

ARIZONA WATER BANKING AUTHORITY

TUESDAY, AUGUST 20, 1996
 ARIZONA DEPARTMENT OF WATER RESOURCES
 PHOENIX, ARIZONA

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6	NAME: Dennis Rule REPRESENTING: City of Tucson	BUSINESS ADDRESS: PO Box 27210 Tucson, AZ 85726-7210	TEL: 520-791-2666 FAX 520-791-3293
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29	NAME: <i>RON WONG</i> REPRESENTING <i>RKW FARMS</i>	BUSINESS ADDRESS <i>PO BOX 186</i> <i>MARANA AZ 85653</i>	TEL: <i>(520) 682-2516</i> FAX <i>-2516</i>
30	NAME: <i>DAVID SWIDER</i> REPRESENTING <i>CITY OF CASA GRANDE</i>	BUSINESS ADDRESS <i>405 E. 6TH ST.</i> <i>CASA GRANDE, AZ 85222</i>	TEL: <i>421-8690</i> FAX <i>836-1914</i>
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38	NAME: REPRESENTING	BUSINESS ADDRESS	TEL: FAX
39	NAME: REPRESENTING	BUSINESS ADDRESS	TEL: FAX
40	NAME: REPRESENTING	BUSINESS ADDRESS	TEL: FAX
41	NAME: REPRESENTING	BUSINESS ADDRESS	TEL: FAX
42	NAME: REPRESENTING	BUSINESS ADDRESS	TEL: FAX
43	NAME: REPRESENTING	BUSINESS ADDRESS	TEL: FAX
44	NAME: REPRESENTING	BUSINESS ADDRESS	TEL: FAX

FINAL AGENDA

ARIZONA WATER BANKING AUTHORITY

Tuesday, August 20, 1996

12:30 - 3:30 p.m.

Arizona Department of Water Resources

500 North 3rd Street

3rd Floor Conference Room A

Phoenix, Arizona

- | | | |
|-------|---|-------------------------------|
| I. | Welcome / Opening Remarks | Rita Pearson |
| II. | Approval of July 18, 1996 Meeting Minutes | Rita Pearson |
| III. | Presentation on draft Storage Site Criteria for water storage | Tim Henley |
| IV. | Discussion on status of working draft outline of IGA | Tim Henley |
| V. | Discussion on status of interim Storage Facilities Inventory | Jimmy Jayne |
| VI. | Discussion on cost of water (in-direct /direct) | Rita Pearson
Grady Gammage |
| VII. | Discussion on 1997 Annual Plan of Operation | Tim Henley |
| VIII. | Discussion and approval of FY 98 General Fund appropriation request | Tim Henley |
| IX. | Presentation on Mohave County Water Authority/Roosevelt Water Conservation District/City of Mesa banking proposal | Mike Brophy |
| X. | Presentation on proposed Lower Colorado River Tour | Chris Harris |
| XI. | Overview of key upcoming dates for the Authority | Jimmy Jayne |
| XII. | Next Meeting
-Tuesday, September 10, 1996, 9:30 - 12:30
(City of Tucson, Mayor and Council Chambers)
- Proposed agenda items | Jimmy Jayne |
| XIII. | Call to the Public | |
| XIV. | Adjournment | |



JANE DEE HULL
SECRETARY OF STATE
STATE OF ARIZONA

July 23, 1996

Mr. Tim Henley
Arizona Water Banking Authority
500 North 3rd Street
Phoenix, Arizona 85004

via FAX: (602) 417-2424

Dear Mr. Henley:

The proposed seal of the Arizona Water Banking Authority is approved as submitted.

I understand the seal will be used by the Authority as the official stamp on all Resolutions and other business, as well as on the letterhead of the Authority.

Sincerely,

A handwritten signature in cursive script that reads "Jane Dee Hull".

Jane Dee Hull
Secretary of State

JDH/lpv

ARIZONA WATER BANKING AUTHORITY

Storage Site Criteria for Existing and Potential Sites:

Statutory and Infrastructure Considerations

DRAFT

One of the significant tasks of the Arizona Water Banking Authority will be to determine in what manner and where water will be stored within the State of Arizona. Although a large number of policy considerations may guide the Authority in making these decisions, some of the decisions will likely be shaped by the Arizona Water Banking Authority statutes, A.R.S. §§ 45-2401 *et seq.*, the location of the Central Arizona Project water conveyance system, economic factors, as well as other technical and beneficial factors.

Two statutes provide guidance on where water should be stored - A.R.S. § 45-2453 describes the process and provides some criteria by which the Authority will select types of sites and locations for additional storage facilities, should the Authority decide that additional sites are necessary. A.R.S. § 45-2456 describes the factors the Authority should consider when the Authority develops its annual operating plan, while providing guidance on where water should be stored.

The following is a list of the factors prescribed by A.R.S. § 45-2453 and A.R.S. § 45-2456, including economic and technical factors that shall be used as considerations for storage location criteria.

(Note: not all criteria listed are appropriate for all types of recharge facilities)

A) Groundwater Code Objectives

Groundwater Code Objectives should be considered in determining water storage location. A.R.S. § 45-2453(B)(2) and § 45-2456(B)(2).

The Second Management Plans, promulgated under the Code for the state's active management areas (AMA), offer some guidance on where water storage should occur. The Second Management Plans deem water storage in the following locations to be inconsistent with the augmentation program of the Department of Water Resources:

- a) in remote or isolated locations where no benefits would be realized.
- b) in locations where storage would contribute to the migration of poor quality water.
- c) in localized areas of high groundwater levels.

[See Phoenix Second Management Plan, Ch. 7(H)(3)]

The Second Management Plan also states that water storage must meet one of the following tests to be deemed consistent with the management goal for the Active Management Area:

- a) Storage must contribute to groundwater supplies that are currently being used or that could be used in the future so long as the areas which are recharged are not experiencing problems associated with a shallow depth to water.
- b) Storage is contributing to an EPA/DEQ corrective management program.

[See Phoenix Second Management Plan, Ch. 7(H)(3)]

Two additional key criteria should be considered in examining direct or in-direct recharge sites in relation to meeting Groundwater Code objectives and water storage:

- Total historical groundwater level decline
- Potential to alleviate subsidence

B) The Central Arizona Water Conservation District ("CAWCD")

The CAWCD shall be consulted in determining at what storage locations and during what times of the year water can be delivered for the Authority's use [A.R.S. § 45-2453(B)(3) and § 45-2456(B)(3)].

C) Cost of Storage / Cost of Recovery / Other Economic Factors

There are many economic factors that should be considered in examining various recharge site locations. The cost of constructing a facility vs. the beneficial use aspects in areas such as meeting Groundwater Code Objectives and eventual recovery should be considered [A.R.S. § 45-2453(B)(5) and § 45-2456(B)(4)].

- Recovery Costs - feasible recovery locations and all recovery costs should first be considered when evaluating an application submitted to the Authority.
- Capital Costs - if it is determined that a facility is needed - capital expenditures for the construction of the facility would be the biggest cost of storage, including any conveyance and/or pumping systems required.
- Construction Costs - including any earthwork, on-site construction, piping and control systems.
- Annual Operation and Maintenance Costs - examine the average annual costs of operating the facility, including energy, any conveyance system or recharge system maintenance.
- Land and Right-of-Way Acquisition - any acquisition needed, including land availability and ownership, cost per acre vs. acres required and land use compatibility must be considered.
- Environmental Issues - environmental impact of the facility must be taken into consideration, including hydrologic, water quality and effects on water quality standards,

archaeological sites in the vicinity, habitat-related issues, flooding potential, compliance with local, state and federal environmental ordinances and laws, and consideration of the local community.

- Recovery of Water - issues in eventual recovery of the water must be examined in choosing a site, including but not limited to the location of recovery system, depth to groundwater and energy costs associated, transmissivity of aquifer, potential use of existing wells and pipelines, requirements for future treatment.
- Time Line - given the statutory deadlines imposed, the time required to implement the proposed facility must be taken into consideration, including but not limited to obtaining required permits, design and construction and timing of delivery of water by CAWCD.
- Regulatory Issues - all regulatory issues must be considered, including the issuance of required permits by all local, state and federal agencies.

D) Any Other Factor Deemed Relevant by the Authority.

(Again note: not all criteria listed are appropriate for all recharge facilities)

- Infiltration Rate - the rate at which water enters the soil. This instantaneous rate, when measured by conducting small-scale infiltration tests, can be substantially larger than larger scale infiltration rate for a surface recharge project.
- Long-term Average Annual Recharge Rate - 20 year average amount of water that can be recharged, with and without recovery in the area of hydrologic impact of the recharge project (recovery must be taken into consideration).
- Volume of potentially recoverable water below the recharge facility in acre feet (af).
- Depth to groundwater and direction of flow.
- Impact on Groundwater Quality - including 1) potential to change native groundwater through recharge activities 2) potential sources of contamination such as landfills, agricultural and other past land use and 3) migration of contaminant plumes.
- Other Technical Issues - factors including, but not limited to the transmissivity of aquifer, impeding layers in the vadose zone, surface elevation of facility.
- Regional Benefits - many include the sharing of conveyance, recharge and/or recovery facilities, potential recreational use, habitat restoration and multiple use benefits, such as combining flood control and recharge objectives.

Assuming there are multiple storage facilities that meet the above listed criteria, the Authority will need to rank or select from the qualifying sites. Among the factors that might be considered by the Authority are:

- a) Cost - where can the Authority store water and get the most long-term storage credits for their dollars and where can/will recovery occur and at what cost?

- b) Water management objectives - are there storage sites that could alleviate existing or projected water problems or contribute to AMA safe yield?
- c) Indian water rights settlements - are there storage sites that might assist in the resolution of an Indian water rights settlement?
- d) Western Arizona objectives - to the extent General Fund monies are available, where could water be stored so that it is available as a substitute water supply for CAWCD customers when western Arizona cities need additional supplies from the Colorado?
- e) Does the storage site cause harm or concern to other parties? [ADWR is not statutorily allowed to permit a site that will cause unreasonable harm to land or other water users (A.R.S. § 45-811.01(C)(3))]
- f) Recovery location - to the extent that water is stored for purposes that call for its recovery, recovery location may be significant. While recovery can occur anywhere in the AMA in which storage occurred, recovery outside of the area of storage might contribute to dropping water tables in the area of recovery. Therefore, recovery locations should be considered in determining where it is advisable to store water. To the extent possible, water storage should occur in the same aquifer from which recovery will occur.

PERMITS REQUIRED FOR USE AND/OR CONSTRUCTION OF FACILITIES

Permits Issued Under the Underground Water Storage, Savings and Replenishment Program

- **Underground Storage Facility Permit - ADWR (A.R.S. § 45-811.01)**
Permit is required prior to construction of a "constructed" or direct recharge facility. Water is recharged into the aquifer by percolation or injection wells.
- **Groundwater Savings Facility Permit - ADWR (A.R.S. § 45-812)**
Permit is required prior to operation of a "managed" or in-direct recharge facility. Colorado River water would be delivered to a recipient (referred to as in-lieu water) who agrees to use this renewable surface (in-lieu) water to replace an equivalent amount of groundwater pumping.
- **Water Storage Permit - ADWR (A.R.S. § 45-831.01)**
Allows the permit holder to store water at a facility. The applicant must have a right to use the source water, must ensure that the storage occurs at a permitted facility and must have applied for all necessary water quality permits.

- Recovery Well Permit - ADWR (A.R.S. § 45-834.01)
Permit is required for the withdrawal of recharged water, no matter the location.

Permits Primarily Related to Construction of Facilities

- National Pollution Discharge Elimination System Permit, Sec. 402 of Clean Water Act - EPA / ADEQ (33 U.S.C. § 1251 et.seq.)
Permit required for any private or public entity who discharges pollutants from a point source into navigable waters of the U.S. Would apply to in stream recharge if CAP water would invoke NPDES criteria.
- Section 404 of Clean Water Act (Dredge and Fill) - Corps of Engineers/EPA
A Section 404 permit is required for any project that will result in the discharge of dredged or fill material into navigable streambeds. This provision would pertain to the construction of in stream recharge projects.
- Section 7 of the Endangered Species Act - U.S.F.W.S. (166 U.S.C. §§ 1531 et.seq.)
A biological opinion is required from the U.S. Fish and Wildlife Service regarding the likelihood of any action proposed to be taken by or funded by a federal agency which would jeopardize the continued existence of any endangered species or result in the destruction or modification of the species' critical habitat. The ESA prohibits the taking of an endangered species even absent federal involvement.
- Local Flood Control District Floodplain Use Permit - Local Governments
(A.R.S. § 48-3609) Permit needed for doing virtually any work within the 100 year flood plain as designated by the Arizona Department of Water Resources.
- State Historic Preservation Act - ????????????? (A.R.S. § 41-844)
Permit is needed if project involves the potential disturbance of the surface and/or subsurface of the ground to prevent any prehistoric and/or historic archaeological sites to be disturbed.

revised 8/19/96

b: \criteria.wpd\jgj

**INTER-GOVERNMENTAL AGREEMENT (IGA)
DRAFT OUTLINE**

**ARIZONA WATER BANKING AUTHORITY (AWBA)
ARIZONA DEPARTMENT OF WATER RESOURCES (ADWR)
CENTRAL ARIZONA WATER CONSERVATION DISTRICT (CAWCD)**

CENTRAL ARIZONA WATER CONSERVATION DISTRICT (CAWCD)

Procedures / Time Line for Ordering Water by Authority From CAWCD

Measurement / Reporting of Water Delivery / Water Accounting

Water Service Charges / Financial Accounting

Procedures for Levying 4 Cent Tax

Technical Support - Cost of Services

ARIZONA DEPARTMENT OF WATER RESOURCES (ADWR)

Financial Accounting

Administrative, Legal And Technical Support

Payment for Services (Methods / Time Line)

Office Space / Vehicles / Other Costs

Determination of Credits

ARIZONA WATER BANKING AUTHORITY

Annual Request for Services

Approval of Cost of Services Budgets Submitted by ADWR and CAWCD

Request for Water

Water Storage Annual Report

Phoenix AMA Proposed Underground Storage Facility (USF) Projects, August 15, 1996

Project	(Full/Pilot (Proposed/ In-Process)	TYPE OF FACILITY	LEGAL LOCATION	SUB-BASIN LOCATION	SOURCE WATERS	PROPOSED VOLUME	MAP NUMBER
Proposed Projects Utilizing CAP Water							
CAWCD/Agua Fria	F/Pr	Unknown	Unknown	WSRV	CAP	50,000	20
Scottsdale Water Campus	F/Pr	Constructed Facility (Vadose Zone Injection Wells)	4N 4E Sec 25 SE of SE1/4	ESRV	CAP/Effluent	37,337	11
Peoria/Skunk Creek	F/In	Constructed Facility (Vadose Zone Injection Wells/Infiltration Basins)	3N 1E Sec 2,11	WSRV	CAP/SRP/SW	30,000	27
W. Maricopa Combine	F/In	Managed Facility	3N 5W Sec 1, 11-14 4N 4W Sec 19,20,30,31 4N 5W Sec 25, 36	Hassayampa	CAP	25,000	34
Goodyear	F/In	Constructed Facility (Infiltration Basins)	2N 2W East 1/2 Sec 9 & 16	WSRV	CAP (MWD)	20,000	22
SW Facility Beardsley Terminus	F/Pr	Unknown	Unknown	WSRV	CAP	20,000	32
Surprise/MWD McMicken Dam Extension	F/Pr	Constructed Facility (Infiltration Basins)	4N 2W Sec 34	WSRV	CAP	7,500	13
Del Webb Grande Avenue	F/In	Constructed Facility (Recharge Trenches)	4N 1W Sec 19,20, 29-32 4N 2W Sec 24-26,35,36	WSRV	CAP/SW	4,000	15
Superstition Mtns.	F/In	Managed Facility	1S 8E Sec 8 NW of SE of NW1/4	ESRV	CAP	2,352	33
CAWCD/Queen Creek	F/Pr	Unknown	Unknown	ESRV	CAP	Unknown	35

