

**CITY OF PHOENIX  
23 RD AND 91ST AVENUE  
WASTEWATER TREATMENT PLANTS**

**DRAFT  
RESIDUALS MANAGEMENT  
FACILITY PLAN**

**VOLUME 6 - PHASE D  
EFFLUENT REUSE**

**AUGUST 1980**

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**SOUTHWEST ENGINEERS & PLANNERS, INC  
JAMES FULTON, P.E.**

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PHASE D - EFFLUENT REUSE

Southwest Engineers and Planners, Inc.  
James Fulton, P.E.

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EXECUTIVE SUMMARY

## EXECUTIVE SUMMARY

Most of the effluent from the 91st Avenue and 23rd Avenue treatment plants is committed to various reuses, but at certain times of the year, there will be effluent discharged to the river. The Multi-Cities, as part of their residuals management planning for both plants, is assessing the impact of this discharge downstream of the plants. But, as time goes on and the population increases, more and more effluent will be discharged to the river under the present reuse commitments. Therefore the MAG Water Quality Policy Advisory Committee (WQPAC) suggested that the Multi-City partners study long-term uses of the effluent. This suggestion was considered favorably by the Multi-City SROG and each City Council passed a resolution in support of the study. The WQPAC also recommended that the Tolleson effluent be included in the study and this was worked out in an agreement between Tolleson and MAG. Thus this effluent reuse study was initiated as a result of the WQPAC suggestion and approved by the SROG resolution.

In developing the scope of the reuse study some important long- and short-term problems had to be addressed. Long-term planning problems for effluent reuse is directly tied to the water resource planning and management of the Salt River Basin. Present thinking for the basin is to gradually reduce the water consumption to obtain a safe yield by the year 2025. This means that less water will be available in the basin and therefore effluent could augment the reduced water supply. To integrate effluent into the water resource planning for the basin will be a long and complex process requiring

knowledge of the water resource situation in the Valley, the water needs of the communities, negotiations with potential users, analysis of alternative means of effluent transport, analysis of potential water trades and costs.

Together with the long-term reuse problems, the study must also look at short-term solutions and their implementation to reduce or mitigate the effects of the 91st Avenue plant discharge to the river.

This effluent reuse study is the initial step in developing an effluent management plan for the 91st and 23rd Avenue plants. This feasibility-level study looks at:

- The overall resource picture in the Valley and recommended future action.
- Future wastewater flows, existing effluent reuse commitments and future effluent availability.
- Potential long-term reuse options and their implementation.
- Potential short-term solutions to problems downstream of the 91st Avenue plant.

Following is a summary of the results.

#### WATER RESOURCES IN THE SALT RIVER VALLEY

Developing an effective effluent management plan cannot be done without due regard to the overall water resource picture in the Valley. Therefore, the area's water resource picture was reviewed, the planning efforts of the

various water interests summarized, and future problems identified. Based on this review, the following observations and recommendations were made.

### Problems

The basic problem facing the Valley is that more water is being used than is being supplied. The groundwater overdraft exceeds 1,000,000 acre-feet per year. While initially the Central Arizona Project (CAP) will significantly reduce the rate of overdraft, as CAP supplies decrease, overdraft will again increase. Generally groundwater quality is good, but there are significant quality problems in some areas due to chromium, fluorides, nitrates and pesticides.

The chief water resource management problem is the lack of an agency or organization with responsibility for overall water resource planning in the Valley. Few of the major cities have a firm idea of their long-term water needs and where this water will come from.

Several other uncertainties cloud planning efforts. Settlement of Indian claims on water and how individual Indian claims impact each other are major questions. Ownership of the effluent from the treatment plants brings up another uncertainty for the future. Along with these questions is the whole area of groundwater legislation and the proposal to balance the Salt River Basin by 2025.

## Recommendation

Planning for water resources is difficult in light of these variables just discussed. But to get a handle on the situation, the consultant recommended that the communities, organizations and agencies involved work together to develop a water resource plan for the Valley.

## Implementation

Several possible agencies could implement this planning effort:

- Maricopa Association of Governments
- Arizona Water Commission
- Municipal Water Users Association
- SROG
- Phoenix
- Corps of Engineers
- Water and Power Resources Service
- Salt River Project

The agency selected should possess the needed expertise and represent the urban water consumers. The program would be initiated in July 1980 and the initial phase of the study would be complete in March 1982. The estimated cost of this study would be \$250,000 to \$500,000.

## EFFLUENT COMMITMENTS AND AVAILABILITY

To fully assess the potential for wastewater reuse from the 91st Avenue, 23rd Avenue, and Tolleson plants, the study identified: 1) wastewater flows through 2020; 2) existing effluent commitments; and 3) effluent available for reuse to the year 2020.

### Wastewater Flows

Projected wastewater flows from the three plants to the year 2020 based on projected population are as follows:

WWTP	<u>Annual Average Flow (mgd)</u>						
	1980	1985	1990	1995	2000	2010	2020
23rd Avenue	36.5	36.4	36.4	36.7	37.2	37.2	37.2
91st Avenue	90.7	102.9	113.7	124.2	137.0	176.9	217.3
Tolleson	<u>2.9</u>	<u>3.3</u>	<u>4.9</u>	<u>6.5</u>	<u>8.2</u>	<u>13.9</u>	<u>17.4</u>
TOTAL	131.1	142.6	155.0	167.4	182.4	228.0	271.9

### Existing Effluent Commitments

The following table summarizes the existing commitments, duration of contract, and the contracted amount.

---

EFFLUENT COMMITMENTS

<u>Contract</u>	<u>Contract Duration</u>	<u>Effluent Required (mgd)</u>
APS/SRP and Multi-Cities	1973-2040 <sup>1</sup>	125
USDA Lab and Phoenix	Project Inactive	1.07
AGFD and Phoenix <sup>2</sup>	Unknown	6.52
Buckeye I. C. and Phoenix	1971-2011	26.8
Roosevelt I. D. and Phoenix	1975-2000	17.9
Sod Farm and Tolleson	1977-1987	Up to 2.0

1. Or 40 years from date of last generating unit completion, whichever comes first.
2. Unofficial agreement between Arizona Game and Fish Department (AGFD) and Phoenix.

---

Effluent Available for Reuse

Based on projected flows and existing effluent commitments, the amount of effluent available for reuse from the three plants was developed through 2020, as follows:

---

AVAILABLE EFFLUENT

Year	Less Committed Effluent (mgd)	Less that Actually Used (mgd)
1980	-(49.2)	53.1
1985	-(36.7)	70.1
1990	-(22.3)	63.7
1995	-(9.9)	76.1
2000	5.1	91.1
2010	68.6	135.6
2020	139.3	207.4

---

POTENTIAL LONG-TERM REUSE OPTIONS

Potential long-term reuse options were identified and evaluated for implementation in the Salt River Valley. The following potential reuse options were developed by the consultants and the WQPAC.

- Recreation
  - Park Irrigation
  - Rio Salado
  - Golf Course Irrigation
  - Wildlife Habitat
- Industrial
  - Tumbleweed Farming
  - Grass Sod Production

- Process Water
- Cooling Water
- Construction Water
- Gravel Mining- Concrete Batching
- Salt Mining
- Petro-Chemical Processing
- Pump Storage
- Agriculture
- Municipal
  - Drinking Water
  - Residential Irrigation
  - Fire Fighting
  - Median Irrigation
  - Cemeteries
  - Joint Use System
- Miscellaneous
  - Groundwater Recharge
  - Indian Water Rights
  - Water and Wastewater Planning
  - Fish Farming

These potential reuse options were evaluated for implementability, economic feasibility, institutional and legal constraints, environmental impacts, how well the option provides additional water or reduces water consumption for the Multi-City partners, and for its potential for being implemented in the near or medium-term (1-10 years), or in the long-term (beyond 10 years). Based upon the evaluation, the best medium- and long-term options are:

---

RECOMMENDED REUSE OPTIONS

<u>Reuse Option</u>	<u>Medium Term</u>	<u>Long Term</u>
<u>Recreation</u>		
Park Irrigation		X
Rio Salado		X
Golf Course		X
Wildlife Habitat	X	X
<u>Industrial</u>		
Grass Sod	X	
Cooling Water	X	X
<u>Municipal</u>		
Drinking Water		X
Joint Use System		X
<u>Agriculture</u>		
Crops	X	X
<u>Miscellaneous</u>		
Groundwater Recharge		X
Indian Water Rights	X	X
Water/Wastewater Planning	X	X

---

## Recommendations

In reviewing the potential reuse options it became apparent that some of the options could be implemented immediately or in the very near future and others may become viable in the future with increased technology and demand for other water sources. Also, for the next 10-20 years there will be effluent discharged to the river. Therefore the consultant recommended that:

1. A program be initiated to develop in more detail the medium-term reuse options and to negotiate contracts.
2. A study be initiated to develop a long-term effluent discharge management plan for effluent from the 91st, 23rd Avenue, and Tolleson plants.
3. Any study of the long-term reuse options be postponed until completion of the water resource planning and implementation of the medium-term reuse options.

## Implementation

These recommendations result in two separate, but related efforts:

- 1) Initiation of the negotiations for additional effluent reuse, and
- 2) an effluent discharge study. For both efforts, the Multi-City SROG would be the implementing agency.

The effluent reuse negotiations would be initiated in July 1980 with an agreement by the SROG to pursue the program. A preferred effluent reuse plan would be selected in March 1981 and final reuse negotiations would

be complete in December 1981. Estimated cost of the effort is \$100,000 to \$250,000, depending on how many users are interested after each step of the negotiation effort and duration of the negotiations.

The long-term effluent discharge study would begin in July 1980 with a SROG agreement and end in December 1981 with selection of a preferred discharge plan. Estimated cost of the study would range from \$50,000 to \$150,000.

#### SHORT-TERM OPTIONS

In addition to identifying feasible long-term reuses for the effluent from the 91st and 23rd Avenue and Tolleson treatment plants, the study also identified possible solutions to mitigate problems downstream of the 91st Avenue plant.

#### Problems and Possible Solutions

Recent flooding and the planning for the 91st and 23rd Avenue plants have brought to a head the problems downstream of the plant.

- Local residents, the Flood Control District and the Gila Indians are concerned about unregulated and unmanaged effluent discharge to the river.
- A long-term effluent discharge plan as recommended in the evaluation of long-term reuse options, will have to interface with the various flood control studies and activities underway (Gila Channel Clearing,

State appropriations for levees downstream of Holly Acres, Central Arizona Water Control Study), the Game and Fish Department and State Parks Board. This could take a number of years.

- A short-term, low cost effluent discharge plan is needed immediately.
- The City must do something quickly to repair flood damage to the effluent channel at the 91st Avenue plant.

The following short-term options were identified:

- No action- Continued discharge to the north side of the river.
- Palo Verde Nuclear Generating Station (PVNGS) Pipeline- Several options exist for use of the pipeline.
  - A. Existing contract amount (30,000 acre-feet) to Buckeye Irrigation Company (BIC) with the balance to Hassayampa (70,000 acre-feet).
  - B. Increased contract amount to BIC (45,000 acre-feet) with balance to Hassayampa (55,000 acre-feet).
  - C. All of BIC needs (70,000 acre-feet) with balance to Hassayampa (30,000 acre-feet).
  - D. Increased contract amount to BIC (45,000 acre-feet) with balance to Arlington/Paloma (55,000 acre-feet).
  - E. Increased contract amount to BIC, (45,000 acre-feet), discharge to AGFD (7,000 acre-feet), and balance to Hassayampa (48,000 acre-feet).
- Channeling- Several options exist:
  - A. Concrete Channel

- B. Earthen effluent channel as part of FCDMC channel clearing
  - C. Combined earthen drainage/effluent low flow channel
  - D. Separate effluent earthen channel to 115th Avenue and combined drainage/effluent channel to the Agua Fria River.
- Miscellaneous
    - A. Additional irrigation use
    - B. Percolation ponds

### Recommendation

These short-term options were evaluated relative to cost, potential for mitigating problems, implementability, and acceptability. Based on this evaluation, the consultant recommended that the Multi-City SROG and the Flood Control District work together to implement as part of the channel clearing project, the north bank earthen channel to 115th Avenue and a combined drainage/effluent channel to the Agua Fria River.

### Implementation

The implementing agencies for this project would be the Multi-City SROG and the Flood Control District. Implementation, which would begin in May 1980, would require approval by the property owners for construction and an agreement between the SROG and Flood Control District on cost distribution for construction and maintenance. Channel construction as part of the clearing project would be complete by September 1980. Estimated construction cost is \$75,000 to \$150,000.

## PUBLIC PARTICIPATION AND PROJECT SELECTION

Unlike the other elements of the residuals management facility plan, the effluent reuse study originated out of a recommendation from the Water Quality Policy Advisory Committee. They reviewed the scope of work of the effluent discharge assessment and suggested that the Multi-Cities look at developing a plan to manage the effluent from their treatment plants. They also suggested that effluent from the Tolleson plant be included in the study. This process started in September 1979 and by early January 1980 a scope of work was approved by the Multi-City SROG. Development of the scope of work involved several meetings with Holly Acres, WQPAC and SROG.

### Alternative Development and Recommendations

Alternatives were developed and/or recommendations made in three areas in the effluent reuse study:

- Water Resources
- Long-Term Reuses
- Short-Term Solutions to the Problems Downstream of 91st Avenue

The major input from the Advisory Committee and the public was in the areas of developing long-term reuse options and possible solutions to downstream problems. The consultants developed a list of alternatives and this list was presented to the Advisory Committee for their review and suggested additional options. All of the options were analyzed by the consultants and presented again to the Advisory Committee along with

the consultants' recommendations of preferred alternatives. This procedure was carried out for both the long-term reuses and the short-term solutions and all in all there was a total of seven Advisory Committee and SROG meetings on the subject.

The Advisory Committee in reviewing the report and the recommendations concluded that:

1. An effluent channel be constructed from 91st Avenue to the confluence of the Agua Fria River.
2. The Multi-Cities proceed with marketing and contracting with potential users for use of the effluent, and
3. Because of limited funds, monies should be directed to concrete designs or construction of facilities now under consideration.

These recommendations were presented to SROG which in turn made the following recommendations:

1. Continue negotiations with the Flood Control District of Maricopa County for the construction of an effluent discharge channel and prepare detailed cost estimates for alternative channels by July 1980; and,
2. Proceed with the marketing of the effluent on a short-term basis and contracting with potential users for use of the effluent.

Neither the Advisory Committee nor the SROG recommended the initiation of the water resource study or the long-term discharge plan.

Over and above the meetings with the Advisory Committee and SROG other meetings were held to develop and review the alternatives with the Holly Acres Flood Association, Gila River Indian Community, Buckeye Irrigation Company, Arizona Public Service, Arizona Water Commission, Flood Control District of Maricopa County, U. S. Army Corps of Engineers, Water and Power Resources Service, Central Arizona Water Conservation District, and numerous other farmers and irrigation companies.

#### Other Public Participation Activities

Throughout the effluent reuse study, efforts were made to keep the media, public and interested groups informed. These efforts included summary brochures and articles in CLEAN WATER, the 208 newsletter.

In the future a public hearing on the residuals management facility plan, including the effluent reuse study will be held in Phoenix. Elected officials of each participating City and Town will serve as hearing officers.

#### EFFLUENT REUSE STUDY RECOMMENDATIONS

The recommended actions of the effluent reuse study are:

1. The Multi-Cities will continue negotiations with the Flood Control District of Maricopa County concerning an effluent channel in the riverbed and prepare detailed cost estimates of alternative channels by the end of July 1980.

2. The Multi-Cities will proceed with marketing of effluent on a short-term basis and contracting with potential users for use of the effluent.

I  
INTRODUCTION

## CHAPTER I

### INTRODUCTION

The Multi-City SROG, with Phoenix as its lead agency, is completing facility planning for expansion of the 91st Avenue Wastewater Treatment Plant, upgrade of the 23rd Avenue Wastewater Treatment Plant, and residuals management for both plants. Most of the effluent from the plants is committed to various reuses, but at certain times of the year, there will be effluent discharged to the river. Therefore, as part of the existing residuals management planning effort, the Multi-Cities in an effluent discharge assessment are assessing the impacts of this discharge to the river.

In reviewing the scope of work for the effluent discharge assessment, the MAG Water Quality Policy Advisory Committee (WQPAC) suggested that since, as the population increases, more and more effluent will be discharged to the river as time goes on, the Multi-City partners should be studying specific long-term uses for the effluent from both plants. This suggestion was looked at favorably by the City of Phoenix and its Multi-City partners, and a resolution in support of the study was developed by the SROG Committee in December 1979. The resolution was submitted to, reviewed and approved by the individual City Councils in early 1980 (See Appendix A). In addition, the WQPAC suggested that the study should consider the Tolleson effluent. This was worked out in an agreement between the City of Tolleson and MAG. This effluent reuse study (part of the residuals planning effort) was initiated as a result of the WQPAC suggestion and approved SROG resolution.

## LONG-TERM PROBLEMS AND NEEDS

Developing an effluent management plan that is implementable and meaningful to the Multi-City members cannot be done without due regard to the whole question of water resource management in the Salt River Basin.

For the past several years, people in the Salt River Valley have known they were depleting the groundwater supplies, but little has been done about it other than to declare it a critical groundwater area. This declaration stopped new irrigation wells from going in but did nothing about pumping from existing wells. In 1977, the Groundwater Management Study Commission was established with the responsibility to develop a comprehensive groundwater management code for Arizona. A draft report prepared in July 1979 stated two possible goals: either a safe yield in the basin or prolonging the life of the basin by planned depletion. Either goal would mean a reduction in groundwater pumping in the Salt River Basin. This in turn means that effluent could, by necessity, have to augment the reduced groundwater pumping.

With this increased attention to water resources, an effluent management plan must take into account the changes in the State's groundwater law, water needs of the communities, and how these two factors will affect the Salt River Basin. Because of the slow and complex nature of water resource planning, it is important that the City of Phoenix and its Multi-City partners start thinking now about how effluent can be best used to meet their long-term needs and the needs of the basin as a whole.

## SHORT-TERM PROBLEMS

Together with this long-term planning need, the existing situation downstream of the 91st Avenue plant must also be addressed. It is claimed that the effluent discharged from the plants is a source of insects in the area. It is also claimed that the effluent causes increased vegetation (particularly salt cedars) in the river which in turn increases flood water spreading. The current effluent discharge assessment prepared as part of the Residuals Management Facility Plan ("Effluent Discharge Assessment Working Paper, CDM/ABE, February 1980) identified the extent of the existing problems downstream caused by effluent discharge to the river. Although in the long-term, effluent will be discharged to the river on a planned basis and thereby reduce flows, the time frame for this is uncertain. Therefore, any effluent **reuse** study should consider means to reduce or mitigate the effects of the discharge to the river until a long-term effluent management plan can be implemented.

## SCOPE OF WORK

Developing an effluent management plan that will meet the long-term needs of the Multi-City partners involves a number of steps. These include

- Preliminary identification of local needs and effluent reuses
- Detailed development of feasible reuses
- Interface with other agency planning and water rights
- Negotiation of reuse contracts
- Implementation of effluent management plan

This effluent reuse study covers the first step in this multi-step planning process for the effluent from the 91st and 23rd Avenue wastewater treatment plants. It is a feasibility level study which identifies practical long-term reuse options and steps for their implementation, and practical short-term solutions to the immediate problems downstream and steps to implement those solutions. This report includes: 1) an overview of water resource management in the Valley and recommended action (Chapter II); 2) a summary of effluent commitments and projected effluent availability (Chapter III); 3) identification, evaluation and recommendation of potential long-term effluent reuse options (Chapter IV); 4) identification and evaluation of practical short-term reuse options and recommendation of the most feasible solution (Chapter V); and 5) a plan for implementation of study recommendations.

II  
WATER RESOURCES IN  
THE SALT RIVER VALLEY

## CHAPTER II

### WATER RESOURCES IN THE SALT RIVER VALLEY

In order to evaluate alternative reuses for the Valley's effluent, it is important to have a clear picture of the overall water resources setting of which effluent is just a part. This chapter presents a brief review of the area's water resources picture, summarizes the various water interests and their planning efforts, identifies problems which are expected to arise in water resource management in the future, and recommends future action. The specific ways in which effluent might relate to present and future problems are addressed in the evaluation of long-term effluent reuse alternatives (Chapter IV).

#### WATER RESOURCE SETTING

The fundamental water problem facing the Salt River Valley is quite simply that more water is being used than is being supplied. The overdraft of groundwater in 1975 was 1,019,000 acre-feet. Since groundwater is a limited commodity, this situation cannot continue indefinitely.

Population projections, water demand and water supply projections combine to form a picture of water shortages in the future. Table II-1 shows the Arizona Water Commission's picture of the water situation in the Salt River Valley in 1975 and the Commission's projections for the future. The figures indicate baseline conditions and assume no groundwater management plan is implemented.

Table II-1  
 PROJECTED BASELINE WATER USE AND SUPPLY  
 SALT RIVER VALLEY  
 (In 1,000 AF/YR except where noted)

LINE	ITEM	YEAR			
		1975	1990	2005	2020
1	POPULATION (in 1,000's) <sup>6/</sup>	1241	1817	2530	3395
2	HARVESTED ACRES (in 1,000's)	381	323	298	262
3	WATER USE				
4	Urban Withdrawal	446	632	840	1094
5	Urban Depletion	304	431	571	732
6	Ag. Withdrawal	2223	1873	1711	1489
7	Ag. Depletion	1465	1229	1115	960
8	Mining <sup>1/</sup>	5	6	8	9
9	Steam Electric <sup>1/</sup>	9	8	16	23
10	Fish and Wildlife <sup>1/</sup>	7	7	7	7
11	TOTAL WITHDRAWAL BY BASIN USERS (4+6+8+9+10)	2690	2526	2582	2622
12	TOTAL DEPLETION BY BASIN USERS (5+7+8+9+10)	1790	1681	1717	1731
13	WATER SUPPLY				
14	Surface Water Diverted	839	870	854	844
15	Imports <sup>2/</sup>	34	542	426	411
16	Groundwater Pumped	1750	1031	1197	1172
17	TOTAL WATER SUPPLY (14+15+16)	2623	2443	2477	2427
18	Wastewater Reused	67	83	105	195
19	TOTAL WITHDRAWAL FOR USE (17+18)	2690	2526	2582	2622
20	DISTRIBUTION OF SUPPLY				
21	Depletion by Users	1790	1681	1717	1731
22	Export <sup>3/</sup>	51	92	129	133
23	Other Losses <sup>4/</sup>	56	43	43	43
24	Groundwater Recharge from Use	726	627	588	520
25	TOTAL (21+22+23+24)	2623	2443	2477	2427
26	DEPENDABLE SUPPLY				
27	Surface Water Sources (14+15)	873	1412	1280	1255
28	Natural Recharge	5	5	5	5
29	TOTAL DEPENDABLE SUPPLY (27+28)	878	1417	1285	1260
30	OVERDRAFT (21+22+23-29)	1019	399	604	647
31	GROUNDWATER IN STORAGE <sup>5/</sup>				
	0 to 700 feet	99500	87700	80200	70800
	700 to 1200 feet	49600	49600	49600	49600
—	Dash indicates unknown or negligible value.				
<sup>1/</sup>	Depletions and withdrawals assumed equal.				
<sup>2/</sup>	All supplies imported as surface flow.				
<sup>3/</sup>	Developed freshwater and/or wastewater leaving area as surface flow.				
<sup>4/</sup>	Evaporation and evapotranspiration from return flows.				
<sup>5/</sup>	Values based on reductions from estimates of storage made about 1970.				
<sup>6/</sup>	Population total does not include persons on Indian Reservations.				

Source: Groundwater Management- Impacts of Alternatives:  
 A Report to the Groundwater Management Study  
 Commission, Arizona Water Commission,  
 December 1978.

## Population Projections

The Water Commission estimates that in 2020 the Valley's population will be 3,395,000, about 2.7 times the 1975 population. Clearly this will mean increased urban uses of water (Table II-1, Lines 4 & 5), and at the same time decreased irrigated acreage (Table II-1, Line 2). The impact of changing land use patterns on water use is not easy to assess. The Salt River Project estimates that urban acres overall use approximately 80 percent as much water as is used by farm irrigation (Interview, Teeples and Jutten). The Water Commission has used a figure of 5 acre-feet per year use for a typical subdivision of five houses per acre. This compares to an average figure of 5.4 acre-feet per year for irrigated farm land. The 1968 regional waterworks plan indicated that urban use amounts to about half of irrigated crop lands (Carollo, 1968). Urban water use depends on the use to which land is put and varies especially with industrial or high-density development. Overall, as urbanization increases, the Water Commission projects a slight decline in the amount of water withdrawn by Valley users and the amount depleted as well (Table II-1, Lines 11 & 12).

## Water Demand Projections

Table II-1 shows a water demand in 1975 of 2,690,000 acre-feet (Line 11). By the year 2020, this demand is projected to be slightly less-- 2,622,000 acre-feet. The use to which the water will be put will change dramatically in these years. In 1975, 83 percent of the withdrawal in the basin was for agricultural use. By 2020 agricultural withdrawal is expected to be down to

57 percent. At the same time urban withdrawals will go from about 17 percent of total withdrawals to about 42 percent.

### Water Supply Projections

The water supply is currently made up of a combination of surface water, imported water, groundwater and wastewater reused. The following table, based on Water Commission figures from Table II-1, shows the percentages of the total water supply contributed from each source for the years 1975, 1990 and 2020.

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Table II-2  
PERCENT OF TOTAL WATER SUPPLY FROM EACH SOURCE

Source	Year		
	1975	1990	2020
Surface Water	31%	34%	32%
Imported Water	1%	21.5%	16%
Pumped Groundwater	65%	41%	45%
Reused Wastewater	2.5%	3%	7%

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It is clear that even with Central Arizona Project (CAP) water, groundwater will continue to be an important source of water. And as years go by the percentage of the total water supply contributed by groundwater will again rise.

## Surface Water Supply

The surface water resources of the Salt River Basin are already highly developed and the supply expected in the future will not be significantly different from current supplies (Table II-1, Line 14). Watershed management practices may increase supplies somewhat, but there are no major surface water sources left to develop in the area. The quality of the surface water meets necessary standards.

## Imported Water Supply

Quantity: The Central Arizona Project is a multipurpose reclamation project designed to bring water from the Colorado River to the central areas of Arizona. Although well into construction and expected to begin deliveries in 1986, the Central Arizona Project is the subject of continuing controversy. Estimated supplies, the quality of the water to be delivered, the distribution of the water to various users, the costs and benefits and other aspects of the CAP continue to be questioned.

The Water Commission has made allocation recommendations to the Secretary of the Interior and for the purposes of this report those figures will be used when referring to CAP supplies. According to the Commission, the CAP will begin delivery at an average yearly level of about 1,500,000 acre-feet; this will decline to less than 1,000,000 acre-feet by 2035 (see Figure II-1). Based on recommended allocations, municipal and industrial users would increase their use of CAP water from 282,000 acre-feet in 1986

to 500,000 acre-feet in 2035. Indian Reservations use would begin at 257,000 acre-feet and decrease to 95,000 acre-feet. (The amounts allocated to Indian Reservations --and therefore to other users-- may change as negotiations now in progress proceed). Agriculture would use 996,000 acre-feet in 1986 and 359,000 in 2035.

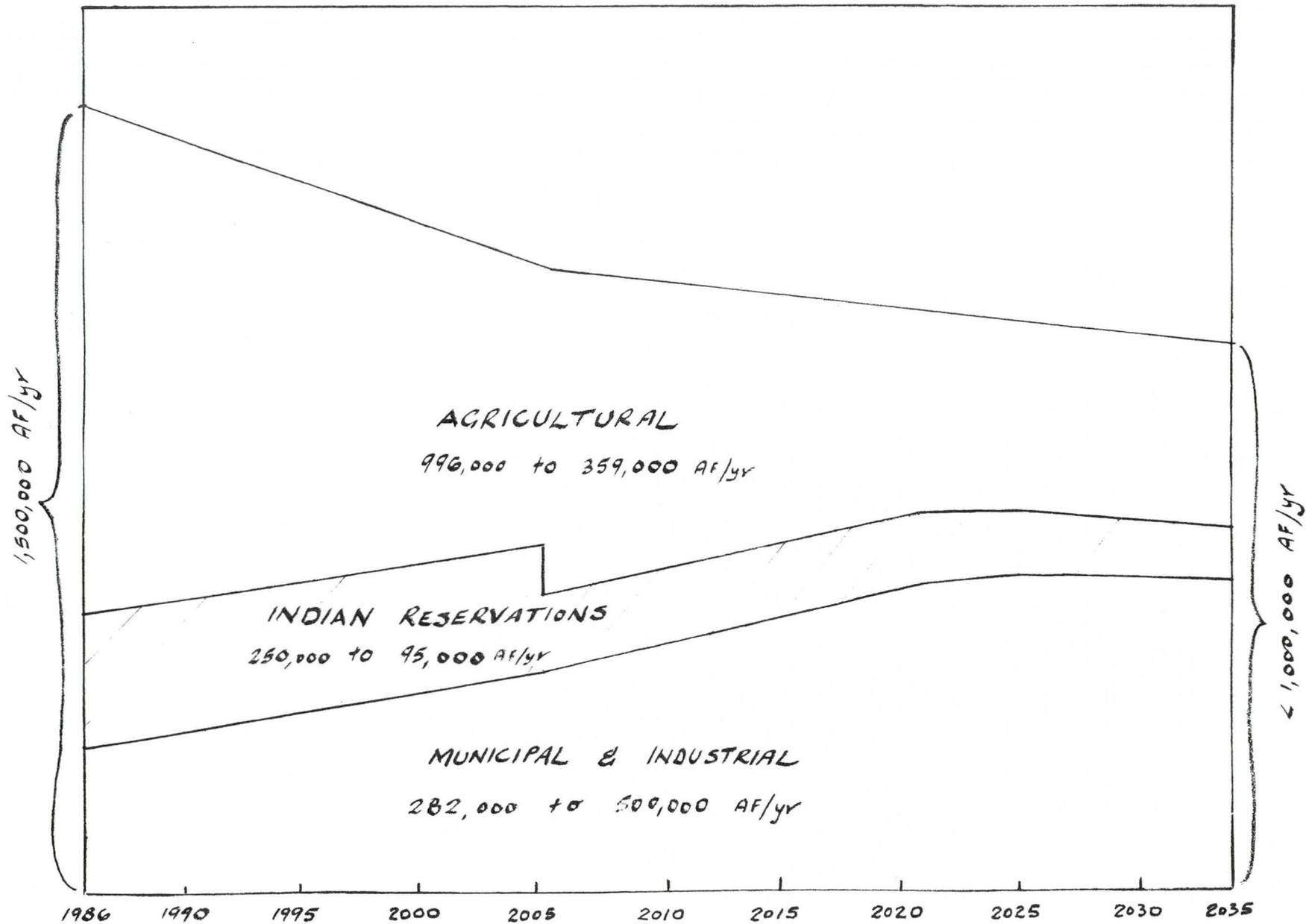
Before the recommendations were made, those water users requesting CAP water were asked by the Commission to make commitments to purchase water from the Project. The quantities allocated fall far short of the requests made. Municipal and industrial requests for 1985 totalled 592,633 acre-feet; for 2034 the total was 2,168,030. The agricultural requests totalled 3,065,783 acre-feet. Table II-3 shows the requests and recommended allocations for the five major cities in the Salt River Valley.

Table II-3

CAP REQUESTS AND RECOMMENDED ALLOCATIONS--MUNICIPALITIES

City	Requests (Acre-feet)		Recommended Allocation (Acre-feet)	
	1985	2034	1985	2034
Glendale	11,000	20,000	4,800	12,700
Mesa	6,700	42,000	6,700	15,600
Phoenix	43,000	190,000	56,000	102,000
Scottsdale	5,000	34,300	5,000	17,600
Tempe	0	5,200	0	3,400

(Source: Arizona Water Commission, November 20, 1979).



ESTIMATED AVERAGE ANNUAL DELIVERIES  
CENTRAL ARIZONA PROJECT

FIGURE II-1

There is disagreement as to how much water will be delivered by the CAP. For example, critics of the Central Arizona Project have suggested that should the very worst runoff records be matched and combined with maximum future demands, the Project might deliver a total of only 50,000 acre-feet in a year (Arizona Academy, Arizona Water: The Management of Scarcity, October 1977, p. 10). According to the Water and Power Resources Service the yearly supply could range from a minimum of 400,000 acre-feet to the 2.2 million acre-feet capacity of the system (Information Paper No. 5, Central Arizona Project, November 1978).

Quality: At the point of diversion to the CAP aqueduct, the Colorado River water will have an average salinity of about 740 mg/l. By the time it reaches Maricopa County the salinity will increase by about 10 mg/l due to evaporation. This is higher than the 300 mg/l in the Verde System and 575 mg/l in the Salt River system. It is, however, lower than about 75 percent of the groundwater presently used in Central Arizona. The groundwater in the area ranges from about 300 to 4,500 mg/l with an average salinity of about 955 mg/l. CAP water to be used for domestic purposes will have to be treated at treatment plants just as other surface water must be treated.

