be the same using the range of estimates of annual use found in the Palo Verde Units 4 and 5 Environmental Statement, except that use of higher estimates in the range (115,000 and 117,500 af/yr) would result in a greater and earlier shortfall of effluent for Palo Verde.

This analysis, however, does not include other factors which need to be considered, but for which the necessary inforamtion is not available. One is the amount of effluent that may be lost between the headworks of the 91st Avenue and 23rd Avenue treatment plants and the nuclear reactors. The second is the amount of effluent that may be available for delivery to the power plant but cannot be used because of unacceptable quality. The third is peak demand requirements of the Buckeye Irrigation District. All of these factors will reduce, by some unknown amount, the quantity of effluent available for Palo Verde. Because of these factors, the conclusions on availability of effluent for Palo Verde stated in this analysis are likely to be better than the actual situation.

ANALYSIS OF AVAILABLE FLOWS AND COMMITMENTS

Figures C-1 through C-3 (following pages) plot the flows available from the 23rd Avenue and 91st Avenue plants under the selected wastewater management plan and show the projected uses and ultimate commitments to ANPP, the Buckeye Irrigation Company, and the Arizona Game and Fish Department. The flow needs of the five Palo Verde Nuclear Generating Station units are shown as follows: 1) annual demand of 21,400 af/yr per unit (Figure C-1); 2) low estimate of peak month flow needs of 2,200 af/mo, or a flow rate of 26,400 af/yr, per unit (Figure C-2); and 3) high estimate of peak month flow needs of 2,600 af/mo, or a flow rate of 31,200 af/yr, per unit (Figure C-3). Flows are shown in thousands of acre-feet per year and millions of gallons per day (1 mgd = 1,120 af/yr).

Figures C-1 through C-3 indicate the following:

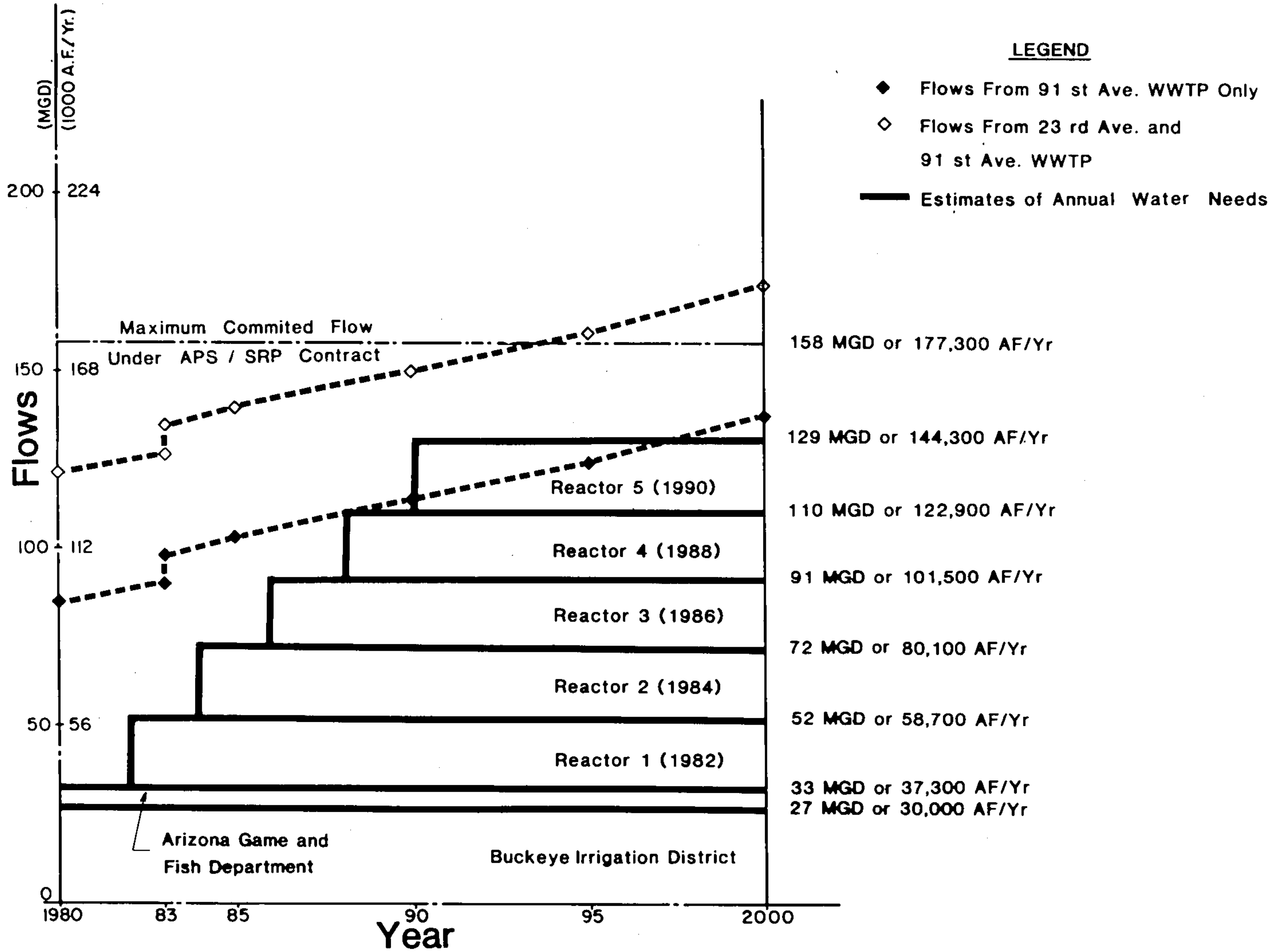
1. Maximum flows available from the two treatment plants are not sufficient to meet the peak month needs of all five units under the high estimate of needs (Figure C-3).