Proposed Projects Utilizing Effluent

Phoenix/91st Ave. WWTP	F/Pr	Constructed Facility (Infiltration Basins)	Unknown	WSRV	Effluent	141,000	29
Mesa/Queen Creek Wash	F/Pr	Constructed Facility (Infiltration Basins)	Unknown	ESRV	Effluent	47,000	31
Phoenix/23rd Ave. WWTP	F/Pr	Constructed Facility (Infiltration Basins)	Unknown	WSRV	Effluent	35,000	28
Mesa/NWWRP	F/Pr	Constructed Facility (Infiltration Basins)	1N 5E Sec 4 South 1/2	ESRV	Effluent	17,922	7
Phoenix/Cave Creek Project	F/Pr	Unknown	4N 3E Sec 14 NW of NW1/4	ESRV	Effluent	8,961	21
Tempe Kyrene	F/Pr	Constructed Facility (Injection Wells)	1S 4E Sec 10 SE1/4	ESRV	Effluent	6,700	14
Glendale Western Area Recharge	F/Pr	Unknown	Unknown	WSRV	Effluent	6,500	25
Chandler Regional Park	F/Pr	Constructed Facility (Injection Wells) (Pilot in Progress)	2S 5E Sec 10 SE of NE1/4	ESRV	Effluent	5,600	3
Surprise WWTP	F/Pr	Constructed Facility (Infiltration Basin)	3N 1W Sec 22 SW 1/4	WSRV	Effluent	3,360	12
Peoria Beardsley	F/Pr	Constructed Facility (Infiltration Basins)	4N 4E Sec 30 SE of NE of NW1/4	ESRV	Effluent	2,240	23
Pima Utilities/ Sun Lakes	P/Pr	Constructed Facility (Injection Wells)	2S 5E Sec 29	ESRV	Effluent	800	30
Goodyear WWTP	P/Pr	Unknown	Unknown	WSRV	Effluent	336	26
SRP/ASU Mobile In Situ (Grant)	P/Pr	Constructed Facility (Injection Well)	Various	Various	Various	Various	N/A

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Phoenix AMA Permitted Groundwater Savings Facilities (GSF's), August 15, 1996

PERMIT TYPE/NO. (DURATION)	PERMIT HOLDER	PROJECT DESCRIPTION	ASSOCIATED WATER STORAGE PERMIT NO.s AND PERMIT HOLDER	SUB-BASIN LOCATION	SOURCE WATERS	PERMITTED VOLUME	TOTAL WSP VOLUME	CAP VOLUME	EFFLUENT VOLUME
GSF 72-553133 (6/1/98 to 12/31/05)	Salt River Project	Indirect recharge of up to 200,000 acre feet annually of CAP water within the Salt River Project boundaries. TEMPE WSP WILL GO OUT WITHIN 2 WEEKS	73-555520: Glendale 73-557848: Del Webb 73-557419: CAWCD 73-553133.2 Peoria 73-553133.1 Scottsdale 73-553133.3 Tempe	ESRV	CAP	200,000	310,000	310,000	
GSF 72-545895 (2/23/95 to 12/31/10)	RWCD	Indirect recharge of up to 100,000 acre feet annually of CAP water and effluent through RWCD's water users.	73-547123: Chandler 73-545895.2: Chandler 73-545895.1 CAWCD 73-545895.3 Mesa	ESRV	CAP Effluent	100,000	143,100	140,000	3,100
GSF 72-533859 (1/1/95 to 1/1/22)	City of Tempe	Indirect recharge of up to 85,000 acre feet annually of CAP water at New Magna Irrigation District. Will be converting to a WSP.	73-533859: Tempe	ESRV	CAP	85,000	85,000	85,000	
GSF 72-534888 (4/21/92 to 12/31/95) Note: Permit Expired - Permittee filed for extension	CAWCD	Indirect recharge of up to 40,000 acre feet annually of CAP water at New Magna Irrigation District. Will lose this GSF permit but keep WSP.	73-534888: CAWCD	ESRV	CAP	40,000	40,000	40,000	
GSF 72-558216	MWD	Indirect Recharge of up to 20,000 acre feet annually in 1996 and 40,000 in 1997. Only two years project		WSRV	CAP	30,000			
GSF 72-534550 (7/17/92 to 12/31/95) Note: Permit Expired - Permittee filed for extension.	CAWCD	Indirect recharge of up to 20,000 acre feet annually of CAP water at Queen Creek Irrigation District.	73-534550: CAWCD	ESRV	CAP	20,000	20,000	20,000	
GSF 72-534439.0001 (8/18/98 to 12/31/08)	Tonopah Irrigation District	Indirect recharge of up to 15,000 acre feet annually of CAP water at Tonopah Irrigation District. Project replaces CAWCD GSF 72-534439	73-534439: CAWCD 73-534439.1: Goodyear	Hasseyampa	CAP	15,000	25,000	25,000	
GSF 72-534438 (3/10/92 to 12/31/95) Note: Permit Expired - Permittee filed for extension.	CAWCD	Indirect recharge of up to 5,000 acre feet annually of CAP water at San Tan Irrigation District.	73-534438: CAWCD	ESRV	CAP	5,000	5,000	5,000	
GSF 72-534753 (4/21/92 to 12/31/95) Note: Permit Expired - Permittee filed for extension.	CAWCD	Indirect recharge of up to 3,000 acre feet annually of CAP water at Chandler Heights Citrus Irrigation District.	73-534753: CAWCD	ESRV	CAP	3,000	3,000	3,000	
GSF 72-530370 (10/23/91 to 12/31/24)	Pima Utilities	Indirect recharge of up to 1500 acre feet annually of effluent at Sun Lakes Community Association.	73-530370: Pima Utilities	ESRV	Effluent	1,500	1,500		1,500
GSF 72-534978 (8/20/92 to 12/31/22)	LPSCO	Indirect recharge of up to 840 acre feet annually of effluent at Suncor Farms.	73-534978: LPSCD	WSRV	Effluent	840	840		840

Proposed GSF's					
Applicant	(F)ull/(P)artial/(I)nterposed Process	PROJECT DESCRIPTION	SUB-BASIN LOCATION	SOURCE WATERS	PROPOSED VOLUME
Phoenix/Roosevelt ID	F/Pv	Roosevelt Irrigation District	WSRV	Effluent	20,000

* Data for Select GSF's	ESTIMATED CAPACITY (Minimum)	ESTIMATED CAPACITY (Maximum)	VOLUME USED 1998 (As of Aug)	VOLUME AVAILABLE 1998	VOLUME AVAILABLE 1997 (Minimum)	VOLUME AVAILABLE 1997 (Maximum)
RWCD 72-545895	70,000	100,000	80,000	Unknown	70,000	100,000
SRP 72-553133	75,000	150,000	14,000	30,000	100,000	150,000

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Phoenix AMA Permitted Underground Storage Facilities (USF's) Using Other Source Water, August 15 1996

PERMIT TYPE AND DURATION	PERMIT HOLDER	PROJECT DESCRIPTION	ASSOCIATED WATER STORAGE PERMIT NO'S AND PERMIT HOLDER	TYPE OF FACILITY	LEGAL LOCATION	SUB-BASIN LOCATION	SOURCE WATERS	MAP NUMBER	PERMITTED VOLUME	TOTAL WSP VOLUME	SURFACE WATER VOLUME	EFFLUENT VOLUME
USF 71-518105 (3/31/88 to 3/31/08)	City of Mesa	MWWRP Recharge of up to 8,983 acre feet of effluent annually at the Mesa MW Water Reclamation Plant through recharge basins. The plant and project are located adjacent to the Salt River, East of Price Road.	73-518105 Mesa	Basins	1N SE Sec 18	ESRV	City of Mesa Effluent	7	8,983	8,983		8,983
USF 71-520379 (1/1/85 to 10/18/12)	Town of Gilbert	Recharge of up to 3,314 acre feet annually of effluent from the Gilbert Wastewater Treatment Plant through basins and an injection well located near Warner and McCQueen Roads.	73-520379 Gilbert	Basins, Injection Well	1S SE Sec 12 NW SW	ESRV	Gilbert Effluent	6	3,314	3,314		3,314
USF 71-541455 (3/2/94 to 3/2/14)	City of Chandler	Inlet Project Recharge of up to 3,100 acre feet annually of effluent from the inlet plant through injection wells. The project is located in South Chandler, South of Occobito Road and East of Cooper Road.	73-541423 Chandler	Injection Wells	2S SE Sec 24 SW SE NE	ESRV	Inlet Effluent	2	3,100	3,100		3,100
USF 71-534362 (4/4/93 to 4/14/13)	Del E. Webb	Recharge of up to 3,042 acre feet annually of effluent from the Sun City West wastewater treatment plant into infiltration basins adjacent to the plant. The plant and project are located adjacent to the Agua Fria River, East of 115th Avenue.	73-534362 Del Webb	Basins	4N 1E Sec 30	WSRV	Sun City West Effluent	4	3,042	3,042		3,042
USF 71-546845 (5/2/95 to 5/2/15)	Occobito Management Group	Recharge of up to 2,500 acre feet of effluent from the City of Chandler's Occobito Wastewater Treatment Plant. Recharge occurs through overflow dry-wells. The project is located at the Occobito development in South Chandler. The project receives cost project 71-505527.	73-546844 Occobito	Overflow Dry Wells	2S SE Sec 17 NW & SW Sec 18 NE & SE	ESRV	Chandler/Occobito Effluent	9	2,500	2,500		2,500
USF 71-551762 (4/2/98 to 4/22/98)	City of Tempe	Kyrone Wastewater Treatment Plant. PACT recharge of up to 1,000 acre feet annually of CAP water and recovered effluent from Tempe's double absorption system through injection wells at Tempe's Ran McDonald Golf Course.	73-551761 Tempe	Injection Wells	1S 4E Sec 10 SE	ESRV	Kyrone Effluent	14	1,000	1,000		1,000
USF 71-551877 (1/17/86 to 1/17/86)	City of Surprise	South Wastewater Treatment Plant. PACT infiltration (leasing of up to 313.6 acre feet of effluent over 2 years through a basin. The project is located at the South Surprise Wastewater Treatment Plant.	73-551877 Surprise	Basin	3W 1W Sec 22 SW	WSRV	South Surprise Effluent	12	314	314		314
USF 71-551727 (1/12/96 to 1/12/97)	Del Webb Home Construction	Grand Avenue PACT recharge of 100 acre feet of MWD surface water over one year through trenches. Project is located at the Grand Avenue development site in the City of Surprise.	73-551728 Del Webb Home Construction	Trenches	4N 1W Sec 30 SE SE	WSRV	MWD Surface Water	15	100	100	100	

** Indicates PACT Project

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Phoenix AMA Permitted Underground Storage Facilities (USF's) Using CAP Water, August 15 1996

PERMIT TYPE AND DURATION	PERMIT HOLDER	PROJECT DESCRIPTION	ASSOCIATED WATER STORAGE PERMIT (WSP) NO. s AND PERMIT HOLDER	TYPE OF FACILITY	LEGAL LOCATION	SUB-BASIN LOCATION	SOURCE WATERS	MAP NUMBER	PERMITTED VOLUME	TOTAL WSP VOLUME	CAP VOLUME	SURFACE WATER VOLUME	EFFLUENT VOLUME
USF 71-518371 (12/24/90 to 12/31/90)	Salt River Project	GRUSP: Recharge of up to 200,000 acre feet annually of CAP water. Salt and Verde River water and City of Mesa effluent through in-channel basins in the Salt River just below the CAP interconnect at the Granite Road Dam. To date, only CAP water has been stored at the facility.	73-518371.01: SRP 73-518371.02: SRP 73-518371.03: Mesa 73-518371.04: Chandler 73-518371.05: Gilbert 73-518371.07: Tempe 73-518371.08: CAWCO 73-547304: SRP 73-548228: Chandler 73-548229: SRP 73-550053: Tempe	In Channel Basins	2N 4E Sec 13, 14, 21, 22, 23, 24, 27, 28, 29, 30	ESRV	CAP, Salt and Verde, City of Mesa Effluent	5	200,000	ERR	461,235	770,438	
USF 71-540417 (12/31/95 to 12/31/97)	City of Avondale	Wetlands: Recharge of up to 10,000 acre feet annually of CAP water through infiltration basins after undergoing treatment in constructed wetlands. The project is sited in the canal-right-of-way/riparian ecotone. The project is located adjacent to the Agua Fria River, just North of McDowell Road	73-540417: Avondale	Basins after Wetlands Treatment	1N 1W Sec 1, 2 2N 1W Sec 35, 36	WSRV	CAP	1	5,000	5,000			
USF 71-545917 (5/22/95 to 12/31/97)	City of Scottsdale	East Pima Site: Recharge of up to 5,000 acre feet annually of CAP water through vadose zone injection wells. The project is located in North Scottsdale, North of Union Hills Drive and East of Pima Road.	73-545918: Scottsdale	Vadose Zone Injection Wells	4N 5E Sec 30 SE SE SE	ESRV	CAP	11	5,000	ERR	5,000		
USF 71-545915 (3/94 to 3/96)	City of Scottsdale	Water Cabinet: Pilot recharge of up to 5,000 acre feet annually of CAP water through vadose zone injection wells. The project is located in North Scottsdale, North of Union Hills Drive and West of Pima Road	73-545916: Scottsdale	Vadose Zone Injection Wells	4N 4E Sec 25 SE SE	ESRV	CAP	11	5,000	ERR	5,000		
USF 71-552711 (3/21/96 to 3/21/98)	City of Surprise	McMullen Dam: Pilot infiltration basins of up to 2,000 acre feet of CAP water over 2 years on the North side of the McMullen Dam.	73-553178: Surprise	Basin	4N 2W Sec 34	WSRV	CAP	13	2,000	ERR			
USF 71-525755 (9/22/93 to 9/20/95)	City of Mesa	Sook Hill: Infiltration of 2,000 acre feet annually of CAP water through a multi-purposed site at the City Park. The pens and facility are located in the Southwest corner of Red Mountain District Park in East Mesa.	73-525755: Mesa	Multi Purpose Land/Vadose Zone Injection Wells	1N 7E Sec 18 NE	ESRV	CAP	8	2,000	ERR	2,000		
USF 71-520487 (3/8/98 to 12/31/98)	City of Phoenix	Recharge of up to 800 acre feet annually through injection wells located at 4th Avenue and Greenway. This project was approved but experienced operational problems in its early stages. Construction has been discontinued.	73-520487: Phoenix	Injection Wells	3N 2E Sec 10 SW SE NW	WSRV	CAP	10	800	ERR	800		
USF 71-555251 (8/17/96 to 6/1/98)	City of Chandler	Chandler Regional Park: Pilot recharge of up to 250 acre feet of CAP water from Chandler's potable system annually. Recharge occurs through vadose zone wells.	73-555252: Chandler	Vadose Zone Injection Wells	2S 5E Sec 10 SE NE	ESRV	CAP	3	250	ERR			

** Indicates Pilot Projects

Data for GRUSP (71-518371)			
Volume recharged 1996	Volume Available 1996	Volume Available 1997 (Maximum)	Volume Available 1997 (Maximum)
60,000	30,000	100,000	120,000

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IX. IDENTIFICATION OF POSSIBLE RECHARGE SITES AND SELECTION CRITERIA

A subcommittee was established to identify the sites that merited further investigation. At the first meeting, subcommittee members: 1) completed a list of sites to be evaluated; 2) conducted an initial screening to eliminate from further consideration those sites considered to be unfavorable for implementation of recharge within the next 5 years; 3) reviewed general and specific criteria to be used for evaluation of the remaining possible recharge sites; and 4) agreed on assignments whereby each subcommittee member would evaluate the possible recharge sites based on one or more general criteria in accordance with that member's particular expertise. Results would then be integrated to obtain overall ratings.