#### Groundwater Supply

Quantity: In 1975 there were 1,750,000 acre-feet of groundwater pumped in the Valley (Table II-1, Line 16). Natural recharge averages only 5,000 acre-feet per year. There were 726,000 acre-feet of water recharged from use. The overdraft was 1,019,000 acre-feet. With the advent of CAP

water the overdraft is expected to drop dramatically by 1990-- to 399,000 acre-feet. Thereafter, as CAP deliveries decline, the overdraft will build again until in 2020 it is expected to amount to 647,000 acre-feet (Table II-1, Line 30).

According to the MAG 208 Final Plan, the groundwater decline in the Salt River Valley averages 1.8 feet per year. Since 1923 groundwater declines have ranged from less than 50 feet (at the Salt and Gila Rivers) to more than 420 feet (near Queen Creek). In the metro area the decline has been 150 to 200 feet (Final Plan, p. IV-20).

The annual overdraft creates three major problems. The Salt River Valley stands to incur 1) deteriorating quality of groundwater in some areas 2) land subsidence or earth fissures in some overdraft areas, and 3) increased costs of pumping the water. In addition the legal and institutional problems involved in the use, distribution and management of the groundwater represent substantial time and money investments.

Quality: In addition to the problems of quantity, there are also substantial groundwater quality problems facing the Valley. The MAG 208 Final Plan summarizes the quality problems:

"In summary, the major groundwater quality problems at present in the Salt River Valley are increasing salinity in two areas and high contents of salinity, chromium, arsenic, nitrate and fluoride in some parts of the Valley. High salinity adversely affects the usefulness of the water for agricultural, municipal

and industrial uses. The other factors affect health and meeting water quality standards may result in expensive treatment, blending with higher quality water, or abandonment of the source for drinking water purposes... high contents of chromium and arsenic are found in Paradise Valley and salinity is increasing near Gilbert (due to irrigation return flow) and near Chandler (due to altered groundwater flow pattern)... there are high nitrate contents in Glendale and west and northwest of Phoenix, high fluoride contents west of the Agua Fria River and increasing salinity in the Goodyear-Liberty area (due to altered groundwater flow)."

(Page IV-24)

Recently groundwater quality concerns have begun to focus on organic pollutants. Leaching from landfills is being looked into, petroleum products have been found in wells, and the pesticide DBCP has been found in wells in Chandler Heights and Glendale.

#### Effluent Supply

The fourth component of water supply is reused wastewater. A discussion of the expected quantities and possible qualities of effluent is presented in Chapter III.

## WATER INTERESTS AND WATER PLANNING IN THE VALLEY

This section of the chapter reviews and updates information on "who-wants-what" from the Valley's water supply. The consultants interviewed major current or potential water users in the Valley. The following pages summarize current planning for and expected demands on the water resources by the county, cities, special districts, Indians, state agencies, and federal agencies.

### Maricopa County

The county is not responsible for the provision of water or for wastewater treatment. Through its health department the county does engage in monitoring water quality. Its primary involvement in water resources is through a comprehensive flood control program administered and operated by the Flood Control District. The Flood Control District of Maricopa County is a separate political subdivision with its own powers to impose property taxes. Administration of the District is by a Board of Directors who also are the County Commissioners. State funded flood control projects for Maricopa County are administered by the District.

### Maricopa Association of Governments

In 1968 a comprehensive report entitled "Waterworks Report for the Valley Metropolitan Area of Phoenix, Arizona" was presented to the Maricopa Association of Governments in accordance with a contract with the City of

Phoenix. The report covered past events in Valley water development, urban expansion and population growth, water resources in the Valley, water uses in the area, and waterworks at that time and for the future to the year 2000. This regional plan, now 12 years old, concluded:

"...water management ought to center on perpetuation of both urban and agricultural elements of the Valley Metropolitan Study Area through a discipline creating a water surplus or at least eliminating depletion of the water resources." (page vii)

The report warns against treating the groundwater as though it were "inexhaustible" and asserts that "the pump draft should be balanced to equal recharge" (page v). In the area of management of water resources, the report suggests creation of some kind of joint organization to manage water (page vii).

The Maricopa Association of Governments is currently engaged in a Groundwater Monitoring Program "designed to provide the knowledge that is necessary to make sound groundwater management decisions " (MAG, November 1979, p. 15). The program will include collection of hydro-geologic data and water quality data. The objectives of the monitoring program are 1) "To broaden the understanding and knowledge regarding quality conditions in Maricopa County" and 2) "To establish correlations between potential sources of groundwater pollution and the underlying and downgradient groundwater quality " (MAG, November 1979, p. 3). The study will focus on quality and complement the AWC groundwater study which is more involved with quantity.

## Municipalities

For the limited scope of this study a review of the water resource problems of all 17 incorporated communities in the area was unnecessary. Interviews were conducted with water administration officials in the five major cities. Updated information for those five cities follows. For further information as to water problems and goals in other parts of the area, refer to a report titled Water and Water Related Programs and Goals which was done for the Corps of Engineers as part of the Phoenix Urban Study in December 1976. The following statement from that report appears valid today:

"The community water and water-related programs...are service oriented rather than resource oriented. The communities... do not have all encompassing water resource management programs, although several of the communities are engaged in the long-term planning for capital improvements. Priorities for community water and water-related programs are established on the basis of community-wide need. Since most community programs are service oriented, greater priorities are usually given to the provision of essential services rather than to the conservation of resources. Such priorities are often established at the expense of resource conservation, even though the resource being conserved (e.g., water) is vital to the continued provision of essential services." (p. 13)

## Phoenix

The City of Phoenix uses 233,138 acre-feet of water per year. On the average 30 percent comes from wells and 70 percent is provided by the Salt River Project system. In 1978 SRP provided the City with 140,692 acre-feet of water. The recommended allocation of CAP water will be far short of the City's requests for use in 2034. The major quantity problems for the future will lie in the areas of the City which are not served by the SRP. As the north and south areas grow, water will have to be supplied by off-Project wells or by gate water. Areas served by SRP are expected to have adequate supplies of water.

A few wells have been shut off due to nitrate or chromium content though on the whole the quality of water does not seem to be a major concern. There are seven wells with high nitrates and the State Bureau of Water Quality Control is working out a schedule for compliance with standards. The City has a water plan from 1968/69; it was updated in 1973.

## Tempe

The City of Tempe's peak water use is currently about 41,000 acre-feet per year. Wells provide 12,500 acre-feet. In 1978 SRP provided the City with 21,640 acre-feet of water. The recommended allocation for CAP water is lower than the City's request but about 90 percent of Tempe is within the SRP service area and the City has rights to more than 110,000 acre-feet of SRP water at the Tempe Canal. Tempe has no concern regarding

adequacy of future supplies. There are no major problems with the quality of the water either. One well is on the border of nitrate problems and there is some hardness in the water. The City has a water plan several years old.

#### Glendale

All of Glendale's water currently comes from wells though a new treatment plant will treat SRP water. In 1978 SRP delivered 12,629 acre-feet of water to Glendale. The CAP recommended allocations are substantially lower than the City's requests for CAP water.

The City's quality problems have been recently noted in the Arizona Republic. High nitrates have forced the City to obtain an exemption to nitrate regulations; the state nitrate limit is 10 mg/l and some Glendale wells have close to 20 mg/l. The permit requires the City to discontinue use of high nitrate wells by July 31, 1980, following completion of the water plant (Republic, 2-22-80, p. B2). Wells closed due to DBCP contamination further reduced the supply of water to the City.

Some general water planning is undertaken jointly with the City of Phoenix.

#### Scottsdale

The residents of Scottsdale are served by both the City of Scottsdale and the City of Phoenix. The City of Phoenix serves about 40 percent of

Scottsdale; its source of water is SRP surface water and wells. The City of Scottsdale serves about 42,000 people from SRP and municipal wells. In 1978, SRP provided Scottsdale with 2,392 acre-feet of water. The City's recommended CAP allocation for 2034 is about half of its request. Preliminary work has begun for a water treatment plant to treat CAP water.

There are some quality problems in Scottsdale's water supply. Some wells have hexavalent chromium and fluoride contents (FMS/STR, December 1976). The City of Scottsdale does not have a water plan.

#### Mesa

About half of Mesa's water comes from wells. The rest is supplied by SRP which delivered 16,107 acre-feet of water to Mesa in 1978. The CAP recommended allocation for 2034 is about 38 percent of its request for water.

Mesa has lost one well through DBCP pollution. There are groundwater problems in the east Mesa area. Some water sources are high in fluoride and total dissolved solids (FMS/STR, December 1976). Mesa has a water plan which was updated in the winter of 1979.

#### Tolleson

All of Tolleson's water comes from three wells and at present they have a capacity three times greater than the demand. Quality of the water is good.

The City has recently acquired a fourth well which has a capacity of about 3,000 gallons per minute.

Tolleson is in a similar position as Tempe in that its expansion is limited by the surrounding communities. On this basis Tolleson has adequate water for its future growth and is not looking to trade its effluent for water.

#### Municipal Water Users Association

In 1969 the Cities of Mesa, Phoenix and Scottsdale joined together in the Municipal Water Users Association. Tempe and Glendale have since joined this group whose purpose is education for the Cities with regard to water and lobbying for the members' water interests. The Association negotiates water contracts with SRP and negotiated the settlement between the City of Phoenix and SRP on the question of ownership of effluent. The Association is an information clearing house for the Cities and most recently has been represented on the Groundwater Management Study Commission.

#### Irrigation Districts

There are 16 irrigation districts in Maricopa County. Eleven of these get all of their water from groundwater sources; four more get some water from wells; one district gets all its water from the Salt River Project. One district (Buckeye Irrigation District) currently uses effluent as part of its water. Ten of the districts requested CAP water and have received

recommended allocations from the Water Commission. The total requests were for 1,146,862 acre-feet. The total recommended allocations for 1985 were 395,289 acre-feet. This would decrease to 188,843 in 2005 and to 135,866 acre-feet in 2034. Table II-4 shows the requests and recommended allocations by irrigation districts.

Table II-5 shows the irrigation districts in the county; their location, amount of water use, sources of water, the acres irrigated and crops generally grown.

### Salt River Project

The Salt River Project began in 1903 as the nation's first multipurpose reclamation project and has been the mainstay of the Valley's water supply throughout this century. The Project is two entities: the Salt River Water Users' Association, a private Arizona corporation; and the Salt River Project Agricultural Improvement and Power District, a special district and political subdivision of the State. The Salt River Project provides power to a 2,900 square mile area and provides water in a 250,000-acre service area. Electric revenues are used to help support the water operations in order to keep water delivery costs at a reasonable level. Table II-6 (information taken from SRP's 1978 annual report) shows the total amount of water delivered in 1978 by SRP, to whom it was delivered and where it came from in SRP's system.

Table II-4  
IRRIGATION DISTRICTS AND CAP

District	Requests for CAP Agricultural Water (Acre-feet)	Recommended Allocation (Acre-feet)		
		1985	2005	2034
Buckeye (Withdrew its CAP request)				
Chandler Heights	7,500	2,837	1,304	775
Harquahala Valley	165,000	76,861	39,579	29,361
MC MWCD	139,400	46,104	15,546	10,677
McMicken	138,000	79,981	41,035	30,274
New Magna	152,412	43,525	22,413	16,627
New State	-	-	-	-
Ocotillo	-	-	-	-
Queen Creek	117,180	47,796	24,345	17,074
Rainbow Valley	-	-	-	-
Roosevelt I.D.	145,000	9,188	606	444
Roosevelt W.C.D.	123,087	61,086	29,642	19,972
San Tan	19,283	8,042	4,141	3,072
St. Johns	-	-	-	-
Tonopah	140,000	19,869	10,232	7,590
Western Meadows	-	-	-	-
	<hr/>	<hr/>	<hr/>	<hr/>
	1,146,862	395,289	188,843	135,866

Source: Arizona Water Commission, November 20, 1979

Table II-5  
IRRIGATION DISTRICTS

Irrigation District	Location	Amount of Water Delivered	Source of Water	Miscellaneous Information	Acres Irrigated	Crops Grown	Cost of Water
Buckeye	North of Gila River- up to Roosevelt I.D.- Liberty to Hassayampa River.	1975 140,008 ac-ft. total 1979 pumped 47,610	30,000 ac-ft./yr. effluent contract (using 70,000) 65,337 ac-ft. groundwater-some SRP	Water rights from Benson-Allison	18,000	Cotton, alfalfa, grains	Summer 1978 \$4.75/ac.-ft.
Chandler Heights Citrus Irrigation Dist.	S. of Queen Creek on Pinal Co. line	June '76-June '77 5,876 ac.-ft. for irrigation 15 million gal. for domestic & community	All groundwater		1,250	Primarily citrus, some grapes, pasture	1978 \$25/ac.-ft.
Harquahala Valley I.D.	Far western part of county	Estimated 104,000 ac.-ft./yr. might be up to 168,000 ac.-ft./yr.	All groundwater	All private wells	33,400(1969)	Primarily cotton, wheat, safflower, fruit, alfalfa, vegetables	
Maricopa County Municipal Water Conservation District	West of El Mirage Peoria/Agua Fria	1977 47,930 ac.-ft.	31,436 AF pumped 16,495 AF Waddell Dam	Dam capacity of 157,590 ac. ft. Water rights for 188,000 ac.-ft. from Agua Fria River	Serves 33,666 ac. in 1977, 22,892 ac. irrigated	Cotton is major crop	1978 \$12/ac.-ft.
McMicken I.D.	Around Luke AFB/ Peoria	Estimated 155,000 ac.-ft./yr.	All groundwater	All ditches or wells privately owned	31,266 ac. in 1974	Cotton, barley, citrus and vegetables	
New Magna I.D. (Almost all in Pinal County)	In Pinal County & N. to Queen Creek	1969 86,000 ac.-ft. pumped	All groundwater	All private wells	15,000 ac. "cropped" in 1969		
New State I.D. & Drainage District	S. of Tolleson on Salt River	1977 5,138 ac.-ft.	From SRVWUA	Water rights under Benson-Allison Decree	2,377 ac.	Cotton	

Irrigation District	Location	Amount of Water Delivered	Source of Water	Miscellaneous Information	Acres Irrigated	Crops Grown	Cost of Water
Ocotillo Water Conservation District	S. of Chandler to County line		All groundwater	Bogle Farms, Sunlakes owns all this; all private wells canals or laterals		Cotton, alfalfa, wheat, barley, milo, safflower	
Queen Creek I.D.	Near Williams AFB, Queen Creek		Groundwater	All wells and ditches privately owned	About 23,000 ac.	Potatoes, cotton, alfalfa, grapes, citrus	
Rainbow Valley I.D.	NE of Gila Bend, W. of Gila Reservation	1969 55,000 ac.-ft.	Groundwater	Privately owned wells	17,000 ac.	Cotton, grains, alfalfa, citrus, beets, cucumbers	
Roosevelt I.D.	N. of Gila from Avondale to Hassayampa-N. of Buckeye I.D.	Average for 1967-1977 152,000 ac.-ft.	Groundwater	Pumps from waterlogged area near Tolleson (on SRP lands)	32-35,000 ac. cropped		\$13.50/ac.-ft.
Roosevelt Water Conservation District	East of Chandler & Mesa from N. of Mesa to Pinal Co. line	125-135,000 ac.-ft./yr. Deliveries	30% Salt-Verde System 70% pumped		about 37,000 ac.		\$18/ac.-ft.
San Tan I.D.	Near Queen Creek along County line	10,000 ac.-ft./yr.	All groundwater		3,185 ac.	Citrus, cotton, potatoes	\$30/ac.-ft.
St. Johns I.D.	Along confluence of Salt & Gila Rivers		9,400 ac.-ft. from SRP One well supplements	Water rights under Benson-Allison Decree for 1,593 ac.	2,000 ac.		About \$4/ac.-ft. or \$16/ac.-ft. from SRP pumps
Tonopah I.D.	North of Tonopah 40 mi. w of Phoenix		Groundwater	Private wells only	16,000 ac.	Cotton, alfalfa, some wheat and safflower	
Western Meadows I.D.	Between Skunk Creek & I 17		Groundwater	280 Acres in whole dist.		Pasture, some lawns	

Source: Arizona Water Commission, Water Service Organizations in Arizona, August 1978.

Table II-6  
SRP WATER SOURCE AND USE

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Sources of Water for Deliveries	1,050,647 AF
Gravity Supply	977,988
Groundwater (SRP pumped)	66,747
Groundwater (pumped by others)	5,912
Use of Water	
Agricultural	400,707 AF
Urban	
City domestic	198,228
Subdivision irrigation	49,615
Other non-agricultural irrigation	43,706
Decreed deliveries	43,052
Contract deliveries	127,195
Seepage and evapotranspiration	188,144

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This water is supplied from a system of dams with a capacity of 2,063,948 acre-feet, plus 248 deep wells. In 1978 deliveries from the lakes accounted for 93.3 percent of the water delivered. Over a 30-year period, the average delivery from lakes is about 65 percent.

The Salt River Project has contracts with eight cities to deliver water. In 1978 SRP delivered the following amounts to the cities:

Phoenix	140,692 AF
Tempe	21,640
Glendale	12,629
Mesa	16,107
Scottsdale	2,392
Chandler	1,963
Peoria	1,096
Gilbert	1,709

The City of Phoenix has a 25 year contract with SRP; the other cities have annual contracts. SRP also has contracts or agreements with several irrigation districts in the area: Buckeye, St. Johns, Roosevelt Water Conservation District and Roosevelt Irrigation District. These agreements were developed based upon court decrees, drainage needs or water savings from canal lining.

The Salt River Project's planning operations are limited, of course, to their water service area. There is a 1977 water supply and demand study being updated this year. Project officials expect resources will be adequate to meet the future demand for water from SRP.

#### Central Arizona Water Conservation District

The Central Arizona Water Conservation District was created as a special district for the purpose of providing a mechanism for repayment of Central Arizona Project costs to the U. S. Government. The District has the power

to levy taxes, subcontract with water users for CAP water and repay the federal government. The District has a 15-member board (one member from Pinal County, four from Pima County, and the remaining 10 from Maricopa County) which has recently indicated they want to have responsibility for physical operation of the Project. However, to do so would require additional legislation to broaden its existing authority.

### Indians

There are currently 12 Gila River Basin Indian Tribes involved in some stage of discussion over the amount of water to which they are entitled. The Camp Verde, Fort Apache, Fort McDowell, Payson, Salt River, San Carlos Apache and Yavapai Prescott Indians each make claims on the Salt River. Each Tribe has its own view of the matter and each makes its own demands on the water supply. This makes a general summary of the situation difficult at best. The unsettled state of Indian water claims muddies the water picture for the entire Valley.

The Indians base their claims to water on one or more of three general premises depending on the individual Tribe. First is a claim to an aboriginal right-- this is a claim that the Indians used the water before the coming of the white man and therefore have a continuing right to the water. Second is a claim based on what is known as the Winters Doctrine-- this is a holding that the creation of the reservations included a right to water for the reservation. Finally there are claims based on Arizona

vs. California-- this claim is seen as an extension of the Winters Doctrine and established the magnitude of water rights. In general the Indians are interested in a firm water supply and protection against overdrafts on the Reservations. They do not necessarily care where the water comes from (that is whether it comes from the CAP or a river, etc.) as long as it meets those conditions.

The U. S. Department of Interior is trying to get the water claims settled as soon as possible in order to clear the way for final settlements of CAP allocations. The government is encouraging negotiations as opposed to litigation. The Salt River Indians have filed suit concerning the CAP allocations and were, until recently, negotiating water claims with the Salt River Project. The Community's attorney has indicated that a suit may be filed to enjoin the cities from further pumping of water west of the Salt River and that they will "sue the city for using our effluent " (Interview by phone, March 18, 1980). The Salt River Indians maintain they have a first claim on the water of the Salt River. The Gila River Tribe has also filed a suit concerning CAP allocations and is currently engaged in negotiations for water.

The various negotiations are being conducted separately and no one agency or organization appears to have a complete picture of the extent of the Indian claims nor of the potential meaning of the claims. The total claims being made on waters of Arizona exceed the total available water plus all of the CAP water. Until these claims are settled water resource planning is seriously hampered. The final settlements of the claims will

obviously have a very great impact on the development of the entire Valley.

### Arizona State Agencies

Several state agencies have varying degrees of impact on the water resource situation in the Valley. The activities of these agencies are briefly highlighted here.

#### Arizona Water Commission

The Arizona Water Commission (AWC) is currently involved in a long-term effort to establish a State Water Plan. To the extent that the Plan results in statewide policies being adopted, the Salt River Valley will of course feel the impact. The Commission has provided studies for the Groundwater Management Study Commission and for the Central Arizona Water Conservation District. The Commission has also made recommended municipal, industrial and agricultural allocations for CAP water. These allocations will obviously be an important factor in water resource planning for all the governments in the Valley. The information collected in the course of these studies is of course valuable to local planning.

One major AWC program is specifically concerned with the Salt River Valley. In conjunction with SRP, irrigation districts and the Municipal Water Users Association, AWC is developing a groundwater computer model. As part of the model calibration an intensive inventory of groundwater resources is being completed.

objectives of the project are to:

1. Develop a computerized groundwater model of the entire Phoenix metropolitan area and provide copies of it to local planning agencies for use in planning and managing their groundwater supplies.
2. Determine the amount, availability and quality of groundwater in the aquifers in the Salt River Valley through new data collection efforts and analysis of all available data.
3. Establish a centralized groundwater data file (AWC, Ninth Annual Report, 1978-79, P. 11).

This report and the model (expected to be developed by the end of June 1980) will be a basic planning tool for the agencies involved in water planning. As the study progresses the participants are kept informed through progress reports and meetings of technical and managerial staff. Hopefully this will lead to more coordinated efforts in water planning, but at the moment there are no specific plans to actually use the model once it is calibrated.

#### Arizona Game and Fish Department

The Arizona Game and Fish Department is involved in collecting water quality data on lakes and rivers in the State. The Department administers several wildlife areas along the Salt and Gila Rivers. Downstream of the 91st Avenue treatment plant is the Base and Meridian Wildlife Area

which uses effluent from the plant. In the Buckeye area are three more wildlife areas which use return flow from agriculture.

Currently being discussed at the Game and Fish Department is a proposal for a multi-agency effluent reuse system. The concept is in the very early stages of development and will be subject to review and comment by many agencies and interests before detailed planning takes place. As envisioned at this point effluent would be used in the development of a wildlife, birding area which would include several small retention dams with spillways. The effluent a few miles downstream from the 91st Avenue plant is expected to be of good quality and lower salinity than water now there. The concept might include recharge of groundwater and pumping from the channel.

Bureau of Water Quality Control, Department of Health Services

The Bureau of Water Quality Control has two major functions: water supply monitoring and water pollution control. Federal legislation in both areas has caused rapid growth in the Bureau's work load and staff in recent years. The Bureau monitors water quality, reviews construction plans for water and wastewater facilities, inspects those facilities, and enforces regulations regarding water.

One of the Bureau's recent major efforts centers on the Safe Drinking Water Act, federal legislation which mandates minimum water quality standards and

requires drinking water regulation to assure public health. Prior to October 1979 the Bureau's program involved largely voluntary compliance with standards. A survey of compliance under this program revealed about five percent compliance. Following this survey an aggressive compliance program was initiated. New regulations are mandatory and have specific quality and monitoring requirements. New standards will probably be developed aimed at regulation of organic contaminants uncovered during increased monitoring efforts. It is anticipated that wells will be closed for non-compliance, thus reducing the total water supply.

#### Groundwater Management Study Commission

In 1977 the legislature established the Groundwater Management Study Commission and gave it the formidable task of developing a groundwater management law for the State. Since that time the 25-member Commission has been working to draft legislation. The task was to have been completed by December 1979 but at this writing is still in process. Once the Commission finishes the draft, the legislature has until September 1981 to act; if the legislature does not act the Commission's work will become law.

The legislation currently being drafted would create a State Department of Water Resources whose director would be appointed by the Governor. The legislation would establish Active Management Areas (AMAs) which would be subject to strict water controls. Initially there would be four AMAs-- including the Salt River Valley. The goal for the Salt River Valley AMA would be to achieve a balance between water use and water replenishment.

Conservation measures would be imposed on urban as well as agricultural areas. In the urban area the effort would be to reduce water use from 220 gallons per capita per day to 150 gallons per capita per day.

This legislation has the potential for imposing areawide water goals and water plans on the Salt River Valley. There would be local advisory boards for AMAs which would report to the director but the director would have final authority in water resource management.

#### Federal Agencies

The principal Federal agencies involved in planning for water resources in the Salt River Valley are the U. S. Geological Survey, the U. S. Army Corps of Engineers and the U. S. Water and Power Resources Service (formerly the Bureau of Reclamation).

#### U. S. Geological Survey (USGS)

The Southwest Alluvial Basin (SWAB) Study is currently being conducted by the U.S.G.S. as part of a nationwide effort to study groundwater resources. The objectives of the study are: 1) to define the groundwater resources of the area which includes all of southern Arizona; 2) to describe the present level of development of the groundwater and surface water resources of the basins; and 3) to provide management tools so that alternative development strategies can be evaluated on a regional basis. The study began in October 1978 and is scheduled to take four years.

Preliminary work has been done and the project is into Phase II which involves developing models of selected groundwater basins and looking for trends in basin areas.

In addition to the SWAB study, U.S.G.S. is involved in a study of urban storm runoff. The historic data collection has been done and the data entered into the computer. The current phase of this study involves further data collection. U.S.G.S. is also involved in preparing inundation maps for flood reports and has some involvement in establishing a flood warning system.

Water and Power Resources Service and Army Corps of Engineers

The major function of WPRS in the Salt River Valley is the planning and execution of the Central Arizona Project. This agency, formerly known as the Bureau of Reclamation, is responsible for building the CAP and will operate the project until such time as a local organization expresses interest in operating it and shows its capability to operate it.

The Central Arizona Water Control Study currently underway is being conducted by WPRS, assisted by the U. S. Army Corps of Engineers. The study is an effort "to provide consensus on what should be done to solve Central Arizona's water problems. The study will examine all reasonable alternatives, including Orme Dam, and will consider both regulatory storage and flood control " (CAWCS, Newsletter 1, July 1979). With its long history of involvement in flood control studies and projects in the

Valley, the Army Corps of Engineers will take responsibility for the flood control aspects of the study.

#### CONCLUSIONS AND RECOMMENDATION

The following observations and conclusions can be made concerning water resources in the Salt River Valley:

- There is an existing groundwater overdraft of about one million acre-feet per year in the Valley. The CAP water will initially, significantly reduce the overdraft but as CAP supplies decrease, the overdraft will again increase.
- Although the quality of groundwater in the Valley is generally good, there are substantial quality problems in some areas due to nitrates, chromium, pesticides and fluorides. The Bureau of Water Quality Control is stepping up its monitoring program and more wells are likely to be closed.
- The proposed groundwater legislation calls for a safe yield by 2025 and the establishment of an active management area for the Valley. However, surface water is not covered in the proposal.
- At present there is no agency or organization responsible for overall water resource planning for the Valley. The only planning done by the Cities is for providing services to the expanding urban area.

- Few of the major cities have a firm idea of their long-term water needs and where this water will come from. How any proposed municipal conservation program will affect these needs is not known.
- What the final settlement will be with the Indians on their water claims and how these claims will impact the available supply to the communities is still a big question. It is also not clear, in these Indian negotiations, if the negotiators know what proposals are being presented in the different negotiations and how they would impact each other in the total water resource picture.
- Another possible cloud on the horizon is the ownership of the effluent from the treatment plants. The Indians as part of their claim for SRP water, are saying that any effluent generated from SRP also belongs to them. A similar question on ownership also arises on the effluent from CAP water. It is possible that the effluent could be claimed by the Department of the Interior for further distribution.

Planning is at best a difficult process, but in the case of water resources in the Salt River Valley it is more difficult than normal due to the large number of variables discussed above. However, something must be done to get a handle on the situation. Therefore, it is recommended that:

"The communities, agencies and organizations involved work together to develop a water resource plan for the Salt River Valley."

Details of the scope, content, timing and management agency for this plan is contained in Chapter VI IMPLEMENTATION.

III  
EFFLUENT AVAILABILITY  
AND COMMITMENTS

CHAPTER III  
EFFLUENT AVAILABILITY AND COMMITMENTS

In order to fully assess the potential for wastewater reuse from the 91st Avenue and 23rd Avenue treatment plants, it is necessary to know the amount of effluent generated and the existing commitments and how long they last. This chapter identifies 1) wastewater flows through 2020 based on projected population, 2) existing effluent commitments, and 3) current and projected availability of effluent for reuse.

PROJECTED POPULATION

Populations by treatment plant service area were projected in 10-year increments through 2020 based on Arizona Department of Economic Security (DES) and Arizona Water Commission population projections and are shown in Table III-1.

PROJECTED WASTEWATER FLOWS

As part of their facility planning for 91st and 23rd Avenue wastewater treatment plants, Greeley and Hansen with John Carollo Engineers (GH/JCE) developed future wastewater flow projections. These projections, summarized in Table III-2, were based upon Maricopa Association of Governments (MAG) 208 planning, through the year 2000. The flows for 2010 and 2020 were extrapolated using the DES population projections. The flows for the Tolleson plant came from the City of Tolleson Wastewater Treatment Facility Plan, 1980, by Brown and Caldwell.

Table III-1  
PROJECTED POPULATION BY TREATMENT PLANT SERVICE AREA

Treatment Facility	1980	1985	1990	1995	2000	2010*	2020*
<u>91st AVENUE</u>							
El Mirage	4,124	4,744	5,260	5,776	6,188	8,920	10,780
Gilbert	970	1,330	2,230	3,130	4,095	6,500	9,230
Glendale	78,232	94,642	110,755	126,966	145,004	215,780	265,000
Guadalupe	4,500	5,000	6,000	6,900	8,000	10,480	12,450
Luke AFB	4,900	5,000	5,000	5,000	5,000	5,000	5,000
Mesa (Includes East Mesa)	162,777	189,605	213,799	237,880	265,144	339,310	396,155
Paradise Valley	6,830	7,933	8,088	8,342	8,692	11,138	13,230
Phoenix	399,469	458,004	527,570	596,197	675,958	799,170	1,018,670
Scottsdale	84,500	92,700	96,600	100,700	106,400	126,380	133,600
Sun City	40,192	47,817	48,310	48,439	48,755	49,204	49,660
Surprise	3,602	3,702	4,701	5,702	6,800	9,860	11,710
Tempe	126,800	162,700	168,600	175,100	184,000	220,080	240,850
Youngtown	2,000	2,000	2,000	2,100	2,200	2,770	2,930
Subtotal	918,896	1,075,177	1,198,913	1,322,232	1,466,236	1,804,592	2,169,265
<u>23rd AVENUE</u>							
Paradise Valley	6,670	7,867	8,112	8,358	8,708	10,850	13,250
Phoenix	340,880	342,908	346,788	354,292	363,842	460,130	529,434
Subtotal	347,550	350,775	354,900	362,650	372,550	470,980	542,684
<u>TOLLESON</u>							
Tolleson	4,085	4,675	9,350	14,000	18,900	29,590	38,430
Peoria	18,008	20,432	33,691	46,933	61,067	109,120	136,160
Subtotal	22,093	25,107	43,041	60,933	79,967	138,710	174,590

\*Arizona Water Commission-- Projected Population by Municipal Planning Area

Table III-2  
PROJECTED WASTEWATER FLOWS

Wastewater Treatment Plant	<u>Annual Average Flows, mgd</u>						
	1980	1985	1990	1995	2000	2010	2020
23rd Avenue	36.5	36.4	36.4	36.7	37.2	37.2	37.2
91st Avenue	90.7	102.9	113.7	124.2	137.0	176.9	217.3
Tolleson	<u>2.9</u>	<u>3.3</u>	<u>4.9</u>	<u>6.5</u>	<u>8.2</u>	<u>13.9</u>	<u>17.4</u>
TOTAL	131.1	142.6	155.0	167.4	182.4	228.0	271.9

#### EXISTING EFFLUENT COMMITMENTS

Effluent commitments exist for:

- Arizona Public Service/SRP (91st and 23rd Avenue plants)
- USDA Water Conservation Lab (91st Avenue plant)
- Arizona Game and Fish Department (91st Avenue plant)
- Buckeye Irrigation Company (91st Avenue plant)
- Roosevelt Irrigation District (23rd Avenue plant)
- Sod Farm (Tolleson plant)

McDonald Farms also uses effluent from the 23rd Avenue treatment plant, the amount of which is unknown. While they have no formal contract with the City, the Farms feel they have a claim for the effluent. The legal aspects of this claim are unknown at this time.

Information on these commitments excluding McDonald Farms, is summarized

in Table III-3.

Some of the information tabulated is not specific since the contracts, when they exist, are not specific. For example, the Arizona Game and Fish Department acquired the right to effluent in 1961 in a land trade when the City of Phoenix needed land for the Phoenix zoo. Use of the effluent was included in the trade. Also, it should be emphasized that the quantities of effluent to be delivered are quite general and do not reflect short term peak requirements normally encountered by agricultural and industrial users.