2. With the exception of the Arizona Game and Fish Department's flow of 7,300 af/yr, discharge to the Salt River would be eliminated during the peak months starting in 1988 under the high peak month estimate of needs, and in 1990 under the low peak month estimate (Figures C-2, C-3).

3. Flow for the Roosevelt Irrigation District's commitment (20,000 af/yr), or for the development of the Northeast plant (diverting flows of 9.1 mgd), would not be available until after 1995 if the cities must first meet the maximum commitment of 140,000 af/yr to ANPP (Figure C-1).

4. Effluent available from the 91st Avenue plant only, under the low estimate of peak month needs, would be sufficient for the first three units on schedule and the fourth unit sometime between 1995 and 2000 (Figure C-2).

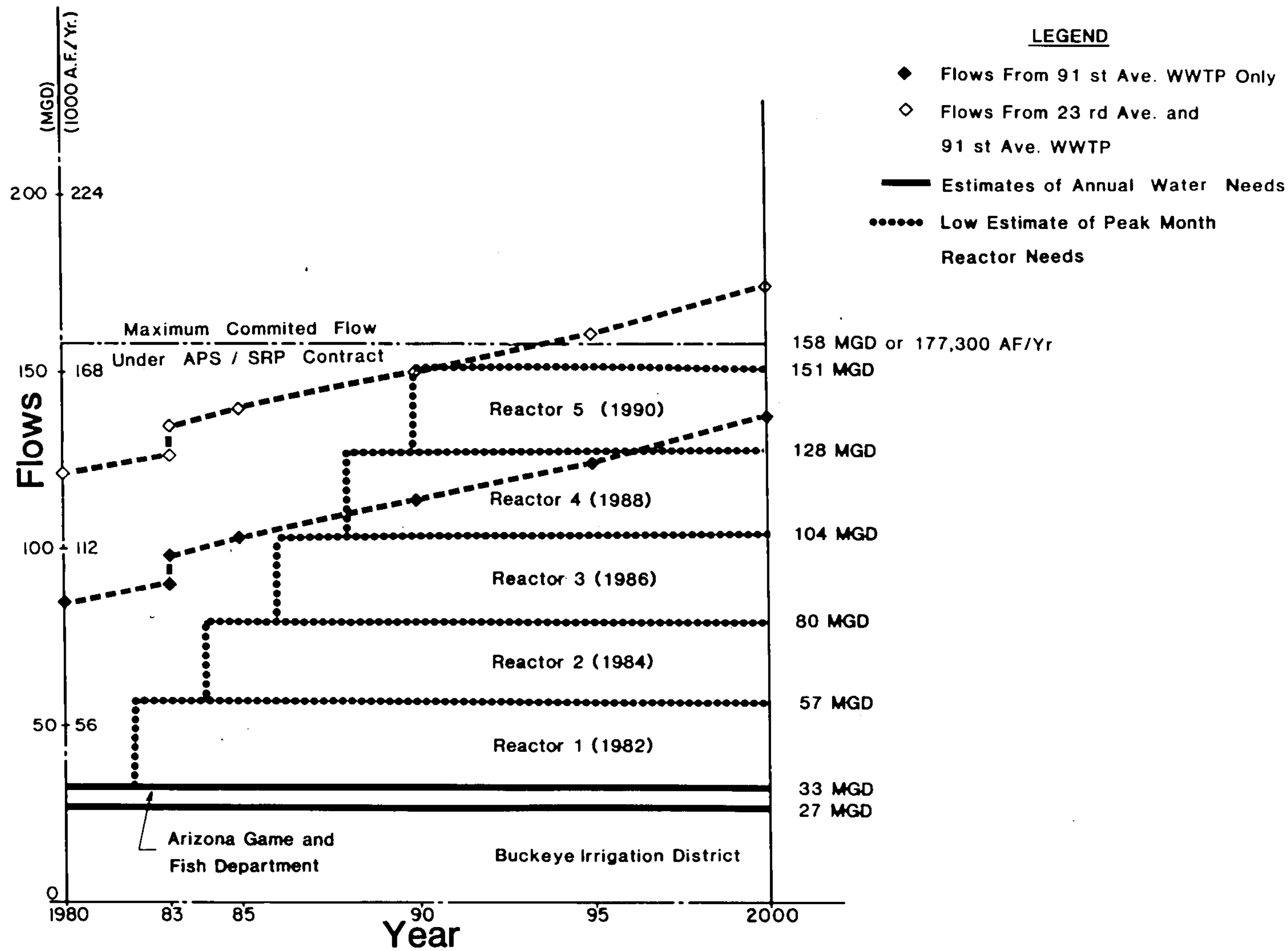
5. Effluent available from the 91st Avenue plant only, under the high estimate of peak month needs, would be sufficient for the first two units on schedule, the third reactor between 1990 and 1995, and the fourth reactor after the year 2000 (Figure C-3).