A total of 35 potential recharge sites were initially evaluated for implementation of recharge to maximize the volume of recharge in the next five years while maximizing long-term benefits. CAP water was the source water considered in each case. Recharge outside the Tucson AMA was considered as an option for maximizing recharge opportunities in the near-term while providing potential long-term benefits to the Tucson AMA. These benefits would be gained via recovery of the water or through water exchanges with entities outside the Tucson AMA and subsequent conveyance of the water to the Tucson AMA via the CAP canal system. No specific site is recommended, but several are possibilities. The remaining 34 recharge sites that were considered are located in the Tucson AMA.

Seven existing or possible groundwater savings projects were evaluated along with direct recharge projects because both types of projects can assist in maximizing volume of recharge in the near-term while maximizing long-term benefits. Two of the seven groundwater savings projects (Cortaro-Marana Irrigation District (CMID) and with BKW Farms), are permitted and operating, and were included in the evaluation because continuation of recharge at these sites is important for meeting near-term and long-term recharge objectives.

The remaining 27 recharge projects considered are direct recharge projects. One of the direct recharge sites is the Central Wellfield, where recharge by well injection using treated CAP water was discontinued in 1994, and could only be continued if the water is treated to standards required under Proposition 200. The remaining 26 recharge sites are surface recharge sites. Two of the surface recharge sites, the Pima Mine Road Pilot Recharge project and the Avra Valley Pilot Recharge project, are presently in the permitting stage and are already planned to be implemented. These sites were included in the evaluation because recharge has not yet started.

Need for Further Information

The subcommittee identified major information needs or unknowns that impact the ability to assess feasibility of implementing recharge programs within the next 2 to 3 years. Information needs that were identified can be classified into the following categories: 1) hydrogeologic data to assess long-term recharge rate, 2) opportunities and constraints for use of existing water conveyance and storage facilities, and 3) regulatory constraints. Hydrogeologic data needs include site-specific lithologic and infiltration test data for surficial soils, and site-specific lithologic and stratigraphic data for the vadose zone. Additional information

is required to assess the potential opportunities and costs for use of existing potable and reclaimed water conveyance and storage facilities, and possibly stormwater conveyance facilities, to deliver water to possible recharge sites in the Tucson metropolitan area.

Additional information is also required to assess constraints and potential costs associated with meeting U.S. Department of Fish and Wildlife requirements under the Endangered Species Act, Section 7, regarding introduction of nonnative aquatic species in the Santa Cruz River basin.

ADDITIONAL REFERENCES

1. Memorandum to Mr. Sam F. Spiller from Dennis E. Schroeder, dated June 3, 1994, regarding: Biological Assessment (BA) of possible impacts to federally-listed endangered species for the Central Arizona Project (CAP) due to the transfer of nonnative fish, submitted by Eric Holler.
2. Memorandum to Area Manager, Bureau of Reclamation, Phoenix, Arizona, from State Supervisor, regarding: Endangered Species Act, Section 7, consultation on the Central Arizona Project in the Santa Cruz River Basin, from State Supervisor, to Area Manager, Bureau of Reclamation, Phoenix, Arizona, dated December 6, 1994, submitted by Eric Holler.
3. Memorandum to State Supervisor, Arizona Ecological Services, Fish and Wildlife Service, Phoenix, Arizona, from Dennis E. Schroeder, dated June 9, 1995, regarding: Addendum to the Biological Assessment (BA) on transport of nonnative fishes into the Santa Cruz River Basin by the Central Arizona Project (CAP) Aqueduct, submitted by Eric Holler.

X. RECHARGE FACILITY DESCRIPTIONS
RRC SITES COST SUMMARY*
 (Assuming 20 year amortization)

SITE NO.	SITE NAME	ANNUAL RECHARGE VOLUME AF	CAPITAL COST	RECHARGE UNIT COST S/AF		RECOVERY UNIT COST S/AF		TOTAL UNIT COST S/AF
				CAP	O&M	CAP	O&M	
1	Lower Santa Cruz River	30,000	\$4,975,150 ¹	\$16.90	\$6.35	\$37.00	\$8.50	\$68.75
2	Canada Del Oro Recharge & Recovery	25,000	\$18,217,800 ²	\$74.20	\$26.10 min. \$98.25 max.	Assume Use of Existing Wells	Not Yet Estimated	
3	Avra Valley Pilot Recharge Project	4,000	\$292,430	\$7.45	\$28.75	\$37.00	\$8.50	\$81.70
4	Pima Mine Road Basins	23,000	\$16,722,270 ³	\$74.05	\$2.20		No Recovery	\$76.25
5	Central Avra Valley Storage & Recovery	60,000	Recharge: \$8,687,440 Recovery: \$51,527,890	\$14.75	\$2.85	\$87.45	\$24.00	\$129.05
6	South Avra Valley Basins	43,800	\$27,131,280	\$63.10	\$7.70	Assume Use of Existing Wells	Not Yet Estimated	
7	West of CAP @ Tangerine Road	50,000	\$6,874,590 ¹	\$14.05	\$4.30	Not Determined	Not Yet Estimated	
8	San Xavier Arroyos	9,000	\$290,420	\$3.30	\$6.10	No Recovery	No Recovery	\$9.40
9	Santa Cruz River @ San Xavier	8,500	\$448,500	\$5.35	\$4.70	No Recovery	No Recovery	\$10.05
10	Pantano, TanqueVerde & Rillito Rivers	17,000	\$4,744,000	\$28.40		Assume Use of Existing Wells	Not Yet Estimated	
11	Brawley Wash @ Three Points	40,000	\$22,114,880	\$56.30	\$2.25	Assume Use of Existing Wells	Not Yet Estimated	

FINAL DRAFT

SITE NO.	SITE NAME	ANNUAL RECHARGE VOLUME AF	CAPITAL COST	RECHARGE UNIT COST S/AF		RECOVERY UNIT COST S/AF		TOTAL UNIT COST S/AF
				CAP	O&M	CAP	O&M	
12	Cortaro Marana Irrigation District Expansion	6,000 (In-lieu)	\$120,000	\$2.05	\$0.70	N/A	N/A	\$2.75
13	BKW Farms Expansion	6,200 (In-lieu)	\$75,000	\$1.25	\$2.35	N/A	N/A	\$5.60
14	Avra Valley Irrigation District	19,800 (In-lieu)	\$3,361,800	\$17.30	\$4.05	N/A	N/A	\$21.35
15	FICO-Sahuarita Farms	20,000 (In-lieu)	\$6,686,750	\$34.05	\$21.40	N/A	N/A	\$55.45
16	ASARCO-Mission Mine	13,000 (In-lieu)	\$981,500**	\$7.70	\$12.00	N/A	N/A	\$19.70**

* The purchase cost of CAP water has not been included in the estimates for any of the potential sites. Permitting costs have not been included.

** The costs for water quality monitoring and/or treatment by the mines to compensate for variable quality and reliability of CAP water are included.

N/A=Not applicable to in-lieu projects.

¹ Includes land acquisitions @ \$3,000/acre

² Includes land acquisitions @ \$10,000/acre

³ Includes land acquisitions @ \$9,000/acre

RECHARGE FACILITY DESCRIPTION & BASIC ASSUMPTIONS

Preliminary information based on conceptual project design and cost estimates.

RRC SITE NO. 1

FACILITY NAME: LOWER SANTA CRUZ FLOOD CONTROL AND REPLENISHMENT PROJECT

<p>FACILITY DESCRIPTION</p>	<p>This project is one element of the Northwest Tucson Active Management Area Replenishment Program (NW TAMA RP) whose primary sponsors include the Pima County Flood Control District, the Metropolitan Domestic Water Improvement District, the Towns of Marana and Oro Valley, the U.S. Bureau of Reclamation, the Central Arizona Project, and the Arizona Department of Water Resources. The initial phase of the project consists of approximately 82 acres of spreading basins recharging about 30,000 AF/yr of CAP water. A later phase may involve spreading basins and approximately eight miles of managed recharge in the Santa Cruz River bed recharging about 14,400 AF/yr. The materials excavated for the spreading basins will be used to construct the Marana flood control levee. The recharge basins would be located in the south overbank floodplain of the Santa Cruz River, in sections 2, 3 and 4 of T12S, R11E. The site for the recharge basins is southeast and upstream of the "ox-bow" segment of the Lower Santa Cruz River, and is adjacent to the site of the Avra Valley Pilot Recharge Project (AVPRP) which is also part of the NW TAMA RP.</p>
<p>BASIC ASSUMPTIONS</p>	<p>A 42" pipeline conveyance will be constructed from the CAP canal to the site of the spreading basins. Pima County Flood Control District will acquire the site and construct basins in 1997.</p>

<p>TECHNICAL CRITERIA</p>	<p>RRC SITE NO. 1 DESCRIPTION/DATA/ASSUMPTION</p>
<p>1. INFILTRATION RATE (FT/DAY)</p>	<p>CAP Recharge Basins: 0.4 to 150 ft/day measured; 2 ft/day for planning purposes.</p>
<p>2. VOLUME OF POTENTIALLY RECOVERABLE WATER IN VADOSE ZONE BELOW RECHARGE FACILITY (AF)</p>	<p>250 ft x 90 acres x 0.15 = 3375 AF. However, it is expected that recharged water would also move laterally.</p>
<p>3. DEPTH TO GW (FT)</p>	<p>250 to 300 ft</p>
<p>4. TOTAL HISTORICAL GWL DECLINE (FT)</p>	<p>-100 ft between 1952 and 1981; + 45 ft between 1977 and 1994</p>

TECHNICAL CRITERIA	RRC SITE NO. 1 DESCRIPTION/DATA/ASSUMPTION
5. POTENTIAL TO ALLEVIATE SUBSIDENCE	Yes, but minimal subsidence is predicted.
<p>6. GW QUALITY IMPACTS</p> <p>A. AMBIENT WATER QUALITY</p> <p>B. POTENTIAL TO DEGRADE NATIVE GW</p> <p>C. POTENTIAL SOURCES OF CONTAMINATION (LANDFILLS, EXISTING PLUMES, TDS IMPACTS, ETC.)</p> <p>D. MIGRATION OR CONTAINMENT OF CONTAMINANT PLUMES</p>	<p>A. Ambient GW: TDS = 418 - 501 ppm; nitrate (N) = 2.28 - 17.0 ppm; sulfate = 84 ppm; TOC = 0.2 ppm.</p> <p>B. CAP water: ave. TDS = 576 ppm; ave. nitrate = 0.13 ppm; ave. sulfate = 241 ppm; ave. TOC = 4.5 ppm. CAP appears on average to be higher in TDS, TOC and sulfate and lower in nitrate than ambient groundwater. Recharging CAP water will probably increase the TDS and sulfate levels and may increase the TOC level in groundwater, depending upon how much TOC is removed through the recharge process. Recharging CAP water may dilute the nitrate in groundwater, however, if nitrate is present at high concentrations in the vadose zone, it could be flushed into the aquifer by the recharge water, causing groundwater nitrate levels to rise temporarily. Soil column tests are underway to examine potential reactions.</p> <p>C. Tangerine Road & Marana #2 landfills are monitored, located upgradient and are not likely to be sources of contamination of water recharged by this project. Marana #1 waste is being evaluated, however it is not a likely source of contamination.</p> <p>D. No known plumes. No exceedances of aquifer stds for VOCS or pesticides at landfill monitoring wells. The site has not been previously farmed.</p>
7. OTHER TECHNICAL ISSUES (TRANSMISSIVITY OF AQUIFER, IMPERMEABLE LAYERS IN VADOSE ZONE, SURFACE ELEVATION OF FACILITY (MSL), ETC.)	<p>Transmissivity estimate of 13,000 ft²/day (Whallon, 1983); Impeding layer in vadose at 100 feet bls has K_{sat} of 10⁻² to 10⁻⁴ ft/day but does not appear to be continuous. Additional data will be available soon because of on-going ADWR-funded studies and groundwater investigations at the AVPRP.</p>
8. ESTIMATED ANNUAL RECHARGE VOLUME	30,000 AF/yr

ECONOMIC FACTORS	RRC SITE NO. 1 DESCRIPTION/DATA/ASSUMPTION
<p>1. CAPITAL COSTS</p> <p>A. DESCRIBE CONVEYANCE SYSTEM COMPONENTS (PIPES (CAPACITY/DIAMETER), PUMPS (CAPACITY, HEAD, BHP), SPECIAL CONSTRUCTION CONSTRAINTS)</p> <p>B. DESCRIBE RECHARGE FACILITY COMPONENTS (EARTHWORK, LENGTH OF REACH/AREA OF BASINS, ON-SITE CONSTRUCTION, PIPING & CONTROL SYSTEM, OTHER)</p>	<p>1. Capital costs (basins) = \$4,975,153. Annual cost for 20 yrs @ 8% = \$506,738 or \$16.89/AF</p> <p>A. Pump station w/55.25 cfs @ 270.65 BHP capacity and turnout at the CAP canal; 800 lf of 42" Transmission line; 5000 lf of 44" and 5000 lf of 34" lined ditch.</p> <p>B. Excavation of basins & channels = 1,387,500 cy. Assume 50% of excavation costs are paid by the P.C. Flood Control District for construction of Marana levee; land acquisition = 90 acres @ \$3,000/acre; fencing and 3 monitoring wells with monitoring equipment.</p>
<p>2. AVERAGE ANNUAL O&M COSTS (ENERGY, CONVEYANCE SYSTEM MAINTENANCE, RECHARGE SYSTEM MAINTENANCE)</p>	<p>Annual O&M costs = \$191,122 /yr, or \$6.37/AF, including costs of groundwater monitoring, vegetation and erosion control, conveyance system maintenance, and electrical power.</p> <p>Total annual cost for CAP recharge = \$16.89 + \$6.37 = \$23.26/AF</p>
<p>3. LAND & RIGHT OF WAY ACQUISITION (AVAILABILITY, OWNERSHIP, COST, ACRES REQUIRED, LAND USE COMPATIBILITY, PRIOR LAND USE)</p>	<p>Private and state - discussions ongoing between PCFCD, SLD and BKW;</p> <p>Present land use is grazing;</p> <p>Approximately 90 acres will have to be acquired by purchase or lease.</p>
<p>4. ENVIRONMENTAL CONSTRAINTS (ARCHEOLOGICAL, AESTHETIC, HABITAT-RELATED, FLOODING POTENTIAL, OTHER)</p>	<p>In the 100-year floodplain of Lower Santa Cruz River, near Avra Valley airport; archaeologic surveys to be completed in June 1996. Section 7 issues may be shortly resolved by Bureau of Reclamation and U.S. Fish & Wildlife.</p>

ECONOMIC FACTORS	RRC SITE NO. 1 DESCRIPTION/DATA/ASSUMPTION
5. REGULATORY CONSIDERATIONS (ADWR, ADEQ, PCFCD, FEMA, COE, F&WL, SAWRSA, ETC.)	Permits needed; ADWR Facility and storage permits ADEQ 401 permit Town of Marana floodplain use permit Section 7 if BOR is involved in CAP environmental enhancement No Section 404 is needed.
6. RECOVERY ASSUMPTIONS (LOCATION OF RECOVERY SYSTEM, DEPTH TO GWL, TRANSMISSIVITY OF AQUIFER, POTENTIAL USE OF EXISTING WELLS & PIPELINES, REQUIREMENT FOR TREATMENT, ETC.)	Recovery using 800-ft. deep wells within 1 mi. radius. Assumed capital cost = \$8.50/AF (includes well & pipeline costs); Assumed energy cost for recovery = \$37/AF; assume any treatment occurs at POU or at Tucson treatment facility. Total annual cost for recovery = \$45.50/AF.
7. TIME REQUIRED TO IMPLEMENT (PERMITS, DESIGN, CONSTRUCTION, ETC.)	1997 Construction of basins, permitting. 1998 Operation of 1st phase recharge. 1999 Continued expansion of recharge.