All but one of the existing contracts will expire prior to 2020. The SRP/APS contract could run until 2040 if the last generating unit at the Palo Verde Plant is not completed before the year 2000. Although SRP/APS have contracted for 140,000 acre-feet per year, the actual use for units 1, 2 and 3 will be much less. Also, the seasonal demands will vary according to the power demand, evaporation rate, and scheduled plant outages for maintenance and refueling. The projected seasonal use by SRP/APS follows:

<u>Month</u>	<u>1986 (mgd)</u>	<u>1987 (mgd)</u>
January	26.2	37.9
February	25.6	39.6
March	39.0	57.1
April	40.2	59.3
May(3rd unit comes on line-1986)	65.3	65.3
June	70.2	70.2
July	69.3	69.3
August	69.3	69.3
September	65.1	65.1
October	63.0	63.0
November	40.8	40.8
December	53.7	53.7

Table III-3  
SUMMARY OF EXISTING EFFLUENT CONTRACTS

Contract Between	Unit Price of Effluent	Start Date	End Date	Quantities of Effluent Required	Quality Required	Delivery Method	Discharge Point
Arizona Game and Fish Dept. (AGF) and the City of Phoenix (City)				7,300 Ac-Ft./year* (6.52 MGD)	Secondary + Disinfection	Salt River Channel	To Salt River @ 91st Ave. Outfall
USDA-- Water Conservation Lab (WCL) and the City		Project now Inactive		9,200 Ac-Ft./year* (1.07 MGD)	Secondary	Salt River Channel	To Salt River @ 91st Ave. Outfall
Buckeye Irrigation Company (BIC) and the City	\$1.50/Ac-Ft.	1971	2011	2,500 Ac-Ft./month* (30,000 Ac-Ft./year (26.8 MGD)	Secondary + Disinfection	Salt River now; pipe-line later	Natural Channel N. Salt River on City Phoenix land
Arizona Public Service/Salt River Project Agricultural Improvement & Power District (APS/SRPI&P) and the Cities of Glendale, Mesa, Phoenix, Scottsdale, Tempe, and Youngtown	\$20-30/Ac-Ft.	1973	2040**	140,000 Ac-Ft./year* (125 MGD)	Phosphate: 60 mg/l SS: 30 mg/l BOD <sub>5</sub> : 30 mg/l	Pipeline	To Plant Site
Roosevelt Irrigation District (RID) and the City	\$1.50/Ac-Ft.	1975	2000	20,000 Ac-Ft./year* from 23rd Avenue (17.9 MGD)	That needed for edible crops-Fecal coliform 200/100ml SS: 10 mg/l BOD <sub>5</sub> : 10 mg/l	Pipeline	To North Property Line of WCL Site
Sod Farm and City of Tolleson	% of gross income of sod farm	1977	1987	Up to 2.0 MGD	Secondary	Pumped	Plant Outfall to Site

\* From Projections of Effluent Flow, Greely and Hansen (G&H), 1979

\*\*or 40 years from date of last Generating Unit Completion, which ever comes first (approximately 2026).

## EFFLUENT AVAILABLE FOR REUSE

Based on projected wastewater flows and existing effluent commitments the amount of effluent available for reuse has been developed through 2020, as shown in Table III-4. Availability both on a contractual basis and a practical basis has been presented. It is clear from the table that expected use of effluent is much less than that committed.

The difference between that amount of effluent committed and the amount actually needed will cover a very wide range when considered on a seasonal basis. Most of the large effluent users will want the bulk of their effluent during the summer even though their contracts call for a set amount on a yearly basis.

Table III-4  
CURRENT AND PROJECTED EFFLUENT AVAILABILITY

Year	Available Effluent Average Annual Flow (mgd)				Effluent Committed by Agree- ment Average Annual Flow (mgd)						Average Annual Effluent Actually Used (mgd)		Available Effluent Less Committed Effluent (mgd)	Effluent Available Less that Actually Used (mgd)
	23rd	91st	Tolleson	Total	(1) AG&F	(2) USWCL	(3) BIC	(4) APS-SRP	(5) RID	(6) Tolleson	Total	Total		
1980	36.5	90.7	2.9	130.1	6.52/>>6.52	1.07/-	26.8/70 <sup>+</sup>	125/-	17.9/-	2.0/.45	179.3/77.0 <sup>+</sup>	130.1-179.3=- (49.2)	130.1-77.0=53.1*	
1985	36.4	102.9	3.3	142.6	6.52/>>6.52	1.07/-	26.8/26.8	125/38.7	17.9/-	2.0/.45	179.3/72.5	142.6-179.3=- (36.7)	142.6-72.5=70.1	
1990	36.4	113.7	4.9	155.0	6.52/>>6.52	1.07/-	26.8/26.8	125/58	17.9/-	-/-	177.3/91.3	155.0-177.3=- (22.3)	155.0-91.3=63.7	
1995	36.7	124.2	6.5	167.4	6.52/>>6.52	1.07/-	26.8/26.8	125/58	17.9/-	-/-	177.3/91.3	167.4-177.3=- (9.9)	167.4-91.3=76.1	
2000	37.2	137.0	8.2	182.4	6.52/>>6.52	1.07/-	26.8/26.8	125/58	17.9/-	-/-	177.3/91.3	182.4-177.3=5.1	182.4-91.3=91.1	
2010	37.2	176.9	13.9	228.0	6.52/>>6.52	1.07/-	26.8/26.8	125/58	-/-	-/-	159.4/92.4	228.0-159.4=68.6	228.0-92.4=135.6	
2020	37.2	217.3	17.4	271.9	6.52/>>6.52	1.07/-	-/-	125/58	-/-	-/-	132.6/64.5	271.9-132.6=139.3	271.9-64.5=207.4	

(1) Verbal agreement for 6.52 mgd between City of Phoenix and Arizona Game and Fish Department

(2) U.S. Water Conservation Laboratory (project inactive)

(3) Buckeye Irrigation Company has contracted for 30,000 acre-feet per year (26.8 mgd)

(4) 125 mgd from 91st Avenue and/or the 23rd Avenue plants to Arizona Public Service/Salt River Project

(5) Roosevelt Irrigation District has contract for 17.9 mgd from 23rd Avenue plant until 2000 (requires additional treatment before implemented)

(6) Tolleson has contract with sod farm until 1987

\* 96.3 mgd would be available if BIC used its contractual amount

IV  
POTENTIAL LONG-TERM  
REUSE OPTIONS

CHAPTER IV  
POTENTIAL LONG-TERM REUSE OPTIONS

Technologically there are no limits to the ways to reuse reclaimed wastewater. The limits imposed upon reclaimed wastewater are as a result of public attitudes, institutional and legal arguments on water ownership and rights, present cost of water and availability of water. In areas where there is a shortage of water, reuse of effluent is accepted practice.

There are as many ways to reuse effluent as there are ways to use fresh water. However, due to specific needs, cost of treatment, environmental concerns and institutional constraints, there are normally only a few which are feasible for a particular location. This section of the report identifies potential reuse options and then evaluates them for implementation in the Salt River Valley.

EFFLUENT REUSE STANDARDS

The wastewater system is one mechanism to remove the waste from homes and industries in the area. Without treatment it is a hazardous material, but it can be cleaned to meet the needs of different water uses. How clean the effluent has to be depends upon its subsequent use.

The Arizona Department of Health Services (ADHS) has published rules and regulations for reusing effluent. These regulations are being revised, but it is not anticipated that there will be significant changes in the

regulations for reusing effluent. Most of the changes will occur in the areas defining disposal of effluent and land treatment of wastewater. The main portion of the regulations is shown below with the approved uses for each level of treatment.

#### Secondary Treatment

- 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 to fruit or foliage.
- C. Watering of farm animals other than producing dairy animals.
- D. Industrial purposes.

#### Secondary Treatment and Disinfection

- A. Irrigation of any food crop where the product is subjected to physical or chemical processing sufficient to destroy pathogenic organisms.
- B. Irrigation of orchard crops by methods which involve direct application of water to fruit or foliage.
- C. Irrigation of golf courses, cemeteries, and similar areas.
- D. Watering of producing dairy animals.
- E. To provide a substantial portion of the water supply in any impoundment used for aesthetic enjoyment or for purposes involving only secondary contact recreation.

## Tertiary and Disinfection

- A. To provide a substantial portion of the water supply in any impoundment used for primary contact recreation.
- B. Irrigation of school grounds, playgrounds, lawns, parks or any other area where children are expected to congregate.
- C. Irrigation of food crops which may be consumed in their raw or natural state.

In the regulations secondary treatment is not defined but tertiary treatment is defined as 10 mg/l BOD and suspended solids.

The present discharge from the 91st Avenue and 23rd Avenue treatment plants is secondary. By December 1980 this will include disinfection with the construction of the chlorination facilities at both plants.

### COST CONSIDERATIONS

The use to which effluent is put depends upon a number of factors. These include the availability of water, cost of water and the cost of treating and transporting the effluent.

In the Phoenix Metropolitan Area the present cost of water is relatively cheap in comparison to other southwestern areas. However, as new sources of water are developed the cost increases dramatically. This is shown in Figure IV-1 with surface water from SRP costing about \$5.0 per acre-foot.

Groundwater in the area costs from \$15 to \$30 per acre-foot depending upon the depth of the water table. CAP is the next source of water and it will cost about \$40 per acre-foot for agricultural water and about \$70 per acre-foot for municipal and industrial water. Treatment of the CAP water to drinking water standards will increase its cost to around \$110 per acre-foot. After CAP the only other sources of water come from conservation, deeper and deeper wells, treatment of previously unsuitable water and treatment of wastewater. Costs for treating brackish water varies depending how salty the water is, but it can range from about \$250 to \$400 per acre-foot. If effluent were to be used as a source of supply, treatment to drinking water standard would cost from \$350 to \$600 per acre-foot.

Costs to transport the effluent by gravity and pumping are shown in Figure IV-2. As can be expected pumping is very expensive and can add greatly to the cost of water. However, the added cost of transportation must be compared to the existing cost of water and the next source of water.

#### POTENTIAL REUSE OPTIONS

The following potential reuse options were developed by the consultants and the Water Quality Policy Advisory Committee (WQPAC). These reuse options will be briefly described along with a preliminary evaluation relative to implementability, economic feasibility, institutional or legal constraints, environmental impacts and how well it meets the region's goals relative to reducing the consumption of domestic quality water.

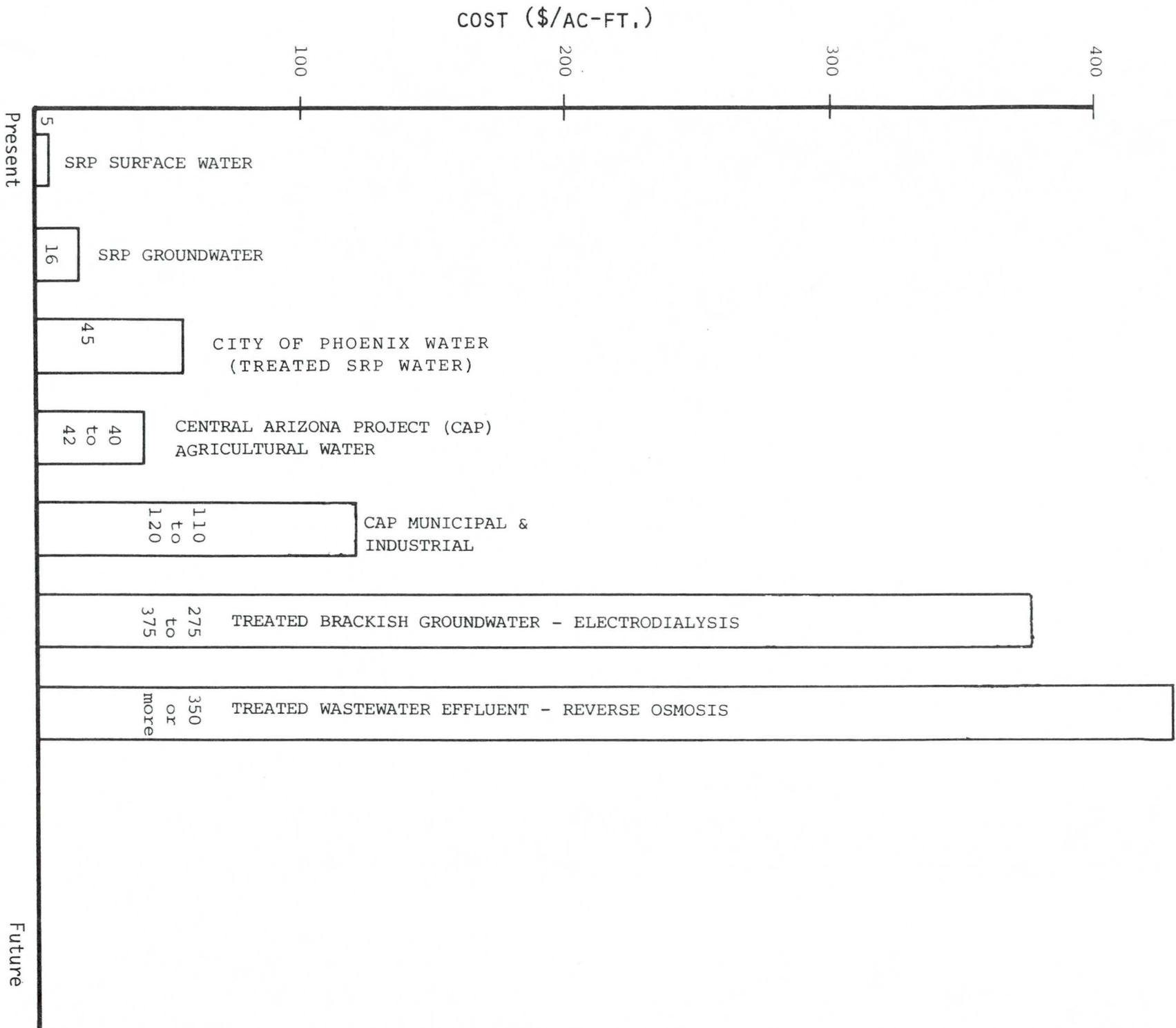


Figure IV-1 Alternative Water Source Costs

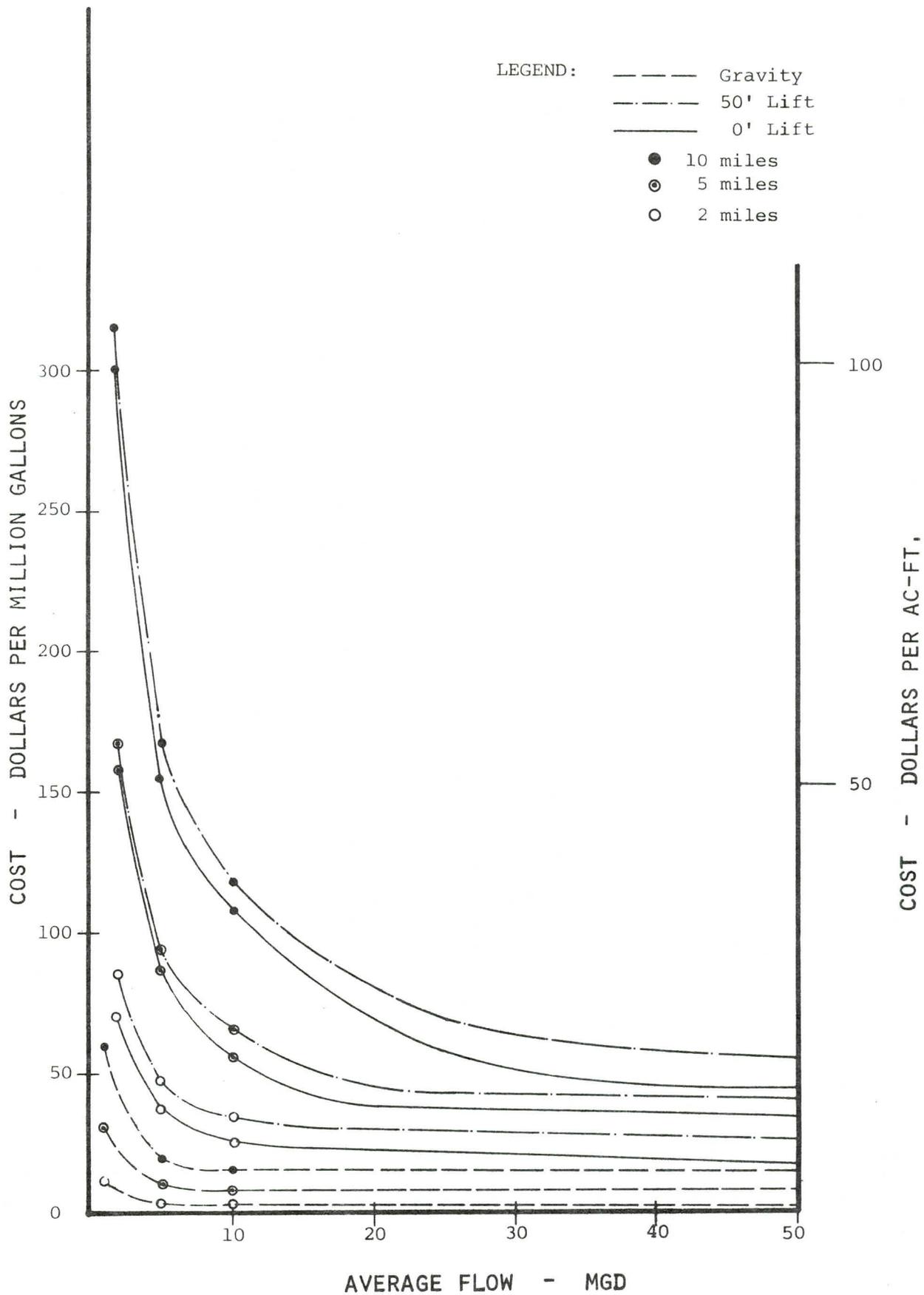


Figure IV-2. Cost of Effluent Delivery

## Recreation

### Parks

There are numerous parks spread throughout the Phoenix Metropolitan area. These range in size from small (10-acre) neighborhood parks to large several hundred acre district parks. In the City of Phoenix the average water use in the parks is about 23,000 acre-feet per year with the majority of the use being in the summer.

In a three-to four-mile radius around the 23rd Avenue plant there are approximately 20 parks. Most of these are small parks, but it does include the large Encanto Park. There are no parks around the 91st Avenue plant.

To use effluent for park irrigation would require additional treatment to reach the 10 mg/l of BOD and suspended solids required by the state reuse standards. It would also require the construction of a separate pumping and distribution system to get the effluent from the plant to the parks. At present it does not appear economical to provide the additional treatment and the distribution system necessary for the parks. In the future, however, if water becomes scarce and the community still wants green parks it may be feasible to build small satellite plants to treat the water specifically for the parks.

One institutional difficulty could arise if some of the effluent from one community were used to irrigate a park in another community. Water credits between the communities would have to be worked out to balance such a situation.

## Rio Salado

The Rio Salado is a concept to develop the bed of the Salt River from about Country Club Road to about 35th Avenue. No definite plans have been developed but a number of suggestions have been made for the development ranging from recreational lakes with commercial areas, to minimum rework and desert landscaping. The Corps of Engineers study (Phoenix Urban Study, 1979), estimated for the high water use plan, a water need of about 17,000 acre-feet per year. This figure assumed sealing of the lakes to reduce the amount of infiltration.

When and how the Rio Salado will be implemented is extremely unclear at this time. However, the City of Tempe is proceeding with development of conceptual plans, Phoenix is constructing a golf course as part of Rio Salado and State legislation has been passed and signed to establish a planning district. There is general support for the concept, but no one knows the specific costs or impacts.

Should effluent be used to irrigate the Rio Salado, additional treatment would have to be provided to make the existing plant effluent suitable for recreation. A potential problem in using effluent for lakes in the Rio Salado would be the nutrient content of the wastewater. The combination of the nutrients and the sun could produce high algal growths in the lakes. Nutrient reduction would be required to reduce the problem. Another potential problem in using any type of water in the Rio Salado is that the area suggested for development contains many sources of pollution such

as old landfills and dumps. These would have to be cleaned or the surface sealed to prevent leaching of pollutants into the groundwater. Rio Salado does not exist at present and any use of effluent to irrigate or provide lakes would be an additional use to the area.

#### Golf Courses

Using effluent on golf courses has problems similar to parks. The individual use is small and they are located all over the Valley. Therefore the only way to serve them would be by a separate distribution system or by local treatment plants. The effluent quality required is similar to that presently produced at the 91st Avenue and 23rd Avenue treatment plants. Existing uses within four to five miles of the 23rd Avenue plant are the Encanto 18-and 9-hole golf courses.

At present it does not appear to be viable to use the effluent from the plant on the golf courses. However, in the future if the community wants green golf courses it may become feasible to build small satellite wastewater treatment plants to supply effluent or to build a separate distribution system for effluent.

Environmental impacts would be minor, if any, but institutional questions could arise over transferring water from one community to another. Water savings would result if effluent was used to irrigate golf courses.

## Wildlife Habitat

Effluent is presently used to support wildlife habitat in the Phoenix Metropolitan area, both directly and indirectly. Locations include the lagoons at Chandler, Buckeye, Avondale and Gilbert which provide habitat for ducks and geese. The solar evaporative ponds and the Bouwer infiltration/percolation ponds when in use at the 23rd Avenue plant also provide habitat for shore and wading birds. Effluent from the 91st Avenue plant helps to maintain a significant riparian habitat in the Salt and Gila Rivers downstream from the plant. Included in this area downstream of the plant is the Fred J. Weiler Greenbelt which extends from about Liberty to 100 miles downstream. The Greenbelt is a 63,000-acre resource conservation area set aside in 1970 by the U. S. Bureau of Land Management for the purposes of preserving wildlife and other important natural resources. Also included in the area is the 123-acre Base and Meridian Wildlife area managed by the Arizona Game and Fish Department (AGFD).

Recent proposals for the area downstream of 91st Avenue include the establishment of a natural area by the Arizona State Parks Board and the extension of the wildlife habitat area by the AGFD.

Use of effluent to maintain wildlife habitat in the area would appear to be a good use of effluent. The quality required would be the disinfected secondary effluent coming from the two plants. Existence of a well-maintained wildlife habitat would be environmentally beneficial to the area.

Also in developing an effluent management plan it may not be practical or possible to reuse all of the effluent all of the time. Therefore a planned wildlife habitat area could provide a beneficial reuse alternative.

One problem with the wildlife habitat option is that it does not create any additional water for the area, but it is in fact a consumptive user of water. Also, whose effluent provides the habitat and who benefits from the habitat?

How much effluent it would take to maintain a wildlife habitat is not really known, although the AGFD have a claim for 7,300 acre-feet per year. Proper management of the wildlife area is critical to avoid problems with insects, odors, and flooding. If these problems could be worked out, then it would be feasible to implement a wildlife habitat option.

### Industrial

#### Tumbleweed Farming

Production of this fast-growing plant as a fuel source in energy production has been proposed as a potential use of sewage effluent. This would involve cultivation, harvesting and processing the plants into a usable form of fuel. The water consumption would be approximately 2.0 acre-feet per year and no advanced treatment would be required for this use.

The economics of this alternative would depend on where the growing area

was located relative to the treatment plants and of course on the economics of the process itself. Tumbleweeds can be grown by dry farming in this area, but the application of water can increase the crop production dramatically.

The process could be started in the area, effluent could be sold to the processor and there would be no institutional or environmental problems. From a water resource aspect it would be another water use introduced into the Valley.

#### Grass Sod Production

In this industry, production is year round but most water use is in the period from March through October. Water usage generally runs about eight acre-feet per year. Effluent from the Tolleson treatment plant is used for sod growing. Growers now using effluent find the practice successful with no special treatment required. Salt-tolerant grasses are recommended, however.

There are some sod growers near the 91st Avenue plant but they are either supplied by the Tolleson plant or are negotiating with Tolleson for use of their effluent. Other sod growers are generally located in the south-east area of the Valley. To use the effluent they would have to move.

As the population of the Phoenix metro area has expanded, so too has the grass sod industry. However, as the cost of water increases, it would be

natural for the popularity of lawns to decline as it has in Tucson. The demand for sod grass and therefore its production should eventually level off or perhaps decline. Thus in the short term, sod growing would be a good use for the effluent, however, its future is going to be tied to the availability and cost of water.

Institutionally and environmentally there are no problems. If the present sod growers changed over to effluent there would be a small savings in water supply for the area.

#### Process Water

Phoenix has developed a considerable light industrial base, but there has been very little heavy industrial development. Without heavy industries such as steel manufacturing or coal gasification, there are few large users of process water, and as Phoenix expands, it appears that most of the new companies being established are clean, high-technology companies which use relatively small quantities of high quality water. There are few companies located near the river and downstream of the treatment plants which individually could seek contracts with the City for effluent. However, delivery of effluent to the few industries that may be able to make use of it would, on the whole, be uneconomical.

Environmentally and institutionally there are no problems in using the effluent as process water. Substituting effluent for domestic quality water would be beneficial to the water balance in the basin.

cooling water.

The use of effluent as cooling water is fairly widespread around the country. Since it is available in fairly large quantities around the major cities and quality of the cooling water is of minor importance.

A contract already exists between the Multi-cities and the Salt River Project and Arizona Public Service Company for 140,000 acre-feet per year of effluent for the power plant cooling. There are, however, two other possible uses of the effluent. One would be for cooling the existing power plant at 43rd Avenue and Buckeye. The other could be the proposed refuse-fired plant near 23rd Avenue. Both of these plants are located sufficiently close to the 23rd Avenue plant to be economically feasible to use effluent for cooling water.

However, the existing plant at 43rd Avenue has been downgraded to only provide standby power and the cost of retrofitting to use effluent would not make it very economical. Also preliminary analysis showed that construction of the refuse-fueled power plant was uneconomical at this time. In spite of this apparent lack of a use for effluent as cooling water, there are some points to consider.

- According to the APS research and development staff, water

shortage in the Phoenix area is a major deterrent to developing more power plants in the area. Air quality is the main one. Power generation has been given a preliminary allocation of CAP water by the Arizona Water Commission. If this allocation is upheld by the Department of the Interior then there is a potential for trading effluent for CAP water in the Phoenix area in the future.

Use of effluent for cooling has minor environmental problems and apart from negotiating contracts has no major legal or institutional problems. Also it could help the water resource situation if a transfer of use or trading for CAP could be arranged.

#### Construction Water

Use of effluent to suppress dust at construction sites, provide moisture for compaction control and other similar uses constitute a rather large water usage but very diverse application.

A dual system of water distribution would be required to deliver effluent throughout the Valley where construction contractors might be working. Contractors would have to have convenient access to the effluent for use of it to be economically feasible.

The only institutional and legal constraints would be in the trading of water credits from one community to another.

Use of effluent in construction would not have a significant impact on the environment for the most part. There are questions as to the health impact of pathogens in effluent spread on the ground and then dispersed with dust, if equipment travel ways are not kept sufficiently moist.

If this reuse could be implemented, there would be a reduction in the use of domestic quality water.

#### Gravel Mining-Concrete Batching

Much of the "gravel" or aggregate mined in the area is washed, sorted and used to produce concrete. Much of the gravel washing operations use well water but clarify and reuse the water so only make-up water is required. Approximately 1,000,000 cubic yards of concrete were batched in the metropolitan area last year. Each cubic yard of concrete uses approximately five gallons of water, so total batching consumption was five million gallons or usage of 15 acre-feet per year, a very small usage in comparison to the others being discussed.

With the relatively small consumption of water in this industry, it would be economical to provide effluent only to those operations located near and/or downstream of the wastewater treatment plants. Presently there are only four batching operations favorably located with respect to the wastewater treatment plants. Their total consumption is no more than 15 acre-feet per year for both aggregate and concrete production.

Institutional and legal considerations are not expected to be the limiting factor for this reuse option.

Environmental impact for use of the effluent in aggregate and concrete production are not significant.

Implementation of this reuse option would result in very small savings in the use of domestic quality water.

#### Salt Mining

An existing salt mining operation is under way west of Phoenix and it uses a considerable amount of water in the process. However, the management of the operation has stated that effluent cannot be used in their salt production as they produce a high purity product.

Low quality groundwater was tried in the process and was found to be unusable. Effluent is much lower in quality than the groundwater tested, so effluent cannot even be considered in the operations.

#### Petro-Chemical Processing

A petroleum refinery is to be built near Mobile, Arizona, southwest of Phoenix, and is scheduled to go into production in 1983. The refining process will involve modification of crude oils by heating and catalytic cracking, with various purified end products from asphalt to gasoline.

Wastewater could be used in certain refining unit processes (such as steam generation), as reaction medium, as a coolant or for washing products. The proposed plant could use about 1,120 acre-feet per year of effluent in these operations.

Depending upon what part of the refining process is affected, various pre-treatment requirements exist. The economic feasibility of effluent reuse in this application would be a function of the alternative water cost. Less sensitive unit operations such as cooling, should be simple to implement and economically feasible. However, Mobile is 25 miles away from the Salt River and 300 feet higher than the 91st Avenue Wastewater Treatment Plant. This makes the economic feasibility of effluent transmission very doubtful.

Institutional and legal constraints would not affect this reuse option.

The environmental impact of effluent reuse, in this application, would be insignificant.

#### Pump Storage

The SRP had considered pumping water to a reservoir in the Estrella Mountains southeast of Phoenix for later recovery of the energy in peak power use periods. This proposal was called the Montezuma Project and is now inactive. Originally the project was considering use of wastewater effluent for the pump storage system. Subsequently, the Arizona Power

Authority completed licensing agreements with the Indians and groundwater was to be used under the project plan. Approximately 5,000 acre-feet of water would be needed to fill the proposed reservoir with about 600 acre-feet per year in make-up water required thereafter. The SRP and APS decided not to proceed with their share of the project when power consumption increases began to level off in 1975. Currently there is no serious interest in reviving the project on the part of SRP and APS.

With the rather small amounts of make-up water used and the long distance to be covered in providing effluent to the Montezuma project, economic feasibility is questionable.

Legal and institutional constraints are a possible hinderance to this reuse option, as several agencies are directly involved.

The Montezuma Project would be a new use of water and an additional draw on existing water supply.

#### Agriculture

The use of effluent for agricultural irrigation is one of the most viable of the reuse options since the effluent has valuable nutrients, large volumes are required and the fiber and forage crops grown in the area can use the effluent from the 91st and 23rd Avenue treatment plants. To use the effluent on unprocessed vegetables would require additional treatment of the effluent.

Some points to consider in using effluent for agriculture are:

- The primary crops grown in the area are cotton, alfalfa, and grains. Cotton and alfalfa are summer crops with grain a winter crop (see Figure IV-3). With this cropping pattern the majority of the water use is in the summer.
- The nitrates in the effluent can prevent the maturation of plant fruit in certain species. This means that towards the end of the growing season only nitrate-free water can be used, or the effluent used could be diluted with another source of water.
- With the high summer and low winter use some alternative use will be necessary for the winter.
- Since it is more economical to transport the effluent by gravity than by pumping, the majority of the agricultural reuse areas will be to the west.
- Some of the irrigation districts have surface water rights and some have good groundwater. Four of the districts in the area have received tentative CAP allocations from the Arizona Water Commission (see Table IV-1). It would be in the best interest of the Multi-city partners to trade the effluent for domestic quality water.
- Some institutional questions arise relative to trading of the effluent. One is, if it is SRP water, could it be used out of the SRP boundary once it is traded? Another concerns future development of the agricultural land. If groundwater is traded for effluent but in the future the land is developed would the groundwater right still remain with the land?