* Without Roosevelt Irrigation Districts Commitment or Flows to McDonald Farms

AVAILABLE FLOWS 23RD AVENUE & 91ST AVENUE WWTP VS. EXISTING COMMITMENTS*

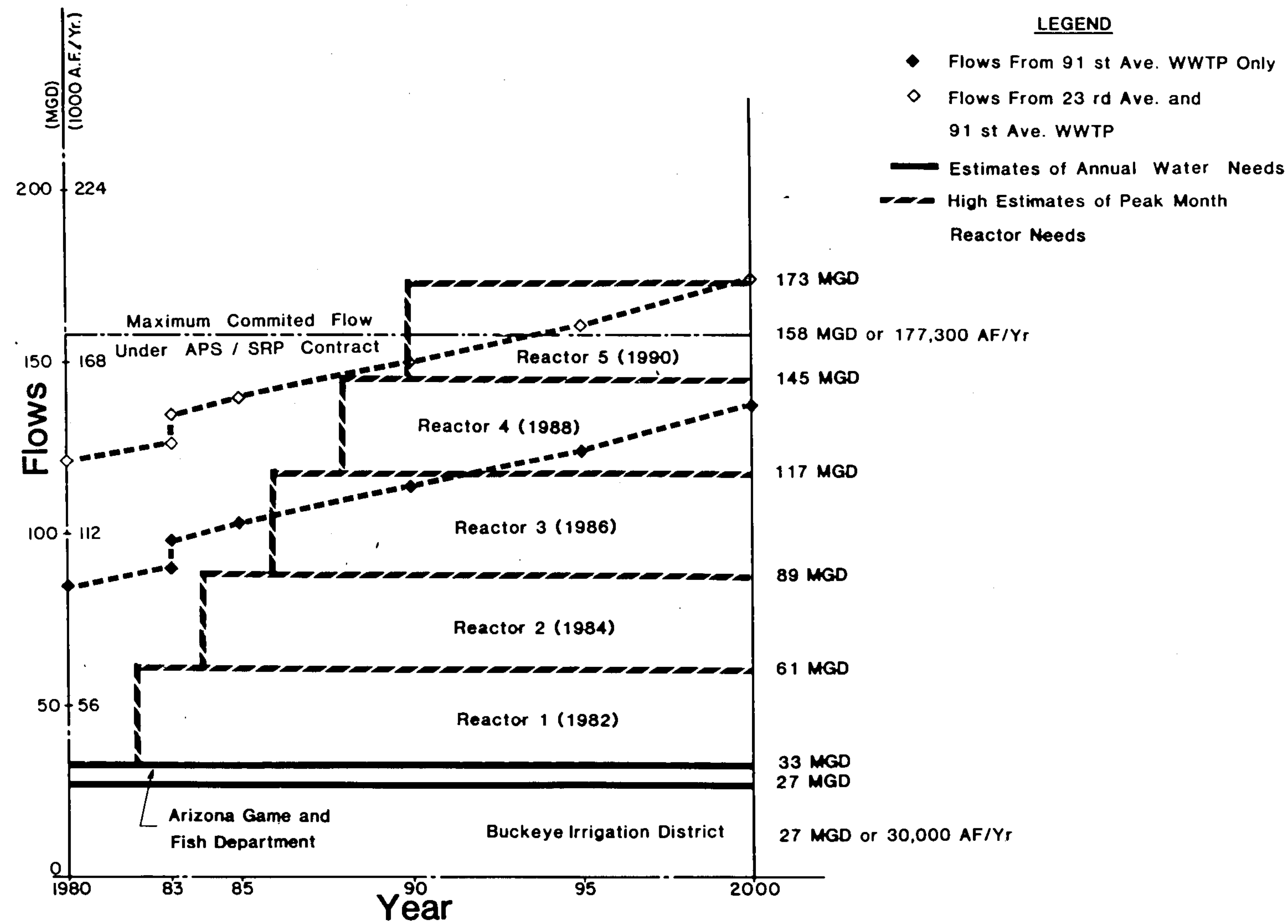
Figure C-1



* Without Roosevelt Irrigation Districts Commitment or Flows to McDonald Farms

AVAILABLE FLOWS 23RD AVENUE & 91ST AVENUE WWTP VS. EXISTING COMMITMENTS*

Figure C-2



* Without Roosevelt Irrigation Districts Commitment or Flows to McDonald Farms

AVAILABLE FLOWS 23RD AVENUE & 91ST AVENUE WWTP VS. EXISTING COMMITMENTS*

Figure C-3

REFERENCES

John Carollo Engineers, 1968. Wastewater Report for the Valley Metropolitan Area of Phoenix, Arizona.

Arizona Public Service and Salt River Project, 1978. Letter from Russell P. Hulse, Arizona Public Service Company, and Leroy Michael, Salt River Project Agricultural Improvement and Power District, to H. W. Worthington, Chief, Phoenix Urban Study, U.S. Army Corps of Engineers, September 20, 1978.

Arizona Public Service, 1978. Letter from E. E. Van Brunt, Jr., APS Vice President, ANPP Project Director, to H. W. Worthington, Chief, Phoenix Urban Study, U.S. Army Corps of Engineers, August 10, 1978.

U.S. Nuclear Regulatory Commission, 1979. Draft Environmental Statement Related to Construction of Palo Verde Nuclear Generating Station Units 4 and 5, Proposed by Arizona Public Service Company, et al. NUREG-0522, U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C., April 1979.