EXTENT OF REGIONAL BENEFITS	RRC SITE NO. 1 DESCRIPTION/DATA/ASSUMPTION		
1. MULTIPLE USERS OF CONVEYANCE, RECHARGE, AND/OR RECOVERY FACILITIES	Marana, MDWID and CAWCD have expressed interest in potential use of the facilities.		
2. RECHARGE OBJECTIVES THAT CAN BE MET BY THIS FACILITY	<u>OBJECTIVE</u>	<u>YES</u>	<u>NO</u>
	• RECOVERY FOR POTABLE USE	X	
	• FOR NON-POTABLE USE	X	
	• ANNUAL STORAGE/RECOVERY	X	
	• LONG-TERM STORAGE, RECOVERY @ SAME LOCATION	X	
	• SHORT-TERM STORAGE, RECOVERY @SAME LOCATION	X	
	• SHORT-TERM STORAGE, RECOVERY @DIFFERENT LOCATION	X	
	• RECHARGE/NO RECOVERY	X	
	• CAWCD RELIABILITY STORAGE	X	
	• WATER PROVIDER RELIABILITY STORAGE	X	
	• ASSURED WATER SUPPLY RECHARGE	X	
	• RIPARIAN ENHANCEMENT	X	
	• SUBSIDENCE CONTROL	X	
	• CONTAIN/MANAGE POOR QUALITY GROUNDWATER	X	
• STATE WATER BANK	X		
• SAWRSA CLAIMS SETTLEMENT		X	
3. RECREATIONAL USES	Trail use - De Anza National Historic Trail and Pima County regional trail system; bird watching, hiking, biking.		

EXTENT OF REGIONAL BENEFITS	RRC SITE NO. 1 DESCRIPTION/DATA/ASSUMPTION
4. ENVIRONMENTAL BENEFITS	<p>It is anticipated that the CAP recharge basins would be constructed in such a way as to provide additional wildlife benefits.</p> <p>The High Plains Effluent Recharge Project, also an element of the NW TAMA Replenishment Program, was approved for an Arizona Water Protection Fund Grant, and Highplains Ground Water Recharge funding. This project integrates riparian protection and enhancement with operation of the Lower Santa Cruz River Replenishment Project.</p>

CURRENT STATUS	RRC SITE NO. 1 DESCRIPTION/DATA/ASSUMPTION
1. SITE EVALUATION	Yes - ongoing by PCFCD.
2. BOREHOLES/TEST-PITS	Yes - completed.
3. EXISTING OR PROPOSED FUNDING (\$,SOURCES)	Yes - PCFCD will construct basins as part of levee project.
4. PILOT PERMIT APPLIED FOR/ISSUED	None, permit for full-scale CAP project to be submitted.
5. FINAL STORAGE FACILITY PERMIT ISSUED	Could be issued by 1997.
6. OTHER PERMITS APPLIED FOR/ISSUED	None.

RECHARGE FACILITY DESCRIPTION & BASIC ASSUMPTIONS

Preliminary information based on conceptual project design and cost estimates.

RRC SITE NO. 2

FACILITY NAME: CDO RECHARGE AND RECOVERY PROJECT

<p>FACILITY DESCRIPTION</p>	<p>The Cañada Del Oro Recharge and Recovery Project would artificially recharge untreated CAP water by using spreading basins and managed in-channel recharge. This project is one element of the Northwest Tucson Active Management Area Replenishment Program (NW TAMA RP), whose sponsors include Pima County, the Metropolitan Domestic Water Improvement District (MDWID), the towns of Marana and Oro Valley, The U.S. Bureau of Reclamation, and the Arizona Department of Water Resources. CAP water would be pumped from approximately Tangerine Road and I-10 to a reservoir at the 2800 ft elevation near Tangerine and La Cañada Boulevard. Water would then be diverted from the reservoir to two recharge areas and for direct use by golf courses. Two smaller diameter pipelines would deliver water by gravity to spreading basins at La Cañada Boulevard/CDO and Tangerine Road/Big Wash. Electrical energy would be generated from the La Cañada Boulevard pipeline by a turbine to recover energy costs associated with boosting CAP water from the reservoir through a pipeline to Rancho Vistoso golf courses. Minor acreage purchase would be required for the basins located at the Big Wash recharge area, the reservoir site and right-of-way for the pipeline. Pima County owns the land at the proposed Oasis recharge site. The actual pipeline alignments, spreading basin sizes and length of reach of in-channel recharge have not yet been determined.</p> <p>An alternative pipeline route to Linda Vista Road could be selected if the feasibility assessment and participants are mutually supportive.</p>
<p>BASIC ASSUMPTIONS</p>	<p>Water treatment costs are minimal at recovery wells. Project will be constructed through funds by water providers and state/federal government. Postage-stamp rates used for O & M pumping lift costs to the 2800 ft contour. Electricity generated from gravity flow is used to balance energy costs to lift water to golf courses.</p> <p>CDO in-channel Recharge: reach 1(north of Linda Vista)=6.1mi x 2200 AF/yr/mi =13,420 AF/yr reach 2(south of “ ”)=0.5 mi x 2700 AF/yr/mi = 1,350 AF/yr Big Wash basin recharge = 4 ac x 8 ft/d x 182.5 d/yr = 5,840 AF/yr Oasis basin recharge = 2 ac x 3 ft/d x 182.5 d/yr = 1,095 AF/yr Total recharge 21,705 AF/yr Say 25,000 AF/yr</p>

TECHNICAL CRITERIA	RRC SITE NO. 2 DESCRIPTION/DATA/ASSUMPTION									
1. INFILTRATION RATE (FT/DAY)	Long-term estimates from Dames & Moore (1996) collected on CDO/Big Wash Big Wash 8 feet/day CDO Wash 8 feet/day Oasis Site 3 feet/day									
2. VOLUME OF POTENTIALLY RECOVERABLE WATER IN VADOSE ZONE BELOW RECHARGE FACILITY (AF)	89,620 AF Used Table 5-5 in Tucson Water Recharge Feasibility Report (1989) with updated estimates for Reach 2 using current depth-to-water data collected by Metro Water District (1996). Reach 2 in Table 5-5 had an average depth to groundwater of 93 feet and total potential recoverable groundwater of 10,000 AF/mi. Recent measurements have shown the average to be 188 feet, so the amount of recoverable groundwater would be 18,200 AF/mi x 0.5 mi = 9,100 AF for reach 2, plus 13,200 AF/mi x 6.1 mi = 80,520 AF for Reach 1.									
3. DEPTH TO GW (FT)	<table border="0"> <tr> <td colspan="2"><u>Reach</u></td> <td><u>Average Depth-to-water</u></td> </tr> <tr> <td>1</td> <td></td> <td>136 feet</td> </tr> <tr> <td>2</td> <td></td> <td>188 feet</td> </tr> </table> <p>Data source for Reach 2 is current depth-to-water collected by Metro Water District (1996)</p>	<u>Reach</u>		<u>Average Depth-to-water</u>	1		136 feet	2		188 feet
<u>Reach</u>		<u>Average Depth-to-water</u>								
1		136 feet								
2		188 feet								
4. TOTAL HISTORICAL GWL DECLINE (FT)	60 - 70 feet (or 1 foot/year) Information with Hydrogeologic Report for Metro Water District Assured Water Supply by Errol L. Montgomery & Associates (1995)									
5. POTENTIAL TO ALLEVIATE SUBSIDENCE	Yes, groundwater is being mined because pumpage exceeds natural recharge and pumpage is expected to increase to meet future urban development.									

TECHNICAL CRITERIA	RRC SITE NO. 2 DESCRIPTION/DATA/ASSUMPTION
<p>6. GW QUALITY IMPACTS</p> <p>A. AMBIENT WATER QUALITY</p> <p>B. POTENTIAL TO DEGRADE NATIVE GW</p> <p>C. POTENTIAL SOURCES OF CONTAMINATION (LANDFILLS, EXISTING PLUMES, TDS IMPACTS, ETC.)</p> <p>D. MIGRATION OR CONTAINMENT OF CONTAMINANT PLUMES</p>	<p>A. Ambient groundwater: TDS = 98 - 204 mg/l; nitrate (N) = 0.02 - 3.0 mg/l; sulfate = 3.6 - 14.9 mg/l; TOC data not yet available.</p> <p>B. Yes, increases in TDS and hardness, potential THM formation.</p> <p>C. None, PAG Water Quality State of the Region Report (1994), PAG Draft Landfill Map (1996), PAG/Metro Wellhead Vulnerability Report (1995) and Figure 2 in City of Tucson Assessment of Cap Water Recharge Alternatives (1996).</p> <p>D. None, unless recharge occurs in Reach 2 and storage is less than recovery. Same data sources in B above.</p>
<p>7. OTHER TECHNICAL ISSUES (TRANSMISSIVITY OF AQUIFER, IMPERMEABLE LAYERS IN VADOSE ZONE, SURFACE ELEVATION OF FACILITY (MSL), ETC.)</p>	<p>Transmissivity of aquifer varies between 45,000 to 50,000 gpd/ft along the Big Wash and CDO. Data from aquifer tests conducted by Errol L. Montgomery & Associates for Rancho Vistoso Water Company and Metro Water District. Transmissivity values for the unsaturated portion of the Fort Lowell Formation is unknown. It is anticipated that modeling studies by Errol L. Montgomery & Associates for Pima County Flood Control District through an augmentation grant with ADWR will provide some estimates. The Task 3 report for this investigation found no significant impermeable layers in the vadose zone except at the confluence of the Big Wash and CDO Wash.</p> <p>Elevation of pump intake at CAP aqueduct is 2040 feet and elevation of delivery point is 2800 feet.</p> <p>A pilot recharge basin test using groundwater as the source water will be needed at both the Big Wash and La Cañada/CDO site.</p>
<p>8. ESTIMATED ANNUAL RECHARGE VOLUME</p>	<p>25,000 AF/year.</p>

ECONOMIC FACTORS	RRC SITE NO. 2 DESCRIPTION/DATA/ASSUMPTION
<p>1. CAPITAL COSTS</p> <p>A. DESCRIBE CONVEYANCE SYSTEM COMPONENTS (PIPES (CAPACITY/DIAMETER), PUMPS (CAPACITY, HEAD, BHP), SPECIAL CONSTRUCTION CONSTRAINTS)</p> <p>B. DESCRIBE RECHARGE FACILITY COMPONENTS (EARTHWORK, LENGTH OF REACH/AREA OF BASINS, ON-SITE CONSTRUCTION, PIPING & CONTROL SYSTEM, OTHER)</p>	<p>1. Capital costs = \$18,217,795. Annual costs for 20 yrs@ 8% = \$1,855,550 or \$74.22/AF</p> <p>A. 50,795 lf of 36 inch pressurized pipeline with a capacity of 46.0 cfs (25,000 AF/year, pumping 18 hrs/day) from Tangerine Road/I-10 to a reservoir at Tangerine Road/La Cañada Boulevard; 18,760 lf of 30" pipe to Big Wash; 14,400 lf of 16" to CDO Wash); and two pump stations pumping 46 cfs @ 3020 BHP. Also, an electrical recovery system would be installed at the PRV at the end of the pipeline to CDO Wash, and 2.5 miles of small diameter pipeline with a booster station at the reservoir would provide untreated CAP water to the Rancho Vistoso golf courses. The two fixed speed, 3020 hp pump stations are needed to lift the water for a total head of 927 feet. The first station would be at the CAP turnout facility with an intake level of 2040 feet. Earthwork for pipeline is assumed to fall between urban and rural cost per linear foot. It is assumed two crossings of Tangerine Road would be needed, one to the reservoir and one leaving the reservoir to the golf courses and Big Wash.</p> <p>B. Four acres of basins needed at Big Wash, plus 2 acres for buffer and control facilities. Two acres of basins required at CDO Wash, plus one acre for control facilities. Five monitor wells with equipment; and flow measuring devices at the basins. Bulldozer or backhoe plus an operator to reconstruct in-channel berms as needed after large storm events to promote spreading CAP water for infiltrating in area of need. No recovery facilities needed because of use of existing wells.</p> <p>Possible treatment system at wells to control pH. Disinfection already in place at Metro Water District wells.</p>
<p>2. AVERAGE ANNUAL O&M COSTS (ENERGY, CONVEYANCE SYSTEM MAINTENANCE, RECHARGE SYSTEM MAINTENANCE)</p>	<p>O & M costs = \$2,455,970 /yr, or \$98.24/AF. If CA WCD approves postage-stamp costs to lift water to 2800 feet, O & M costs = \$652,594, or \$26.10/AF. Maintenance required for pump station, pipelines, reservoir, recharge basins and in-channel berms.</p> <p>Total recharge annual costs: minimum = \$74.22 + \$26.10 = \$100.32 maximum = \$74.22 + \$98.24 = \$172.46</p>

ECONOMIC FACTORS	RRC SITE NO. 2 DESCRIPTION/DATA/ASSUMPTION
3. LAND & RIGHT OF WAY ACQUISITION (AVAILABILITY, OWNERSHIP, COST, ACRES REQUIRED, LAND USE COMPATIBILITY, PRIOR LAND USE)	Stream reach and Oasis site owned by Pima County. Assumes no fee because project would provide recreational and environmental enhancement opportunities. Five acres needed for reservoir and booster station. Six acres of recharge basins, plus an additional 3 acres for control facilities. Seventeen acres of right-of-way acquisition (35 foot width).
4. ENVIRONMENTAL CONSTRAINTS (ARCHEOLOGICAL, AESTHETIC, HABITAT-RELATED, FLOODING POTENTIAL, OTHER)	Archeological to be investigated in 1996. WLB Group (1996) found that the increase in flooding potential is minimal by constructing project. No landfills or superfund sites. Section 7 issues may be shortly resolved by Bureau of Reclamation and U.S. Fish & Wildlife.
5. REGULATORY CONSIDERATIONS (ADWR, ADEQ, PCFCD, FEMA, COE, F&WL, SAWRSA, ETC.)	Section 7 - U.S. Fish & Wildlife ADEQ interpretation of Surface Water Treatment Rule 404 permit from Army Corps of Engineers Full scale recharge and storage permits from ADWR
6. RECOVERY ASSUMPTIONS (LOCATION OF RECOVERY SYSTEM, DEPTH TO GWL, TRANSMISSIVITY OF AQUIFER, POTENTIAL USE OF EXISTING WELLS & PIPELINES, REQUIREMENT FOR TREATMENT, ETC.)	Use existing wellfields as recovery wells due to close proximity to recharge area. This provides the benefit of no additional capital costs because wells are within AOHI. As depth to water rises, pumping costs would decrease or remain constant. Rapid water quality changes in TDS, hardness and sodium could create negative public reaction depending on the quickness of recharge water being intercepted by the recovery wells. Disinfection would be needed at Rancho Vistoso and Cañada Hills wells. Metro Water District wells already are equipped with wellhead disinfection. The water companies may also need to install treatment systems to control the pH of the recovered water to avoid corrosion problems. It is uncertain if additional treatment will be required by the Surface Water Treatment Rule.
7. TIME REQUIRED TO IMPLEMENT (PERMITS, DESIGN, CONSTRUCTION, ETC.)	3 - 5 years total: 1 - 2 years for permits/pilot project 1 year for design 1 - 2 years for construction