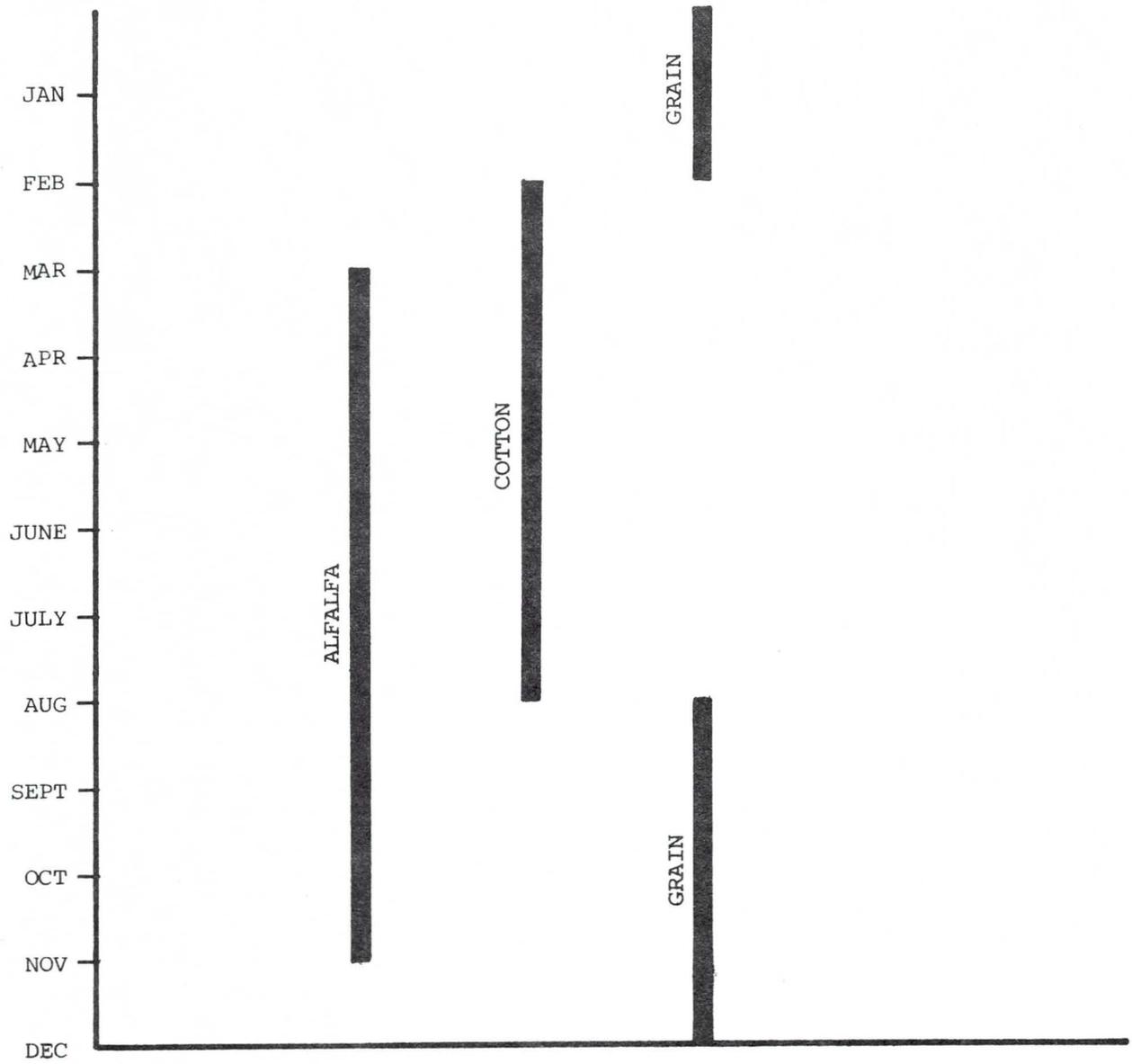


Figure IV-3 Typical Irrigation Seasons For Major Crops

Table IV-1  
POTENTIAL AGRICULTURAL REUSE AREAS

Organization	Area Irrigated (Acres)	Source of Water (1)	Quality Required (2)	Mode of Delivery
Arlington Canal Co.	4,400	TW,S&GW	Sec	Gravity
Buckeye I.D.	18,000	S,E,GW,SRP	Sec	Gravity
Gila Indian Reservation	Unknown	GW	?	Pumping
Harquahala I.D.	33,400	GW,C	Sec + Dis	Pumping
Maricopa Co. Municipal W.C.D.	22,900	S,GW,C	Sec	Pumping
McMicken I.D.	31,270	GW,C	Sec + Dis	Gravity & Pumping
New State I.D.	2,400	SRP	Sec	Gravity
Paloma Ranch	50,000	S,GW,TW	Sec	Gravity
Peninsula Ditch Co.	2,000	SRP,RID	?	Gravity
Private Farms	Unknown	GW	Sec	Gravity & Pumping
Roosevelt I.D.	35,000	GW,C	Tert + Dis	Gravity
Salt River Project	?	S,GW,C	Tert + Dis	Gravity & Pumping
St. Johns I.D.	2,000	SRP,GW	Tert + Dis	Gravity

(1)

TW -- Tailwaters  
 GW -- Groundwater  
 S -- Surface Water  
 SRP-- Salt River Project  
 C -- CAP Request  
 E -- Effluent

(2)

Sec -- Secondary  
 Dis -- Disinfection  
 Tert-- Tertiary

How long agriculture will be viable in the Salt River Valley is not known at this time. However, unless something dramatic happens it should be around for at least twenty to thirty years.

Overall, however, agriculture offers one of the most promising reuse options for the Multi-city effluent since it will help to either reduce the amount of pumping in the Valley or provide additional domestic quality water by trading. Environmentally there should be no significant impacts, although the use of large amounts of effluent for irrigation should be monitored to fully assess its impacts on the groundwater.

Table IV-1 summarizes the potential irrigation areas for the 91st Avenue, 23rd Avenue and Tolleson treatment plants. It also identifies the areas irrigated, present source of water, CAP allocation, quality of effluent required and the probable mode of delivery.

Some of these irrigation districts were contacted to assess their interest in receiving effluent for irrigation and the possibility of trading effluent for domestic quality water. All indicated an interest in pursuing the idea further since they would all like to firm up a long-term supply of water. This was also true of some private farmers west of 91st Avenue.

The Gila Indians indicated they would be interested but stated that they could not really make any definite plans until the ownership of the effluent was determined, negotiations on water claims were further along and the effluent quality and costs were determined. Another point about using

effluent on the Gila Indian Reservation is that they do not have any long range plans for the Reservation and do not know how much farmland would be located south of the 91st and 23rd Avenue plants. The more logical location for effluent use, at this time, is from the Chandler area.

The Salt River Project was negative about trading water for effluent and did not like the idea of effluent in the canal system irrespective of the quality. They could not justify putting effluent with its inherent restrictions onto land that has access to ample amounts of good quality water.

### Municipal

#### Drinking Water

From a technological standpoint, wastewater can be treated to more than meet the current drinking water standards. However, public health authorities cite concerns over virus transmission, organic chemicals that may cause cancer or mutations, inorganic chemicals that may accumulate in body tissues enough to become toxic, lack of real control of the raw material being discharged to the treatment plant, and the lack of reliability of wastewater treatment plant operation.

To verify or show the viability of effluent reuse, a number of pilot programs are being started around the country. The most notable of these is the Potable Water Reuse Demonstration Project by the Denver Water

Department. In this project the Water Department will construct a 5 mgd reclamation plant to test the reliability of the technology and the safety of the product. Public acceptance of the procedures and product is another goal of the project. Overall the project will take about eight years to complete, with five of those years for testing and analysis. After that time they will decide if the program is successful and if it is they will proceed with a full-scale reuse program.

At this time it would not be feasible for the Phoenix area to proceed with a plant to renovate the wastewater back to drinking water standards. However, they should monitor very carefully the results of the Denver project. The Phoenix area may have to go that way in the future.

#### Residential Irrigation

To use effluent for the irrigation of residential lawns and gardens would require tertiary waste treatment to conform to the reuse regulations. This level is necessary because of the likelihood of body contact with the effluent. Also to transport the effluent to the areas to be irrigated would require either a separate distribution system or some means to utilize the present irrigation ditches and canals.

In reviewing the option it would appear to be impractical due to the high cost of the treatment and the distribution system. Also, if there were to be a major reduction in irrigation use it would be more feasible for the Phoenix area to follow Tucson's lead and go over to desert landscaping.

Elimination or replacement by effluent of residential irrigation would be a saving in water use for the area.

#### Fire Fighting

Under this option a separate distribution system would be required for the effluent along with ample storage capacity to handle the large flows needed to fight fires. The quality of effluent would be secondary plus disinfection.

Unless a dual system was built to handle other effluent uses it would not be practical to implement a dual system simply for fire fighting. Water saving on the whole would be rather small.

#### Median Irrigation

One possible use for effluent is for irrigation of highway embankments and street medians. The total water consumption for this in the metropolitan area is about 2,000-3,000 acre-feet per year. Also the City of Phoenix is now using more low water use plants in the strips. Grass and annuals are no longer grown.

Again, if water conservation becomes necessary, the medians and embankments can be changed over to desert landscaping rather than to effluent irrigation. Overall, median or highway irrigation is not a viable reuse option.

## Cemeteries

Using effluent on cemeteries has problems similar to golf courses. The effluent quality required is similar to that presently produced at the 91st and 23rd Avenue plants. An existing use within four to five miles of the 23rd Avenue plant is the Greenwood Memorial Park Cemetery.

At present it does not appear viable to use effluent from the plants for cemetery irrigation. However, in the future if the community wants green cemeteries, it may become feasible to build small satellite plants to supply water or the separate distribution system.

Environmental impacts would be minor, if any, but institutional questions could arise over transferring water from one community to another.

Water savings would result if effluent were used to irrigate cemeteries.

## Joint Use System

Fire fighting, median irrigation, residential irrigation and cemetery irrigation are not terribly feasible by themselves, since the cost of distribution is too high. However, if the uses could be combined then they become much more practical. How much of a distribution system and what quantity of flow makes it economical depends again on the cost of water. In Denver, they found that the break even point was about 3.0 mgd or a subdivision of about 10,000 people. They also found it was not

economical to build a separate effluent distribution system in an existing area. The impact on the existing utilities was too great. These findings are probably appropriate to the Phoenix metropolitan area as well as to Denver.

### Miscellaneous

#### Groundwater Recharge

The idea of using surplus effluent to recharge a declining water basin is very attractive. It promotes the idea of replenishing the source and it is a means to use the effluent in the winter when the irrigation and power plant cooling demands are low. Also the beds of the Salt, Gila and Agua Fria Rivers are extremely porous and can percolate large volumes of water and it has been shown that percolation through the soil helps to clean the wastewater.

Unfortunately there are almost as many questions with groundwater recharge as there are good points. One of the biggest questions relates to the quality of effluent used to recharge the groundwater. As with using effluent as a source of drinking water, questions arise as to virus transmission, toxic materials, organic chemicals, etc.

Effluent is being used in various parts of the country for groundwater recharge. However, it is primarily being used as a barrier to salt water intrusion into existing well fields. Even so, the level of treatment is

very high, especially in California, where they call for removal of phosphorus, nitrogen, organic chemicals, suspended solids and dissolved solids. At that treatment level, the effluent is equal in chemical quality to that of drinking water. Such a high degree of treatment ensures that no pollutants reach the groundwater making it unfit for human consumption. Another reason for the high degree of treatment is that once the treated effluent goes into the ground, it cannot be stopped from reaching the groundwater. There is no bypassing if there is a malfunction.

The cost to treat the effluent to the high degree necessary could range from \$350 to \$600 per acre-foot. This cost would have to be compared to the next source of supply.

Implementing groundwater recharge would be difficult since there are many legal and institutional questions to answer. These include ownership, credit transfers and monitoring of consumption.

Environmentally there are also many questions since the area relies on groundwater as a primary source of water. As stated above, once the groundwater is polluted it would be extremely expensive to correct.

The Arizona Department of Health Services (ADHS) is in the process of developing standards for groundwater and for the protection of the groundwater. By establishing these standards the ADHS will define the quality of effluent suitable for groundwater recharge.

At this time there are too many questions about using effluent for recharge. However, in some parts of the country it is being tried and the Phoenix Metropolitan area should be looking at recharge as a possible reuse in the future.

#### Indian Water Rights

The Salt River and Gila River Indians claim that they do not have adequate water rights from the Salt and Verde Rivers. The Gila Indians are also claiming additional water for their Reservation from the San Pedro and Gila Rivers. Negotiations are underway and in some cases suits filed. How long it will be before claims are settled or adjudicated is not known. However, if the claims are upheld and the Indian Reservations are granted more water, effluent could be used as part of the settlement. The problems associated with this option are many, including the quality required, the quantity, would the Indians want it, who would pay for the transmission, etc. But the only other sources are groundwater or surface water. These, as already noted, are limited.

Actual implementation of such an option would of course depend on the negotiations with the Indians, but it is an option that could save large quantities of domestic quality water.

#### Water and Wastewater Planning

In the Phoenix Metropolitan area water is collected from the Salt and Verde

Rivers, transported to water treatment plants, used in the home or industry and then sent to two wastewater treatment plants in the southwest corner of the Valley. From there the effluent flows west and out of the Salt River Basin. Groundwater used for domestic supply from the basin ends up in the same place. This practice results in the groundwater table dropping in the north and eastern parts of the Valley and rising in the southwest.

A more logical approach to water and wastewater planning would be to reuse the water where it is generated. That is, a series of small satellite plants could be built to serve smaller local areas. The effluent could then be used locally for parks, golf courses, lawns and farming and would save the high cost of pumping the effluent back from central treatment plants.

To implement such a plan would not really be that difficult once the commitment was made by the communities. There are no real institutional or legal problems and environmentally it would not be damaging to the area.

Savings of domestic quality water could result if effluent was used to irrigate local parks, golf courses, cemeteries, etc.

#### Fish Farming

Fish farming involves the production of fish in artificial environments to maximize growth. Generally this requires high quality water which is

clarified and recycled. Overall water usage is low.

Use of effluent is being experimented with, but at the moment it appears that the costs of treating the effluent to the high standards necessary make it uneconomical.

#### SUMMARY EVALUATION

Table IV-2 summarizes the evaluation of the potential reuse options. The options are evaluated for implementability, economic feasibility, institutional and legal constraints, environmental impacts and how well the option provides additional water or reduces water consumption for the Multi-City partners. Each option is also evaluated relative to its potential for being implemented in the near or medium term or in the long term. Medium term is defined as one to ten years and long term is anything beyond ten years. The best medium and long term reuse options based upon the evaluation are listed in Table IV-3.

#### CONCLUSIONS AND RECOMMENDATIONS

In reviewing the potential reuse options for the Phoenix Metropolitan area the following become apparent.

- The reuse options studied divide into two areas: those which can be implemented immediately or in the very near future and those which may become viable in the future as technology and the demand for

Table IV-2  
POTENTIAL LONG-TERM REUSE OPTION EVALUATION

	Implementability		Economic Feasibility		Institutional and Legal Constraints		Environmental Impact		Compatibility With Water Goals	
	Medium	Long	Short	Long	Short	Long	Short	Long	Medium	Long
<u>Recreation</u>										
Park Irrigation	●	o	●	o	-	-	-	-	o	o
Rio Salado	●	o	●	o	-	-	●	●	●	●
Golf Course Irrigation	●	o	●	o	-	-	-	-	o	o
Wildlife Habitat	o	o	o	o	-	-	o	o	-	-
<u>Industrial</u>										
Tumbleweed	●	-	●	-	-	-	-	-	●	●
Grass Sod	o	o	o	-	-	-	-	-	o	o
Cooling Water	o	o	o	o	o	o	o	o	o	o
Process Water	●	●	●	●	-	-	-	-	o	o
Construction	●	●	●	●	-	-	-	-	o	o
Gravel & Concrete	●	●	●	●	-	-	-	-	-	-
Salt Mining	●	●	●	●	-	-	●	●	-	-
Petroleum Processing	o	o	●	●	●	●			●	●
Pump Storage	●	●	●	●	●	●	●	●	●	●
<u>Municipal</u>										
Drinking Water	●	o	●	o	●	●	●	●	o	o
Residential Irrigation	●	●	●	●	-	-	-	-	o	o
Fire Fighting	●	●	●	●	-	-	-	-	-	-
Median Irrigation	●	●	●	●	-	-	-	-	-	-
Joint Use	●	o	●	o	-	-	-	-	o	o
Cemeteries	●	o	●	o	-	-	-	-	o	o
<u>Agricultural</u>										
Crops	o	o	o	o	-	-	-	-	o	o
<u>Miscellaneous</u>										
Groundwater Recharge	●	o	●	o	●	●	●	●	o	o
Indian Water Rights	o	o	●	o	●	●	-	-	o	o
Wastewater Planning	o	o	o	o	-	-	o	o	o	o
Fish Farming	●	●	●	●	-	-	-	-	●	●

o Beneficial or Easily Accomplished  
 ● Negative Impact or Major Problem  
 - Minor or No Impact

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Table IV-3  
RECOMMENDED POTENTIAL REUSE OPTIONS

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	Medium-term	Long-term
<u>Recreation</u>		
Park Irrigation		x
Rio Salado		x
Golf Course		x
Wildlife Habitat	x	x
<u>Industrial</u>		
Grass Sod	x	
Cooling Water	x	x
<u>Municipal</u>		
Drinking Water		x
Joint Use Systems		x
<u>Agricultural</u>		
Crops	x	x
<u>Miscellaneous</u>		
Groundwater Recharge		x
Indian Water Rights	x	x
Wastewater/Water Planning	x	x

---

other water sources increases.

- The medium-term options will not be able to utilize all of the effluent all of the time. Therefore for the next ten to twenty years there will be some discharge to the river.

From these conclusions the following recommendations are made:

1. Initiate a program to develop in more detail the medium-term reuse options and to negotiate contracts.
2. Initiate a study to develop a long-term effluent discharge management plan for the effluent from 91st and 23rd Avenue, and Tolleson plants.
3. Postpone any study of the long-term reuse options until completion of the water resource planning and implementation of the medium reuse options.

Details of the scope of the effluent discharge study and the implementation of the medium reuse studies are contained in Chapter VI IMPLEMENTATION.

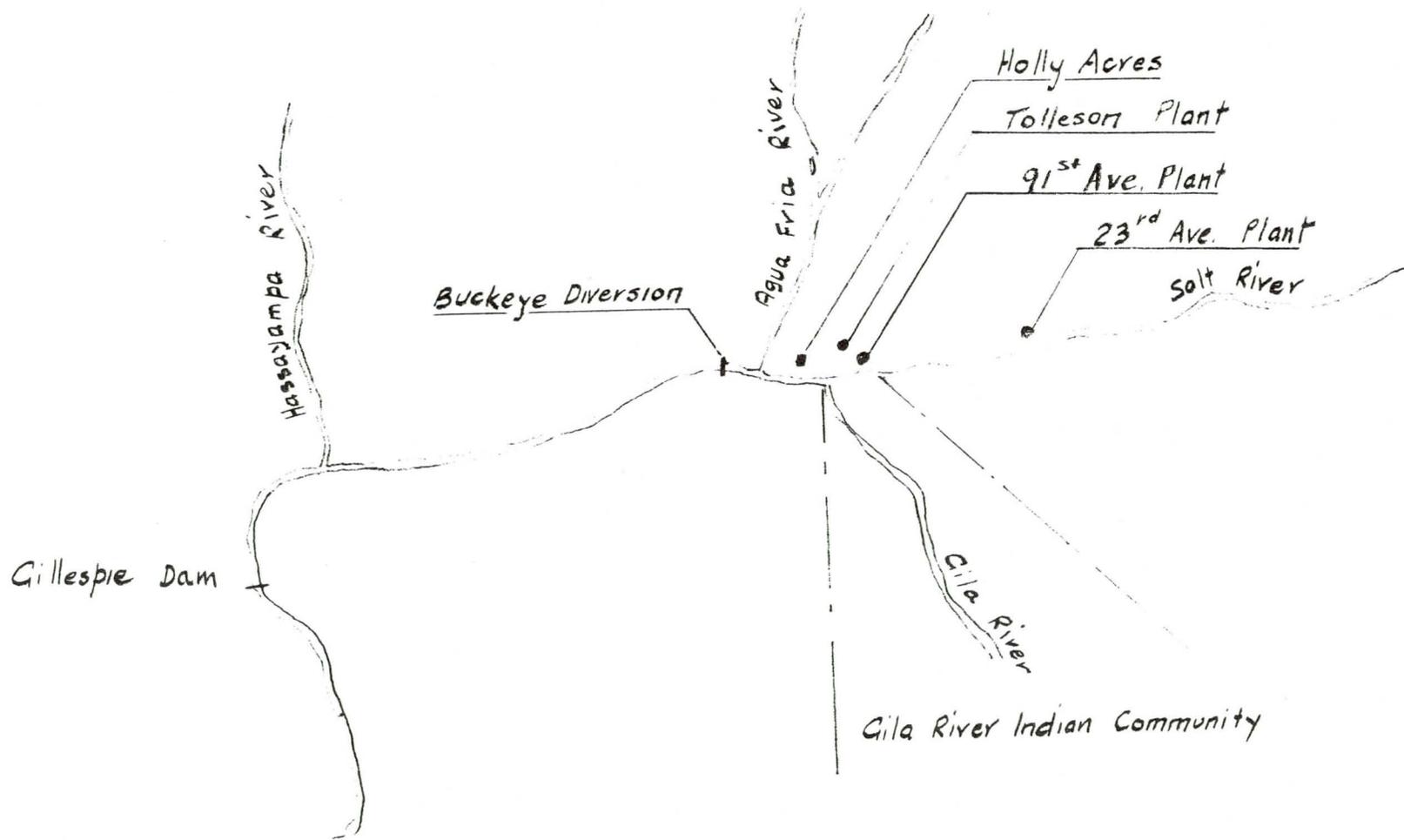
V  
SHORT-TERM OPTIONS

CHAPTER V  
SHORT TERM OPTIONS

In addition to identifying feasible long-term reuses for the effluent from the 91st and 23rd Avenue treatment plants, the study also has to identify solutions to mitigate problems downstream of the 91st Avenue plant. The description and assessment of the problems in this section are based upon the following Camp, Dresser and McKee reports: "91st Avenue Wastewater Treatment Plant- Draft Plant Expansion Facility Plan, Volume 3, Appendix G: Insects and Odors: February 1980; and Environmental Assessment Working Paper- Phase C Effluent Discharge Assessment: February 1980. Figure V-1 shows a layout of the area.

PROBLEMS

Effluent discharge from the 91st Avenue Wastewater treatment plant is a mixed blessing. On one hand it is a source of irrigation water for the Buckeye Irrigation Company (BIC) and other downstream users and a means to sustain riparian habitat in the river bed. On the other hand it is a source of insects and odors. It has been accused of promoting the growth of vegetation which in turn impedes floodwaters in the river causing increased damage. Another complaint associated with the effluent is that the City in changing the discharge from the south side of the river to the north side, has changed the low flow channel in the river to the north. This in turn has promoted the main flood flows to push northward towards the community of Holly Acres.



LOCATION MAP

FIGURE V-1

It has been generally acknowledged that insect and odor problems have existed in the past as a result of the plant discharges. However, these problems are expected to decrease dramatically for the following reasons:

- Operation of the plant is improving with additional manpower and maintenance.
- Added facilities will improve the quality of the effluent being discharged.
- By December 1980 the effluent will be disinfected.

However, unless the effluent from the plant enters a clean, free-flowing channel, there could be ponding and backwaters to harbor mosquito and midge larvae.

The conclusions drawn from the Effluent Discharge Assessment are that the effluent helps to maintain the water table east of 115th Avenue. This higher groundwater table and effluent surface flow supports riparian vegetation in the area. If the effluent were reduced or eliminated there would be a thinning of native riparian vegetation (cottonwood and willows). West of 115th Avenue the effluent has little impact on the groundwater table due to the naturally occurring shallow groundwater in the area. Therefore there would be minor impact on the vegetation west of 115th Avenue if the effluent were removed. The impact of the vegetation on the flooding has not been quantified but it will restrict flood flow and therefore increases to some extent overbank flow.

However, flooding is a problem downstream of 91st Avenue and the U.S. Army Corps of Engineers, as part of the Central Arizona Water Control Study (CAWCS), is looking at alternatives such as dams, levees, channels, and clearing to mitigate the problem. Also the Flood Control District of Maricopa County has a project underway for selective clearing of a 1000-foot wide strip of the river from 91st Avenue to Gillespie Dam. As of this writing, two bills were passed by the State Legislature. One was to appropriate \$50,000 for the "Holly Acres Flood Relief Commission." This bill would establish a commission to look into the feasibility of diking the area or relocating the residents of Holly Acres. The other bill appropriated \$1.1 million to the Flood Control District of Maricopa County for study, evaluation and construction of channels and dikes along reaches of the Gila River between 91st Avenue and 101st Avenue. In spite of these improvements and studies, solution of the flooding problem could take ten to twenty years to fund and implement.

In the long term there will be a plan developed such that effluent discharge to the river from the 91st Avenue treatment plant will be greatly reduced. To develop and implement such an effluent management plan may take several years. Therefore, the problem to be resolved is what should be done in the short term (the next five years) to help mitigate the concerns and problems downstream of 91st Avenue. The options identified for consideration fall into the following general categories:

- No Action
- Utilize the ANPP Pipeline
- Channelization of the Effluent
- Miscellaneous

#### SHORT-TERM OPTIONS

##### No Action

Under this option the effluent from the 91st Avenue plant would continue to be discharged to the north side of the river. It would continue to meander its way downstream until it was sufficiently diluted or purified that it was no longer a problem or concern. Considerations under this option are:

- Potential for insect or odor problems would not be reduced.
- Continued discharge to the river would help maintain the groundwater which in turn would support the vegetation east of 115th Avenue.
- Maintenance of the cleared channel by the Flood Control District would be more difficult.
- Maintenance of the riparian habitat would be easier for the Arizona Department of Game and Fish (ADGF).
- This would be the easiest option to implement by the Multi-City SROG.
- Failure by the Multi-City SROG to do something about the complaints could result in litigation by residents of Holly Acres.

- This option could result in continued complaints from the Gila Indians.
- Downstream users of the effluent would be unaffected.

### Palo Verde Nuclear Generating Station Pipeline

The pipeline to transport effluent from the 91st Avenue treatment plant to the Buckeye Irrigation Company and the nuclear generating station is approximately 85 percent complete. That portion from the plant to the pump station at the Hassayampa River is 100 percent complete with a capacity of about 86.5 mgd. Flows to the Buckeye Irrigation Company of 26.8 mgd (30,000 acre-feet per year) will be diverted from the pipeline.

Operation of the pipeline will be controlled by the PVNGS and only the flows needed by the generating station and the irrigation company will enter the pipeline. All other flows will be bypassed at the treatment plant to the Salt River. There is no provision in the design of the pipeline to bypass any effluent to the Hassayampa and the maximum flow that can be diverted to the irrigation company is about 40.0 mgd (45,000 acre-feet per year). The irrigation company would like to increase its contracted amount from 30,000 to 45,000 acre-feet per year.

Some general considerations in using the pipeline to bypass the effluent to some point downstream are listed below. However, one important point to note is that it is the policy of the owners of the pipeline that the line should only be used to transport effluent to the power station and the irrigation company.

- Removing effluent from the river will not appreciably affect the vegetation growth downstream in the short-term and therefore would have no significant impact on the flooding problem.
- The problems of odors, insects and other nuisances attributed to the effluent would be completely removed.
- Removal of the effluent could be detrimental to the development of wildlife habitat plans by the Arizona Game and Fish Department. Also, under the operating permit for the Palo Verde Nuclear Generating Station, the power companies must monitor the impacts of effluent removal on the riparian habitat.
- Arizona Game and Fish feel they have the right to effluent from the 91st Avenue plant. How much and how firm has not been determined at this time.
- Downstream users of the effluent, primarily the Buckeye Irrigation Company, would be seriously affected unless there were some means to get the effluent into the river upstream of their diversion dam or else into their canal. The BIC does not, however, have any rights to the effluent other than their contracted 30,000 acre-feet per year.
- Maintenance of a cleared channel would be easier without the effluent in the river.
- Implementing an option to remove the effluent from the river could be totally within the control of the Multi-City SROG.
- An agreement would be required from the owners of the pipeline that the line could be used for an interim period to transport effluent.
- Agreement would have to be reached by the various parties as to who would build the necessary diversion facilities, operate the pipeline and monitor the effluent.

- Cost to operate the pipeline would have to be worked out with PVNGS.
- Effluent from the Tolleson plant would still be discharged to the river via the 91st Avenue effluent channel.

In looking at the pipeline option, it soon became apparent that there were several ways to use the pipeline and several entities interested in using the effluent. The following describes the sub-options identified.

A. Existing Contract Amount to BIC with Balance to Hassayampa

With this option all of the effluent would be diverted at the treatment plant into the pipeline. BIC would take its contracted amount (30,000 acre-feet per year) and the balance (70,000 acre-feet per year) would be discharged into the Hassayampa River.

- Bypassing facilities at the Hassayampa pump station will be required.
- No assessment has been made as to the impacts of discharging about 70 to 100 mgd of effluent into the Hassayampa. Some comments have been made that silting up of the Gillespie Dam has seriously impaired the capacity of the Hassayampa as it flows into the Gila River. Therefore, any flow into the Hassayampa River could cause problems although no analysis has been carried out. It should be noted that the Flood Control District is looking at methods to reduce the silting behind the dam and improve the capacity of the dam to pass flood waters.
- A new NPDES permit will be required for discharging to the Hassayampa since the existing permit is only for discharging of the 91st Avenue plant effluent into the Salt River.
- BIC would be limited to 30,000 acre-feet per year.
- The Arlington Canal Company and the Paloma Ranch would have access to the effluent from the Hassayampa and Gila Rivers.
- The cost of the diversion structure could run about \$100,000.

B. Increased Contract Amount to BIC with Balance to Hassayampa

Under this option 45,000 acre-feet would go to BIC with 55,000 to the Hassayampa. The Buckeye Irrigation Company would like to use additional effluent and has, in fact, requested an additional 15,000 acre-feet per year from the City of Phoenix. This would be transported through the PVNGS pipeline. However, a condition requested by the irrigation district is that the City extend their contract for the 45,000 acre-feet per year until the year 2040. The City on the other hand is perfectly willing to enter into a short-term contract with the district for additional effluent but does not want to commit itself to long-term contracts until it knows exactly what it wants to do with the effluent in the long-term. Buckeye Irrigation Company does not want to pay for additional effluent on a short-term basis when they can divert it from the river for free. As yet there is no resolution to the differences between the City and the irrigation district; however, the BIC district would like to start the effluent delivery this summer.

C. All of BIC Needs with Balance to Hassayampa

The BIC currently diverts about 70,000 acre-feet per year (6,000 acre-feet per month) from the Gila River during its peak irrigation season. To bypass this amount from the pipeline to the BIC system would require new valving and pipework at a cost of about \$100,000. This rate of diversion would only take place during the summer months. At other times of the year it would be closer to the 2,500 acre-feet per month rate of their contract.

D. Increased Contract Amount to BIC with Balance to Arlington/Paloma

With this option 45,000 acre-feet goes to BIC and 55,000 acre-feet to Arlington/Paloma. The Arlington Canal Company and the Paloma Ranch have indicated an interest in obtaining effluent from the 91st Avenue plant. If a long-term contract could be arranged they would consider providing facilities to pick up the effluent from the PVNGS pipeline at the Hassayampa. This would eliminate any discharge into the Hassayampa. Effluent would be transported through the Arlington Canal system south to the Paloma Ranch area. This would require a major investment by the irrigation companies and a long-term commitment by the Multi-Cities.

E. Increased Contract Amount to BIC, Discharge to AGFD, Balance to Hassayampa

Under this option 45,000 acre-feet goes to BIC, 7,000 acre-feet to AGFD and 48,000 acre-feet to Hassayampa. To offset some of the problems with bypassing everything to the Hassayampa, this option would have a discharge to the Salt River from the treatment plant to maintain a riparian habitat. BIC would use as much as it could negotiate and the balance would go into the Hassayampa.

This would still require an NPDES permit and an agreement between the BIC and the Multi-City SROG. It would also depend upon whether the Tolleson effluent could be utilized for the AGFD in lieu of the Multi-City effluent. It would also depend upon the feelings of all of the agencies and communities concerned of any discharge to the river for maintenance of riparian habitat and on the final decision on the AGFD claim for effluent.

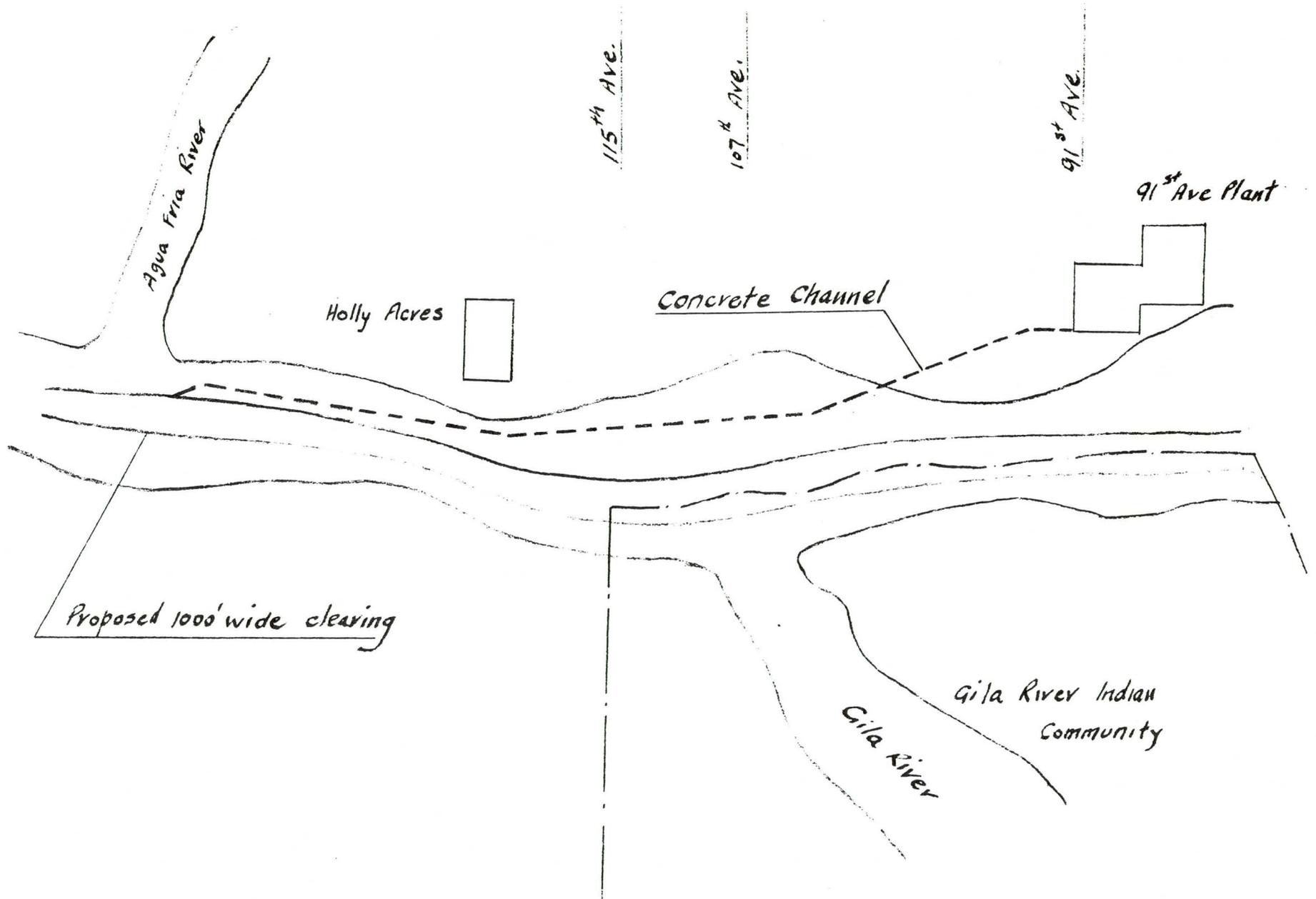
## Channelization of the Effluent

Effluent from the 91st Avenue treatment plant discharges to a channel which runs westerly from the plant and discharges into a north flowing loop on the Salt River at about 93rd Avenue. The channel was damaged in the 1979 floods and the City was in the process of repairing and extending the channel further west. Recent floods have further damaged the channel and the City is now looking at the best means to rebuild the channel. Present thinking by the City is to reconstruct the channel to about 95th Avenue. Various options for channeling the effluent are discussed below.