APPENDIX D

ADVISORY GROUP RECOMMENDATIONS
AND MAG REGIONAL COUNCIL RESOLUTIONS
CONCERNING SELECTED PLAN

MAG 208 PROGRAM ADVISORY GROUP RECOMMENDATIONS CONCERNING DRAFT 208 PLAN

TECHNICAL ADVISORY GROUP — January 8, 1979

Discussion focused on the accuracy of the engineering assumptions made in the Plan and the need for annual evaluations and updates.

The Technical Advisory Group recommends that the MAG 208 Draft Final Plan be approved.

AGRICULTURAL ADVISORY GROUP — January 9, 1979

The Agricultural Advisory Group recommends that the MAG 208 Draft Final Plan be approved with the following condition: that, in the area of Nonpoint Sources of Pollution (landfills, irrigated agriculture, septic systems, urban stormwater runoff, feedlots and dairies, etc.), Natural Resource Conservations Districts should be designated as the lead or primary management agencies to deal with nonpoint sources of pollution in Maricopa County.

CITIZEN ADVISORY GROUP — January 9, 1979

The Citizen Advisory Group recommends that the MAG 208 Draft Final Plan be approved with the following conditions:

1) That continued examination of the 48th Street and Northeast Area Wastewater Treatment Plants be an element of the annual MAG 208 Plan update,

2) That involvement by citizen, agricultural and technical representatives on the Wastewater Policy Advisory Committee and in the Subregional Operating Group structure (SROG Board and/or Technical and Citizens Advisory Committee) be mandatory and not optional,

3) That sodium and boron concentrations of reclaimed wastewater be examined during continued 208 planning, with respect to its impact on intended uses and potential for control, and

4) That current plans by the Arizona Nuclear Power Project and the Nuclear Regulatory Commission to control the impacts of the solid salt concentrations resulting from evaporated cooling water (117,000 tons per year) be examined during the continuing 208 planning program.

MANAGEMENT SUBCOMMITTEE (EXPANDED) January 10, 1979

The Management Subcommittee met to discuss the recommendations of the three advisory groups, as well as their own concerns on the 208 Draft Final Plan.

In regard to the advisory group conditions for approval the Management Subcommittee took the following action.

Technical Advisory Group - No action needed.

Citizen Advisory Group - Concurred with conditions 1,3, and 4. Condition 2, which would make citizen, agricultural, and technical involvement on the Wastewater Policy Advisory Committee and the Subregional Operating Groups mandatory, the Subcommittee concurred with the recommended mandatory involvement on the Wastewater Policy Advisory Committee but left involvement by these interests in the Subregional Operating Groups as optional.

Agricultural Advisory Group - Without the benefit of additional information on nonpoint source problems and Natural Resource Conservation Districts (NRCD), the Subcommittee chose to defer formal consideration of the Agricultural Advisory Group Committee recommendation. Meetings will be scheduled as soon as possible with representatives of the Natural Resource Conservation Districts, Arizona Department of Health Services, and MAG to further examine the Agricultural Advisory Group recommendation.

The Management Subcommittee, in consideration of the advisory group recommendations and subsequent discussion on the 208 Plan, recommends that the MAG 208 Draft Final Plan be approved.

208 EXECUTIVE COMMITTEE January 11, 1979

The 208 Executive Committee met to discuss the recommendations of the three advisory groups, the Management Subcommittee, as well as their own concerns on the 208 Draft Final Plan. In regard to the advisory group conditions for approval, the Executive Committee took the following action.

Technical Advisory Group - No action needed.

Citizen Advisory Group - Concurred with the actions of the Management Subcommittee.

Agricultural Advisory Group - Concurred with the actions of the Management Subcommittee.

In addition, the Executive Committee recommended that the potential for future improvement of groundwater quality through the utilization of some poor quality groundwater and irrigation drainage water by the Arizona Nuclear Power Project should be investigated in the future by the ongoing MAG 208 Program.

The Executive Committee, in consideration of the advisory group recommendations, the Management Subcommittee recommendations and subsequent discussion on the 208 Plan, recommends that the MAG 208 Draft Final Plan be approved.

RESOLUTION

BY THE MARICOPA ASSOCIATION OF GOVERNMENTS REGARDING THE AREAWIDE WASTEWATER COLLECTION AND TREATMENT PLAN FOR THE PHOENIX METROPOLITAN AREA.

WHEREAS, the Maricopa Association of Governments has been designated as the areawide water quality management planning agency by the Governor of Arizona and the Environmental Protection Agency, Region IX, and;

WHEREAS, the MAG 208 Water Quality Management Program has been initiated to identify and address water quality control problems within Maricopa County, and;

WHEREAS, the cities and towns and the County are experiencing similar and related water quality problems which require mutual action to mitigate said problems, and;

WHEREAS, water quality problems have been historically associated with inadequate sewage collection and treatment systems, and;

WHEREAS, the MAG 208 Water Quality Management Program has identified a wastewater collection and treatment plan necessary to mitigate water quality problems in specific areas of the Phoenix Metropolitan Area, and;

WHEREAS, the aforementioned identification and approval calls for construction or expansion of the following:

> Seven plants to serve the Phoenix Metropolitan area to the year 2000. The existing 90 mgd 91st Avenue plant would be expanded to 134.6 mgd to serve all service areas except Tolleson/Peoria, portions of Gilbert, Chandler, Litchfield Park, Avondale, and Goodyear which are served by their own treatment facilities.
>
> The 91st Avenue plant would be expanded by 30 mgd immediately to handle flows from the contributing service areas to between 1990 and 1995. At that point, an additional expansion would come on line to handle flows through the year 2000.