EXTENT OF REGIONAL BENEFITS	RRC SITE NO. 2 DESCRIPTION/DATA/ASSUMPTION		
1. MULTIPLE USERS OF CONVEYANCE, RECHARGE, AND/OR RECOVERY FACILITIES	<p>Town of Marana, Town of Oro Valley (Cañada Hills and Rancho Vistoso Water Companies) and Metro Water District. There is a short term opportunity within the first 20 years for the State Water Bank or CAWCD to utilize the excess capacity.</p> <p>Water providers desire to use project as a regional solution to satisfy ADWR's 100 year assured water supply requirements.</p>		
2. RECHARGE OBJECTIVES THAT CAN BE MET BY THIS FACILITY	<u>OBJECTIVE</u>	<u>YES</u>	<u>NO</u>
	• RECOVERY FOR POTABLE USE	X	
	• FOR NON-POTABLE USE (Golf Courses)	X	
	• ANNUAL STORAGE/RECOVERY	X	
	• LONG-TERM STORAGE, RECOVERY @ SAME LOCATION	X	
	• SHORT-TERM STORAGE, RECOVERY @SAME LOCATION	X	
	• SHORT-TERM STORAGE, RECOVERY @DIFFERENT LOCATION	X	
	• RECHARGE/NO RECOVERY	X	
	• CAWCD RELIABILITY STORAGE	X	
	• WATER PROVIDER RELIABILITY STORAGE	X	
	• ASSURED WATER SUPPLY RECHARGE	X	
	• RIPARIAN ENHANCEMENT	X	
	• SUBSIDENCE CONTROL	X	
	• CONTAIN/MANAGE POOR QUALITY GROUNDWATER		X
• STATE WATER BANK (Short term, 20 years)	X		
• SAWRSA CLAIMS SETTLEMENT		X	
3. RECREATIONAL USES	Trails, parks and equestrian uses.		
4. ENVIRONMENTAL BENEFITS	<p>Vegetation enhancement in existing riparian zone; habitat for wildlife; alleviation of potential subsidence; halt groundwater declines; solves long-term drought management concern.</p> <p>Public wants multi-purpose public works projects: water supply, environmental and recreational components.</p>		

FINAL DRAFT

CURRENT STATUS	RRC SITE NO. 2 DESCRIPTION/DATA/ASSUMPTION
1. SITE EVALUATION	Feasibility study in progress, expected completion date FY96-97.
2. BOREHOLES/TEST-PITS	Investigations completed and results highly favorable.
3. EXISTING OR PROPOSED FUNDING (\$,SOURCES)	<p>Current funding sources: Bureau of Reclamation, ADWR, MDWID, Pima County, Oro Valley, and Marana.</p> <p>Proposed additional funding sources: CAWCD and State Water Bank.</p>
4. PILOT PERMIT APPLIED FOR/ISSUED	Pilot project permit not required since pilot operation would use groundwater.
5. FINAL STORAGE FACILITY PERMIT ISSUED	Must wait first for results of feasibility study and pilot project.
6. OTHER PERMITS APPLIED FOR/ISSUED.	Must wait first for results of feasibility study and pilot project.

RECHARGE FACILITY DESCRIPTION & BASIC ASSUMPTIONS

Preliminary information based on conceptual project design and cost estimates.

RRC SITE NO. 3

FACILITY NAME: AVRA VALLEY PILOT RECHARGE PROJECT

FACILITY DESCRIPTION	This project is one element of the Northwest Tucson Active Management Area Replenishment Program (NW TAMA RP) whose primary sponsors include the Metropolitan Domestic Water Improvement District and the Central Arizona Project (CAWCD). Site is a 60 acre state land lease, north of Avra Valley Airport, section 3, T12S, R11E. Pilot project will recharge 4,000 AF/yr for 2 years in 10 acres of infiltration basins utilizing abandoned material borrow pits. Present status: permits obtained, conveyance ditch completed, basin construction ongoing, monitoring well completed, facility should be operational by July, 1996.
BASIC ASSUMPTIONS	Successful pilot project could result in a full scale project lasting 20 years with a recharge rate less than 10,000 AF/yr; max. Facility size at buildout approximately 50 acres of basins; no short term plans for recovery, however recovery is possible during the facility life.

TECHNICAL CRITERIA	RRC SITE NO. 3 DESCRIPTION/DATA/ASSUMPTION
1. INFILTRATION RATE (FT/DAY)	<1 ft/day estimated from infiltrometer data, pilot operation will define the long term rate.
2. VOLUME OF POTENTIALLY RECOVERABLE WATER IN VADOSE ZONE BELOW RECHARGE FACILITY (AF)	1,200 AF directly below facility, assuming 50 acres basins, 240 feet unsaturated material from present water table to within 50 ft of land surface, 0.10 Sy. Recharge water is expected to move laterally and not remain under facility.
3. DEPTH TO GW (FT)	290 ft.
4. TOTAL HISTORICAL GWL DECLINE (FT)	Decline = 100 ft. 1952-1981, rate = 3ft/yr Rise = 45 ft. 1977- 1994, rate = 2.5 ft/yr
5. POTENTIAL TO ALLEVIATE SUBSIDENCE	Subsidence documented northwest of facility, potential exists to slow subsidence since groundwater flow from facility is roughly to the northwest.

TECHNICAL CRITERIA	RRC SITE NO. 3 DESCRIPTION/DATA/ASSUMPTION
<p>6. GW QUALITY IMPACTS</p> <p>A. AMBIENT WATER QUALITY</p> <p>B. POTENTIAL TO DEGRADE NATIVE GW</p> <p>C. POTENTIAL SOURCES OF CONTAMINATION (LANDFILLS, EXISTING PLUMES, TDS IMPACTS, ETC.)</p> <p>D. MIGRATION OR CONTAINMENT OF CONTAMINANT PLUMES</p>	<p>A. Ambient TDS = 500-600 mg/l Ambient nitrate (N) = 7-9 mg/l</p> <p>B. Low potential for groundwater quality degradation, native groundwater is higher in nitrate but lower in TDS than CAP water.</p> <p>C. No documented existing contamination, Tangerine landfill is located 2 miles northeast, upgradient of facility. Monitoring at landfill shows no contamination plumes.</p> <p>D. No contaminant plumes documented in area, recharge will not result in migration of any poor quality water.</p>
<p>7. OTHER TECHNICAL ISSUES (TRANSMISSIVITY OF AQUIFER, IMPERMEABLE LAYERS IN VADOSE ZONE, SURFACE ELEVATION OF FACILITY (MSL), ETC.</p>	<p>Transmissivity to be determined by aquifer test in June 1996. Soil borings indicated presence of fine-grained zones in unsaturated zone at about 30 ft. bls, could have the potential to retard vertical flow if laterally continuous.</p>
<p>8. ESTIMATED ANNUAL RECHARGE VOLUME</p>	<p>4,000 AF/year</p>

ECONOMIC FACTORS	RRC SITE NO. 3 DESCRIPTION/DATA/ASSUMPTION
<p>1. CAPITAL COSTS A. DESCRIBE CONVEYANCE SYSTEM COMPONENTS (PIPES (CAPACITY/DIAMETER), PUMPS (CAPACITY, HEAD, BHP), SPECIAL CONSTRUCTION CONSTRAINTS)</p> <p>B. DESCRIBE RECHARGE FACILITY COMPONENTS (EARTHWORK, LENGTH OF REACH/AREA OF BASINS, ON-SITE CONSTRUCTION, PIPING & CONTROL SYSTEM, OTHER)</p>	<p>1. Capital costs = \$292,433. Annual costs expressed over 20 yrs @ 8% = \$29,785/yr or \$7.45/AF (the actual cost would be \$0/AF since state demonstration funds are being used. The annual cost is being expressed for comparative purposes). A. CAP water will be wheeled through the existing lined ditch from the pump station at CAP canal to the BKW groundwater savings facility; gravity flow about 1 mile to facility turnout; ditch capacity is about 50 cfs. Wheeling cost approximately \$15/ AF for energy and O&M.</p> <p>B. Minimal earthwork required by utilizing existing gravel pits. Facility consists of a quadrilateral 11 acre basin divided into 4 cells. Potential for 50 acres of basin at full scale project. Facility inflow controls will be manual valves. Flow measurement and basin water levels will be monitored continuously and transmitted to CAP headquarters. One monitor well and piezometers to be installed to document aquifer response to recharge.</p>
<p>2. AVERAGE ANNUAL O&M COSTS (ENERGY, CONVEYANCE SYSTEM MAINTENANCE, RECHARGE SYSTEM MAINTENANCE)</p>	<p>Annual O & M costs = \$115,000/yr, or \$28.75/AF, including vegetation & erosion control, conveyance maintenance, wheeling charge and monitoring.</p> <p>Total recharge annual cost = \$7.45 + \$28.75 = \$36.20/AF (actually only \$28.75/AF)</p>
<p>3. LAND & RIGHT OF WAY ACQUISITION (AVAILABILITY, OWNERSHIP, COST, ACRES REQUIRED, LAND USE COMPATIBILITY, PRIOR LAND USE)</p>	<p>60 acre state land lease @ \$15,000/yr, may pursue purchase after 2 year pilot study.</p> <p>Historic land use was grazing and materials excavation.</p>
<p>4. ENVIRONMENTAL CONSTRAINTS (ARCHEOLOGICAL, AESTHETIC, HABITAT-RELATED, FLOODING POTENTIAL, OTHER)</p>	<p>No known environmental constraints</p>

ECONOMIC FACTORS	RRC SITE NO. 3 DESCRIPTION/DATA/ASSUMPTION
5. REGULATORY CONSIDERATIONS (ADWR, ADEQ, PCFCD, FEMA, COE, F&WL, SAWRSA, ETC.)	Underground storage facility permit approved, no floodplain or section 404 required. Due to proximity to airport, FAA bird abatement plan was prepared. ADWR hydrologic testing permit was obtained to conduct pump test of monitoring well.
6. RECOVERY ASSUMPTIONS (LOCATION OF RECOVERY SYSTEM, DEPTH TO GWL, TRANSMISSIVITY OF AQUIFER, POTENTIAL USE OF EXISTING WELLS & PIPELINES, REQUIREMENT FOR TREATMENT, ETC.)	Assume recovered water pumped back into CAP canal for delivery; no treatment for ag use; other use may require treatment at place of use. Recovery wells at 800' deep located adjacent to canal to reduce pipeline runs. Assume: energy = \$37/AF; wells, pipelines, O&M = \$8.50 Total cost for recovery = \$37 + \$8.50 = \$45.50/AF May be possible to reduce recovery costs by utilizing existing agricultural wells in the area.
7. TIME REQUIRED TO IMPLEMENT (PERMITS, DESIGN, CONSTRUCTION, ETC.)	Pilot project operation by July 1996, full scale possible by June 1998.

EXTENT OF REGIONAL BENEFITS	RRC SITE NO. 3 DESCRIPTION/DATA/ASSUMPTION		
1. MULTIPLE USERS OF CONVEYANCE, RECHARGE, AND/OR RECOVERY FACILITIES	Facility designed, constructed and operated by CAWCD using state demonstration project funds. Storage capacity available for entities with CAP subcontracts and water storage permits, or to the CAGR. Conveyance oversized to deliver to BKW groundwater savings facility, and the Avra Valley Pilot Project.		
2. RECHARGE OBJECTIVES THAT CAN BE MET BY THIS FACILITY	<u>OBJECTIVE</u>	<u>YES</u>	<u>NO</u>
	• RECOVERY FOR POTABLE USE	X	
	• FOR NON-POTABLE USE	X	
	• ANNUAL STORAGE/RECOVERY	X	
	• LONG-TERM STORAGE, RECOVERY @ SAME LOCATION	X	
	• SHORT-TERM STORAGE, RECOVERY @SAME LOCATION	X	
	• SHORT-TERM STORAGE, RECOVERY @ DIFFERENT LOCATION	X	
	• RECHARGE/NO RECOVERY	X	
	• CAWCD RELIABILITY STORAGE	X	
	• WATER PROVIDER RELIABILITY STORAGE	X	
	• ASSURED WATER SUPPLY RECHARGE	X	
	• RIPARIAN ENHANCEMENT		X
	• SUBSIDENCE CONTROL	X	
	• CONTAIN/MANAGE POOR QUALITY GROUNDWATER		X
• STATE WATER BANK	X		
• SAWRSA CLAIMS SETTLEMENT		X	
3. RECREATIONAL USES	None Planned.		
4. ENVIRONMENTAL BENEFITS	Not an objective, recharge project only.		

CURRENT STATUS	RRC SITE NO. 3 DESCRIPTION/DATA/ASSUMPTION
1. SITE EVALUATION	Preliminary evaluation complete, pilot phase evaluation under way.
2. BOREHOLES/TEST-PITS	Boreholes, soil analysis, infiltrometer tests all completed.
3. EXISTING OR PROPOSED FUNDING (\$,SOURCES)	Funded through state demonstration project funds.
4. PILOT PERMIT APPLIED FOR/ISSUED	Permit issued.
5. FINAL STORAGE FACILITY PERMIT ISSUED	Will be applied for toward end of pilot project, mid 1998.
6. OTHER PERMITS APPLIED FOR/ISSUED	State Land ROW permit issued, archeological clearance, FAA Bird attractant mitigation plan filed.

RECHARGE FACILITY DESCRIPTION & BASIC ASSUMPTIONS

Preliminary information based on conceptual project design and cost estimates.

RRC SITE NO. 4

FACILITY NAME: PIMA MINE ROAD SURFACE BASIN PROJECT

<p>FACILITY DESCRIPTION</p>	<p>This project, which is jointly sponsored by the City of Tucson and the Central Arizona Project (CAWCD) was identified during Phase B of the Tucson Recharge Feasibility Assessment (TRFA) as being viable for recharging excess CAP water. The 690-acre site is located in T16S, R14E, Sections 19 & 30. It is two miles east of the terminus of the CAP aqueduct, about 15 miles south of Tucson, north of Pima Mine Road and east of the Santa Cruz River. The previous site use was agricultural. For the pilot phase, 14 acres of infiltration basins are planned for Basin 4. Eight 1.8-acre cells will be initially designed and constructed for Basin 4. The full project was initially planned to contain five basins, but the design report (CH2M Hill, 1993) eliminated Basin # 1 because of its encroachment on the Santa Cruz River floodplain, and eliminated Basin # 5 because of the presence of relatively fine-grained soils, thereby leaving three basins with about 42 acres of infiltration area. A turnout into the Santa Cruz River at the Pima Mine Road bridge is also being investigated. Acquisition of the site, which is owned by ASARCO, is occurring through the condemnation process. City and CAWCD have a right of use easement. CAWCD will be the recharge facility owner/operator, with the City of Tucson receiving 50% of the recharge credits. There are three other potential projects which can be served from the CAP turnout: Use by ASARCO Mine (ASARCO-Mission Project), in-channel recharge in the upper Santa Cruz River (The Santa Cruz River @ San Xavier District Project), and groundwater savings to irrigate existing pecan orchards (The FICO-Sahuarita Project).</p>
<p>BASIC ASSUMPTIONS</p>	<ol style="list-style-type: none"> 1. Pilot project capacity is of 10,000 AF/year; full project capacity is designed at 23,000 AF/year. 2. Conveyance of untreated CAP water from new CAP turnout via 24" and 36" pipeline - about 2.2 miles (11,696'). 3. Boreholes and backhoe pits have been previously constructed indicating infiltration rates from 1.5 to 71.4 feet per day (from surface to 12 feet below surface). 4. No current plans for recovery of recharged water. 5. Basins to be operated with 50 percent wetting and 50 percent drying.