### A. Concrete Channel

This option would be for an extension of the 91st Avenue treatment plant effluent channel to the Agua Fria River. The channel would be concrete lined and protected from some flood damage by a levee. The channel would be outside of the proposed 1000 foot wide cleared area. See Figure V-2. Impacts to consider are:

- A separate lined channel would eliminate local problems of insects, odors and vegetative growth.
- Unless some provision was made to bypass flow, the Arizona Department of Game and Fish would not receive their claimed 7,300 acre-feet per year.
- Construction of such a channel protected against a 100 year flood would be extremely expensive, but it could be done if a levee was identified as part of the flood protection for the area.



PROPOSED CONCRETE CHANNEL

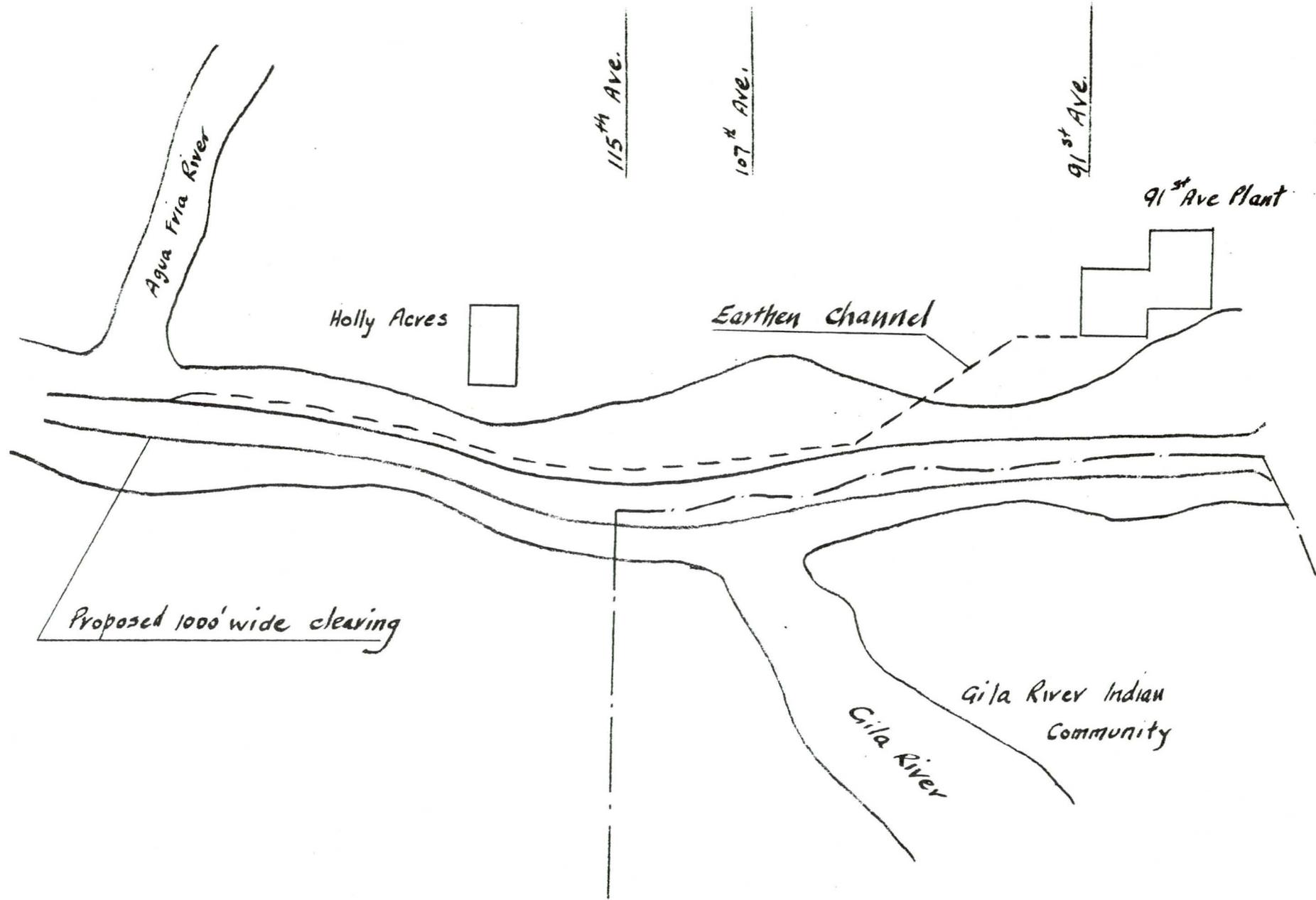
FIGURE V-2

- Construction of a channel with some protection against flooding would cost about \$1.0 to \$1.5 million.
- The channel constructed out of the river bed would not require a U. S. Army Corps of Engineers dredging permit or an environmental assessment.
- Downstream users of the effluent would welcome a lined channel since water losses would be greatly reduced.
- Since the treatment plant property line only goes to about 95th Avenue, an easement for the effluent channel would have to be obtained from the property owners.
- Expenditure of the \$1.0 to 1.5 million by the Multi-Cities would only be justified if the channel was also the best long-term solution.
- The separate channel would be best for the maintenance of the 1000 foot cleared area.
- The Flood Control District is funded to construct some diking between 91st and 101st Avenues.

#### B. Earthen Channel

An alternative to the expensive concrete lined channel would be an earthen channel constructed just north of the cleared area. Conceivably this could be constructed as part of or simultaneously with the channel clearing. See Figure V-3. Impacts to note with this are:

- A high level of coordination would be required between the Multi-City SROG and the Flood Control District.



PROPOSED EARTHEN CHANNEL

FIGURE V-3

- Agreement would have to be reached fairly quickly between the Flood Control District and the Multi-City SROG for the design, construction, maintenance and cost of the channel.
- Approval would be required from the property owners.
- An earthen channel, built as part of the clearing project would be subject to damage by any flood waters.
- Constructing a channel in the river bed may require a permit from the U. S. Army Corps of Engineers. If this is the case an environmental assessment may also be required.
- Provision would be required for the claimed Game and Fish effluent allocation.
- Downstream users would be unaffected by the channel option.
- As long as the channel was maintained to ensure free flow of the effluent, it would probably be accepted by the residents of the area.
- The estimated cost of a simple earthen channel would be about \$75,000.

#### C. Combined Low Flow Channel

The Flood Control District of Maricopa County as part of their clearing program, is proposing a small drainage channel between 91st Avenue and about 103rd Avenue. This channel is primarily designed to drain some Gila Indian Reservation land along the south side of the river as well as any upstream flow that comes down. It is not planned to carry any effluent from the 91st Avenue plant since an assumption of the Flood Control District is that the effluent will remain on the north side of the river.

This option proposes that the drainage or low flow channel be extended all the way to the Agua Fria River. Effluent from the plant would go straight south to meet the low flow channel and the north channel of the Salt River would be blocked off to redirect any upstream flow into the low flow channel. See Figure V-4. Impacts to consider are:

- Insects and odors would be controlled.
- Game and Fish could develop a wildlife management plan around the channel.
- Downstream users would not be affected.
- Agreement would be required from the Flood Control District.
- Objections are possible from the Gila Indians about effluent in the drainage channel.
- The Flood Control District, assuming a plan could be developed with the Multi-City SROG, would have to go back to the Gila Indians to obtain their approval.
- Costs to maintain the cleared area would probably increase due to the effluent in the channel.
- One of the reasons stated for changing the direction of the effluent discharge was that when the effluent went south it crosses the Gila Indian Reservation. Arizona law could make it possible for the Gila Indians to claim the effluent. Therefore, to avoid any possible problems the effluent was sent west such that it remained on the north side of the river. Effluent in the proposed low flow channel would again cross the Indian Reservation.
- Agreement would be required rather quickly between the Flood Control District and the Multi-City SROG for the design, construction,

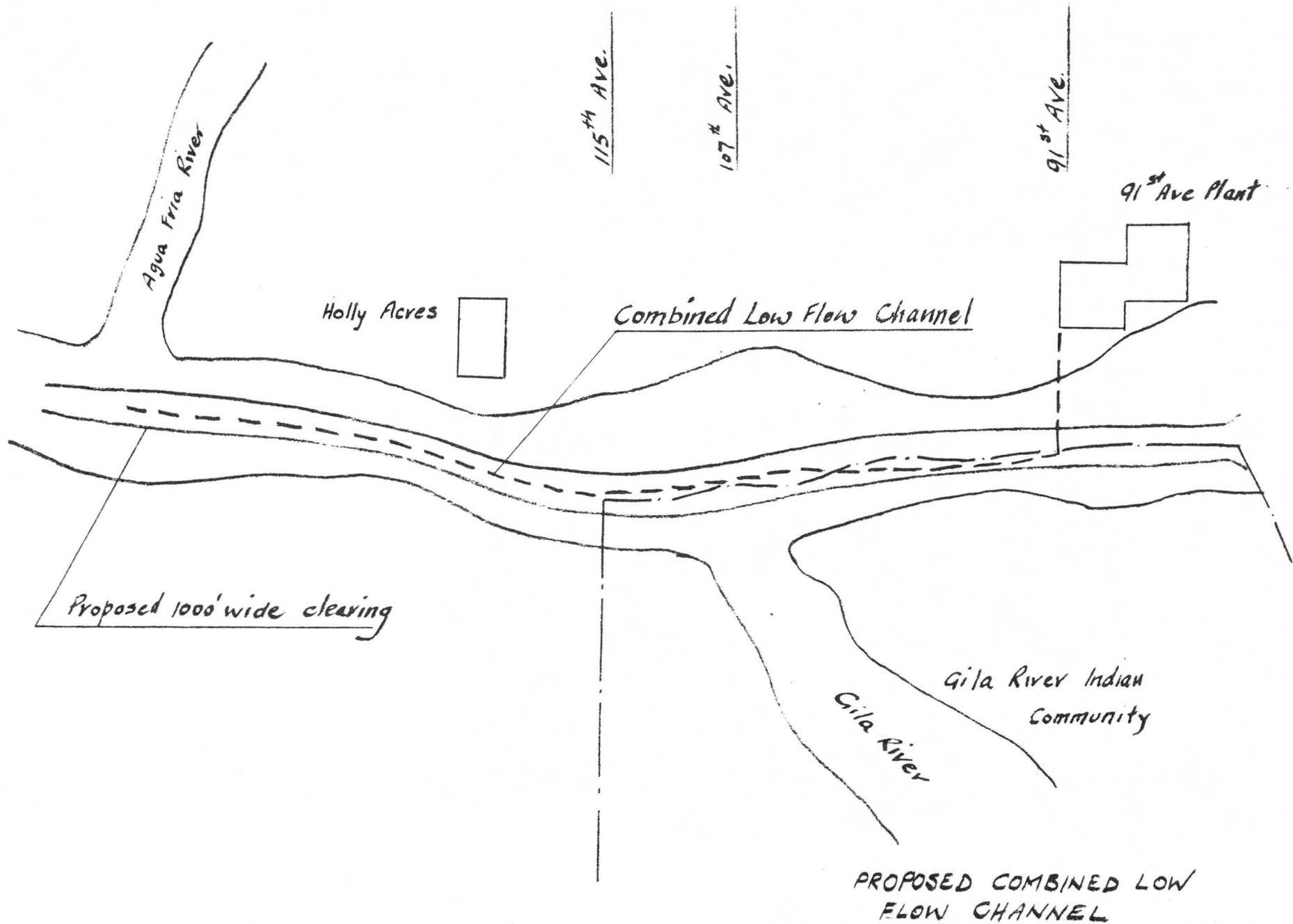


FIGURE V-4

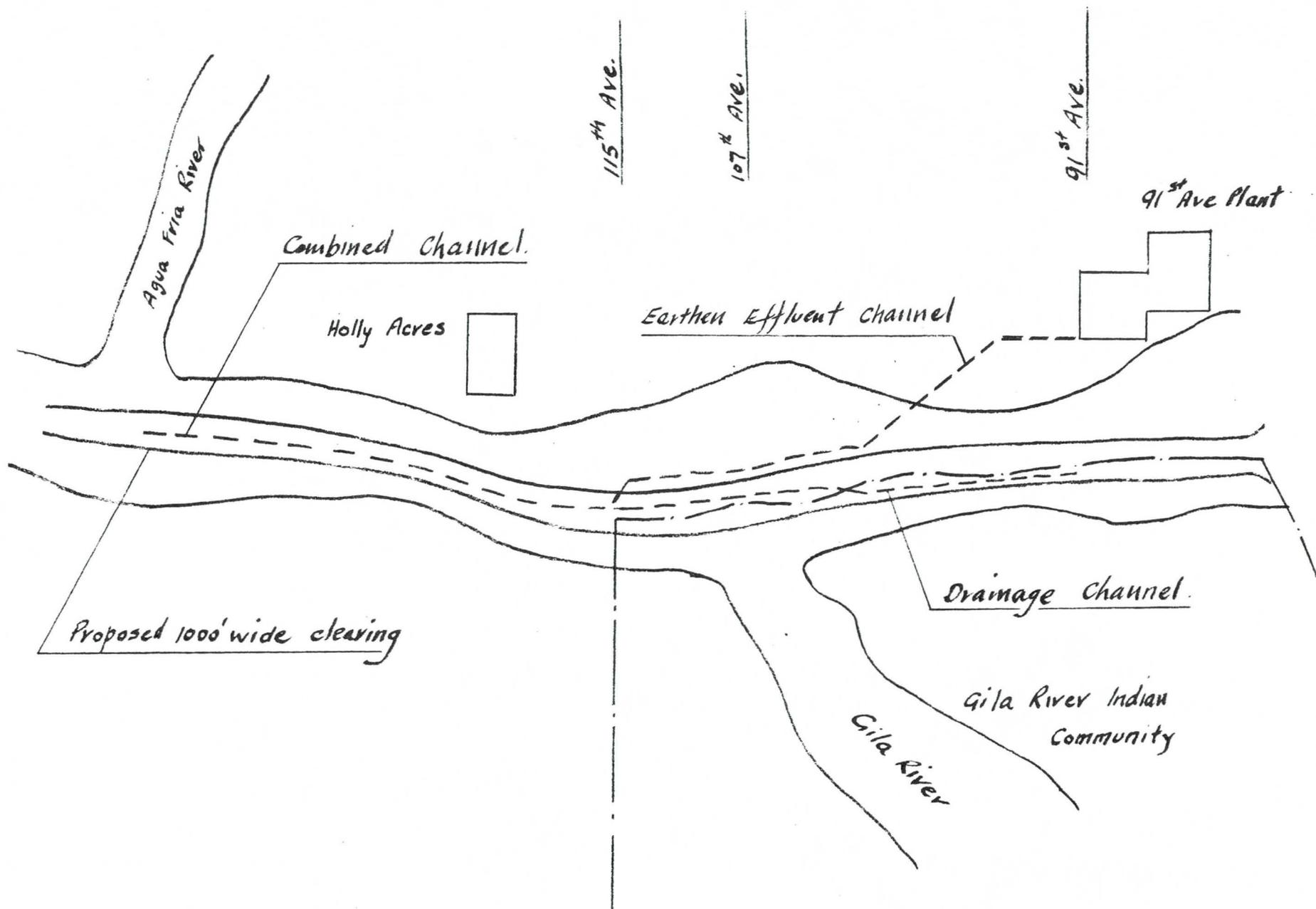
maintenance and costs of the channel.

- A permit from the U. S. Army Corps of Engineers may be required to construct the channel.
- The estimated cost of a low flow channel would be about \$125,000.

D. Separate Channel to 115th Avenue and Combined to the Agua Fria River

Under this option a separate earthen channel would be constructed just north of the 1000 foot wide cleared area. It would go from about 95th Avenue to about 115th Avenue. There it would go into a low flow channel in the 1000 foot cleared area. This low flow channel would extend to the Agua Fria River. See Figure V-5. Impacts and benefits of this option are:

- The effluent is not put into the channel draining the north bank of the Gila Indian Reservation. This would satisfy the Indians' needs.
- The potential for insect and odor problems would be reduced.
- The option would reduce a little the amount of effluent recharge east of 115th Avenue.
- Provisions could be made for the claimed Game and Fish flows.
- A maintained channel would probably be accepted by the residents of the area.
- The FCDMC does not presently plan any channel other than the one between 91st and 103rd Avenues.
- A high level of coordination would be required between the Multi-City partners, Arizona Game and Fish and the Flood Control District.
- A permit may be required from the U. S. Army Corps of Engineers.
- The channels would be subject to damage from flood flows.
- Estimated cost would be about \$100,000.



PROPOSED SEPARATE/COMBINED CHANNEL

FIGURE V-5

## Miscellaneous

### A. Additional Irrigation Use

Over and above additional irrigation uses identified as part of the PVNGS pipeline option there are other potential irrigation areas close to the 91st Avenue plant. These are:

- St. Johns Irrigation District
- Tolleson Sod Farm
- Roosevelt Irrigation District
- Gila Indian Farms

The reuses would be with short-term contracts (1-2 years), renewable until such time as existing commitments used all of the effluent or the Multi-Cities agreed upon their long-term reuse plans.

Effluent could be easily transported to the St. Johns Irrigation District by pumping from the City of Phoenix effluent channel to the District's canal. However, unlike the Buckeye Irrigation District which grows only field crops, the St. Johns District also supplies water for lawn irrigation. This requires a higher quality of effluent than that currently produced at the 91st Avenue plant. Therefore, unless some provision could be made to change the cropping patterns or else the mode of delivery of effluent, it would appear that utilization of the effluent by the St. Johns Irrigation District would be best considered in the long-term options.

The Roosevelt Irrigation District has an agreement with the City of Phoenix for utilizing the effluent. However, the crops grown by the District require a treatment level which is more advanced than that carried out at the 91st Avenue plant. Therefore, utilizing the effluent for the short term on the Roosevelt Farms is not practical at this time.

Effluent could also be pumped to the Gila Indian Reservation for irrigation use. Unfortunately, to implement such a concept could take some time since, as yet the Gila Indians have only voiced a casual interest in utilizing effluent on the Reservation.

The Sod Farm at Tolleson utilizes the effluent from the Tolleson treatment plant to irrigate the sod. At present the farm uses about 500 acre-feet per year. The farm plans to expand and use about 2200 acre-feet per year of effluent from the expanded Tolleson Wastewater Treatment Plant. Effluent from the 91st Avenue plant could be pumped to the sod farm. However, this would be fairly expensive for the limited amount of effluent to be reused and would only be operational until the expansion of the plant was complete in 1982.

#### B. Percolation Ponds

Another method of getting the effluent out of the river is to percolate it into the groundwater using the idea developed by Dr. Bouwer at Flushing Meadows. Such a system would require an effluent channel capable of handling all of the flow and approximately 500 acres of percolation

basins. To recover the percolated effluent would require the installation of shallow recovery wells. The recovered effluent would be of a high quality and suitable for unrestricted agriculture.

Areas to consider in this option include:

- Implementation of the percolation pond option would take three to four years.
- If the ponds were located at Flushing Meadows then some form of flood protection would be required if a recovery system were installed.
- Cost of putting in the ponds and recovery system would be about \$10-15 million. This translates to a water cost at the surface of about \$20 to 25 per acre-foot. Transport of the renovated water would increase the costs further.
- The percolation basins could possibly be modified to provide some wildlife habitat.
- If no recovery system was installed then there would be a substantial impact on the groundwater table in the vicinity of the ponds.
- It would appear that using percolation basins would be best suited for consideration of increasing the effluent quality for long-term options.

#### EVALUATION SUMMARY

Table V-1 summarizes the evaluation of the various short-term reuse options.

The criteria used are divided into three main areas:

- Problems
- Permits
- Acceptability

These in turn are divided into specific criteria and the options are evaluated against these criteria. Under problems there are seven existing or potential problems. Each option is then evaluated as to its potential for mitigating the existing problems and avoiding future problems.

Under permits the options are identified as requiring a new NPDES permit or a U. S. Army Corps of Engineers permit.

Under acceptability the agencies and communities impacted by the options are identified. Each option is evaluated as to its acceptability or impact on the agencies or communities.

It should be noted that the evaluation completed in Table V-1 is that of the consultants. This is especially pertinent for the acceptability columns for the agencies and communities. The evaluation in these columns is how the consultant feels the agencies or communities would accept the particular alternatives.

Table V-1  
SHORT TERM OPTIONS EVALUATION

OPTIONS	EST. CAPITAL COST	PROBLEMS							PERMITS				ACCEPTABILITY						
		Insects & Odors	Vegetation Growth	Maintenance of Wildlife Habitat	Impact on Existing Agricultural Use	Needs Term Contract	Impact on Hassayampa	Implementability for Short Term	NPDES	COE Dredging	Multi-Cities	PVNGS	FCDMC	AGFD	Gila Indians	BIC	Arlington/Paloma	Local Communities	Tolleason
No Action	-	●	●	○	○	-	-	-	-	-	●	○	●	○	●	○	-	●	-
ANPP Pipeline																			
A .30,000 to BIC 70,000 to Hassayampa	\$ 100,000	○	○	●	●	●	●	●	●	-	○	●	○	●	○	●	○	○	-
B .45,000 to BIC 55,000 to Hassayampa	75,000	○	○	●	●	●	●	●	●	-	●	●	○	●	○	●	○	○	-
C .70,000 TO BIC 30,000 to Hassayampa	100,000	○	○	●	○	●	●	●	●	-	●	●	○	●	○	●	○	○	-
D .45,000 to BIC 55,000 to Arlington/Paloma	-	○	○	●	●	●	-	●	-	-	●	●	○	●	○	●	○	○	-
E .45,000 to BIC 7,000 to AGFD 48,000 to Hassayampa	70,000	○	○	○	○	●	●	●	●	-	●	●	○	○	○	○	○	○	-
Channeling																			
A .Concrete Lined	1,500,000	○	○	●	○	-	-	●	-	-	●	-	○	●	○	○	○	○	-
B .Earthen as Part of Clearing	75,000	○	○	●	○	-	-	-	-	●	○	-	○	●	○	○	-	○	-
C .Combined Low Flow	125,000	○	○	○	○	-	-	-	-	●	●	-	●	○	●	-	○	-	-
D .Earthen to 115th Avenue and Combined to Agua Fria River	100,000	○	○	○	●	-	-	-	-	●	○	-	●	○	○	○	-	○	-
Miscellaneous																			
A .Additional Irrigation	-	○	○	○	-	●	-	●	-	-	●	-	○	○	-	-	○	-	-
B .Percolation Ponds	15,000,000	○	○	○	●	-	-	●	-	-	●	-	○	○	○	●	-	○	-

- Beneficial or Easily Accomplished
- Negative Impact or Major Problem
- Minor or No Impact

## CONCLUSIONS AND RECOMMENDATION

The recent floods and the planning for 91st and 23rd Avenue plants have brought to a head the problems downstream of the plants.

- The local residents, Flood Control District and the Gila Indians are concerned about unregulated and unmanaged effluent discharge to the river.
- The Flood Control District is proceeding with plans to clear the reach of the river downstream of 91st Avenue.
- Recent State legislation has appropriated funds for levees downstream of 91st Avenue and planning for Holly Acres.
- The Corps of Engineers, as part of the Central Arizona Water Control Study, is looking at long-term flood control alternatives for the area.
- The City has to do something quickly relative to repairing the damage done by floods to the effluent channel at the 91st Avenue plant.
- A long-term effluent discharge plan as identified in Chapter IV LONG-TERM REUSE OPTIONS, will have to interface with the various flood control studies going on as well as the Arizona Game and Fish Department and the Arizona State Parks Board. This could take a number of years.
- A short-term, low-cost effluent discharge plan is required immediately.
- Discharge to the proposed drainage channel on the south side of the river could cause disapproval by the Indians of the Flood Control District clearing project.

- Use of the ANPP pipeline although not impractical could be difficult to implement in the short-term due to requirements for an NPDES permit, negotiations with the owners of the pipeline and a detailed assessment of the impacts of discharging to the Hassayampa River.

Based upon these conclusions the following recommendation is made:

" The Multi-City SROG and the Flood Control District work together to implement as part of the channel clearing project, the north bank earthen channel to 115th Avenue and then the combined drainage/effluent channel to the Agua Fria River."

The plan to implement this recommendation is included in Chapter VI-IMPLEMENTATION.

VI  
IMPLEMENTATION

## CHAPTER VI

### IMPLEMENTATION

This chapter describes how recommendations made in this study are to be implemented, the work to be done, implementing agency, and time frame for completion. An estimated cost is also included.

#### WATER RESOURCES

It was recommended that a water resources plan be developed for the area. To implement this recommendation will be extremely difficult for the following reasons:

- There is no agency or organization with responsibility and/or authority to carry out the necessary broad-based planning program.
- There are a number of presently unanswered questions concerning water supply and demand. These include the Indian water claims, groundwater management legislation, water quality and the interface of surface and groundwater management.

However, the planning should be initiated soon in order that the cities and towns can identify the impacts of the alternative situations that may confront them. The early planning could also help to identify the scope and role of the Active Management Area once it is established for the Salt River Valley.

## Scope of Study

The scope of the Water Resource Planning Study should contain the following elements:

- Identification of future water needs and type of water uses of the area through the year 2030 for the various users. This task will also include an evaluation of present consumption and an assessment of the impact of future (proposed) conservation practices.
- Identification of potential sources of water by type and quality. This task will input data from the groundwater monitoring program, the Water Commission groundwater model, USGS studies, CAP allocations, and any Indian claims that have been settled.
- Establish basin goals and objectives. These should include conservation goals and if the basin should be balanced and when. The Groundwater Management Study Commission has suggested some goals for the area but these should be carefully reviewed by the communities.
- Using the Arizona Water Commission groundwater model compare the basin needs, supplies and goals.
- Develop and analyze alternative water resource strategies to meet the goals on a basinwide basis.
- Select the water resource strategy that best meets the area's goals and needs.
- Develop and analyze alternative water management strategies for each city and town based upon the selected basin strategy.
- Inventory existing water management agencies and develop alternative water resource management structures for the area. These management

structures must interface with the pending groundwater management legislation.

- Identify the legal and institutional constraints to complete water resource planning in the Salt River Valley.
- Establish a process and program to monitor the changes in the State groundwater quality standards to determine the impacts on the Salt River Valley.
- Establish a process and program to monitor the trends in water consumption and use.
- Develop communication and coordination between the various negotiators relative to the Indian water claims.
- Develop a procedure to better improve the coordination and communication between the federal, state and local agencies and private interests relative to water resource planning.

To carry out the above described elements of a water resource plan will require a well thought out and coordinated program. Possible agencies to implement the task are discussed below.

#### Implementing Agency

There are several possible agencies or organizations which could implement the recommended water resource planning tasks:

- Maricopa Association of Governments (MAG)
- State of Arizona Water Commission (AWC)
- Municipal Water Users Association (MWUA)

- Multi-City Subregional Operating Group (SROG)
- City of Phoenix
- U. S. Army Corps of Engineers (COE)
- U. S. Water and Power Resource Service (WPRS)
- Salt River Project

The selection and designation of a water resource planning agency for the Salt River Valley is an important decision. Care should be taken to choose a planning organization which possesses expertise and which will also represent the urban water consumers. Consideration could also be given to the selection of two or more of the agencies and organizations listed to conduct the water resource planning activities. Additionally, sufficient funds should be allocated to establish a strong water resource planning foundation and a commitment to an ongoing planning effort.

Following is a discussion of the possible implementing agencies.

Maricopa Association of Governments (MAG)

Mag is a county-wide planning and coordinating organization formed by the local governments of Maricopa County. At present, MAG is not active in water resource planning nor has staff time been allocated to the activity. It did, however, sponsor the preparation of a 1968 regional water plan and until a few years ago had an active technical committee for the water function. As the designated agency responsible for areawide water quality management planning, MAG is active in groundwater quality

monitoring and studies, as well as the planning and coordinating of wastewater activities. For MAG to undertake water resource planning for the region, the MAG members would have to agree to assume this activity and to provide necessary funding.

#### State of Arizona Water Commission (AWC)

Arizona Water Commission responsibilities include development of a State Water Plan. In the Phoenix Urban Area, the AWC is presently actively involved in 1) groundwater modeling and data collection, 2) Central Arizona Project (CAP) allocation, and 3) State-level water resource planning including effluent reuse. If the proposed groundwater management legislation is enacted, the duties and responsibilities of the AWC will be drastically altered. A new State Department of Water Resources will be created to replace the AWC and will be, among other duties, required to develop a plan to manage the groundwater of the Salt River Valley. At present, the management of surface water is not included in the proposed legislation. Presently the AWC does not have adequate staff capability nor authority to develop a water resource planning effort for the Phoenix Urban Area. If the proposed Department of Water Resources is enacted, it will probably be a few years before the new agency is properly staffed to undertake local water resources planning. Additionally, the primary responsibility and activity will probably be to focus initially upon the broader Statewide implications of water resource planning and management.

## Municipal Water Users Association (MWUA)

The MWUA is a non-profit organization formed by the Cities of Phoenix, Tempe, Mesa, Scottsdale and Glendale to serve as an information clearing-house, and provide legislative lobbying and legal representation on water matters. The MWUA as an organization has not been active in water resource planning activities and does not possess in-house planning or technical staff. If this organization was designated as the water resource planner for the region, a change in role and responsibilities and an increase in the funding level would be necessary. Additionally, in order to represent the local governments of the region, membership should be increased to include most of the entities in the Salt River Valley.

## Multi-City Subregional Operating Group (SROG)

The Multi-City SROG is responsible for the wastewater planning for the Cities of Phoenix, Scottsdale, Tempe, Glendale and Mesa and the Towns of Youngtown, and Gilbert. The City of Phoenix was selected as the Lead Agency to carry out contracted responsibilities on behalf of SROG members. A major activity of the SROG is to plan and coordinate wastewater management among and for the member entities. The SROG plans and activities are integrated at the MAG level to form areawide plans and programs. Five of the seven SROG members are also members of the MWUA and all seven entities are MAG members. In the event SROG was assigned the water resource planning tasks additional staff and funds would be necessary. Also, in order to provide proper representation from all areas of the region, new members should probably be added.

## City of Phoenix

The City of Phoenix is the largest incorporated entity of the Salt River Valley. As the largest City, it also has the most water customers. The City of Phoenix has provided strong leadership in developing joint or contracted facilities involving many of the local governments of the area. The City of Phoenix also has some in-house local water planning activity. If the City of Phoenix was assigned the water resource planning responsibility, additional staff and funds would be necessary. Some concern could also develop among other cities and towns because Phoenix does not represent all communities. An option to this alternative is the City of Phoenix providing water resource planning to another entity, i.e., MAG, SROG, or MWUA.

## U. S. Army Corps of Engineers (COE)

The COE is presently assisting the U. S. Water and Power Resources Service in the Central Arizona Water Control Study. The COE in 1975, at the request of the Maricopa Association of Governments Regional Council, undertook the development of an Urban Studies Program including the preparation of the MAG Areawide Water Quality Management Plan for the urban area. For the past two years, the COE has been conducting an Urban Studies Program in Tucson with a major task providing for the development of an Eastern Pima County Water Resources Plan. At present, the COE does not have staff nor funds to undertake the water resources planning effort for the Salt River Valley. If requested to do so, Congressional authorization for funds and

task assignment would be necessary. An alternative would be the local governments contracting with local funds with the COE for this service.

#### U. S. Water and Power Resources Service (WPRS)

WPRS is presently involved in two Salt River Valley water resource activities: the Central Arizona Water Control Study and the planning and execution of the Central Arizona Project. WPRS has strong experience and expertise in water resource planning. If WPRS were assigned the water resource planning tasks, additional funds and staff would be necessary. This would mean Congressional action would be necessary as a prerequisite for involvement. Local governments of the area could contract with WPRS to provide the planning services. This, however, would also require authorization for additional staff and funds.

#### Salt River Project (SRP)

SRP serves as the principal water wholesaler for the major cities of the Salt River Valley. SRP possesses strong water resource planning and management capability. Since SRP only provides water to eight of Salt River Valley cities and towns, their planning area may be limited for Valley-wide water resource planning. In the event SRP was selected to undertake water resource planning for the region, coordination mechanisms should be established to involve cities and towns, and state and federal agencies.

## Implementation Steps and Schedule

Following are the initial steps to implement the Water Resource Study along with a proposed schedule.