Flows from northeast Phoenix and portions of Paradise Valley would be served to the 23rd Avenue plant. Year 2000 projections are for the plant to handle 37.2 mgd.

A new major interceptor system and pump stations would be constructed to collect and carry flows to the 91st Avenue plant from Surprise, El Mirage, Youngtown, Luke AFB, Glendale, Sun City East and Phoenix to a major interceptor along 99th Avenue. The northeast area, Mesa, and the northern most portion of Gilbert would be served to 91st Avenue by the existing collection system plus a new relief interceptor along Baseline and Southern. No pumping would be required. A new interceptor system would also be required to collect and carry flows from East Mesa to the Southern Avenue interceptor.

Flows from Peoria would be collected and carried to the expanded Tolleson facility via a new interceptor along 99th Avenue. The Tolleson plant would be expanded to handle a year 2000 flow of 7.2 mgd.

Flows from Chandler would be served to the expanded plant by the existing sewer system plus new major interceptors along Pecos and Ray Roads.

Two separate collection systems would serve the major portion of the Gilbert Area, the majority of the north system to be constructed immediately and the south system to be constructed by 1990.

Flows from Litchfield Park, Avondale and Goodyear would be carried to a new facility at Reems Road via a major new interceptor from Thomas Road to the plant. A new pump station and pressure sewer would be required to lift and carry flows from Litchfield Park to the interceptor. A new lift station would also be required at Reems Road to lift flows to the plant.

NOW, THEREFORE, BE IT RESOLVED, that the Maricopa Association of Governments Regional Council, after reveiw and consideration, approveds the selection of Alternative 2 (as identified in the MAG 208 Program - Areawide Alternatives Brochure) as the wastewater treatment needs of the area over a twenty-year period with the provision for continuing study of the Northease area plant, and that the 48th Street plant, which could serve as a stimulus to the development of the Rio Salado, be given continued consideration in future 208 planning. This resolution should be forwarded to the Arizona Department of Health Services and the Environmental Protection Agency.

Passed and adopted this 1st day of November, 1978 by the Maricopa Association of Governments Regional Council.

Charles H. Salem
Chairman, MAG Regional Council

Attest

G. Kenneth Driggs
Staff Coordinator

RESOLUTION

APPROVING THE MARICOPA ASSOCIATION OF GOVERNMENTS

WATER QUALITY MANAGEMENT PLAN

WHEREAS, Public Law 92-500, Section 208, requires a water quality management planning process to be established in each area experiencing significant water quality problems, and;

WHEREAS the Maricopa Association of Governments (MAG) has been designated by the Governor of Arizona, and the U.S. Environmental Protection Agency, Region IX Administrator to prepare the Areawide Water Quality Management Plan for the Maricopa County area in accordance with the provisions of Clean Water Act (Public Laws 92-500 and 95-217) Section 208, and;

WHEREAS the MAG has developed a program designed to address the water quality problems in the MAG area consistent with the requirements set forth in Public Law 92-500 and Public Law 95-217.

NOW THEREFORE BE IT RESOLVED THAT, the Regional Council of the Maricopa Association of Governments does hereby approve the MAG Areawide Water Quality Management Plan.

AND FURTHER BE IT RESOLVED THAT, all water quality management activities conducted in the MAG area shall be in accordance with these plans.

Approved this 27th day of June 1979.

Charles H. Salem
Charles H. Salem
Chairman, MAG Regional Council

APPENDIX E

MEMORANDUM OF AGREEMENT BETWEEN THE MARICOPA ASSOCIATION
OF GOVERNMENTS AND THE ARIZONA DEPARTMENT OF HEALTH SERVICES
BUREAU OF AIR QUALITY CONTROL

MEMORANDUM OF AGREEMENT
BETWEEN
THE MARICOPA ASSOCIATION OF GOVERNMENTS
AND
THE ARIZONA DEPARTMENT OF HEALTH SERVICES
BUREAU OF AIR QUALITY CONTROL

The purpose of this memorandum of agreement between the Maricopa Association of Governments and the Arizona Department of Health Services, Bureau of Air Quality Control is to provide for integration of work plans and consistency of data and control strategies relative to the MAG 208 Areawide Waste Treatment Management Planning program and the Phoenix Air Quality Maintenance Area (AQMA) analysis and planning program.

This memorandum of agreement also satisfies the requirement of U.S. Environmental Protection Agency (EPA) Program Guidance Memorandum AM-14 dated October 30, 1975, that agencies responsible for developing 208 areawide plans "Develop letters of agreement with corresponding AQMA planning agencies to cover such items as integration of work plans and consistency of data and control strategies."

It is understood by the parties of this memorandum that:

1. The Governor, consistent with EPA requirements, has designated the Department of Health Services, through its Bureau of Air Quality Control, as the agency responsible for the AQMA programs, including the coordination of the Phoenix AQMA Task Force, the operation of the supporting Technical Operations Committee, and the revision of the State Implementation Plan (SIP) for air pollution control.

2. The Governor, consistent with EPA regulations, has designated the six Councils of Government in Arizona as the official areawide planning agencies for the purpose of preparing areawide water quality management plans.

3. The Governor has directed that the Department of Health Services, Bureau of Water Quality Control, and the Office of Economic Planning and Development cooperatively fulfill the official State Agency role in 208 water quality management planning.