TECHNICAL CRITERIA	RRC SITE NO. 4 DESCRIPTION/DATA/ASSUMPTION
1. INFILTRATION RATE (FT/DAY)	Variable from 1.5 to 71.4 ft/day Assumed for Basin 4 = 5 ft/day; and 2 ft/day for Basins 2 & 3
2. VOLUME OF POTENTIALLY RECOVERABLE WATER IN VADOSE ZONE BELOW RECHARGE FACILITY (AF)	Vadose zone volume = 14 acres x 130 feet = 1,820 x 0.10 = 182 AF. 182 AF ÷ 4 = 45 AF for Basin 4 for 14-acre initial pilot recharge project. Full project implementation of three basins = 546 AF.
3. DEPTH TO GW (FT)	130 feet
4. TOTAL HISTORICAL GWL DECLINE (FT)	10-20 feet from 1982 to 1992 From 1947-1981, total water level decline was 100-150 feet.
5. POTENTIAL TO ALLEVIATE SUBSIDENCE	This area is in the center of a potential land subsidence area having potential of greater than 10 feet subsidence by 2030. Although there is a possibility of mitigation of potential subsidence, there is also the possibility of surface recharge causing an increase ineffective intergranular stress which may exacerbate potential subsidence.
6. GW QUALITY IMPACTS A. AMBIENT WATER QUALITY B. POTENTIAL TO DEGRADE NATIVE GW C. POTENTIAL SOURCES OF CONTAMINATION (LANDFILLS, EXISTING PLUMES, TDS IMPACTS, ETC.) D. MIGRATION OR CONTAINMENT OF CONTAMINANT PLUMES	A. Ambient GW quality = 450 TDS (variable); Nitrate (N) has been as high as 11.1 mg/l B. Untreated CAP could increase groundwater TDS C. Past Agricultural activity; possible impacts from upgradient mines tailings, leachate and agricultural activity or a near-site mineral recovery facility. D. Could positively impact containment of mines tailings sulfate plume to the west and agricultural nitrate plume to the east through mounting. Hydrogeologic modeling of subsurface required.
7. OTHER TECHNICAL ISSUES (TRANSMISSIVITY OF AQUIFER, IMPERMEABLE LAYERS IN VADOSE ZONE, SURFACE ELEVATION OF FACILITY (MSL), ETC.)	Surface elevation from 2650' to 2635'. Test borings to water table indicate presence of impeding layers beneath the site which will be further evaluated during the pilot period.

TECHNICAL CRITERIA	RRC SITE NO. 4 DESCRIPTION/DATA/ASSUMPTION
8. ESTIMATED ANNUAL RECHARGE VOLUME	23,000 AF/year

ECONOMIC FACTORS	RRC SITE NO. 4 DESCRIPTION/DATA/ASSUMPTION
<p>1. CAPITAL COSTS</p> <p>A. DESCRIBE CONVEYANCE SYSTEM COMPONENTS (PIPES (CAPACITY/DIAMETER), PUMPS (CAPACITY, HEAD, BHP), SPECIAL CONSTRUCTION CONSTRAINTS)</p> <p>B. DESCRIBE RECHARGE FACILITY COMPONENTS (EARTHWORK, LENGTH OF REACH/AREA OF BASINS, ON-SITE CONSTRUCTION, PIPING & CONTROL SYSTEM, OTHER)</p>	<p>Capital costs = \$16,722,265. Annual cost for 20 yrs @ 8% = \$1,703,225 or \$74.05/AF</p> <p>A. Primary conveyance is CAP turnout and 9436 lf 36" and 2260 lf of 24" pipeline; also included are approximately 5660 lf of 24', 3230 lf of 16' and 12,864 lf of 12' distribution piping, six monitoring wells, and modifications to the SCR bridge at Pima Mine Rd to suspend the conveyance line from it</p> <p>B. Approximately 714,000 cy of excavation required. Basins 10-12' below grade. Berming required to protect from flooding.</p>
<p>2. AVERAGE ANNUAL O&M COSTS (ENERGY, CONVEYANCE SYSTEM MAINTENANCE, RECHARGE SYSTEM MAINTENANCE)</p>	<p>Anticipated annual O/M for 14 acres of recharge basins is 14 x \$1200 = \$16,800. Three basins = \$50,400/year, or \$2.19/AF.</p> <p>Total annual cost = \$74.05 + \$2.19 = \$76.24</p>
<p>3. LAND & RIGHT OF WAY ACQUISITION (AVAILABILITY, OWNERSHIP, COST, ACRES REQUIRED, LAND USE COMPATIBILITY, PRIOR LAND USE)</p>	<p>Acquisition of site in condemnation process. ASARCO owns site. Court will set value of the Pima Mine Road Site since a large difference in City appraisal and ASARCO appraisal based on sand and gravel mining.</p> <p>Historical land use was agricultural/grazing.</p>

ECONOMIC FACTORS	RRC SITE NO. 4 DESCRIPTION/DATA/ASSUMPTION
4. ENVIRONMENTAL CONSTRAINTS (ARCHEOLOGICAL, AESTHETIC, HABITAT-RELATED, FLOODING POTENTIAL, OTHER)	Archaeological clearance obtained. Environmental study underway by CAWCD. Cymet facility now closed. No wildlife enhancement planned. No recreation planned.
5. REGULATORY CONSIDERATIONS (ADWR, ADEQ, PCFCD, FEMA, COE, F&WL, SAWRSA, ETC.)	Pilot Underground Storage Facility and Water Storage Permit applications have been submitted and determined to be complete and correct. Floodplain clearance, monitor-well permits, hydrologic testing permits, and Fish and Wildlife abatement are regulatory considerations for which applications have not yet been made.
6. RECOVERY ASSUMPTIONS (LOCATION OF RECOVERY SYSTEM, DEPTH TO GWL, TRANSMISSIVITY OF AQUIFER, POTENTIAL USE OF EXISTING WELLS & PIPELINES, REQUIREMENT FOR TREATMENT, ETC.)	On-site recovery of recharged water not planned at this time. If recovery desired, new wells north of site would be installed and integrated with existing Santa Cruz wellfield.
7. TIME REQUIRED TO IMPLEMENT (PERMITS, DESIGN, CONSTRUCTION, ETC.)	Demonstration startup planned for October 1996

EXTENT OF REGIONAL BENEFITS	RRC SITE NO. 4 DESCRIPTION/DATA/ASSUMPTION		
1. MULTIPLE USERS OF CONVEYANCE, RECHARGE, AND/OR RECOVERY FACILITIES	Shared storage capability; subsidence mitigation; potential plume containment. The cost of the CAP turnout could be shared with the ASARCO-Mission, USCR @ San Xavier, and FICO-Sahuarita projects; the cost of the pipe between the turnout and the river could be shared with the USCR @ San Xavier, and FICO-Sahuarita projects; and the cost of the pipe from the river to the PMR delivery point could be shared with the FICO-Sahuarita project, thereby reducing construction costs for all four projects.		
2. RECHARGE OBJECTIVES THAT CAN BE MET BY THIS FACILITY	<u>OBJECTIVE</u>	<u>YES</u>	<u>NO</u>
	• RECOVERY FOR POTABLE USE	X	
	• FOR NON-POTABLE USE	X	
	• ANNUAL STORAGE/RECOVERY	X	
	• LONG-TERM STORAGE, RECOVERY @ SAME LOCATION		X
	• SHORT-TERM STORAGE, RECOVERY @ SAME LOCATION		X
	• SHORT-TERM STORAGE, RECOVERY @ DIFFERENT LOCATION	X	
	• RECHARGE/NO RECOVERY	X	
	• CAWCD RELIABILITY STORAGE	X	
	• WATER PROVIDER RELIABILITY STORAGE	X	
	• ASSURED WATER SUPPLY RECHARGE	X	
	• RIPARIAN ENHANCEMENT		X
	• SUBSIDENCE CONTROL	-	X
	• CONTAIN/MANAGE POOR QUALITY GROUNDWATER	X	
• STATE WATER BANK	X		
• SAWRSA CLAIMS SETTLEMENT		X	
3. RECREATIONAL USES	None planned.		
4. ENVIRONMENTAL BENEFITS	Secondary benefits associated with recharge.		

FINAL DRAFT

CURRENT STATUS	RRC SITE NO. 4 DESCRIPTION/DATA/ASSUMPTION
1. SITE EVALUATION	Multiple reports have been completed from 1991 through 1994 for the proposed basins and pipelines. Subjects include soils and infiltration investigations, conceptual design, hydrogeologic investigations, surveys, archaeological and environmental surveys, opinions of cost, route studies, and geotechnical investigations.
2. BOREHOLES/TEST-PITS	Completed under basin investigations between 1991 and 1994.
3. EXISTING OR PROPOSED FUNDING (\$,SOURCES)	Joint funding (50%/50%) via Intergovernmental Agreement between City of Tucson and CAWCD (state demonstration recharge funds). \$508,100 contract issued for final design and construction services.
4. PILOT PERMIT APPLIED FOR/ISSUED	Pilot permit application filed with ADWR. Facility permit application filed. Storage application filed.
5. FINAL STORAGE FACILITY PERMIT ISSUED	Anticipated after 2-year pilot phase in late 1998.
6. OTHER PERMITS APPLIED FOR/ISSUED	None.

RECHARGE FACILITY DESCRIPTION & BASIC ASSUMPTIONS

Preliminary information based on conceptual project design and cost estimates.

RRC SITE NO. 5

FACILITY NAME: CENTRAL AVRA VALLEY STORAGE AND RECOVERY PROJECT

<p>FACILITY DESCRIPTION</p>	<p>Approximately 660 acres of recharge basins, on City of Tucson owned land in T13S, R10E, Sections 24 & 25, T13S, R11E, Sections 30 & 31, and T14S, R11E, Section 6. About 1.75 miles of 42" pipe will deliver raw CAP water from the CAP canal located east of the site. Up to 25 recovery wells will produce up to 60,000 AF/yr from the site and deliver the water to the Snyder Hill pumping plant forebay at the CAP Treatment Plant site to pump to the Clearwell Reservoir for delivery to the distribution system by gravity. This project is designed to comply with Proposition 200, a citizens initiative passed by City voters in 1995. It will initially recharge and recover a volume of CAP water equal to the current annual groundwater withdrawals from the City's central wellfield. The City will then cease operation of the central wellfield wells, allowing groundwater levels to rise due to net natural recharge.</p>
<p>BASIC ASSUMPTIONS</p>	<p>Annual capacity for recharge is 60,000-100,000 AF. Up to 660 acres of recharge basins based on an assumed infiltration rate of ½ foot per day and a 1:1 wet/dry operational cycle. There are 25 planned recovery wells for the facility.</p>

<p>TECHNICAL CRITERIA</p>	<p>RRC SITE NO. 5 DESCRIPTION/DATA/ASSUMPTION</p>
<p>1. INFILTRATION RATE (FT/DAY)</p>	<p>Assumed to be ½ foot/day.</p>
<p>2. VOLUME OF POTENTIALLY RECOVERABLE WATER IN VADOSE ZONE BELOW RECHARGE FACILITY (AF)</p>	<p>660 acres x 370 ft x 0.10 = 24,420 AF.</p>
<p>3. DEPTH TO GW (FT)</p>	<p>Varies from 360' to 380'.</p>
<p>4. TOTAL HISTORICAL GWL DECLINE (FT)</p>	<p>Varies from 100' to 150'.</p>
<p>5. POTENTIAL TO ALLEVIATE SUBSIDENCE</p>	<p>Moderate - it is planned as a "put & take" facility.</p>

TECHNICAL CRITERIA	RRC SITE NO. 5 DESCRIPTION/DATA/ASSUMPTION
<p>6. GW QUALITY IMPACTS</p> <p>A. AMBIENT WATER QUALITY</p> <p>B. POTENTIAL TO DEGRADE NATIVE GW</p> <p>C. POTENTIAL SOURCES OF CONTAMINATION (LANDFILLS, EXISTING PLUMES, TDS IMPACTS, ETC.)</p> <p>D. MIGRATION OR CONTAINMENT OF CONTAMINANT PLUMES</p>	<p>A. TDS = 206 mg/l</p> <p>B. There will be a transitional change from Avra Valley groundwater quality to CAP water quality in the vicinity of project.</p> <p>C. Previously agricultural land. No known landfills on site. No pesticides or elevated levels of nitrate have been identified.</p> <p>D. No known contaminant plumes in vicinity of project site.</p>
<p>7. OTHER TECHNICAL ISSUES (TRANSMISSIVITY OF AQUIFER, IMPERMEABLE LAYERS IN VADOSE ZONE, SURFACE ELEVATION OF FACILITY (MSL), ETC.)</p>	<p>Impeding layers may be present in vadose zone. No observed cascading water or poor surface drainage.</p>
<p>8. ESTIMATED ANNUAL RECHARGE VOLUME</p>	<p>60,000 AF/year</p>

ECONOMIC FACTORS	RRC SITE NO. 5 DESCRIPTION/DATA/ASSUMPTION
<p>1. CAPITAL COSTS</p> <p>A. DESCRIBE CONVEYANCE SYSTEM COMPONENTS (PIPES (CAPACITY/DIAMETER), PUMPS (CAPACITY, HEAD, BHP), SPECIAL CONSTRUCTION CONSTRAINTS)</p> <p>B. DESCRIBE RECHARGE FACILITY COMPONENTS (EARTHWORK, LENGTH OF REACH/AREA OF BASINS, ON-SITE CONSTRUCTION, PIPING & CONTROL SYSTEM, OTHER)</p>	<p>1. Total capital costs = \$60,215,327. Annual cost over 20 yrs @ 8% = \$6,133,156 or \$102.22/AF, broken down as follows: Recharge Capital costs = \$8,687,441. Annual cost for 20 yrs @ 8% = \$884,848 or \$14.75/AF Recovery Capital Costs = \$51,527,886. Annual cost for 20 yrs @ 8% = \$5,248,308 or \$87.47/AF</p> <p>A. CAP turnout @ existing 36" dia. manhole on 108" dia. CAP pipeline; 9240 lf of 42" conveyance pipeline; and 60,720 lf of 60" recovered water conveyance pipeline.</p> <p>B. Excavation of top 12" of soil for basin & berm construction = 1,064,800 cy. On-site components include 5280 lf lined 48" conveyance ditch; 10,720 lf of lined 34" conveyance ditch; 8,420' deep, eight 4" dia. monitoring wells; 25 recovery wells, 700' deep; 1867 lf of 60", 1867 lf of 54", 5280 lf of 48", 3960 lf of 42", 3574 lf of 36", 934 lf of 30", 2640 lf of 24", 2640 lf of 20", 1867 lf of 16" and 36576 lf of 12" recovered water collection pipelines; and a 110.5 cfs @ 3439 BHP recovered water pumping station.</p>
<p>2. AVERAGE ANNUAL O&M COSTS (ENERGY, CONVEYANCE SYSTEM MAINTENANCE, RECHARGE SYSTEM MAINTENANCE)</p>	<p>Total O & M costs = \$1,608,574 or \$26.81/AF, broken down as follows: Recharge O & M costs = \$170,000 or \$2.83/AF, including costs of groundwater monitoring, vegetation & erosion control, and conveyance system maintenance. Recovery O & M costs = \$1,438,574 or \$23.98/AF, including costs for recovery system maintenance and electrical power.</p>
<p>3. LAND & RIGHT OF WAY ACQUISITION (AVAILABILITY, OWNERSHIP, COST, ACRES REQUIRED, LAND USE COMPATIBILITY, PRIOR LAND USE)</p>	<p>No cost for land. City owned property for basins and wells. Public right-of-way and/or private land may be required for pipeline to treatment plant site.</p>
<p>4. ENVIRONMENTAL CONSTRAINTS (ARCHEOLOGICAL, AESTHETIC, HABITAT-RELATED, FLOODING POTENTIAL, OTHER)</p>	<p>Previous agricultural land. No significant archaeological sites are anticipated or other issues other than flooding are expected.</p>

ECONOMIC FACTORS	RRC SITE NO. 5 DESCRIPTION/DATA/ASSUMPTION
5. REGULATORY CONSIDERATIONS (ADWR, ADEQ, PCFCD, FEMA, COE, F&WL, SAWRSA, ETC.)	Recharge and recovery permits will be necessary as well as floodplain review. Monitoring will be required for the facility to evaluate both recharge and recovery.
6. RECOVERY ASSUMPTIONS (LOCATION OF RECOVERY SYSTEM, DEPTH TO GWL, TRANSMISSIVITY OF AQUIFER, POTENTIAL USE OF EXISTING WELLS & PIPELINES, REQUIREMENT FOR TREATMENT, ETC.)	Recovery will be through 25 wells located throughout the recharge basins. Depth to present groundwater ranges from about 360' to 380'. Aquifer transmissivity is about 100,000 gpd/ft.
7. TIME REQUIRED TO IMPLEMENT (PERMITS, DESIGN, CONSTRUCTION, ETC.)	Two years.