- Agreement between the Multi-City members that a Water Resource Study as described above is needed. July 1980
- The agencies involved should decide the best agency to manage the study and the agencies and organizations to participate. Also identify funding sources. September 1980
- Selected management agency should develop detailed scope of work for the various elements and assign responsibilities. December 1980
- Select and negotiate with consultants to do elements of the project. March 1981
- Complete initial phase of study. March 1982

The estimated cost for the Water Resource Study will range from \$250,000 to \$500,000 depending upon the level of detail of the various elements.

### LONG-TERM REUSE OPTIONS

The recommendations made relative to the long-term reuse options were:

- Initiate a program to develop the medium-term reuse options and to negotiate contracts, and

- Complete a study to develop a long-term plan for discharging the unused effluent from 91st and 23rd Avenue, and Tolleson treatment plants to the river.

If adopted these two recommendations would result in two separate but related studies.

#### Implementing Agency

For both of these projects the Multi-City SROG would be the implementing agency. The City of Phoenix would provide staff to SROG until such time that SROG is able to hire its own staff.

#### Scope of Work

The scopes of work for the two projects are described below.

#### Effluent Reuse Program

- Define Multi-City Goals and Constraints  
Before any work is started on the effluent reuse program, the Multi-City SROG should document exactly what its goals and constraints are. These could cover additional water supplies, reduced treatment costs, balancing the water table, etc., and would assist later in identifying the best reuse plans.

- Initial Contact with Potential Reusers  
A number of potential reusers have been identified in this study. These plus any others should be contacted individually to determine in more detail the quantity of effluent desired, quality required, options to the Multi-Cities for trading water, possible delivery systems, time frame for contract, legal problems and degree of interest.
  
- Develop Alternative Reuse Systems  
Based upon the existing commitments and potential commitments an array of alternative reuse systems would be developed. These systems would identify reusers, water trades and delivery systems. They would also identify costs, environmental impacts, legal or institutional constraints, storage requirements, volumes discharged to the river on a seasonal basis, and time frame for implementation.
  
- Initial Negotiations with Reusers  
Once the basic information is developed from the previous task, negotiations can proceed to determine how many of the initial reusers are still interested in the effluent. The negotiations will also identify specific problems for the reusers and the Multi-City partners.
  
- Selection of Best Reuse System  
Based upon the initial negotiations, the costs and benefits of the systems and the SROG goals and constraints, the Multi-City SROG would select those reuse systems which best meet their needs and have the best chance to be implemented.

- Second Negotiations with Reusers

These negotiations will try to determine as closely as possible the specific conditions and requirements for the successful negotiation of the reuse contracts. The negotiations will also determine which reusers are willing to sign a contract with the Multi-City SROG.

Before these negotiations start the SROG should prioritize the potential reusers and negotiations should start with the preferred reuser.

Once this round of negotiations is completed it should be fairly clear which reuses can be implemented and therefore what the delivery systems will be.

- Select Preferred Reuse Plan

The Multi-City SROG will review the possible reuse options and delivery systems and select the preferred plan.

- Finalize Delivery System

The final details of the effluent delivery system can be developed once the final reusers of the effluent are identified.

- Finalize Reuse Contracts

Final negotiations can take place for trading and/or purchase of the effluent.

## Effluent Discharge Study

The effluent discharge study will have the responsibility of developing a plan to handle the varying seasonal discharges to the river from the two treatment plants. This plan will have to meet the wildlife needs of the area as well as be compatible with flood control recommendations for the area.

- Identify Existing and Future Recreation and Wildlife Habitat Needs  
A review should be made, in conjunction with the various Arizona State agencies, of the need, location and requirements for maintenance of existing or additional wildlife and recreation areas downstream of the two plants.

This review should cover the amount of water needed, quality needed, the impact of too much or too little water, seasonal needs, etc. The task should also identify as closely as possible the needs of the AGFD, State Parks Board and the flood control alternatives.

- Determine Discharges to River  
Based upon the flow projections and the alternative reuse and delivery systems from the Effluent Reuse Study, develop a range of discharges that can reasonably be expected to go to the river.
- Develop Alternative Effluent Discharge Plans  
These plans will identify different ways by which the unused effluent

can be discharged to the river. They will cover wildlife habitat needs, hydraulic requirements, sizes, costs, locations, management and interface with proposed flood control measures by the Corps and Flood Control District.

Interface will be required with the various state and federal agencies to ensure compatibility with their planning efforts.

- Review Plans with Impacted Agencies  
To ensure that all agencies are included and represented there should be a formal review of the suggested alternative plans. Agencies involved would be Flood Control District, U. S. Army Corps of Engineers, Arizona Game and Fish Department and Arizona State Parks, SROG and City of Tolleson.
- Select Preferred Discharge Plan  
After review by the various agencies the Multi-City SROG will select the preferred discharge plan.
- Finalize Effluent Discharge Plan  
The selected plan will be finalized, relative to actual flows to the river, locations, costs, maintenance, management and time schedule.

## Implementation Steps and Schedule

The initial steps to implement the two projects are identified below along with a proposed time schedule.

### Effluent Reuse Program

- Agreement by the Multi-City SROG to pursue the development of additional reuses of the effluent. July 1980
- Agreement by the Tolleson/Peoria SROG to work with the Multi-City SROG for the development of additional reuses of the Tolleson effluent. July 1980
- Staff of the Multi-City SROG will develop a detailed scope of work for the effluent reuse program. September 1980
- Staff of the Multi-City SROG will determine needs for staff, consultants, and attorneys based upon the detailed scope of work. November 1980
- Complete staff assignments and if necessary select and negotiate with consultants and attorneys. March 1980

- Select Preferred Reuse Plan. March 1981
- Complete reuse negotiations. December 1981

Estimated cost for this effort is dependent upon how many reusers are interested after each step and how prolonged the negotiations are. However, the cost could run between \$100,000 and \$250,000.

#### Effluent Discharge Study

- Agreement by the Multi-City SROG to pursue the development of an effluent discharge plan. July 1980
- Agreement between the SROG and the Flood Control District of Maricopa County to develop an effluent discharge plan. July 1980
- Agreement by the Tolleson/Peoria SROG to work with the Multi-City SROG to develop an effluent discharge plan. July 1980
- Staff of the Multi-City SROG will develop a detailed scope of work and schedule for the effluent discharge study. November 1980

- Complete SROG staff assignments and if necessary select and negotiate with consultants. March 1981
  
- Final flood control plan from Central Arizona Water Control Study. April 1981
  
- Select preferred discharge plan. December 1981

Estimated cost for the Effluent Discharge Study will range from \$50,000 to \$150,000.

#### SHORT-TERM OPTIONS

The recommendation made to mitigate the immediate problems downstream of 91st Avenue was that the Multi-City SROG and the Flood Control District work together to construct an earthen effluent and low flow channel. This would be an interim project but would be sufficient for the area until the long-term effluent discharge plan can be implemented.

To implement this recommendation will require the following:

- An agreement between the Multi-City SROG and the Flood Control District to work together to implement a short-term solution for the effluent discharge. May 1980

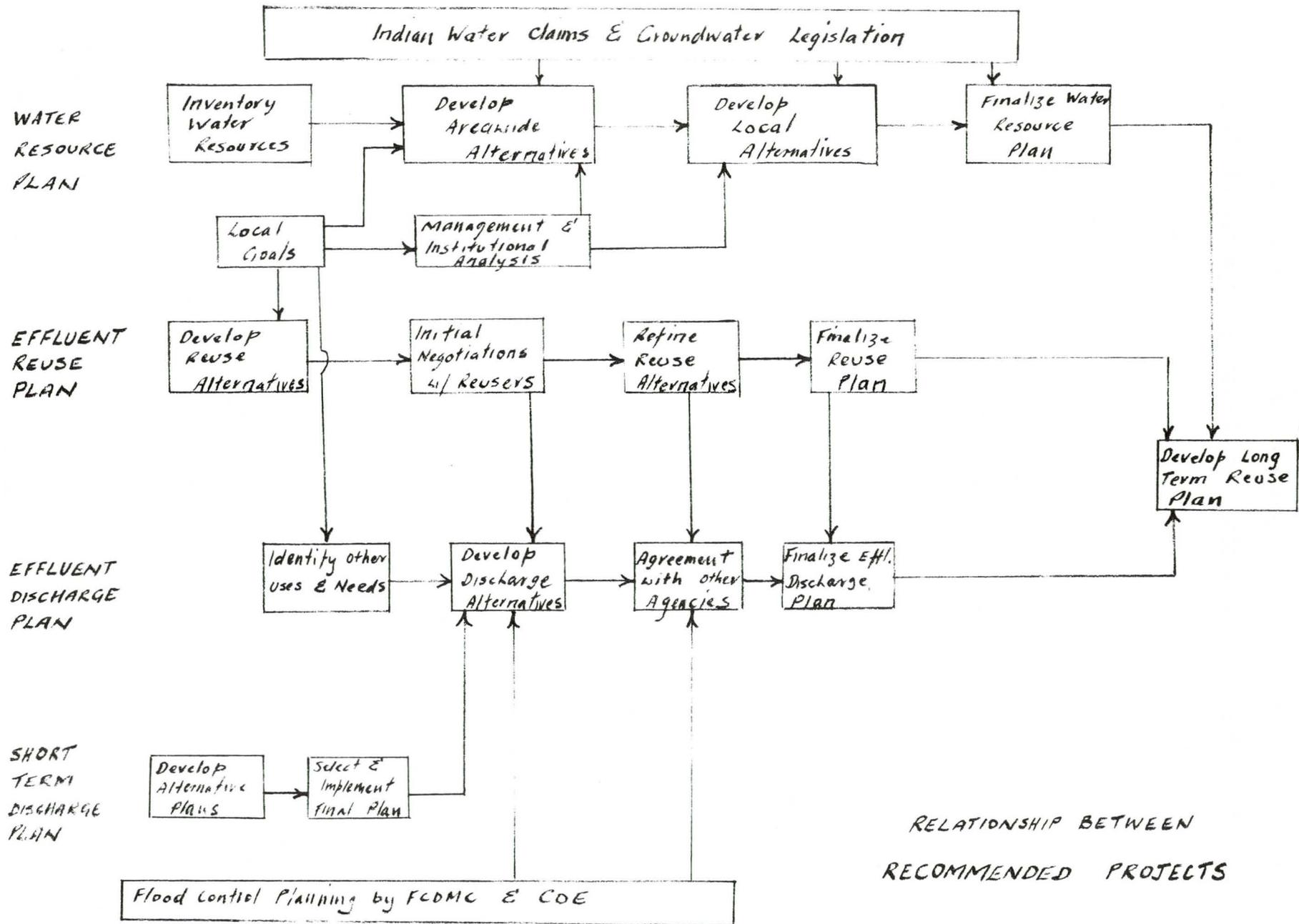
- Agreement between the Multi-City SROG and the Tolleson/Peoria SROG to include the Tolleson effluent in the short-term solution. May 1980
- Development by SROG and FCDMC of alternative channel location and configuration. June 1980
- Approval of the property owners for the channel construction. June 1980
- Selection by the SROG and FCDMC of the preferred channel alternative. June 1980
- Agreement between the SROG and the FCDMC on the cost distribution for construction and maintenance of the channels. July 1980
- Complete channel construction as part of clearing project. September 1980

Estimated cost for the short-term channel construction is \$75,000 to \$150,000.

#### RELATIONSHIP BETWEEN THE RECOMMENDED PROJECTS

Although the projects have been described in a separate and somewhat unrelated manner, they are very much related to one another. Figure VI-1

shows a simplified activity diagram for the various projects and related activities. It also shows how the various projects interface with each other.



RELATIONSHIP BETWEEN  
RECOMMENDED PROJECTS

FIGURE VI-1

PUBLIC PARTICIPATION AND  
PROJECT SELECTION

CHAPTER VII  
PUBLIC PARTICIPATION AND PROJECT SELECTION

BACKGROUND

In response to the need to meet NPDES Permit requirements and concerns of the public, the Multi-Cities initiated the Multi-City Facility Plan which included expansion and upgrading of the 91st Avenue plant, upgrading of the 23rd Avenue plant, disinfection at 23rd Avenue, and minor modifications and disinfection at the 91st Avenue plant. Subsequently, to meet deadlines imposed by the Consent Decree, the facility plan was broken out into several separate facility plans. Minor modifications and effluent disinfection at the 91st Avenue plant, disinfection at the 23rd Avenue plant, expansion of the 91st Avenue plant, and upgrading of the 23rd Avenue plant are now complete.

A residuals management facility plan was also separated out because of schedule requirements. The plan has four phases:

- Sludge Solids Disposal/Reuse
- Scum, Screenings, and Grit Disposal/Reuse
- Effluent Discharge Assessment
- Effluent Reuse Study

This chapter describes the public involvement program for the effluent reuse study, including plan development, alternative development and recommendations, and other public participation activities. Descriptions

of the public involvement programs for the other portions of the residuals management facility plan are contained in the respective reports.

## STUDY DEVELOPMENT

The effluent reuse study portion of the residuals management facility plan was actually initiated at the suggestion of the Water Quality Policy Advisory Committee. An effluent reuse study was originally included as a part of the residuals management plan, but was dropped from the scope of work by the Environmental Protection Agency (EPA). The residuals management facility plan was then divided into three phases: 1) **sludge solids**; 2) **scum, screenings, and grit**; and 3) **effluent discharge assessment**.

In reviewing the scope of work for the effluent discharge assessment, the Advisory Committee suggested that the Multi-Cities look at long-term reuses of the effluent. They also suggested that the effluent from the Tolleson treatment plant be considered. Therefore, at the suggestion of the Advisory Committee and a Multi-City SROG resolution in agreement, the Multi-Cities initiated the effluent reuse study as part of the residuals management plan.

Key meetings in this process were:

- September 20, 1979                      Discussion of need to study alternatives for effluent management and discussion of ANPP contract for effluent
- October 18, 1979                         Status report on effluent scope

- November 28, 1979                      Multi-Cities plans for effluent studies
- December 13, 1979                     EPA clarification of scope of work
- January 3, 1980                        Meeting with Holly Acres to discuss scope of work
- January 10, 1980                      Scope of work presented to Advisory Committee
- January 11, 1980                      SROG approves effluent reuse study scope of work

#### ALTERNATIVE DEVELOPMENT AND RECOMMENDATIONS

Alternatives were developed and/or recommendations made in three areas in the effluent reuse study:

- Water Resources
- Long-Term Reuses
- Short-Term Solutions to the Problems Downstream of 91st Avenue

The major input of the Advisory Committee and the public was in the areas of developing long-term reuse options and possible solutions to downstream problems. Regarding the long-term options, the consultants first developed a "laundry list" of possible reuse options. This list of options was presented to the Advisory Committee which reviewed them and suggested additional options. All of the options were analyzed by the consultants and then presented again to the Advisory Committee along with consultant recommendation of preferred alternatives for their review and recommendation. The same process was carried out for short-term solutions, including numerous discussions with communities affected by the problems

downstream of 91st Avenue. The Advisory Committee recommended that, since the study concluded that there are no other short-term alternatives besides allowing effluent to discharge to the channel: 1) an effluent channel be constructed from 91st Avenue to the confluence of the Agua Fria River; 2) the Multi-Cities proceed with marketing and contracting with potential users for use of the effluent; and 3) because of limited funds, monies should be directed to concrete design or construction of facilities now under consideration. The Advisory Committee recommendations were presented to the SROG. The SROG recommended: 1) continued negotiations with the Flood Control District of Maricopa County and prepare detailed cost estimates for alternative channels by the end of July 1980; and 2) proceed with marketing of effluent on a short-term basis and contracting with potential users for use of the effluent. Neither the Advisory Committee nor the SROG recommended initiating the water resource study or the long-term discharge plan.

Key meetings in development of alternatives and recommendations were:

- January 31, 1980                      Advisory Committee meeting to review list of long-term reuse options and suggest others
- February 21, 1980                     Advisory Committee meeting to review list of short-term solutions and suggest others
- May 9, 1980                             SROG Board meeting-- presentation of effluent reuse study status
- May 21, 1980                            SROG Board reviews recommendations of effluent reuse study
- May 22, 1980                            Advisory Committee meeting-- presentation of effluent reuse study recommendations for review (water resources, long-term, and short-term)

- June 5, 1980                      Advisory Committee meeting-- Committee recommendations on effluent reuse study
- June 6, 1980                      SROG meeting-- final recommendations on effluent reuse study

Throughout the course of the effluent reuse study, numerous community meetings were held and contact made with agencies involved in planning activities in the area. Their input provided a basis for development of alternatives and making recommendations. A listing follows.

Holly Acres

- January 28, 1980                      Meeting with Executive Committee on effluent related problems
- March 7, 1980                        Community meeting on reuse study
- March 25, 1980                      Meeting with Adron Reichert on effluent report problems
- April 1, 1980                         Meeting with Adron Reichert
- April 26, 1980                      Meeting with Adron Reichert on short-term solutions chapter

Gila River Indian Community

- January 18, 1980                      Community meeting
- February 21, 1980                    Community meeting
- March 11, 1980                        Community meeting

## Agencies

Several agencies and groups are involved in planning in the area related to water resources and effluent reuse. Numerous meetings were made with these agencies throughout the study to assist in development of alternatives and recommendations. Those contacted and general topics discussed are listed below.

- Buckeye Irrigation Company      Three or four meetings to discuss alternatives, restrictions and problems
- Arizona Public Service      Three meetings to discuss ANPP pipeline and to review effluent report draft
- Arizona Water Commission      Meetings to discuss water resource planning and negotiations with the Indians
- Flood Control District of Maricopa County      Meetings to discuss Gila River channel clearing
- Corps of Engineers      Meetings to discuss COE flood control planning underway
- Water and Power Resources Service      Meeting to discuss Central Arizona Water Control Study currently underway
- Farmers/Irrigation Companies      Discuss position relative to water/effluent trade
- City Administration Staffs      Meetings to discuss water resource planning efforts
- Central Arizona Water Conservation District      Meeting to discuss impact of CAP on Valley water supply

## OTHER PUBLIC PARTICIPATION ACTIVITIES

Throughout the residuals management facility planning process, efforts were made to keep the media, public and interested groups informed. A summary of these efforts follows.

### Information Materials

Summary brochures were prepared and distributed to the Advisory Committee and the public at key points in the effluent reuse study.

- January 31, 1980 "Residuals Management Facility Plan-Long-Term Reuse Options"
- February 21, 1980 "Residuals Management Facility Plan-Short-Term Solutions"
- August 10, 1980 Summary Brochure- "Residuals Management Facility Plan"

In addition to these brochures, articles were published in CLEAN WATER, the MAG 208 Water Quality newsletter:

- January 1980 Article on effluent study scope of work
- June 1980 "Effluent Study Looks at Long and Short Term Options"

### Advertisements

- July 28, 1980 Legal advertisement for residuals management public hearing

● August 10, 1980

Display ads for residuals management  
public hearing

### Public Hearing

A public hearing on the total residuals management facility plan, including the effluent reuse study, will be held in the Maricopa County Auditorium, 205 West Jefferson Street, in Phoenix, at 7:30 p.m. on September 10, 1980. Elected officials of each participating City and Town will serve as hearing officers.

### EFFLUENT REUSE STUDY RECOMMENDATIONS

The recommended actions of the effluent reuse study are:

1. The Multi-Cities will continue negotiations with the Flood Control District of Maricopa County concerning an effluent channel in the river, and prepare detailed cost estimates of alternative channels by the end of July 1980.
2. The Multi-Cities will proceed with the marketing of effluent on a short-term basis, and contracting with potential users for use of the effluent.

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## BIBLIOGRAPHY

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CITY AND TOWN RESOLUTIONS

A RESOLUTION OF THE MAYOR AND COMMON COUNCIL OF THE TOWN OF GILBERT, MARICOPA COUNTY, ARIZONA, THAT, IN THE INTEREST OF A GOOD NEIGHBOR POLICY, THEY ARE IN ACCORDANCE WITH THE DEVELOPMENT OF A WASTEWATER REUSE AND MANAGEMENT PLAN FOR LONG-TERM REUSE OPTIONS, AS PROPOSED BY THE MULTI-CITY SUBREGIONAL OPERATING GROUP.

WHEREAS, the Multi-City Subregional Operating Group (SROG) and the member cities and towns have determined that the wastewater effluent released from the jointly owned and operated 23rd Avenue and 91st Avenue Wastewater Treatment Plants is of the utmost importance and value as a water resource for recycling and reuse purposes, and;

WHEREAS, water reuse planning and reclamation is essential in the growing recognition to meet long-term water needs, as a potential alternative to expensive water importation projects and as a means of improving and extending community water supplies, and;

WHEREAS, immediate consideration of reuse, water systems, and water resources are necessary in the ultimate determination of a management program and;

WHEREAS, the Clean Water Act of 1977 and its related guidelines identify reclamation/reuse programs as "innovative or alternative" techniques that must be considered in any "201" wastewater facilities plan, if the recommended plan is to receive Federal construction grants, and;

WHEREAS, the Multi-City SROG has demonstrated these concerns in contracting for an effluent reuse study designed to evaluate effluent as a potential water resource and determine its total utilization to meet their long-term water needs, and;

WHEREAS, it is essential to develop long-range goals not only for water resource management but for the development of an environmentally sound, workable program in an effort to promote better relations with the neighbors in the downstream vicinity of the existing wastewater treatment plants.

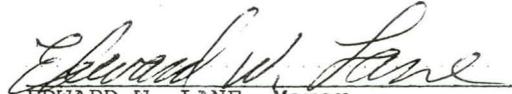
NOW THEREFORE BE IT RESOLVED, that in the interest of developing sound wastewater (resource) management programs, the development of long-range goals, and in the interest of putting forth a good neighbor policy, the Multi-City SROG hereby commits itself to the development of a resource management and implementation plan for long-term reuse options, with an initial effluent reuse study which will identify:

1. The work to be done in developing a long-term total effluent management program.
2. Time schedule.
3. Cost.
4. Relationship and interface with other planning efforts.
5. Responsibilities for implementation.

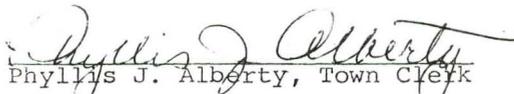
PASSED AND ADOPTED by the Mayor and Common Council of the Town of Gilbert, Maricopa County, Arizona, this 12th day of February, 1980, by the following vote:

AYES: Lane, Jenkins, Lowry, Clay, Petersen, Reed, Tidwell  
 NAYS: None ABSENT: None  
 EXCUSED: None ABSTAINED: None

RESOLUTION NO. 367

  
EDWARD W. LANE, Mayor

ATTEST:

  
Phyllis J. Alberty, Town Clerk

APPROVED AS TO FORM:

  
William L. Clemmens, Town Attorney

## RESOLUTION NO. 1946 NEW SERIES

A RESOLUTION OF THE COUNCIL OF THE CITY OF GLENDALE, MARICOPA COUNTY, ARIZONA, COMMITTING THE CITY AS A PARTICIPANT IN THE MULTI-CITY SUBREGIONAL OPERATING GROUP (SROG) TO THE DEVELOPMENT OF A RESOURCE MANAGEMENT AND IMPLEMENTATION PLAN FOR LONG-TERM REUSE OPTIONS WITH AN INITIAL EFFLUENT REUSE STUDY; AND DECLARING AN EMERGENCY

WHEREAS, the Multi-City Subregional Operating Group (SROG) and the member cities and towns have determined that the wastewater effluent released from the jointly owned and operated 23rd Avenue and 91st Avenue Wastewater Treatment Plants is of the utmost importance and value as a water resource for recycling and reuse purposes, and;

WHEREAS, water reuse planning and reclamation is essential in the growing recognition to meet long-term water needs, as a potential alternative to expensive water importation projects and as a means of improving and extending community water supplies, and;

WHEREAS, immediate consideration of reuse, water systems, and water resources are necessary in the ultimate determination of a management program, and;

WHEREAS, The Clean Water Act of 1977 and its related guidelines identify reclamation/reuse programs as "innovative or alternative" techniques that must be considered in any "201" wastewater facilities plan, if the recommended plan is to receive Federal construction grants, and;

WHEREAS, the Multi-City SROG has demonstrated these concerns in contracting for an effluent reuse study designed to evaluate effluent as a potential water resource and determine its total utilization to meet their long-term water needs, and;

WHEREAS, it is essential to develop long-range goals not only for water resource management but for the development of an environmentally sound, workable program in an effort to promote better relations with the neighbors in the downstream vicinity of the existing wastewater treatment plants.

NOW, THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE CITY OF GLENDALE as follows:

SECTION 1. That in the interest of developing sound wastewater (resource) management programs, the development of long-range goals, and in the interest of putting forth a good neighbor policy, the Multi-City SROG hereby commits itself to the development of a resource management and implementation plan for long-term reuse options, with an initial effluent reuse study which will identify:

1. The work to be done in developing a long-term total effluent management program.
2. Time schedule.
3. Cost.
4. Relationship and interface with other planning efforts.
5. Responsibilities for implementation.

SECTION 2. WHEREAS the immediate operation of the provisions of this Resolution is necessary for the preservation of the public peace, health and safety of the City of Glendale, an emergency is hereby declared to exist, and this Resolution shall be in full force and effect from and after its passage, adoption and approval by the Mayor and Council of the City of Glendale, and it is hereby exempt from the referendum provisions of the Constitution and laws of the State of Arizona.

PASSED, ADOPTED AND APPROVED by the Mayor and Council of the City of Glendale, Maricopa County, Arizona, this 13th day of February, 1980.

J. STERLING RIDGE  
M A Y O R

ATTEST:

IRENE WITTER  
City Clerk

(SEAL)

APPROVED AS TO FORM:

THOMAS A. MCCARTHY  
City Attorney

REVIEWED BY:

S. F. VAN DE PUTTE  
City Manager

STATE OF ARIZONA    )  
County of Maricopa ) ss.  
City of Glendale    )

I, the undersigned, Irene Witter, being the duly appointed, qualified and acting City Clerk of the City of Glendale, Maricopa County, Arizona, certify that the foregoing Resolution No. 1946 New Series is a true, correct and accurate copy of Resolution No. 1946 New Series, passed and adopted at a regular meeting of the Council of the City of Glendale, held on the 13th day of February, 1980, at which a quorum was present and voted in favor of said Resolution.

Given under my hand and seal this 13th day of February,  
1980.

Irene Witter  
City Clerk

RESOLUTION NO. 15319

A RESOLUTION ADOPTING A WASTEWATER REUSE  
AND MANAGEMENT POLICY; AND DECLARING AN  
EMERGENCY.

---

WHEREAS, the Multi-City Subregional Operating Group (SROG) and the member cities and towns have determined that the wastewater effluent released from the jointly owned and operated 23rd Avenue and 91st Avenue Wastewater Treatment Plants is of the utmost importance and value as a water resource for recycling and reuse purposes, and

WHEREAS, water reuse planning and reclamation is essential in the growing recognition to meet long-term water needs, as a potential alternative to expensive water importation projects and as a means of improving and extending community water supplies, and

WHEREAS, immediate consideration of reuse, water systems, and water resources are necessary in the ultimate determination of a management program, and

WHEREAS, The Clean Water Act of 1977 and its related guidelines identify reclamation/reuse programs as "innovative or alternative" techniques that must be considered in any "201" wastewater facilities plan, if the recommended plan is to receive Federal construction grants, and

WHEREAS, the Multi-City SROG has demonstrated these concerns in contracting for an effluent reuse study designed to evaluate effluent as a potential water resource and determine its total utilization to meet their long-term water needs, and

WHEREAS, it is essential to develop long-range goals not only for water resource management but for the development

of an environmentally sound, workable program in an effort to promote better relations with the neighbors in the downstream vicinity of the existing wastewater treatment plants.

NOW, THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE CITY OF PHOENIX as follows:

SECTION 1. That in the interest of developing sound wastewater (resource) management programs, the development of long-range goals, and in the interest of putting forth a good neighbor policy, the City of Phoenix as "Lead Agent" for the Multi-City SROG hereby commits itself to the development of a resource management and implementation plan for long-term reuse options, with an initial effluent reuse study which will identify:

- a. The work to be done in developing a long-term total effluent management program.
- b. Time schedule.
- c. Cost.
- d. Relationship and interface with other planning efforts.
- e. Responsibilities for implementation.

SECTION 2. WHEREAS, the immediate operation of the provisions of this resolution is necessary for the preservation of the public peace, health and safety, an EMERGENCY is hereby declared to exist, and this resolution shall be in full force and effect from and after its passage by the Council as required by the City Charter and is hereby exempted from the referendum clause of said Charter.

PASSED by the Council of the City of Phoenix this 29  
day of January, 1980.

MARGARET T. HANCE  
M A Y O R

ATTEST:

DONNA CULBERTSON City Clerk

APPROVED AS TO FORM:

L. VERDE RHUE <sup>ACTING</sup> City Attorney

REVIEWED BY:

MARVIN A. ANDREWS City Manager

217  
JWS/TC  
1/23/80

RESOLUTION NO.

4448

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MESA, MARICOPA COUNTY, ARIZONA, COMMITTING THE CITY OF MESA TO COOPERATE IN DEVELOPING SOUND WASTE WATER MANAGEMENT PROGRAMS.

WHEREAS, the Multi-City Subregional Operating Group (SROG) and the member cities and towns have determined that the wastewater effluent released from the jointly owned and operated 23rd Avenue and 91st Avenue Wastewater Treatment Plants is of the utmost importance and value as a water resource for recycling and reuse purposes, and;

WHEREAS, water reuse planning and reclamation is essential in the growing recognition to meet long-term water needs, as a potential alternative to expensive water importation projects and as a means of improving and extending community water supplies, and;

WHEREAS, immediate consideration or reuse, water systems, and water resources are necessary in the ultimate determination of a management program, and;

WHEREAS, The Clean Water Act of 1977 and its related guidelines identify reclamation/reuse programs as "innovative or alternative" techniques that must be considered in any "201" wastewater facilities plan, if the recommended plan is to receive Federal construction grants, and;

WHEREAS, the Multi-City SROG has demonstrated these concerns in contracting for an effluent reuse study designed to evaluate effluent as a potential water resource and determine its total utilization to meet their long-term water needs, and;

WHEREAS, it is essential to develop long-range goals not only for water resource management but for the development

of an environmentally sound, workable program in an effort to promote better relations with the neighbors in the downstream vicinity of the existing wastewater treatment plants.

NOW, THEREFORE, BE IT RESOLVED, that in the interest of developing sound wastewater (resource) management programs, the development of long-range goals, and in the interest of putting forth a good neighbor policy, the City of Mesa commits itself to cooperate fully with the Multi-City SROG in the development of a resource management and implementation plan for long-term reuse options, with an initial effluent reuse study which will identify:

1. The work to be done in developing a long-term total effluent management program.
2. Time Schedule.
3. Cost.
4. Relationship and interface with other planning efforts.
5. Responsibilities for implementation.

PASSED AND ADOPTED by the City Council of the City of Mesa, Maricopa County, Arizona, this 18th day of February, 1980.

APPROVED:

  
Mayor

ATTEST:

  
City Clerk

A RESOLUTION OF THE MAYOR AND COUNCIL OF THE CITY OF SCOTTSDALE, MARICOPA COUNTY, ARIZONA, SUPPORTING THE DEVELOPMENT OF A RESOURCE MANAGEMENT AND IMPLEMENTATION PLAN FOR LONG-TERM REUSE OPTIONS FOR EFFLUENT FROM THE MULTI-CITY WASTEWATER TREATMENT FACILITIES.

MAR 31 REC'D

WHEREAS, the Multi-City Subregional Operating Group (SROG) and the member cities and towns have determined that the wastewater effluent released from the jointly owned and operated 23rd Avenue and 91st Avenue Wastewater Treatment Plants is of the utmost importance and value as a water resource for recycling and reuse purposes, and;

WHEREAS, water reuse planning and reclamation is essential in the growing recognition to meet long-term water needs, as a potential alternative to expensive water importation projects and as a means of improving and extending community water supplies, and;

WHEREAS, immediate consideration of reuse, water systems, and water resources are necessary in the ultimate determination of a management program and;

WHEREAS, The Clean Water Act of 1977 and its related guidelines identify reclamation/reuse programs as "innovative or alternative" techniques that must be considered in any "201" wastewater facilities plan, if the recommended plan is to receive Federal construction grants, and;

WHEREAS, the Multi-City SROG has demonstrated these concerns in contracting for an effluent reuse study designed to evaluate effluent as a potential water resource and determine its total utilization to meet their long-term water needs, and;

WHEREAS, it is essential to develop long-range goals not only for water resource management but for the development of an environmentally sound, workable program in an effort to promote better relations with the neighbors in the downstream vicinity of the existing wastewater treatment plants.

NOW, THEREFORE, BE IT RESOLVED, that in the interest of developing sound wastewater (resource) management programs, the development of long-range goals, and in the interest of putting forth a good neighbor policy, the Multi-City SROG hereby commits itself to the development of a resource management and implementation plan for long-term reuse options, with an initial effluent reuse study which will identify:

1. The work to be done in developing a long-term total effluent management program.
2. Time Schedule.
3. Cost
4. Relationship and interface with other planning efforts.
5. Responsibilities for implementation.

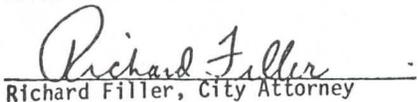
PASSED by the Council of the City of Scottsdale, Arizona, on this 18th day of March, 1980.