It is agreed by the parties of this memorandum that:

Aspects of 208 planning and AQMA planning are interrelated, both in terms of their impact on one another and in terms of their similarities of approach. Both are concerned with maintaining environmental quality; both utilize an areawide approach in which areas of potential or existing problems are identified and a unified plan is developed for the entire area. However, when a program is designed to control pollution in just one medium, it can result in environmental deterioration in another. The goal of both AQMA and 208 planning is to improve the quality of the environment, but by focusing on the problems within a single medium, conflict may arise with the attainment and maintenance of standards in the other medium. At the same time, if care is taken to coordinate their development, the plans produced through these two programs can be mutually supportive.

In order to facilitate coordination between 208 and AQMA planning, the parties of this memorandum will:

1. Effectively coordinate the 208 and AQMA programs.

2. Relate 208 metro and non-metro areas and the AQMA boundary as much as possible.

3. Ensure that there is adequate and periodic reporting of the 208 planning agency with the corresponding AQMA planning agency including semi-annual reporting to the EPA Regional Office.

4. Jointly review 208 and AQMA plans for consistency.

5. Resolve through negotiation any conflict which may develop during the planning stage between an AQMA and a 208 area.

6. Specify in their work plans how coordination will occur throughout the planning process.

7. Integrate the MAG 208 study with the AQMA planning efforts so that the information obtained for the 208 plan is transferable to AQMA planning.

8. Have appropriate representation on 208 and AQMA advisory groups.

9. Inform the AQMA planning agency about 208 alternatives being considered, and offer them an opportunity to review and comment on alternatives. In addition, the environmental assessment associated with a 208 plan must address the impact of the alternatives and the selected plan.

The terms of this memorandum of agreement are hereby accepted.