EXTENT OF REGIONAL BENEFITS	RRC SITE NO. 5 DESCRIPTION/DATA/ASSUMPTION		
1. MULTIPLE USERS OF CONVEYANCE, RECHARGE, AND/OR RECOVERY FACILITIES	Expansion of facility is possible on existing City properties both south and north of project site.		
2. RECHARGE OBJECTIVES THAT CAN BE MET BY THIS FACILITY	<u>OBJECTIVE</u>	<u>YES</u>	<u>NO</u>
	• RECOVERY FOR POTABLE USE	X	
	• FOR NON-POTABLE USE	X	
	• ANNUAL STORAGE/RECOVERY	X	
	• LONG-TERM STORAGE, RECOVERY @ SAME LOCATION	X	
	• SHORT-TERM STORAGE, RECOVERY @SAME LOCATION	X	
	• SHORT-TERM STORAGE, RECOVERY @ DIFFERENT LOCATION	X	
	• RECHARGE/NO RECOVERY		X
	• CAWCD RELIABILITY STORAGE	X	
	• WATER PROVIDER RELIABILITY STORAGE	X	
	• ASSURED WATER SUPPLY RECHARGE	X	
	• RIPARIAN ENHANCEMENT		X
	• SUBSIDENCE CONTROL	X	
	• CONTAIN/MANAGE POOR QUALITY GROUNDWATER		X
• STATE WATER BANK	X		
• SAWRSA CLAIMS SETTLEMENT		X	
3. RECREATIONAL USES	None are anticipated.		
4. ENVIRONMENTAL BENEFITS	Maintain existing water levels in areas subject to water level declines.		

FINAL DRAFT

CURRENT STATUS	RRC SITE NO. 5 DESCRIPTION/DATA/ASSUMPTION
1. SITE EVALUATION	Ongoing.
2. BOREHOLES/TEST-PITS	Planned in near future.
3. EXISTING OR PROPOSED FUNDING (\$,SOURCES)	\$56,000,000 budgeted by the City of Tucson.
4. PILOT PERMIT APPLIED FOR/ISSUED	Permit application received by ADWR.
5. FINAL STORAGE FACILITY PERMIT ISSUED	Anticipated by December, 1996.
6. OTHER PERMITS APPLIED FOR/ISSUED	Floodplain use permit from Pima County.

RECHARGE FACILITY DESCRIPTION & BASIC ASSUMPTIONS

Preliminary information based on conceptual project design and cost estimates.

RRC SITE NO. 6

FACILITY NAME: SOUTH AVRA VALLEY

<p>FACILITY DESCRIPTION</p>	<p>There are approximately 2,500 acres of City owned land in T 14S, R 11E, Sections 22, 27,28, 33, and 34. Assumed area of spreading basins is 240 acres in the north one-half of Section 27. The CAP canal is approximately 1.5 miles to the northeast. CAP water, pumped from a new CAP turnout/pumping station can flow by gravity to the site in 1.5 mi of 54" pipe across approximately 2100 acres acquired by BKW farms for grazing, or in 2 mi. of 60" pipe installed in Bopp Rd. Existing Avra Valley production wells No.AV-14,AV-15,AV-16,AV-17,AV-18,AV-19,AV-20,AV-21 and AV-22 are within one-mile of the recharge area; wells no. AV-13, AV-23,AV-24 and AV-25 are within two-miles of the site.</p>
<p>BASIC ASSUMPTIONS</p>	<p>Retired farm land owned by the City of Tucson; located over recent alluvium; assumed 10' of topsoil removed over the alluvium; subsurface >10' geology is Ft. Lowell and Tinaja formations; depth to groundwater = 350 ft., there is ample storage for long-term project.</p>

<p>TECHNICAL CRITERIA</p>	<p>RRC SITE NO. 6 DESCRIPTION/DATA/ASSUMPTION</p>
<p>1. INFILTRATION RATE (FT/DAY)</p>	<p>Assumed infiltration rate = 1 ft/day; annual recharge volume = 43,800 AF. Site is within Area 4 (favorable for injection wells), as identified by CH2M HILL in the Phase A Tucson Recharge Feasibility Assessment Report, which reported the average aquifer transmissivity = 70,000 gpd/ft, and potentially recoverable groundwater = 720,000 AF.</p>
<p>2. VOLUME OF POTENTIALLY RECOVERABLE WATER IN VADOSE ZONE BELOW RECHARGE FACILITY (AF)</p>	<p>720,000 AF.</p>
<p>3. DEPTH TO GW (FT)</p>	<p>353 to 366 ft.</p>
<p>4. TOTAL HISTORICAL GWL DECLINE (FT)</p>	<p>Unknown.</p>
<p>5. POTENTIAL TO ALLEVIATE SUBSIDENCE</p>	<p>Minimal.</p>

TECHNICAL CRITERIA	RRC SITE NO. 6 DESCRIPTION/DATA/ASSUMPTION
<p>6. GW QUALITY IMPACTS</p> <p>A. AMBIENT WATER QUALITY</p> <p>B. POTENTIAL TO DEGRADE NATIVE GW</p> <p>C. POTENTIAL SOURCES OF CONTAMINATION (LANDFILLS, EXISTING PLUMES, TDS IMPACTS, ETC.)</p> <p>D. MIGRATION OR CONTAINMENT OF CONTAMINANT PLUMES</p>	<p>A. The Recharge Feasibility Assessment Report indicated the mean ambient water quality parameters for the Avra Valley Wellfield: TDS = 165 - 323, mean = 203 mg/l; nitrate (N) = 1.6 - 6.3, mean = 2.7 mg/l; hardness (CaCO₃) = 66.7 - 156.7, mean = 82.1.</p> <p>B. There will be a transitional change from Avra Valley groundwater quality to CAP water quality in the vicinity of the project.</p> <p>C. Previously agricultural land. No known landfills on site. No pesticides or elevated levels of nitrate have been identified yet.</p> <p>D. N/A</p>
<p>7. OTHER TECHNICAL ISSUES (TRANSMISSIVITY OF AQUIFER, IMPERMEABLE LAYERS IN VADOSE ZONE, SURFACE ELEVATION OF FACILITY (MSL), ETC.)</p>	<p>T = 84,000 to 360,000 gpd/ft S = 0.08 to 0.15</p> <p>Contains isolated silt & clay layers Surface elevation = 2300 ft.</p>
<p>8. ESTIMATED ANNUAL RECHARGE VOLUME</p>	<p>43,800 AF/year</p>

ECONOMIC FACTORS	RRC SITE NO. 6 DESCRIPTION/DATA/ASSUMPTION
<p>1. CAPITAL COSTS</p> <p>A. DESCRIBE CONVEYANCE SYSTEM COMPONENTS (PIPES (CAPACITY/DIAMETER), PUMPS (CAPACITY, HEAD, BHP), SPECIAL CONSTRUCTION CONSTRAINTS)</p> <p>B. DESCRIBE RECHARGE FACILITY COMPONENTS (EARTHWORK, LENGTH OF REACH/AREA OF BASINS, ON-SITE CONSTRUCTION, PIPING & CONTROL SYSTEM, OTHER)</p>	<p>1. Recharge capital costs = \$27,131,284. Annual cost for 20 yrs @ 8% = \$2,763,423 or \$63.09/AF</p> <p>A. CAP turnout/pumping station, 242 cfs @ 323 BHP; 7920 lf of 54" conveyance pipeline;</p> <p>B. Excavation of 10' of topsoil for basin & berm construction = 4,069,642 cy; 3,412,781 cy of excess dirt assumed given away free to haulers; on-site distribution piping: 840 lf of 96", 840 lf of 84", 840 lf of 78", 840 lf of 66", 840 lf of 54", 840 lf of 42", 24,864 lf of 18" & 24,846 lf of 12" pipe and equip 8 existing wells with groundwater monitoring equipment.</p>
<p>2. AVERAGE ANNUAL O&M COSTS (ENERGY, CONVEYANCE SYSTEM MAINTENANCE, RECHARGE SYSTEM MAINTENANCE)</p>	<p>Annual O&M costs = \$336,517/yr or \$7.68/AF, including costs for groundwater monitoring, vegetation & erosion control, conveyance & pumping system maintenance, and electrical power.</p> <p>Total annual costs = \$63.09 + 7.68 = \$70.77</p>
<p>3. LAND & RIGHT OF WAY ACQUISITION (AVAILABILITY, OWNERSHIP, COST, ACRES REQUIRED, LAND USE COMPATIBILITY, PRIOR LAND USE)</p>	<p>No cost for land. City owned property for basins; conveyance pipeline requires right-of-way across leased state land, or may be placed in existing public r/w.</p>
<p>4. ENVIRONMENTAL CONSTRAINTS (ARCHEOLOGICAL, AESTHETIC, HABITAT-RELATED, FLOODING POTENTIAL, OTHER)</p>	<p>Previous agricultural land. Archeological must be determined, but no significant archeological sites are anticipated</p>
<p>5. REGULATORY CONSIDERATIONS (ADWR, ADEQ, PCFCD, FEMA, COE, F&WL, SAWRSA, ETC.)</p>	<p>Floodplain use; close to Ryan Airfield</p>

ECONOMIC FACTORS	RRC SITE NO. 6 DESCRIPTION/DATA/ASSUMPTION
6. RECOVERY ASSUMPTIONS (LOCATION OF RECOVERY SYSTEM, DEPTH TO GWL, TRANSMISSIVITY OF AQUIFER, POTENTIAL USE OF EXISTING WELLS & PIPELINES, REQUIREMENT FOR TREATMENT, ETC.)	Recovery using the nine existing Tucson Water Wells within 1 mile radius plus four wells within a 2 mile radius of recharge site.
7. TIME REQUIRED TO IMPLEMENT (PERMITS, DESIGN, CONSTRUCTION, ETC.)	Field Exploration, design, permitting = 9 months Construction = 9 months

EXTENT OF REGIONAL BENEFITS	RRC SITE NO. 6 DESCRIPTION/DATA/ASSUMPTION		
1. MULTIPLE USERS OF CONVEYANCE, RECHARGE, AND/OR RECOVERY FACILITIES	Possible multiple users: Tucson Water, CAWCD, State Water Bank		
2. RECHARGE OBJECTIVES THAT CAN BE MET BY THIS FACILITY	<u>OBJECTIVE</u>	<u>YES</u>	<u>NO</u>
	• RECOVERY FOR POTABLE USE	X	
	• FOR NON-POTABLE USE	X	
	• ANNUAL STORAGE/RECOVERY	X	
	• LONG-TERM STORAGE, RECOVERY @ SAME LOCATION	X	
	• SHORT-TERM STORAGE, RECOVERY @SAME LOCATION	X	
	• SHORT-TERM STORAGE, RECOVERY @DIFFERENT LOCATION	X	
	• RECHARGE/NO RECOVERY	X	
	• CAWCD RELIABILITY STORAGE	X	
	• WATER PROVIDER RELIABILITY STORAGE	X	
	• ASSURED WATER SUPPLY RECHARGE	X	
	• RIPARIAN ENHANCEMENT		X
	• SUBSIDENCE CONTROL		X
	• CONTAIN/MANAGE POOR QUALITY GROUNDWATER		X
• STATE WATER BANK	X		
• SAWRSA CLAIMS SETTLEMENT		X	
3. RECREATIONAL USES	None. A single purpose project is envisioned.		
4. ENVIRONMENTAL BENEFITS	None.		

FINAL DRAFT

CURRENT STATUS	RRC SITE NO. 6 DESCRIPTION/DATA/ASSUMPTION
1. SITE EVALUATION	Needs soil/infiltration investigation.
2. BOREHOLES/TEST-PITS	Limited - based on regional geology & soils.
3. EXISTING OR PROPOSED FUNDING (\$,SOURCES)	Proposed funding by the City of Tucson.
4. PILOT PERMIT APPLIED FOR/ISSUED	No.
5. FINAL STORAGE FACILITY PERMIT ISSUED	No.
6. OTHER PERMITS APPLIED FOR/ISSUED	No.

RECHARGE FACILITY DESCRIPTION & BASIC ASSUMPTIONS

Preliminary information based on conceptual project design and cost estimates.

RRC SITE NO. 7

FACILITY NAME: WEST OF CAP @ TANGERINE RD

<p>FACILITY DESCRIPTION</p>	<p>Vacant land north of Tangerine Rd., east of the I-10 freeway and west of the CAP canal is proposed to be used to construct recharge basins. Land appears to be retired farmland. Location is T 11S, R 12E, Sec 31, and T 11S, R 11E, Sec 25, and 36. There is a levee on the north side of the CAP canal which serves to protect the canal from flooding by sheetflow from the Tortolita fan to the north. The site is in the path of the discharge from two drainage overchutes, each consisting of 3-72" pipes, which transports the drainage collected by the dike over the top of the canal. The CAP turnout which is proposed for the Northwest Tucson Active Management Area Replenishment Program can also be utilized to serve this project, thereby reducing costs for both projects.</p>
<p>BASIC ASSUMPTIONS</p>	<p>Approximately 332.9 acres are available. There is no information on infiltration rates. Assuming an infiltration rate of 1 ft/day results in the annual recharge volume = 50,000 AF. Soils along the CAP alignment north and east of the site have exhibited subsidence (assumed due to "collapsible soils"). However, since this land was farmed in the past, it may not subside. The soil is sandy with less than 15% fines and may be suitable for recharge. Land ownership is unknown. This could be operated as a "put-and-take" facility due to proximity to the canal.</p>

TECHNICAL CRITERIA	RRC SITE NO. 7 DESCRIPTION/DATA/ASSUMPTION
1. INFILTRATION RATE (FT/DAY)	Unknown, assume 1 ft/day.
2. VOLUME OF POTENTIALLY RECOVERABLE WATER IN VADOSE ZONE (AF)	Unknown. Depth to groundwater in the area is approximately 200 feet.
3. DEPTH TO GW (FT)	200 feet.
4. TOTAL HISTORICAL GWL DECLINE (FT)	Unknown.
5. POTENTIAL TO ALLEVIATE SUBSIDENCE	None.