  
William C. Jenkins, Mayor

ATTEST:

  
Timothy R. Bray, Acting City Clerk

APPROVED AS TO FORM:

  
Richard Filler, City Attorney

RESOLUTION NO. 1582

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF TEMPE, ARIZONA, RELATING TO THE DEVELOPMENT OF A RESOURCE MANAGEMENT AND IMPLEMENTATION PLAN FOR LONG TERM REUSE OPTIONS IN CONNECTION WITH A WASTEWATER MANAGEMENT PROGRAM.

\* \* \* \* \*

WHEREAS, the Multi-City Subregional Operating Group (SROG) and the member cities and towns have determined that the wastewater effluent released from the jointly owned and operated 23rd Avenue and 91st Avenue Wastewater Treatment Plants is of the utmost importance and value as a water resource for recycling and reuse purposes, and;

WHEREAS, water reuse planning and reclamation is essential in the growing recognition to meet long-term water needs, as a potential alternative to expensive water importation projects and as a means of improving and extending community water supplies, and;

WHEREAS, immediate consideration of reuse, water systems, and water resources are necessary in the ultimate determination of a management program, and;

WHEREAS, the Clean Water Act of 1977 and its related guidelines identify reclamation/reuse programs as "innovative or alternative" techniques that must be considered in any "201" wastewater facilities plan, if the recommended plan is to receive Federal construction grants, and;

WHEREAS, the City of Tempe as a member of the Multi-City SROG has demonstrated these concerns in contracting for an effluent reuse study designed to evaluate effluent as a potential water resource and determine its best utilization to meet their long-term water needs, and;

WHEREAS, it is essential to develop long-range goals not only for water resource management but for the development of an environmentally sound, workable program in an effort to promote better relations with the neighbors in the downstream vicinity of the existing wastewater treatment plants.

NOW THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF TEMPE, ARIZONA, as follows:

That in the interest of developing sound wastewater (resource) management programs, the development of long-range goals, and in the interest of putting forth a good neighbor policy, the City of Tempe as a member of the Multi-City SROG commits itself to the development of a resource management and implementation plan for long-term reuse options, with an initial effluent reuse study which will identify:

1. The work to be done in developing a long-term management program.

2. Time Schedule.
3. Cost.
4. Relationship and interface with other planning efforts.
5. Responsibilities for implementation.

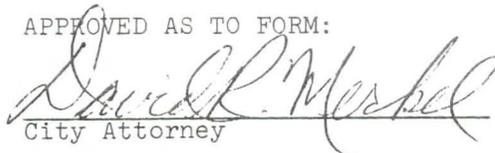
PASSED AND ADOPTED BY THE CITY COUNCIL OF THE CITY OF TEMPE, ARIZONA, this 28th day of February, 1980.

  
MAYOR

ATTEST:

  
City Clerk

APPROVED AS TO FORM:

  
City Attorney

RESOLUTION NO. 2104

A RESOLUTION OF THE MAYOR AND COMMON COUNCIL OF THE TOWN OF YOUNGTOWN,  
ARIZONA, APPROVING THE ADOPTION OF 23rd AVENUE WASTEWATER TREATMENT PLANT  
DISINFECTION FACILITY PLAN, AND DECLARING AN EMERGENCY.

WHEREAS, The Multi-City Subregional Operating Group (SROG) and the member  
cities and towns have determined that the wastewater effluent released  
from the jointly owned and operated 23rd Avenue and 91st Avenue Wastewater  
Treatment Plants is of the utmost importance and value as a water resource  
for recycling and reuse purposes, and;

WHEREAS, water reuse planning and reclamation is essential in the growing  
recognition to meet long-term water needs, as a potential alternative to  
expensive water importation projects and as a means of improving and  
extending community water supplies, and;

WHEREAS, immediate consideration of reuse, water systems, and water  
resources are necessary in the ultimate determination of a management  
program and;

WHEREAS, The Clean Water Act of 1977 and its related guidelines identify  
reclamation/reuse programs as "innovative or alternative" techniques that  
must be considered in any "201" wastewater facilities plan, if the recommended  
plan is to receive Federal construction grants, and;

WHEREAS, the Multi-City SROG has demonstrated these concerns in contracting  
for an effluent reuse study designed to evaluate effluent as a potential  
water resource and determine its best utilization to meet their long-term  
water needs, and;

WHEREAS, it is essential to develop long-range goals not only for water  
resource management but for the development of an environmentally sound,  
workable program in an effort to promote better relations with the neighbors  
in the downstream vicinity of the existing wastewater treatment plants.

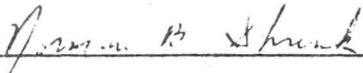
NOW THEREFORE BE IT RESOLVED, that in the interest of developing sound wastewater (resource) management programs, the development of long-range goals, and in the interest of putting forth a good neighbor policy, the Multi-City SROG hereby commits itself to the development of a resource management and implementation plan for long-term reuse options, with an initial effluent reuse study which will identify:

1. The work to be done in developing a long-term management program.
2. Time Schedule.
3. Cost
4. Relationship and interface with other planning efforts.
5. Responsibilities for implementation.

WHEREAS, it is necessary for the preservation of the public peace, health and safety of the Town of Youngtown, Arizona, an emergency is hereby declared to exist and this resolution shall be effective immediately upon its passage and adoption and approval of the Mayor and Common Council of the Town of Youngtown, Arizona.

PASSED AND ADOPTED, by the Mayor and Common Council of the Town of Youngtown, Arizona on this 17th day of January 1980.

APPROVED, this 17th day of January 1980 by the affirmative vote of three-fourths of the members of the Common Council of the Town of Youngtown, Arizona.

  
\_\_\_\_\_  
Norman B. Shrenk, Mayor

ATTEST:   
\_\_\_\_\_  
Mary B. Cayton, Town Clerk

SUMMARY OF MEETINGS

MINUTES OF THE  
MULTI-CITY SUBREGIONAL OPERATING GROUP  
MEETING  
MAY 9, 1980

This meeting was held in the Plaza Municipal Building Public Works Conference Room and was called to order at 10:05 a.m. by Chairman Robert Brunton. The following were in attendance:

MULTI-CITY SROG MEMBERS

Robert L. Brunton  
Dean Sloan  
Jerry Geiger  
Harold Goodman  
O.A. Hartzell  
Dick Brown

REPRESENTING

City of Phoenix  
City of Mesa  
City of Tempe  
City of Glendale  
Town of Youngtown  
City of Scottsdale

ABSENT

Ed Wohlenberg

Town of Gilbert

OTHERS PRESENT

Jesse Sears  
Jim Webb  
Ken Spiker  
Art Moyer  
Jim Fulton  
Susan Mitchell  
Wally Ambrose  
Rick Cote  
Madelyn Fong

City of Phoenix  
SROG  
City of Phoenix  
SROG  
Consultant  
Public Participation Consultant  
Greeley & Hansen  
Camp, Dresser & McKee  
Greeley & Hansen

I. Minutes of April 18 Meeting

A motion was made by Dick Brown to approve the minutes of the April 18th meeting. The motion was seconded by Jerry Geiger and approved unanimously.

II. Effluent Reuse Study

Jim Fulton distributed copies of the Draft Effluent Reuse study and presented highlights with a general summary:

- A. An overview of water resources was presented, and how Effluent Reuse ties in with overall water resources in the area. He explained that no one has a full understanding of water resources in this area and that little has been done in the last ten to twelve years in that respect. The Cities have been concerned only with providing services, with no consideration for where the water is coming from. He indicated the study includes recommendations and proposed scope of work.
- B. Jim Fulton then discussed sources of water, mentioning that the CAP water will cost \$70 per acre foot and treatment costs about \$120 per acre foot, and concluded that Cities should start working on an overall agency and program for water resources before legislation is enacted requiring it.

- C. He then discussed options for reuse, indicating that options for immediate use include irrigation for agriculture. Long term options discussed included discharge to the Salt River, channelization, and flood control.

Following Jim Fulton's presentation, there was open discussion with flood control and channelization being discussed along with flood damage assistance.

Bob Brunton explained a meeting he attended with Bill Matthews of the Maricopa County Flood Control District and actions they are taking which include channel clearing from 91st to 123rd Avenue. He explained that Phoenix is coordinating restoration of the effluent channel with the flood control project.

Other items discussed were maintenance of the channel and the possibility of an increased flood control levy.

It was also explained that there are still conflicts between the Holly Acres group and the Game & Fish Department.

### III. Multi-City Agreement Changes

Jesse Sears reviewed the proposed changes and discussed each change. As a result of the discussions, revisions were made clarifying the changes.

Bob Brunton indicated that we need a total write-up explaining the formula system, which would help in determining what purchased capacity is and resolving other issues. He expressed a need for a special meeting to resolve final changes to the Multi-City Agreement and financing arrangements. Bob explained that the agreement should be redrafted and submitted to EPA for concurrent review.

### IV. 23rd Avenue Plant Upgrade

Wally Ambrose, distributed handouts and reviewed alternatives on sludge and miscellaneous items presented to WQPAC at their meeting on April 8, 1980.

Items discussed were:

- (a) Primary Sludge
- (b) Gas for engine driven blowers as a back-up system. This becomes practical if the cost of electricity exceed 4.6¢ per KWH.
- (c) Monitoring & control - Distributed Digital System Controls.
- (d) A second source of power - The alternative chosen was a redundant source of power from SRP.

Dean Sloan made a motion to accept the recommendation of WQPAC, which was seconded by Harold Goodman and approved unanimously.

### V. SROG Organization

Bob Brunton explained the changes in the organization of the SROG Committee. He indicated that the City Managers will serve as the SROG Board with the

present group as alternates. The City Managers have agreed to this. Bob distributed a memo addressed to Marvin Andrews with proposed resolutions to this effect.

He also discussed a trust account arrangement to insure funds availability and management for construction of facilities.

VI. Information Items

- A. Waste Activated Sludge - Ken Spiker mentioned that an experiment is presently being conducted whereby primary sludge (waste activated sludge) is transported from the 23rd Avenue Plant to the 91st Avenue Plant for processing. If practical, this procedure could reduce modification cost for the 23rd Avenue Plant.
- B. Kellogg Sludge Operation - Bob Brunton mentioned that Kellogg is presently using propane gas rather than methane from the 91st Avenue Plant.
- C. Consent Order - Bob Brunton indicated that members need to obtain the approval memo from management agreeing to the consent order on the transmission system.
- D. Bond Sale - Dean Sloan mentioned that on May 19th Mesa will call for bids on their bond sale.
- E. Negative Declaration - Jim Webb indicated that the negative declaration for the final 91st Avenue Expansion Facility Plan is expected July 1.

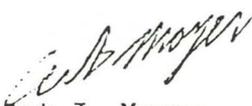
VII. Next Meeting

The next SROG meeting was set for May 23, 1980 at 10:00 a.m. in the Plaza Municipal Building, Public Works Conference Room.

VIII. Adjournment

The meeting was adjourned at 12:00 p.m.

Submitted by,

  
Art J. Moyer  
SROG

AJM:sp

MINUTES OF THE  
MULTI-CITY SUBREGIONAL OPERATING GROUP  
MEETING  
MAY 23, 1980

This meeting was held in the Plaza Municipal Building Public Works Conference Room and was called to order at 10:10 a.m. by Chairman Robert Brunton. The following were in attendance:

MULTI-CITY SROG MEMBERS

Robert L. Brunton  
Dean Sloan  
Jerry Geiger  
Harold Goodman  
Dick Brown  
O.A. Hartzell

REPRESENTING

City of Phoenix  
City of Mesa  
City of Tempe  
City of Glendale  
City of Scottsdale  
Town of Youngtown

ABSENT

Ed Wohlenberg

Town of Gilbert

OTHERS PRESENT

Max Palmer  
Bob Steytler  
Jim Webb  
Art Moyer  
Frank Ales  
Jesse Sears  
Moe Wakefield  
John Puzauskas  
Madelyn Fong  
Susan Mitchell  
Dick Mettler

City of Phoenix  
Arizona Dept. of Health Services  
John Carollo Engineers  
Greeley & Hansen  
Public Participation Consultant  
Homebuilders Association

I. MINUTES OF MAY 9 MEETING

A motion was made by Dean Sloan to approve the minutes of the May 9th meeting. It was seconded by Dick Brown and approved unanimously.

II. SLUDGE DEWATERING SLIDE PRESENTATION

A slide presentation of the 91st Avenue WWTP and Kellogg sludge processing operation was presented by John Puzauskas, John Carollo Engineers. Sludge samples with various percentages of moisture content were also presented. Sludge drying alternatives discussed included mechanical dewatering, natural dewatering and thermal drying methods.

After the slide presentation, there was open discussion and the following comments were made:

- ADHS is still classifying sludge as hazardous waste, which presents a disposal problem.

- The City of Phoenix has asked ADHS to remove sludge from the hazardous waste list.
- The Kellogg contract does require Kellogg to remove sludge from the 23rd Avenue WWTP.
- Experimental sludge drying work is being conducted by John Carollo Engineers.
- Lagoon drying with windrow composting seems to be the most practical method.

Bob Brunton indicated that the alternatives will be discussed at the next SROG meeting.

### III. FINANCING FOR 91ST AVENUE PLANT EXPANSION

Bob Brunton indicated that Phoenix needs firm commitments from the participating Cities in June, and will meet individually with the Cities, if requested, to discuss financing.

Jim Webb indicated that SROG Administration will provide cost estimate schedules by year for cash flow analysis.

Other items discussed were:

- Construction will be segmented.
- Estimated construction cost is \$19.8 million.
- Construction contract award in September.
- Construction to begin in January 81.

### IV. EFFLUENT REUSE

Jim Webb indicated that some critical decisions need to be made prior to the June 5 WQPAC meeting concerning (a) Long-term effluent reuse and, (b) the Tolleson 10 MGD effluent discharge.

Dean Sloan mentioned that the County Board of Supervisors want to raise the property tax rate to provide additional flood control funds.

### V. MULTI-CITY AGREEMENT REVISIONS

Jesse Sears provided a handout on the agreement revisions and explained that they are set up as an addendum to the existing agreement. The revisions were discussed and further refinements are to be made, and presented for discussion.

Bob Brunton mentioned the proposed change whereby the City Managers would make up a major Decision-Making Board with the current committee continuing in an advisory capacity.

Dean Sloan indicated that he felt the City Managers should meet to discuss this reorganization before any changes are made.

Bob Brunton indicated that he and Jim Webb would meet with Bob Logan to discuss the possibility of a study to determine the best way to accomplish the reorganization.

VI. INFORMATION ITEMS

- A. Bob Brunton mentioned the following items:
1. Frank Ales was introduced as a new SROG Staff member.
  2. There is a need to up-date the 208 plan.
  3. Pretreatment & legal review - Scottsdale & Tempe haven't responded.
  4. Consent Order - Scottsdale hasn't responded.
  5. 23rd Avenue Chlorinization - Participation letter is needed from the Cities.
  6. Cost increases have occurred in the Effluent Reuse Study and Chlorine Facilities.
  7. Gilbert will be pulling out of SROG.
- B. Harold Goodman mentioned that Tolleson/Peoria asked Glendale to pick up the cost of the force main and lift station.
- C. Dean Sloan indicated that the Eastside Cities have been contacted about participation in the Tolleson Plant, which has caused some confusion regarding why they should participate in this plant and 91st too. He expressed a need for clarification of this issue.
- D. Bob Steytler distributed a handout on the Phoenix Sewer User Charge.

VII. NEXT MEETING DATE

The next meeting was set for June 6, 1980 at 10:00 a.m. in the Plaza Municipal Building, Public Works Conference Room.

The meeting adjourned at 12:00 p.m.

Submitted by,



Art Moyer  
SROG

AJM:sp

MINUTES OF THE  
MULTI-CITY SUBREGIONAL OPERATING GROUP  
MEETING  
JUNE 6, 1980

This meeting was held in the Plaza Municipal Building Public Works Conference Room and was called to order at 10:05 a.m. by Chairman Robert Brunton. The following were in attendance:

MULTI-CITY SROG MEMBERS

Robert L. Brunton  
Dean Sloan  
Jerry Geiger  
O.A. Hartzell  
Dick Brown  
Ed Wohlenberg  
Martin Vanacour

REPRESENTING

City of Phoenix  
City of Mesa  
City of Tempe  
Town of Youngtown  
City of Scottsdale  
Town of Gilbert  
City of Glendale

OTHERS PRESENT

Jesse Sears	City of Phoenix
Jim Webb	SROG
Art Moyer	SROG
Jim Fulton	Consultant
Susan Mitchell	Public Participation Consultant
Jerry Bastian	Greeley & Hansen
John Puzauskas	John Carollo Engineers
Ken Dusenberry	City of Scottsdale
Max Palmer	City of Phoenix
Frank Ales	SROG
Bob Steytler	City of Phoenix

I. MINUTES OF MAY 23 MEETING

A motion was made by Dick Brown to approve the minutes of the May 23rd meeting with comments by Jim Webb. The motion was seconded by O. A. Hartzell and approved unanimously.

II. SLUDGE DEWATERING

Reviewed slide presentation of Sludge Dewatering alternatives for cost implications. Susan Mitchell presented WQPAC recommendation.

WQPAC RECOMMENDATION

Paved Sludge Lagoons with Separate Facilities be the alternative selected for the 91st and 23rd Avenue plants. Reasons include the lower cost, the lower land area, no need for a pumping station and pipe, and the fact that Kellogg would transport the dried sludge to the 91st Avenue plant in closed trucks and meet all requirements for safe transportation.

Some discussion relevant to cost of paving lagoons took place with cost estimated at \$150,000 now. Bob Steytler indicated that four different pavements will be tested to determine which may be the most inexpensive, yet have good durability. One to three million dollars will be required for 91st Avenue Wastewater Treatment Plant by September. Dick Brown moved to accept WQPAC's recommendation. Jerry Geiger seconded and the motion was approved unanimously.

III. Item III was passed over for Item IV at this time.

IV. EFFLUENT REUSE STUDY

Jim Fulton reviewed the report and its recommended alternatives.

WQPAC Recommendations

WHEREAS the Study comes to the conclusion that there are no other short-term alternatives besides allowing effluent to discharge in the channel, the advisory committee recommends:

- (1) An effluent channel be constructed from 91st Avenue to the confluence of the Agua Fria River.
- (2) The Multi-Cities proceed with marketability and contracting with potential users for use of effluent.
- (3) That because of limited funds, monies presently available should be directed to concrete design or construction of facilities now under consideration.

Robert Brunton led a discussion about the cost of channelization and what the Maricopa County Flood Control District might contribute. Mr. Brunton suggested that staff should continue to seek methods of channelization and develop cost estimates. A recommendation could be brought to the SROG Committee by the end of July.

Jerry Geiger expressed the need for continued negotiation with MCFCD. He made a motion for the Phoenix staff to assemble a cost estimate package by the end of July. The motion was seconded by Martin Vanacour and approved unanimously.

Dean Sloan commented that the Multi-Cities would have to stay on top of the situation.

Mr. Sloan made a motion that staff proceed with the marketability of effluent on a short-term basis. Jerry Geiger seconded the motion and it was approved unanimously.

Mr. Sloan added that Jim Fulton made a good recommendation that the Multi-Cities should be concerned with Water Resource Management for the future.

III. FINANCING 91ST AVENUE WASTEWATER TREATMENT PLANT - SEGMENT I

Discussion centered on the availability of financing from the Cities to fund the above project.

- o Mesa's bond sale is June 16th.
- o Tempe needs additional public authorization but can currently finance Segment I.
- o Gilbert has been directed by its Council to find out the steps necessary for withdrawal from SROG. They will send letter of intent.
- o Glendale is seeking a side agreement for Phoenix to pickup its share of the 91st Avenue project so they can finance the Tolleson Plant Expansion.
- o Scottsdale has a \$1.8 million bond authorization and will stay with the 0.7 MGD addition.

A letter response is required by the end of next week for the State Priority System.

V. MULTI-CITY AGREEMENT REVISIONS

Martin Vanacour raised an issue regarding Section 9.4 and penalty impositions.

There was considerable discussion about no transfer of ownerships until after additions and no penalties on purchase or interest charges only.

Mr. Steytler indicated that Section 9.4 effective date should be October 1, 1979. Interest should only be applied to capacity.

Mr. Sloan stated that WQPAC was not set up properly. He feels it is functioning as a technical advisory committee rather than just policy.

Mr. Brunton indicated a need for a City Manager's meeting prior to July 2nd. He also indicated the need for a good summary of what is in the agreement.

VI. INFORMATION ITEMS

- (a) A cash flow chart was distributed
- (b) A user charge schedule was also distributed
- (c) Committee members were reminded that the Public Hearing on the 23rd Avenue Wastewater Treatment Plant Facility Plan was scheduled for July 30, 1980, at the Maricopa County Supervisors Auditorium for 7:30 p.m.
- (d) The Residual Management Public Hearing was scheduled for September 10, 1980.

VII. NEXT SROG COMMITTEE MEETING was set for July 2nd, 1980 at the Plaza Municipal Building for 10:00 a.m.

VIII. ADJOURNMENT

The meeting was adjourned at 12:10 p.m.

Submitted by



Frank M. Ales  
SROG Administrative Assistant

WATER QUALITY POLICY ADVISORY COMMITTEE

Residuals Management  
Meeting Summary  
September 20, 1979 - 3:00 PM  
League of Cities and Towns Building, Room 101  
1820 West Washington  
Phoenix, Arizona 85007

Advisory Committee

Jack Berton	Phoenix Chamber of Commerce
Tom Camp	Arizona Wildlife Federation
Helen Cornell	City of Glendale
Michael Goodman	South Mountain Planning Commission
Norm Gumenik (for John Stull)	Arizona Public Health Association
Pam Hait	Phoenix Magazine
Jack Hinchey	Motorola
Terry Hudgins	Arizona Public Service
Sue Lofgren	League of Women Voters
Greg Marek	Maricopa County Planning Department
Bill McCarthy (for Dean Sloan)	City of Mesa
Paul McCleester	Sun City Homeowners Association
Dick Mettler	Central Arizona Homebuilders Association
Dean Moss	Arizona Department of Health Services
Eva Patten	Governor's Commission on Arizona Environment
Daril Peterson	St. John's Irrigation District
William Raymo	Sun City Water and Sewers Department
Adron Reichert	Holly Acres Flood Control Association
John S. Schaper (for Wilbur Wiegold)	Buckeye Irrigation District
Laura Watson	Citizen
Robert Yount	State Land Department

Others Present

Wally Ambrose	Greely and Hansen
Arthur Beard	Arthur Beard Engineers
Jerry Copeland	Willdan Associates
Mark Frank	MAG
Jim Fulton	Consultant
Bob Logan	Southwest Engineers and Planners
David Mansfield	City of Tolleson
Jose E. Martinez	City of Phoenix
Susan Mitchell	MAG
John Puzauskas	John Carollo Engineers
Ken Schmidt	Groundwater Consultant
Carolyn Slatt	Consultant
Bob Steytler	City of Phoenix
Jim Webb	City of Phoenix
Jim Woglom	Camp Dresser and McKee Inc.

Chairperson Sue Lofgren opened the meeting. The purpose of the meeting was to discuss the Multi-cities Residual Management Study Scope of Work and to hear a presentation on the existing Arizona Nuclear Power Plant effluent contracts with the City of Phoenix.

Chairperson Lofgren turned the meeting over to Ken Schmidt, Groundwater Quality Consultant, to briefly discuss the groundwater monitoring study.

Dr. Schmidt stated that MAG would meet with EPA on October 1, 1979 to discuss the proposed monitoring program and with the United States Geological Survey in another week or two to determine what USGS will do relative to storm runoff. On October 18, the Water Quality Policy Advisory Committee will meet to get the details of the monitoring program. Actual monitoring is proposed to start in November, 1979.

Chairperson Lofgren asked that questions or comments on the monitoring program be forwarded to Mark Frank, MAG 208 Coordinator. Chairperson Lofgren then turned the meeting over to Susan Mitchell, MAG.

Ms. Mitchell discussed a schedule of future meetings and actions needed by the advisory committee.

There was some discussion of scheduling meetings at an alternative time. It was decided to continue with the present Thursday afternoon meetings and rescheduling some meetings if conflicts occurred.

Adron Reichert, Holly Acres Flood Control Association, questioned the short time schedule between the effluent reuse/disposal alternatives presentation and recommendations (2 weeks).

Bob Steytler, City of Phoenix, stated that the Advisory Committee would not be making recommendations on alternatives, rather information on existing contracts and other plans for the area downstream of the 91st Avenue plant would be presented to the committee.

Wally Ambrose, Greeley and Hansen, added that there would indeed be a need for an informational presentation on on-going planning and impacts of those proposed plans, but there would be no need for recommendations from the committee.

Mr. Ambrose explained that the effluent reuse/disposal portion of the residuals management study would look at two major areas: 1) describing existing effluent contracts, the priorities on that use, and the availability of effluent for additional use; and 2) flood control plans and how they affect the area downstream of the 91st Avenue plant and the impacts of effluent on the various plans.

Dean Moss, Arizona Department of Health Services, asked if zero discharge was being considered as an alternative in the effluent reuse/disposal portion of the residuals management study.

Mr. Steytler replied no.

Mr. Moss further asked if EPA was aware that no consideration would be given to zero discharge as an alternative.

Mr. Steytler replied that EPA had approved the scope of work.

Mr. Moss stated for the record that many of the problems confronting the advisory committee concern the continued discharge of effluent to the river. Many of the problems can be controlled through a process of looking at this effluent for other purposes when it is not being sent to Arizona Nuclear Power Plant or elsewhere. At least a pro forma consideration should be given to zero discharge as an alternative.

Considerable discussion followed, indicating the committee's desire to consider alternatives for effluent reuse/disposal as part of the residuals management study.

As a result of discussions, it was requested that prior to the next meeting, the committee be provided additional information from the City about the effluent reuse/disposal portion of the study, specifically a handout/mailout that answers questions raised at this meeting, and at the presentation, the committee's role in decision-making relative to effluent disposal should be further clarified.

The meeting was then turned over to Terry Hudgins, Arizona Public Service Company. Mr. Hudgins discussed the terms of effluent reuse, existing contracts between the City of Phoenix and Arizona Nuclear Power Plant, including contracted amounts, costs, quality requirements, and binding EPA and health standards.

Eva Patten, League of Women Voters, asked if an effluent groundwater exchange had been considered.

Mr. Hudgins replied that there was presently no means or alternative to trade groundwater plus considering the investment in the treatment facility and pipeline, differing from the existing plans would be costly to APS as well as the taxpayer.

John Schaper, Buckeye Irrigation District, added that such an option is not available to the Arizona Nuclear Power Plant.

Paul McCleester, Sun City Homeowners Association, asked if flow reduction measures had been considered in determining use figures.

Mr. Hudgins replied yes, that the MAG figures which include flow reduction have always been followed.

Mr. Hudgins stated that the site is a zero discharge site. No effluent leaves the site. Evaporation ponds are used for disposal.

Jack Hinchey, Motorola, asked what would be done with the salt that would accumulate.

Mr. Hudgins replied that each pond is 40 feet deep and it is estimated that over the life of the project (30 years) there will be 20 feet of salt accumulation.

Ms. Patten asked how long was the project life.

Mr. Hudgins stated that 1) financial life of the site was 30 years; 2) physical life of the project is longer, as much as 50 years.

Chairperson Lofgren asked for further questions.

With no further questions, the meeting was adjourned at 5:00 PM.

WATER QUALITY POLICY ADVISORY COMMITTEE

Meeting Summary  
November 28, 1979 - 3:00 PM  
League of Cities and Towns Building  
1820 West Washington Street  
Phoenix, Arizona 85007

Advisory Committee

Bob Bradley	Maricopa Audubon Society
Jim Casey	City of Tempe
Helen Cornell	City of Glendale
Michael Goodman	South Phoenix Planning Committee
Pam Hait	Phoenix Magazine
Terry Hudgins	Arizona Public Service
Sue Lofgren	League of Women Voters
Bill McCarthy (for Dean Sloan)	City of Mesa
Paul McCleester	Sun City Homeowners Association
Jack Muir	City of Tolleson
Eva Patten	Governor's Commission on the Arizona Environment
Daril Peterson	St. John's Irrigation District
Adron Reichert	Holly Acres Flood Control Association
Don Womack	Salt River Project

Others Present

Wally Ambrose	Camp Dresser and McKee
Veda M. Barnes	Holly Acres Flood Control Association
Gerry Bastian	Greeley and Hansen
Bob Brunton	City of Phoenix
Richard Cote'	Camp Dresser and McKee
Allen Davis	Camp Dresser and McKee
Mark Frank	MAG
Jim Fulton	Consultant
Jerry Hill	Holly Acres Flood Control Association
Walt Howard	John Carollo Engineers
Bob Logan	Consultant
Susan Mitchell	Public Participation Coordinator
John Puzauskas	John Carollo Engineers
Ken Schmidt	Consultant
Carolyn Slatt	Consultant
Ken Spiker	City of Phoenix
Bob Steytler	City of Phoenix
Moe Wakefield	Arizona Department of Health Services
Jim Webb	City of Phoenix
Jim Webster	Arthur Beard Engineers

Sue Lofgren, Chairperson, opened the meeting. The purpose of the meeting was to recommend final alternatives for the 91st Avenue plant expansion and to review the Multi-cities plans for effluent studies. Due to time constraints, the recommendation of one treatment process alternative for the 23rd Avenue plant upgrade was deferred to the December 13th meeting of the Water Quality Policy Advisory Committee.

Ms. Lofgren then introduced Robert Brunton, City of Phoenix.

#### EFFLUENT REUSE STUDY

Mr. Brunton reviewed the Multi-city SROG's plans for additional effluent reuse studies. He indicated that the whole area of effluent reuse was in the original scope of work submitted to EPA. EPA, however, elected to take it out. The Multi-city SROG feels that effluent reuse is an important part of not only the 201 planning, but of the overall water management in the Phoenix area as well; and representatives of City of Phoenix would be talking to EPA to find out the reasons for taking it out of the original scope. The study will be funded locally, if necessary. Confirmation from the SROG Board is needed as well as from the City Council. A commitment from the Multi-cities to carry out a long-range effluent management program will be needed.

Jim Fulton, Consultant, then briefly described the scope of work for the effluent reuse study. The study is an initial step in a long-term effluent management program and will 1) provide an overview of the water resource planning for the Salt River Basin; 2) identify and preliminarily evaluate alternative reuse options for the effluent from the 91st and 23rd Avenue plants; and 3) look at the impact effluent has on contributing to the problems downstream of the 91st Avenue plant and identify, evaluate and select solutions for possible implementation (solutions may involve agencies other than Multi-city members). The study should start in early January and be completed in about 3 months.

Mike Goodman, South Phoenix Planning Committee, asked if this study was the one that would tie in Rio Salado as a reuse.

Bob Steytler, City of Phoenix, replied no. There are two effluent studies: one which identified how much water will get to the Salt River and the environmental impacts of that water. The study just described is an additional study which deals with effluent reuse. The time frames are similar.

Adron Reichert, Holly Acres, just asked when Holly Acres residents would be able to speak to the EPA people as requested.

Susan Mitchell, Public Participation Coordinator, replied that EPA would be in town the week of December 10th.

Mr. Reichert stated a desire to have Holly Acres Association speak to them to clarify several issues regarding effluent impacts.

Mr. Steytler added that the Residuals Management report would clarify these issues.

Eva Patten, Governor's Commission on the Arizona Environment, asked if funds had been approved for the study, since EPA is not funding it.

Mr. Brunton replied that no funds have been approved. Phoenix and the other cities will have to fund this study locally. First, the City would like a clarification of why EPA did not include it in the 201 scope of work, and secondly, in all probability no EPA funds would be requested because of the time it would take to get approval, unless it could be tagged on to an existing contract. If not, it will have to be funded locally.

Ms. Lofgren asked for the estimated project cost.

Mr. Brunton replied approximately \$25,000.

Ms. Lofgren stated that the scope of work for this study will be discussed further after the SROG and City Councils have reviewed it and commented.

The meeting was then turned over to Wally Ambrose, Greeley and Hansen.

#### 91ST AVENUE EXPANSION

Mr. Ambrose presented a brief summary of the alternatives for expansion, including responses to questions raised at the last Advisory Committee meeting (see attached handout).

Mr. Reichert asked if there would ever be a bypass of raw sewage to the river. Drawings in the report indicate it can.

Walt Howard, Greeley and Hansen, said the bypass would be plugged.

Mr. Reichert asked that the drawing be revised to indicate so.

It was so agreed and the Committee will receive a copy of the revised drawing.

### Preliminary Treatment Alternatives

Mr. Ambrose described the alternatives and associated costs.

Terry Hudgins, Arizona Public Service Company, asked 1) about improving the capacity of 23rd Avenue plant, 2) increasing that capacity, and 3) adding 15 mgd someplace else in 1990 or 2000.

Mr. Ambrose replied that right now the 23rd Avenue plant is being designed for 37.2 mgd per the MAG 208 plan. If the decision were made to increase the 23rd Avenue plant, the modified pretreatment facilities appear to have the advantage.

Darryl Peterson, St. John's Irrigation District, asked what the life span of modified facilities would be.

Mr. Ambrose replied that it would be about 20 years for both modified and new facilities.

Ms. Lofgren asked for recommendations from the consultants.

Mr. Ambrose stated that in his estimation with probable expansion at 91st Avenue, new pretreatment facilities would be in order.