ARIZONA DEPARTMENT OF HEALTH SERVICES

By: Ted Williams
Ted Williams

Title: Deputy Director

Address: 1740 W. Adams Street
Phoenix, Arizona 85007

Date: April 29, 1977

MARICOPA ASSOCIATION OF GOVERNMENTS

By: John J. DeBolske
John J. DeBolske

Title: Secretary

Address: 1820 West Washington St.
Phoenix, Arizona 85007

Date: May 2, 1977

ENVIRONMENTAL EFFECTS OF FACILITIES

FACILITY	ENVIRONMENTAL CATEGORY												
	[a] AIR QUALITY	[b] GEOLOGY/SOILS	[c] SURFACE WATER	GROUND WATER	[d] BIOLOGICAL RESOURCES	[e] CULTURAL RESOURCES	[f] AESTHETICS	PUBLIC HEALTH	LAND USE	POPULATION	PUBLIC FACILITIES AND SERVICES	ECONOMIC ACTIVITY	PUBLIC AND INSTITUTIONAL ACCEPTABILITY
CHANDLER	No major changes in land use and population between 208 plan and air quality nonattainment area plan (NAAP)	No known exploitable geologic materials present	2,900+ af/yr of effluent available in year 2000 Reuse: restricted agriculture Relatively small volume of additional fair quality effluent available to augment surface water supplies; a major local beneficial impact, a minor regional beneficial impact	Use of effluent for irrigation will not adversely affect local ground water, which is of higher salinity (about 2,600 TDS mg/l) than effluent. The effluent would provide a superior quality of irrigation water compared to local ground water.	Loss of 51,240 to 55,550 creosotebush-bursage habitat units; a minor regional adverse impact Loss of 1,420 to 1,650 saltbush habitat units; a minor regional adverse impact Gain of 70,200 to 75,760 cropland habitat units; a minor regional beneficial impact Gain of 191 to 205 surface acres of water; a major regional beneficial impact Gain of 930 to 3,100 creosotebush-bursage to riparian habitat units; a minor regional beneficial impact	9 mi of interceptor/collector lines in low sensitivity zone; 5.4 mi in moderate sensitivity zone; minor impact pending site survey	Nearest urban development at least 2 mi from site	Proposed reuse will eliminate effluent discharge into the publicly accessible Gila Drain; a local beneficial impact	Required site currently under lease Minimal conflict with adjacent land uses Requires 725 to 2,065 acres for effluent disposal by irrigation Supports continued farming and also proposed industrial park on reservation Wetlands created with treatment process and storage of irrigation effluent	Minimal impact	Minimal impact	Expanded plant operation will create 5 to 7 jobs Supports expanded agricultural development on Indian lands (with reuse) Plant would support proposed industrial development on Gila River Indian Reservation	Complex negotiations required to secure site and reuse agreement Opposition from the Gila River Indian Community Successful project would foster closer ties between Indians and adjacent communities Trust status of reservation lands raises complex jurisdictional questions
GILBERT	No major changes in land use and population between 208 Plan and NAAP	No known exploitable geologic materials present for either the north or south plant	2,900+ af/yr of effluent available in year 2000 Reuse: restricted agriculture Relatively small volume of additional fair quality effluent available to augment surface water supplies; a major local beneficial impact, a minor regional beneficial impact	Irrigation near supply wells at north site could significantly change local ground water quality, although effluent volume is very small compared to ground water supply; a potential local adverse impact Irrigation at south site would decrease ground water overdraft and impede easterly movement of poor quality ground water from southwest of Chandler; a potential local and regional beneficial impact	North Site Loss of 8,928 to 9,108 cropland habitat units; a minor regional adverse impact Gain of 97 to 102 acres of surface water; a major regional beneficial impact Gain of 4,400 to 11,000 cropland to riparian habitat units; a minor regional beneficial impact South Site Loss of 3,744 to 3,776 cropland habitat units; a minor regional adverse impact Gain of 32 to 33 acres of surface water, a major regional beneficial impact Gain of 2,080 to 3,200 creosotebush-bursage to riparian habitat units; a minor regional beneficial impact	19.3 mi of interceptor/collector lines in low sensitivity zone; minor impact pending site survey	Population of 210 to 250 people within 1 mi of lagoons Peripheral population expected to increase several-fold by year 2000 Potential adverse impact due to public exposure to odors and insects is expected to be mitigated by facility design and proper operation and maintenance.	Population of 210 to 250 people within 1 mi of lagoons Potential adverse impact due to public exposure to wastewater and mosquitoes is expected to be mitigated by facility design and proper operation and maintenance.	Removes 82 acres (north site) and 26 acres (south site) of prime agricultural land from production Supplies effluent for 240 acres pasture/turf irrigation (north); 80-230 acres restricted cropland needed for effluent disposal at south site North site area actively converting to urban development, and some planned uses will be displaced Existing area land use plans and zoning will require some modification	Minimal impact; some localized population shifts from that planned may occur	Reuse application supports eventual development of north site reuse area as park or golf course	North plant will create 3 to 4 jobs; south plant 2 jobs Crop value of land taken out of production is $17,312 (annually) Some displacement of currently planned industrial, commercial, and residential activity and growth in north plant area Promotes continued agricultural use of area around south site Some reduction in property values probable in north site area	Some opposition probable for north site due to possible odor episodes and loss of property values based on current development plans for the area High public acquisition costs
TOLLESON	No major changes in land use and population between 208 Plan and NAAP	No known exploitable geologic materials present	2,000+ af/yr of effluent available in year 2000 Reuse: restricted agriculture Relatively small volume of additional fair quality effluent available to augment surface water supplies; a major local beneficial impact, a minor regional beneficial impact	Public water supply of Tolleson and Cashion could be impacted by high nitrates or refractory organic compounds if nitrogen loadings in effluent applied to turf farm are too high. Relatively small volume of effluent compared to ground water supply would diminish this effect.	No apparent effect	1 mi of interceptor/collector lines in moderate sensitivity zone; 8 mi in low sensitivity zone; minor impact pending site survey	Approximately 65 people within 1 mi of site Peripheral land use not expected to change Minor local adverse impact due to good history of plant operation, undeveloped surrounding lands, and small number of people in site vicinity	Plant discharge located in a flood prone area Approximately 75 people within 1 mi of site Surrounding land use not expected to change by year 2000	Minimal local impact Availability of effluent for irrigation supports continued agricultural usage Precludes the need for near term building moratoria in communities to the north, including Peoria, Glendale, and Sun City	Permits uninterrupted planned population growth in communities to the north including Glendale, Peoria, Sun City	Peoria line will alleviate an existing critical shortage in wastewater treatment capacity in areas to the north	Expanded plant operation will create 10 jobs Promotes turf farm now operating around plant, and/or other local agricultural activity	No significant opposition anticipated
REEMS ROAD	No major changes in land use and population between 208 Plan and NAAP Minor potential inconsistency in land use along Buckeye Road interceptor corridor; not regionally significant	Gravel pit in general vicinity of reuse site; no apparent conflict with proposed facility	6,000 af/yr of effluent available in year 2000 Reuse: restricted agriculture Moderate volume of fair quality effluent available to augment irrigation water supplies; a major local beneficial impact and a moderate regional beneficial impact	Little change expected in ground water quantity or quality because of small amount of effluent compared to ground water supply Small change to ground water resource is considered a local minor adverse impact due to high water table and poor quality (TDS about 2,600 mg/l) ground water in site vicinity	Irrigation Loss of 10,368 cropland habitat units; a minor regional adverse impact Gain of 4,260 to 14,200 saltbush to riparian habitat units; a minor regional beneficial impact Gain of 187 to 198 acres of surface water; a major regional beneficial impact Infiltration/Percolation Loss of 14,688 cropland habitat units; a minor regional adverse impact Gain of 1,800 to 6,000 creosotebush-bursage to riparian habitat units; a minor regional beneficial impact Gain of 134 acres of surface water; a major regional beneficial impact	8.5 mi of interceptor/collector lines in high sensitivity zone; 1 mi in low sensitivity zone; major adverse impact pending site survey and possible mitigation measures	Approximately 15 people residing near plant (within 1 mi) Peripheral land use expected to remain the same through year 2000 Minor local adverse impact due to undeveloped surrounding lands and small number of people in site vicinity	Plant and reuse site in or adjacent to flood prone area Approximately 15 people residing near plant Potential adverse impact due to public exposure to wastewater and mosquitoes is expected to be mitigated by facility design and proper operation and maintenance.	Removes 146 acres of prime agricultural land from production for site Requires 476 to 1,297 acres of cropland for disposal of effluent by irrigation Creation of wetlands for possible recreational use associated with treatment process and storage of irrigation effluent	Minimal impact	Minimal impact	Plant operation will create 4 jobs Supports continued agricultural activity Crop value of land taken out of production is $23,360 (annually)	No significant opposition anticipated
91ST AVENUE	No major changes in land use and population between 208 Plan and NAAP. If the proposed Southern Avenue Interceptor is sized to serve eastside needs by not optimizing the existing Salt River Outfall (SRO), excess capacity in the SRO owned by the City of Phoenix could be utilized by up to 80,000 additional people in the year 2000. This is a minor potential population inconsistency, representing less than 3 percent of the year 2000 population in the metro area.	1 to 40 surface acres of potential sand and gravel resources at existing Mesa plant site available when Mesa ties into 91st Avenue plant, a locally minor beneficial impact	56,800+ af/yr of effluent available in year 2000 Reuse: energy production, agricultural irrigation, wildlife management High volume of fair quality effluent available for augmenting water supplies to meet a variety of demands; a major regional beneficial impact	Export of high volume of effluent to power plant would decrease ground water supplies in the West Basin; a major regional adverse impact Export of effluent could improve ground water quality since salts and other potential pollutants would not be added to local ground water; a major regional beneficial impact	Export of effluent to power plant will reduce discharges to Salt River, leading to loss of some vegetation in the riverbed currently supported by effluent flows. Most losses would occur in the riverbed from 91st Ave. to 115th Ave., with lesser effects in segments downstream from 115th Ave. which receive other inflow.	4 to 10 mi of interceptor/collector lines in high sensitivity zone 4 mi in moderate sensitivity zone 15.2 mi in low sensitivity zone; major adverse impact pending site surveys and possible mitigation measures	Approximately 80 people residing within 1 mi of plant Major adverse impacts associated with odors, dust, noise, and insects are expected to be mitigated with upgrading of the plant and improved operation and maintenance. Minor odor episodes may occur, however, and they would primarily affect the nearby Gila River Indian Community.	Discharge into Salt River subject to floods Approximately 80 people reside within 1 mi of plant Residents downstream and around plant complain of odor and insect problems Potential adverse effects in area due to dust and odor from sludge processing Potential odor, dust, and insect problems may affect schools, convalescent hospital, foster care center, community park, and related public facilities on Gila River Indian Community	Minor growth-inducing effects for Phoenix may occur if capacity of Salt River Outfall is not optimized in connection with Southern Avenue interceptor construction	Minor induced population growth possible in connection with possible excess capacity in Salt River Outfall	Sale of effluent to ANPP supports energy production and will help offset wastewater treatment costs.	Expanded plant operation will create 15 to 30 jobs Sale of effluent to ANPP supports utility but will reduce irrigation supplies to area farmers.	Possible strong opposition from Gila Indian Community and residents living north of plant
23RD AVENUE	No major changes in land use and population between 208 Plan and NAAP	50 to 100+ acres of operating sand and gravel concerns in Salt River bed in vicinity of discharge; no apparent conflict with proposed facility	14,600+ af/yr of effluent available in year 2000 Reuse: agricultural irrigation, energy production Moderate volume of fair quality effluent available for augmenting water supplies to meet a variety of demands; a moderate to major regional beneficial impact	When effluent is required for power plant (mid-to-late 1980's), ground water impacts similar to those for 91st Avenue would occur.	When effluent is required for power plant (mid-to-late 1980's), ground water impacts similar to those for 91st Avenue would occur.	No apparent effect	Approximately 2,600 people reside within 1 mi of plant and additional people work at commercial and industrial facilities in area Several elementary schools and County juvenile home just over a mile from the site center Major adverse impacts associated with odors, dust, noise, and insects are expected to be mitigated with upgrading of the plant and improved operation and maintenance. Minor odor episodes may occur, however.	Approximately 2,600 people reside within 1 mi of plant and additional people work in area Schools and other institutions located within 1 mi of site. Continued possible adverse health effects could result unless proposed plant modifications are implemented Potential dust and odor episodes may result from sludge processing facilities Portions of effluent delivery system may be in flood prone areas Reduced volume of discharges and improved wastewater quality will reduce current adverse effects downstream	When effluent is required for power plant (mid-to-late 1980's), agricultural land use may be affected locally by lack of reliable supply of effluent for farmer currently using effluent for irrigation.	Minimal direct impact	Sale of effluent to ANPP (mid-to-late 1980's) supports energy production and will help offset wastewater treatment costs.	Sale of effluent to ANPP supports electric utility but will reduce irrigation supplies to downstream farming operations	Possible opposition from site area residents and businesses Possible litigation from farmer currently using effluent could occur when effluent from 23rd Avenue plant is required by ANPP.

208 POINT SOURCE METRO PHOENIX STUDY

FIGURE # 4-1

NOTES

[a] Air quality impacts defined in terms of consistency or inconsistency between population data used in the air quality Nonattainment Area Plan and the MAG 208 Plan.

[b] Geological/soils impacts defined as the exclusion of sand and gravel or other valuable geological materials from extraction due to location of facilities in mineable areas.

[c] Surface water impacts shown in terms of additional surface acres of treated wastewater per year provided by a facility in the year 2000. Only increases due to expansion or new construction of facilities shown. Quality of treated effluent identified by primary reuses for each facility.

[d] Biological resources impacts shown in terms of gains or losses in terrestrial and aquatic habitat. Terrestrial habitat changes presented as habitat units, which were obtained using the following equation: Habitat Units = Acres x Field Score x Weighting Factor. Aquatic habitat changes presented as surface acres of water created by treatment or storage lagoons.

[e] Cultural resources impact potential shown as miles of proposed major sewer line traversing archaeological sensitivity zones. Zone ratings prepared by Burton, 1977.

[f] Aesthetics impact potential expressed as existing or proposed land use within 1 mile of facility, with the number of people residing in this area identified.