Mr. Howard, John Carollo Engineers, stated that with the Southern Avenue Interceptor and the 99th Avenue Interceptor being planned to connect to the plant and the exact flows and grades not known at this time, it would be more advantageous to modify the pretreatment facilities at this time and replace them with new facilities when the plant is expanded by 17 mgd.

Mr. Steytler stated that from an operational standpoint, he would recommend modification of the existing system.

Mr. Hudgins moved to recommend modification of the existing facilities as the preferred alternative.

Pam Hart, Phoenix Magazine, seconded the motion.

The motion passed unanimously.

### Liquid Stream Alternatives

Mr. Ambrose described the alternatives and associated costs.

Ms. Patten asked if there was a significant energy difference between alternatives 2 and 3 (air activated sludge) and 4 (oxygen activated sludge).

Mr. Ambrose replied there would not be a significant difference.

Ms. Lofgren asked for consultant recommendations.

Mr. Ambrose stated that 1) Alternative 1 is not recommended because it would not consistently meet effluent standards; 2) there are reservations on oxygen activated sludge due to the complexity of having more than one process on line; and 3) between the coarse and fine bubble, fine bubble is more efficient.

Mr. Steytler recommended staying with the air activated sludge process. Operationally there is no difference between coarse and fine bubble equipment.

Mr. Howard stated that the existing coarse bubble systems could be retrofitted to fine bubble later.

Mr. Womack moved that the Committee recommend alternative 2, air activated sludge, three basins, fine bubble as the preferred alternative.

Jim Casey, City of Tempe, seconded the motion.

The motion passed unanimously.

#### Sludge Stabilization Alternatives

Mr. Ambrose described the alternatives and associated costs.

Mr. Casey asked what would cause lowering of temperatures in the thermophilic process.

Mr. Ambrose replied an electrical outage.

Mr. Steytler added that digesters are heated with digester gas and should there be an upset in the plant, either no gas would be produced and temperatures would decrease or the bacteria would get sick and not produce gas, thus decreasing temperatures.

Bob Bradley, Audubon Society, asked if there could be a back-up heating system.

Mr. Steytler replied yes, but that has not been included in the costs.

Ms. Lofgren asked for consultant recommendations.

Mr. Ambrose recommended the mesophilic process.

Mr. Steytler agreed because of the greater system experience.

Mr. Casey moved that the mesophilic digestion process be recommended as the preferred alternative.

Jack Muir, City of Tolleson, seconded the motion.

The motion passed unanimously.

## Gas Utilization

Mr. Ambrose described the alternatives.

Ms. Lofgren asked for consultant recommendations.

Mr. Ambrose recommended Alternative 2, gas to the boilers and generators as a method that conserved energy. Mr. Steytler agreed.

Mr. Hudgins suggested that this decision be tabled on the basis that consideration be given to consolidating planning on making use of all possible power sources (e.g. solid waste), looking at all resources available and the benefits to the community.

Ms. Lofgren asked if such an action were feasible.

Mr. Steytler stated that it depends on the time involved and didn't think it was possible to wait that long. Approvals on all portions of the expansion is needed before design can begin on the first plant.

Mr. Hudgins moved that Alternative 2, gas to generators and boilers, be recommended as the preferred alternative with the proviso that possibilities be explored of looking at it in connection with the total management picture (e.g. solid waste, etc.) and that if determined feasible, modifications be made in the future.

The City of Phoenix has studies underway to analyze using solid waste as a source of energy. The advisory committee asked that a status report be prepared on this issue.

## PUBLIC PARTICIPATION

Ms. Mitchell stated that the SROG would meet November 29th to select 91st Avenue plant expansion alternatives based on advisory committee recommendations. She asked if a committee member would like to present the recommendations. (Ms. Lofgren and Mr. Reichert presented the recommendations at the SROG meeting).

## OTHER BUSINESS

The next meeting will be December 13th to recommend 23rd Avenue upgrade alternatives. Mike Schultz, EPA, will be at that meeting.

With no further business, the meeting was adjourned at 4:55 p.m.

RESPONSE TO ADVISORY COMMITTEE COMMENTS ON 91ST AVENUE  
PLANT EXPANSION ALTERNATIVES

November 28, 1979

In response to questions raised at the Monday, November 19, 1979 advisory committee meeting, the consultants have provided the following information:

1. Air quality impacts of flaring digestion gas at the 91st Avenue plant
  - 1) Gas produced in anaerobic digestion process is 65% to 70% methane ( $\text{CH}_4$ ), 25% to 30% carbon dioxide ( $\text{CO}_2$ ), with small amounts of nitrogen (N), hydrogen (H), hydrogen sulfide ( $\text{H}_2\text{S}$ ), and Oxygen (O).
  - 2) The products of combustion associated with flaring of the digester gas include carbon dioxide ( $\text{CO}_2$ ), water ( $\text{H}_2\text{O}$ ) and sulfur dioxide ( $\text{SO}_2$ ).
  - 3) The major air pollutant when digester gas is flared is the  $\text{SO}_2$  which occurs when the  $\text{H}_2\text{S}$  is burned.
  - 4) A usual concentration of  $\text{H}_2\text{S}$  in digester gas is 50 grains/100  $\text{ft}^3$ . If digester gas at the 91st Avenue WWTP contains  $\text{H}_2\text{S}$  at that concentration, the  $\text{SO}_2$  concentration in the emitted gas after flaring would be about 136 ppm.
  - 5) There are no Federal emission standards for  $\text{SO}_2$ ; however, some localities and states do have standards. The State of Arizona standard for unclassified source emissions of  $\text{SO}_2$  is 600 ppm.
2. Quantification of the benefits on downstream processes with new preliminary treatment facilities

Modified Pretreatment Facilities

Under this preliminary treatment alternative, minimal grit would be captured within the preliminary treatment facilities. Instead, most of the grit would settle out with the primary sludge in the primary sedimentation basins. From there, the combined grit and primary sludge would be pumped to the digestion tanks. Significant amounts of grit would settle out and remain in the digesters. As the quantities of grit in the digester would increase, the effective digestion volume available for the stabilization of sludge solids would decrease. The accumulation of grit in the digestion tanks could hamper the withdrawal of sludge from the digester and the patterns of mixing within the tanks. An accumulation of grit greater than 20 percent of the digestion tank volume could seriously impair the digestion process within the tank.

A 20 percent grit load would be reached after about four years of continuous operation. A program of scheduled digester cleaning would require that a digester be removed from service about once every five years. A standby digester would be provided to allow for internal digester inspection, maintenance and cleaning without loss of effective digestion capacity. Special facilities comprising ten acres of drying beds and associated pumps and piping would be provided for use during digestion cleaning.

Following is a summary table indicating the number of active mesophilic and thermophilic digesters that would be required to maintain a minimum detention time of 20 days and 10 days respectively, assuming an average of 10 percent of the total digester volume was set aside for grit accumulation:

	<u>Number of Active Digesters</u>	<u>Detention Time Days</u>
Mesophilic Digestion		
Air Activated Sludge	10	20.7
Oxygen Activated Sludge	9	19.6
Thermophilic Digestion		
Air Activated Sludge	5	10.4
Oxygen Activated Sludge	5	10.9

#### New Pretreatment Facilities

Under this preliminary treatment alternative, the majority of the grit would be captured within the preliminary treatment facilities. A small percentage of the grit would pass through the pretreatment facilities and would settle out with the primary sludge in the primary sedimentation basins. From there, the grit would be pumped with the sludge to the digestion tanks. Some of this grit would settle in the digesters; some would combine with the digested sludge and be conveyed to downstream sludge disposal.

A standby digester would be provided to allow for a digester to be removed from service for internal inspection, maintenance and cleaning without loss of effective digestion capacity. The accumulated grit would also be removed at the time of inspection. Special facilities comprising ten acres of drying beds and associated pumps and piping would be provided for use during digester cleaning.

If a digester were removed from service once every five years for maintenance and cleaning, it is estimated that the grit would occupy approximately 6 and 12 percent of the digester volume for the mesophilic and thermophilic digestion alternatives, respectively. The number of active digesters required to maintain a minimum of 20 days and 10 days detention for mesophilic and thermophilic digestion respectively is as follows:

	<u>Number of Active Digesters</u>	<u>Detention Time Days</u>
Mesophilic Digestion		
Air Activated Sludge	9	20.1
Oxygen Activated Sludge	9	21.1
Thermophilic Digestion		
Air Activated Sludge	5	10.8
Oxygen Activated Sludge	5	11.4

### Comparison of Pretreatment Facilities

For mesophilic digestion, the first and annual costs of the composite facilities would be similar for either Modified or New Pretreatment Facilities. For thermophilic digestion, the first and annual costs favor the Modified Pretreatment Facilities. Additional considerations, which have not been addressed in the comparative cost analysis include:

- The modified pretreatment facilities would result in more grit being transported with the sludge which would cause increased abrasive wear on pumps, meters, heat exchangers and piping.
  - The modified pretreatment facilities would accommodate the hydraulic distribution of the current plant expansion. Should the decision be made to expand the 91st Avenue Plant beyond 120 mgd in the future, as proposed in the MAG 208 Final Plan, it would be necessary to replace or modify the existing pretreatment facilities. The new pretreatment facilities would be designed to accommodate future expansion.
3. Quantification of oxygen activated sludge system versus air activated sludge system in terms of digestion

The sludge production for the oxygen activated sludge liquid stream alternative, would be approximately five percent less than for the air activated sludge alternatives. The slight reduction is a result of the volatilization of solids that occurs in a covered oxygen reactor. With the same average digester allocation for grit accumulation, the five percent difference in sludge production represents about one day of detention, on a 20 day detention base, or about the volume of one-half of one mesophilic digestion tank. Accordingly, the following active mesophilic digesters would be required:

<u>Liquid Stream Alternative</u>	<u>No. of Active Digesters</u>	<u>Detention Time-Days</u>
Air Activated Sludge	10	21.5
Oxygen Activated Sludge	9	20.7

The number of thermophilic digesters would be the same for the air activated sludge and oxygen activated sludge alternatives.

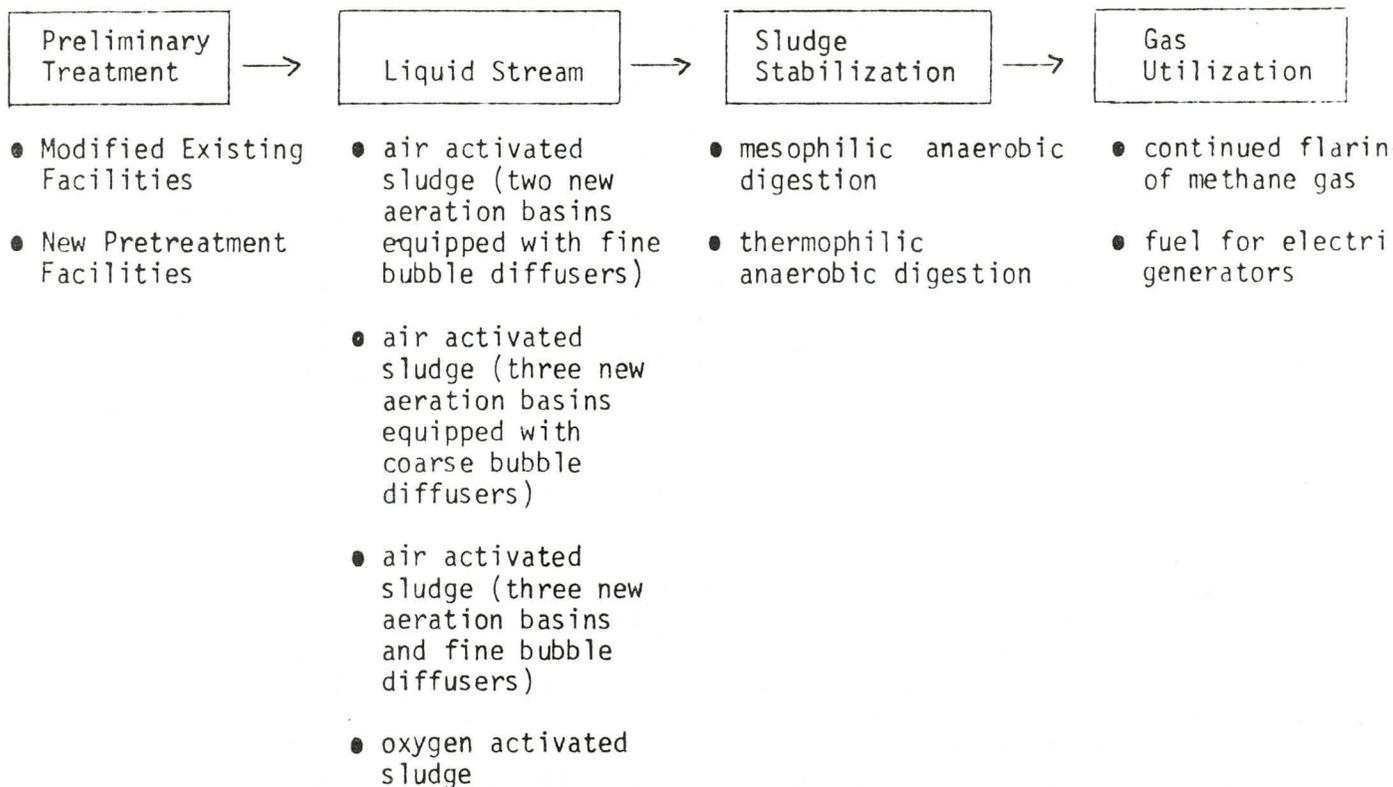
Gas production for the air activated sludge alternatives would slightly exceed the gas production for oxygen activated sludge. However, it is not practical to assign a dollar value to this difference.

4. Presentation of complete alternative systems including an optimum system

These alternative systems are presented in the following table:

### 91ST AVENUE TREATMENT PLAN EXPANSION

#### COMPLETE ALTERNATIVE SYSTEMS



WATER QUALITY POLICY ADVISORY COMMITTEE

Meeting Summary  
December 13, 1979 - 3:00 PM  
League of Cities and Towns Building, Room 103  
1820 West Washington Street  
Phoenix, Arizona 85007

Advisory Committee

Jack Berton	Phoenix Chamber of Commerce
Bob Bradley	Maricopa Audubon Society
Helen Cornell	City of Glendale
Michael Goodman	South Phoenix Planning Committee
Pam Hait	Phoenix Magazine
William McCarthy	City of Mesa
Paul McCleester	Sun City Homeowners Association
Dean Moss	Arizona Department of Health Services
Adron Reichert	Holly Acres Flood Control Association
Don Womack	Salt River Project
Bob Yount	State Land Department

Others Present

Wally Ambrose	Greeley and Hansen
Allen Davis	Camp Dresser and McKee
Susan Mitchell	Public Participation Coordinator
Michael Schulz	EPA
Carolyn Slatt	Consultant
Bob Steytler	City of Phoenix
Moe Wakefield	Arizona Department of Health Services
Jim Webb	Multi-city SROG
R.M. Zimmerman	Greeley and Hansen

# WATER QUALITY POLICY ADVISORY COMMITTEE

## Meeting Summary

December 13, 1979 - 3:00 PM  
League of Cities and Towns Building, Room 101  
1820 West Washington Street  
Phoenix, Arizona 85007

Laura Watson, Acting Chairperson, opened the meeting. The purpose of the meeting was to 1) recommend one liquid stream alternative for the upgrading of the 23rd Avenue plant, and 2) report on the status of the solid waste study. Mike Schulz, Environmental Protection Agency, was also available to discuss with the committee the scope of the residuals management study and other issues of concern to the committee. Ms. Watson announced that the SROG Board would meet December 17 and the next meeting of the Water Quality Policy Advisory Committee was January 10, 1980 at 3:00 PM in the League of Cities and Towns Building. The December 27 and January 3 advisory committee meetings had been cancelled. Ms. Watson then turned the meeting over to Mr. Schulz.

### RESIDUALS STUDY SCOPE

Mr. Schulz clarified why the effluent reuse portion of the residuals management study was eliminated from the scope. He stated that EPA knew there was a range of contracts and commitments that the City had for the effluent but that the particulars of the commitments were unknown (amounts, timing of deliver, or quality). Therefore, EPA felt that it would be unrealistic and premature to lay out alternatives for effluent reuse. EPA therefore asked that that portion of the study be removed from the scope until the needed information was obtained. Then, the study would be rescoped using the information on the contracts to set out realistic alternatives. Mr. Schulz stated that the study was not being scaled down, in fact, before EPA can approve expansion of the plants, it will need a full set of information on both sludge and effluent. EPA is hoping that is what the residuals management study will eventually provide.

Adron Reichert, Holly Acres Association, asked if EPA would provide funds.

Mr. Schulz replied that it was grant eligible but it was a question of whether grant funds would be available.

Mr. Reichert then expressed on behalf of Holly Acres his appreciation for the fair manner in which the study has been conducted and for EPA's discussions with Holly Acres.

Ms. Watson then turned the meeting over to Bob Steytler, City of Phoenix, for a discussion of liquid stream alternatives for 23rd Avenue.

## 23RD AVENUE UPGRADE - RECOMMENDATION OF LIQUID STREAM ALTERNATIVE

Mr. Steytler stated that expansion of the 23rd Avenue plant would also be discussed so that the committee could see which alternatives for upgrading lend themselves to expansion. Mr. Steytler then turned the meeting over to Al Davis, Camp Dresser and McKee, for a discussion of the environmental assessment of alternatives.

Mr. Davis stated that there are no real differences environmentally between alternatives being considered. Basically, the decision of the committee is on a technical basis.

Mr. Steytler then turned the meeting over to Bob Zimmerman, Greeley and Hansen, to discuss the liquid stream alternatives on a technical basis.

Mr. Zimmerman described the alternatives, advantages and disadvantages of the various alternatives, and the costs of the alternatives, as well as costs of the expanded 23rd Avenue plant.

### Conventional Aeration

#### Advantages:

- system experience
- low first cost
- low annual cost

#### Disadvantages:

- less flexibility and reliability than step aeration, for essentially the same cost
- high energy usage

### Step Aeration - Plants I and II

#### Advantages:

- increased reliability through multiple tankage
- greater tankage reduces loadings
- most potential for expansion

#### Disadvantages:

- primary sludge pumping and aeration activities split between two plants
- complex and expensive rehabilitation of plant I is required
- high energy usage

### Step Aeration - Plant II Only

#### Advantages:

- lowest first cost
- lowest annual cost
- lowest energy usage
- consolidates primary sludge pumping and aeration at one location
- can be implemented with least disruption to treatment operations

#### Disadvantages:

- fewer number of tanks reduces reliability
- less tankage increases loadings
- reduced ultimate capacity with proposed facilities

### Oxygen Activated Sludge

#### Advantages:

- lowest sludge production
- second lowest annual cost
- lowest land requirement

#### Disadvantages:

- different process - more training
- aesthetics
- fewer number of tanks reduces reliability

### Rotating Biological Contactors

#### Advantages:

- easy to operate
- reliability

#### Disadvantages:

- highest first cost
- highest annual cost
- large space requirement
- difficult to implement

### Air Activated Sludge with Rotating Biological Contactors

#### Advantages:

- reliability
- low energy usage
- expandability

#### Disadvantages:

- second highest first cost
- second highest annual cost
- difficult to implement

Mr. Moss asked if the first costs for the expanded plant were computed based on expansion being done now.

Mr. Zimmerman replied yes, no inflation was considered.

Ms. Watson asked what would be involved in expanding the oxygen activated sludge alternative.

Mr. Zimmerman replied that an additional covered oxygen aeration facility would have to be built, and the capacity of the oxygen generation facility increased.

Don Womack, Salt River Project, asked if the costs shown in the handout include the three clarifiers.

Mr. Zimmerman replied no, the third tank was a mitigating measure of the disadvantage of the alternative.

Ms. Watson asked why there was low reliability on oxygen activated sludge.

Mr. Zimmerman replied that it was due to only two tanks (could be mitigated by addition of a third tank) and also due to the oxygen generation plant.

Mr. Reichert questioned the need for the additional third tank for capacity.

Mr. Zimmerman replied that the third tank was not for increased capacity, but rather for increased reliability in plant operation.

Bob Bradley, Audubon Society, asked what experience there was with oxygen activated sludge.

Mr. Zimmerman replied that there are several plants in operation, but not of this size. It is a relatively new process.

Mr. Bradley asked if the City anticipated expansion of the 23rd Avenue plant in the future.

Mr. Steytler replied no, because the population projections indicate it will not be necessary through the year 2000. The 208 plan will be updated periodically, however, and it may become desirable in the future to expand the plant.

Mr. Reichert asked about oxygen activated sludge and the expertise in the Valley.

Mr. Zimmerman replied that such expertise was limited.

Ms. Watson then asked for the recommendation of the consultants.

Mr. Zimmerman replied that the recommendation of the consultants was to utilize step aeration in plant II only with three primary clarifiers and modification of the aeration basins for the following reasons:

- lowest first, annual and energy costs
- consolidates primary sludge pumping and aeration at one location
- can be implemented with least disruption to treatment operation

Ms. Watson then asked for a vote on each alternative. The voting was as follows:

- Air Activated Sludge Conventional Aeration - 0
- Air Activated Sludge Step Aeration, Plants I and II - 0
- Air Activated Sludge Step Aeration, Plant II Only (as modified) - 10
- Oxygen Activated Sludge - 3
- Rotating Biological Contactors - 0
- Air Activated Sludge with Rotating Biological Contactors - 0

By majority vote, the recommended alternative was Air Activated Sludge Step Aeration at Plant II only as modified (three primary clarifiers).

#### OTHER BUSINESS

Susan Mitchell stated that more information on the methane gas utilization and solid waste studies underway would be available at the next Water Quality Policy Advisory Committee meeting.

Paul McCleester, Sun City Homeowners Association, asked about the status of the 99th Avenue Interceptor and the availability of federal funds.

Moe Wakefield, Arizona Department of Health Services, replied that funds were available and the project was out for bid.

Ms. Mitchell added that several alternatives were being considered for the effluent from the Tolleson plant.

Mr. Reichert asked for a clarification of the advisory committee's role regarding the other 201's underway in the Valley.

Ms. Mitchell stated that the advisory committee recommends the facility plans to the MAG Regional Council for approval.

Ms. Watson stated that the Chandler 201 study was still in negotiaton with the Indians and they may have to have a new plant.

Mr. Steytler, speaking for Bob Brunton, City of Phoenix, stated that EPA will be funding the effluent reuse study.

With no further business the meeting was adjourned at 4:15 PM.

WATER QUALITY POLICY ADVISORY COMMITTEE

Meeting Summary  
January 10, 1980 - 3:00 PM  
League of Cities and Towns Building  
1820 West Washington Street  
Phoenix, Arizona 85007

Advisory Committee

Bob Bogle	East Maricopa NRCD
Bob Bradley	Maricopa Audubon Society
Helen Cornell	City of Glendale
Dan Devers	Valley Forward Association
Michael Goodman	South Phoenix Planning Committee
Terry Hudgins	Arizona Public Service
William F. McCarthy	City of Mesa
P. R. McCleester	Sun City Homeowners Association
Jack Muir	City of Tolleson
Daril Peterson	St. John's Irrigation District
Adron Reichert	Holly Acres Flood Control
Felix Schmidt	Gila River Indian Community
Don Womack	Salt River Project

Others Present

Wally Ambrose	Greeley & Hansen
Al Davis	Camp Dresser and McKee
Jim Fulton	Consultant
Susan Mitchell	Public Participation Coordinator
John Puzauskas	John Carollo Engineers
Carolyn Slatt	Consultant
Bob Steytler	City of Phoenix
Moe Wakefield	Arizona Department of Health Services
Jim Webb	City of Phoenix

Helen Cornell, Acting Chairperson, opened the meeting. The purpose of the meeting was: 1) to discuss mitigation and enhancement measures for the 91st Avenue plant expansion and approve the course of action proposed by the Multi-cities; 2) to recommend the 23rd Avenue plant Effluent Disinfection Facility Plan; and 3) to present the scope of work and status report on the Effluent Reuse Study.

#### MITIGATION AND ENHANCEMENT MEASURES

The meeting was turned over to Al Davis, Camp Dresser and McKee, who described the potential problems associated with expansion of the 91st Avenue plant as cited in the 208 EIS, measures to eliminate or reduce these, and the action proposed by the Multi-cities.

Paul McCleester, Sun City Homeowners Association, asked what was planned for the effluent channel.

Bob Steytler, City of Phoenix, replied that construction was underway on the plant site to build a proper channel for the effluent with a roadway on either side.

Adron Reichert, Holly Acres Association, asked about a south channel to get effluent into the original main channel.

Mr. Steytler replied that there were property line limitations and that the city had been told such action would be illegal.

Mr. McCleester asked why the effluent had been changed to a westward flow.

Mr. Steytler replied that the original southward flow cut into Indian land and then onto private land.

Mr. Reichert asked if the channel being built was sufficiently floodproofed.

Mr. Steytler replied that it would not withstand a flood of the magnitude of the last one.

Considerable discussion followed regarding the effluent channel and the construction underway. Terry Hudgins, Arizona Public Service Company, stated that the Flood Control District of Maricopa County had clearing projects planned or underway as interim flood control measures, and diking was being studied in the Central Arizona Water Control Study. Until completion of such efforts, the situation would remain unsolved.

Mr. Reichert asked if there was any commitment on the part of the City to work with the various agencies involved to solve effluent problems downstream.

Jim Webb, SROG Administrator, replied that a resolution to that effect had been drafted by the SROG and will go before the Multi-city councils for adoption early in 1980.

Ms. Cornell then asked for a motion to approve the Multi-cities proposed course of action regarding mitigation and enhancement measures.

Bob Bogle, East Maricopa NRCO, moved to table the decision pending more explanation of the efforts to be undertaken in the effluent reuse study underway by the City.

Mr. Hudgins seconded the motion. The motion passed with one dissenting vote.

#### EFFLUENT REUSE STUDY

The meeting was then turned over to Jim Fulton, Consultant, to discuss the effluent reuse study. Mr. Fulton briefly described the scope of work for the study and the time schedule for completion. He stated that the study was underway and should be completed by the end of March 1980. He emphasized the Committee's involvement in developing the "shopping list" of alternatives for effluent reuse. Mr. Fulton noted that existing problems with the effluent discharge are being examined and that the potential for solving problems and implementing solutions will be completed later on by the Multi-cities.

#### 23RD AVENUE DISINFECTION FACILITY PLAN

The meeting was turned over to Susan Mitchell, Public Participation Coordinator, who discussed the comments received at the Public Hearing on the 23rd Avenue Disinfection Facility Plan. The major concerns were the safety factors associated with chlorine handling and transport through the City.

Mr. McCleester asked about the chlorine delivery route.

Mr. Steytler replied that the route taken would depend on where the chlorine came from and that this would be analyzed.

Ms. Cornell noted the City of Glendale's concern about the delivery routes to be selected.

Jack Hinchey, Motorola, moved that the advisory committee recommend the 23rd Avenue Disinfection Facility Plan.

Don Womack, Salt River Project, seconded the motion.

With no further discussion the motion passed unanimously.

## MITIGATION AND ENHANCEMENT

Ms. Cornell then reopened the tabled discussion on mitigation and enhancement measures.

Following discussion, Mr. Hinchey moved that the advisory committee approve the city's action on mitigation measures as a block with concern over future effluent planning in the downstream area.

Mr. McCleester seconded the motion.

The motion passed unanimously.

Mr. Womack moved that the advisory committee approve the Multi-cities' actions on enhancement measures as presented.

Jack Muir, City of Tolleson, seconded the motion.

The motion passed with one dissenting vote.

## OTHER BUSINESS

Mr. Muir stated that Tolleson was going to look at effluent reuse.

Mr. Hudgins asked when the Water Quality Policy Advisory Committee would be discussion the solid waste studies underway as previously requested.

Ms. Mitchell stated that the subject would be discussed at the next meeting of the Committee on January 31, 1980.

With no further discussion, the meeting was adjourned at 4:45 PM.

WATER QUALITY POLICY ADVISORY COMMITTEE

Meeting Summary  
January 31, 1980 - 3:00 PM  
League of Cities and Towns Building  
1820 West Washington Street  
Phoenix, Arizona 85007

Advisory Committee

Bob Bogle	East Maricopa NRC
Helen Cornell	City of Glendale
Michael Goodman	South Phoenix Planning Committee
Pam Hait	Phoenix Magazine
Ken Hanks	Arizona Game & Fish
Jack Hinchey	Motorola
Terry Hudgins	Arizona Public Service
Sue Lofgren	League of Women Voters
William F. McCarthy (for Dean Sloan)	City of Mesa
P. R. McCleester	Sun City Homeowners Association
Dean Moss	Arizona Department of Health Services
Jack L. Muir	City of Tolleson
Eva Patten	Governors Commission on the Arizona Environment
Adron W. Reichert	Holly Acres Flood Control
Rick Santoro	American Public Health Association
Don Womack	Salt River Project
Bob Yount	State Land Department

Others Present

Wally Ambrose	Greeley & Hansen
Allen Davis	Camp Dresser and McKee
Mark Frank	MAG 208
Jim Fulton	Consultant
Susan Goldsmith	Consultant
George J. Hartman	Sun City Homeowners Association
Robert K. Logan	Southwest Engineers
John Puzauskas	John Carollo Engineers
Carolyn Slatt	Consultant
Moe Wakefield	Arizona Department of Health Services
Jim Webb	Multi-city SROG

Sue Lofgren, Chairperson, opened the meeting. The purpose of the meeting was: 1) to review the list of long-term options for effluent reuse and suggest additions to the list; 2) review various options for sludge disposal and reuse and present general advantages and disadvantages of these systems; and 3) present the groundwater monitoring program prepared by Dr. Ken Schmidt, groundwater quality consultant.

Ms. Lofgren asked for corrections to minutes, if any.

Bob Bogle, East Maricopa NRCO, asked that the minutes of the January 10, 1980 advisory committee meeting be corrected to include his question regarding if there were any points raised at the Public Hearing on disinfection at the 23rd Avenue plant that were difficult to answer and the response that there were none. It was so noted and would be included.

Ms. Lofgren announced that 91st Avenue Plant Expansion Facility Plans would not be mailed. They are available to be picked up at the SROG now or they can get them at the February 11 advisory committee meeting.

The meeting was then turned over to Jim Fulton, Consultant to the City of Phoenix.

#### EFFLUENT REUSE STUDY

Mr. Fulton briefly described the scope of the project, an overview of the water problems in the Valley, and the amount of effluent available for reuse.

The advisory committee then broke into small groups to review the list of long-term reuse options and to come up with additions to the list.

Following is a list of their suggested additional reuse options:

- Meat-packing plant: reuse of Tolleson effluent in processes at meat-packing plant for non-edible uses such as dust control
- Building Construction: in the manufacturing of concrete effluent could be used instead of fresh water
- Salt Mining: to dissolve salt in underground basins in the Luke Air Force Base area
- Water Source in Montezuma Pumped Storage Project
- Power generation: pump storage for Estrella Mountains
- Fish or shrimp farming.
- Decorative fountains or lakes
- Pressure injection for groundwater recharge uses

- Petroleum refinery
- Secondary recovery for oil
- Expansion of Rio Salado beyond metro area
- Crops - tumbleweed for tumbleweed logs and water hyacinths as energy sources.
- Hydroelectric energy

Mr. Fulton said that these suggestions would be developed further as would the others and in 4 - 6 weeks they would be presented again to evaluate their feasibility.

Short-term reuse options will be presented at a separate meeting.

The meeting was turned over to Mark Frank, MAG.

#### GROUNDWATER MONITORING

Mr. Frank presented the groundwater monitoring program which was prepared by Dr. Ken Schmidt, groundwater quality consultant, as outlined in the handout.

Jack Burton, Phoenix Chamber of Commerce, asked if the sampling was being coordinated with the Arizona Water Commission.

Mr. Frank replied yes; they exchange sampling data; there is no duplication of efforts.

The meeting was then turned over to Bob Steytler, City of Phoenix.

#### SLUDGE MANAGEMENT OPTIONS

Mr. Steytler stated that the advisory committee would not have a decision to make relative to sludge management options. The City of Phoenix will be going with the Kellogg process and the technical and environmental assessment of the Kellogg process will continue. The consultants did however present the various other methods of sludge management to the advisory committee in a film.

Paul McCleester, Sun City Homeowners Association, asked when Kellogg would go on line.

Mr. Steytler replied Kellogg would be burning within 30 days.

At this point in the meeting, Jack Hinchey, Motorola, asked for a discussion of the lack of federal funding for wastewater treatment plant upgrading and expansion based on the priority system.

Dean Moss, Bureau of Water Quality Control, briefly described the situation, citing cost overruns as one of the main reasons for funds running out. He stated that the Water Quality Control Council would meet Wednesday, February 13, 1980 to discuss the issue.

Mr. Hinchey stated that this was an issue the advisory committee should deal with.

Adron Reichert, Holly Acres, asked what the City of Phoenix plans were in light of the situation.

Mr. Steytler replied that the City would go ahead even without federal funds. The City can fund 100 percent of their share, but not 100 percent of the total cost. Other sources of funding are being investigated.

Ms. Lofgren asked for a decision of the best time for a special advisory committee meeting on this subject. The meeting will be held Monday, February 11, at 3:00 PM.

At that time, Mr. Moss will discuss the situation in more detail. The City of Phoenix staff will present the Multi-city SROG's plans for funding.

With no further business, the meeting was adjourned at 5:15 PM.