TECHNICAL CRITERIA	RRC SITE NO. 7 DESCRIPTION/DATA/ASSUMPTION
<p>6. GW QUALITY IMPACTS</p> <p>A. AMBIENT WATER QUALITY .</p> <p>B. POTENTIAL TO DEGRADE NATIVE GW</p> <p>C. POTENTIAL SOURCES OF CONTAMINATION (LANDFILLS, EXISTING PLUMES, TDS IMPACTS, ETC.)</p> <p>D. MIGRATION OR CONTAINMENT OF CONTAMINANT PLUMES</p>	<p>A. Ambient water quality is unknown, but there is a possibility of high nitrates and/or pesticides from historical farming use.</p> <p>B. Not known, but there may be an initial flush of nitrates and/or pesticides.</p> <p>C. None known or expected.</p> <p>D. None known or expected.</p>
<p>7. OTHER TECHNICAL ISSUES</p>	<p>Transmissivity unknown. Geologic logs along the CAP Santa Cruz River siphon show lean to fatty clay in the upper 10 ft. Poorly graded sand with cobbles is predominant below 15 ft., which should provide high infiltration rates. Assuming a very conservative infiltration rate of 1 ft/day, the capacity of this site could be 49,750 AF/yr. Elevation at site is 2045 feet. CAP max. water elevation adjacent to site is 2038.5 feet.</p>
<p>8. ESTIMATED ANNUAL RECHARGE VOLUME</p>	<p>50,000 AF/yr.</p>

ECONOMIC FACTORS	RRC SITE NO. 7 DESCRIPTION/DATA/ASSUMPTION
<p>1. CAPITAL COSTS A. DESCRIBE CONVEYANCE SYSTEM COMPONENTS</p> <p>B. DESCRIBE RECHARGE FACILITY COMPONENTS (EARTHWORK, LENGTH OF REACH/AREA OF BASINS, ON-SITE CONSTRUCTION, PIPING & CONTROL SYSTEM, OTHER)</p>	<p>1. Recharge capital costs = \$6,874,592 (including land acquisition). Annual costs for 20 yrs @ 8% = \$700,203 or \$14.07/AF.</p> <p>A. The site is adjacent to the CAP canal. A new CAP turnout and pumping station (91.62 cfs @ 113.6 BHP) and approx. 500 ft of 42-inch diameter conveyance pipeline.</p> <p>B. Excavation of top 5 ft of fine-grained soils for basin & berm construction = 473,897 cy; distribution piping consisting of 3160 lf of 42", 1979 lf of 36", 1451 lf of 24" and 14,900 lf of 12" pipe; 8 ea. 4" diameter monitoring wells 400 ft deep; and acquisition of 333 acres @ \$3,000/acre.</p>
<p>2. AVERAGE ANNUAL O&M COSTS (ENERGY, CONVEYANCE SYSTEM MAINTENANCE, RECHARGE SYSTEM MAINTENANCE)</p>	<p>Recharge O & M costs = \$214,571 or \$4.31/AF, including costs for vegetation & erosion control, groundwater monitoring, pump station & pipeline maintenance and electrical power.</p> <p>Total annual cost = \$14.07 + \$4.31 = \$18.38/AF.</p>
<p>3. LAND & RIGHT OF WAY ACQUISITION (AVAILABILITY, OWNERSHIP, COST, ACRES REQUIRED, LAND USE COMPATIBILITY, PRIOR LAND USE)</p>	<p>UNKNOWN. Land is privately held (Tucson Realty).</p>
<p>4. ENVIRONMENTAL CONSTRAINTS (ARCHEOLOGICAL, AESTHETIC, HABITAT-RELATED, FLOODING POTENTIAL, OTHER)</p>	<p>Site is down gradient from the CAP canal which is flood protected by a berm and intermittent pipe overchutes, each consisting of 3 - 72" pipes. There of two of these overchutes discharging onto the site. Possible archeology.</p>
<p>5. REGULATORY CONSIDERATIONS (ADWR, ADEQ, PCFCD, FEMA, COE, F&WL, SAWRSA, ETC.)</p>	<p>Flood potential may provide a problem in getting an exclusion for F&WL, Section 7, endangered species consultation.</p>

ECONOMIC FACTORS	RRC SITE NO. 7 DESCRIPTION/DATA/ASSUMPTION
6. RECOVERY ASSUMPTIONS (LOCATION OF RECOVERY SYSTEM, DEPTH TO GWL, TRANSMISSIVITY OF AQUIFER, POTENTIAL USE OF EXISTING WELLS & PIPELINES, REQUIREMENT FOR TREATMENT, ETC.)	Assuming a depth to GW of 200 feet. Recovery could be back into CAP system by installing wells or using gw credits to be pumped down gradient at BKW/CMD.
7. TIME REQUIRED TO IMPLEMENT (PERMITS, DESIGN, CONSTRUCTION, ETC.)	Two years.

EXTENT OF REGIONAL BENEFITS	RRC SITE NO. 7 DESCRIPTION/DATA/ASSUMPTION		
1. MULTIPLE USERS OF CONVEYANCE, RECHARGE, AND/OR RECOVERY FACILITIES	There is the possibility of cooperative effort with the Northwest Tucson Active Management Area Replenishment Program in the construction of the CAP turnout/pumping station.		
2. RECHARGE OBJECTIVES THAT CAN BE MET BY THIS FACILITY	<u>OBJECTIVE</u>	<u>YES</u>	<u>NO</u>
	• RECOVERY FOR POTABLE USE	X	
	• FOR NON-POTABLE USE	X	
	• ANNUAL STORAGE/RECOVERY	X	
	• LONG-TERM STORAGE, RECOVERY @ SAME LOCATION	X	
	• SHORT-TERM STORAGE, RECOVERY @SAME LOCATION	X	
	• SHORT-TERM STORAGE, RECOVERY @DIFFERENT LOCATION	X	
	• RECHARGE/NO RECOVERY	X	
	• CAWCD RELIABILITY STORAGE	X	
	• WATER PROVIDER RELIABILITY STORAGE	X	
	• ASSURED WATER SUPPLY RECHARGE	X	
	• RIPARIAN ENHANCEMENT		X
	• SUBSIDENCE CONTROL		X
	• CONTAIN/MANAGE POOR QUALITY GROUNDWATER		X
• STATE WATER BANK	X		
• SAWRSA CLAIMS SETTLEMENT		X	
3. RECREATIONAL USES	Could develop recreational activities.		
4. ENVIRONMENTAL BENEFITS	Unknown.		

FINAL DRAFT

CURRENT STATUS	RRC SITE NO. 7 DESCRIPTION/DATA/ASSUMPTION
1. SITE EVALUATION	None have been done yet. Test pits, borings and infiltration testing have to be done.
2. BOREHOLES/TEST-PITS	Unknown. Some exist due to adjacent CAP const.
3. EXISTING OR PROPOSED FUNDING (\$,SOURCES)	Unknown.
4. PILOT PERMIT APPLIED FOR/ISSUED	No.
5. FINAL STORAGE FACILITY PERMIT ISSUED	No.
6. OTHER PERMITS APPLIED FOR/ISSUED	No.

RECHARGE FACILITY DESCRIPTION & BASIC ASSUMPTIONS

Preliminary information based on conceptual project design and cost estimates.

RRC SITE NO. 8

FACILITY NAME: SAN XAVIER ARROYOS

<p>FACILITY DESCRIPTION</p>	<p>This project is a potential alternative that the Tohono O’odham Nation and the San Xavier District may pursue for feasibility and implementation sometime in the future. The Tohono O’odham Nation has not formally considered this idea or endorsed it in any way.</p> <p>The CAP Reach 6 pipeline is buried in its entirety, from the Black Mountain Operating Reservoir to the Terminus at Pima Mine Rd.</p> <p>The pipeline contains 16 blowoff valves which are 8-inch in diameter. Blowoff valves are located in low areas of the pipeline which are directly below main arroyos. Each blowoff is capable of discharging at a rate of 15 cfs (6700 gpm), or 10,870 AF/yr. The four blowoffs that are proposed for this project are in T16S, R13E, Sections 8 and 16. These arroyos, which are about 3 miles long, drain to the northeast, towards the Santa Cruz River (SCR). Interstate Highway I-10 lies between the arroyos and the SCR, but the I-10 drainage system could intercept the flow and carry it approximately two miles to the north where the river crosses I-10. Small check dams may be constructed at various locations for the purpose of slowing and spreading flows.</p>
<p>BASIC ASSUMPTIONS</p>	<p>A pilot phase for this proposal would utilize four blowoffs, discharging into four arroyos. Each arroyo is approximately 3 miles long. Flow at each blowoff would be throttled by control valves, and split into two 8" discharge lines. Flows could be intercepted by a new collection ditch which would carry excess CAP for crop irrigation, so that flows would be prevented from reaching the Santa Cruz River. However, expanding the number of blowoffs used and increasing the flowrate so that flow reaches the SCR, could substantially increase the yearly recharge rate.</p> <p>A report to the Tucson Mayor and City Council, by Tucson water, entitled "Artificial Recharge in the Tucson Basin and CAP Recharge Options," dated February 27, 1995 estimated the infiltration rate to be between 500 - 1000 AF/yr/mi (or an average of 750 AF/yr/mi). Each of the arroyos is approximately 3 miles long indicating that $4 \times 3 \times 750 = 9000$ AF/yr, or 12.4 cfs would be recharged. The flow at each discharge point (two per blowoff) would be $12.4/8 = 1.6$ cfs.</p>

TECHNICAL CRITERIA	RRC SITE NO. 8 DESCRIPTION/DATA/ASSUMPTION
1. INFILTRATION RATE (FT/DAY)	Estimated by city of Tucson to be 500 to 1000 AF/yr/mi.
2. VOLUME OF POTENTIALLY RECOVERABLE WATER IN VADOSE ZONE (AF)	Unknown.
3. DEPTH TO GW (FT)	150 to 200 feet at the Santa Cruz River.
4. TOTAL HISTORICAL GWL DECLINE (FT)	150 feet.
5. POTENTIAL TO ALLEVIATE SUBSIDENCE	Should have a positive affect. Subsidence and sinkholes have been observed in the area.
6. GW QUALITY IMPACTS A. AMBIENT WATER QUALITY B. POTENTIAL TO DEGRADE NATIVE GW C. POTENTIAL SOURCES OF CONTAMINATION (LANDFILLS, EXISTING PLUMES, TDS IMPACTS, ETC.) D. MIGRATION OR CONTAINMENT OF CONTAMINANT PLUMES	<p>A. Ambient gw TDS level 250 to 300 mg/l.</p> <p>B. To the extent that CAP water has a higher TDS level than GW, some degradation will be experienced. The effects should not be substantial considering the relatively small ratio of recharge water to groundwater (project spreads water over a 12 square mile area).</p> <p>C. Potential migration of the sulfate plume to the southwest and the nitrate plume to the southeast could contaminate percolating water from this project. Runoff from tailing ponds, and deposits of windblown tailing dust may have resulted in high metals content of near surface soils.</p> <p>D. If there is a plume from the mine and it is not intercepted at point of discharge, then the recharge mound created by this project could retard migration of plume.</p>
7. OTHER TECHNICAL ISSUES (TRANSMISSIVITY OF AQUIFER, IMPERMEABLE LAYERS IN VADOSE ZONE, SURFACE ELEVATION OF FACILITY (MSL), ETC.	The ground surface elevation varies from 2796.0 ft to 2768.5 ft along the pipeline and from 2600 ft to 2530 ft along the west branch of the SCR. No impeding layers were identified during construction of CAP pipeline. Pipeline was founded in Quaternary alluvial fan deposits (25% coarse to fine gravel) and Q. Basin fill deposits (15% fine gravel). Erosion potential must be evaluated.
8. ESTIMATED ANNUAL RECHARGE VOLUME	9,000 AF/yr.

Note: Data contained herein is assumed, only, and requires corroboration. Additional data may be collected by the T.O.N. and the San Xavier District at some future date in order to determine the feasibility of this proposed concept.

ECONOMIC FACTORS	RRC SITE NO. 8 DESCRIPTION/DATA/ASSUMPTION
<p>1. CAPITAL COSTS A. DESCRIBE CONVEYANCE SYSTEM COMPONENTS (PIPES (CAPACITY/DIAMETER), PUMPS (CAPACITY, HEAD, BHP), SPECIAL CONSTRUCTION CONSTRAINTS)</p> <p>B. DESCRIBE RECHARGE FACILITY COMPONENTS (EARTHWORK, LENGTH OF REACH/AREA OF BASINS, ON-SITE CONSTRUCTION, PIPING & CONTROL SYSTEM, OTHER)</p>	<p>1. Capital costs = \$290,420. Annual costs for 20 yrs @ 8% \$25,580 or \$3.29/AF</p> <p>A. The flowrate at each discharge point will average 1.6 cfs, at velocity = 4.4 fps, based on a CAP system head of 95 feet. Discharge will be throttled to prevent cavitation in the pipe and erosion at the point of discharge. Reqmts: 1000 lf of 8-inch pipe (\$15,000), 8 isolation valves (\$800/discharge), 4 flow meters (\$3000/blowoff), pipe 90 and 45 degree bends (\$500/blowoff). Excavate 1 yd³ of material at point of discharge and replace with gravel/sand filter (\$1000/discharge), 6 monitoring wells & equip (\$30,000/well).</p> <p>B. Recharge will be into arroyos - no recharge facility req'd. Once main discharge valves at blowoff are set, control of discharge for erosion control will be at isolation valve. Valves will be controlled manually by San Xavier District personnel.</p>
<p>2. AVERAGE ANNUAL O&M COSTS (ENERGY, CONVEYANCE SYSTEM MAINTENANCE, RECHARGE SYSTEM MAINTENANCE)</p>	<p>Assume one FTE, erosion & vegetation control, pipe/discharge assembly maintenance, and groundwater monitoring. O & M costs = \$55,000 or \$6.11/AF</p> <p>Total annual costs for recharge = \$3.29 + \$6.11 = \$9.40/AF</p>
<p>3. LAND & RIGHT OF WAY ACQUISITION (AVAILABILITY, OWNERSHIP, COST, ACRES REQUIRED, LAND USE COMPATIBILITY, PRIOR LAND USE)</p>	<p>No cost during pilot. Land is owned by San Xavier District and allottees.</p>
<p>4. ENVIRONMENTAL CONSTRAINTS (ARCHEOLOGICAL, AESTHETIC, HABITAT-RELATED, FLOODING POTENTIAL, OTHER)</p>	<p>Excellent potential for revegetation and wildlife enhancement. No public access. Flooding potential will be minimal.</p>

ECONOMIC FACTORS	RRC SITE NO. 8 DESCRIPTION/DATA/ASSUMPTION
5. REGULATORY CONSIDERATIONS (ADWR, ADEQ, PCFCD, FEMA, COE, F&WL, SAWRSA, ETC.)	Short term interim steps to mitigate Section 7 Native Fish Consultation have been discussed with Fish & Wildlife (sand filters). Two cubic yards of sand filter per 5 cfs is required. Long term fish barriers will be built on the SCR. Excellent way to implement the SAWRSA settlement. San Xavier can begin benefiting from water immediately.
6. RECOVERY ASSUMPTIONS (LOCATION OF RECOVERY SYSTEM, DEPTH TO GWL, TRANSMISSIVITY OF AQUIFER, POTENTIAL USE OF EXISTING WELLS & PIPELINES, REQUIREMENT FOR TREATMENT, ETC.)	Recovery using existing wells that belong to the San Xavier District located along the SCR down gradient from the point of discharge. Surface water that does not infiltrate could be recovered in small reservoirs and channeled into existing distribution system used for agriculture.
7. TIME REQUIRED TO IMPLEMENT (PERMITS, DESIGN, CONSTRUCTION, ETC.)	Design and construction are relatively simple and can be implemented in three months. Permits are only required should the TON wish to receive credits for recharge, for off-reservation use. Permits will then be the critical path.

EXTENT OF REGIONAL BENEFITS	RRC SITE NO. 8 DESCRIPTION/DATA/ASSUMPTION		
1. MULTIPLE USERS OF CONVEYANCE, RECHARGE, AND/OR RECOVERY FACILITIES	Water recharge may replenish the San Xavier District wells and, eventually the Southside wellfield. Recharge and recovery could benefit anyone with wells in the south wellfield.		
2. RECHARGE OBJECTIVES THAT CAN BE MET BY THIS FACILITY	<u>OBJECTIVE</u>	<u>YES</u>	<u>NO</u>
	• RECOVERY FOR POTABLE USE	X	
	• FOR NON-POTABLE USE	X	
	• ANNUAL STORAGE/RECOVERY	X	
	• LONG-TERM STORAGE, RECOVERY @ SAME LOCATION	X	
	• SHORT-TERM STORAGE, RECOVERY @SAME LOCATION	X	
	• SHORT-TERM STORAGE, RECOVERY @ DIFFERENT LOCATION	X	
	• RECHARGE/NO RECOVERY	X	
	• CAWCD RELIABILITY STORAGE		X
	• WATER PROVIDER RELIABILITY STORAGE	X	
	• ASSURED WATER SUPPLY RECHARGE		X
	• RIPARIAN ENHANCEMENT	X	
	• SUBSIDENCE CONTROL	X	
	• CONTAIN/MANAGE POOR QUALITY GROUNDWATER	X?	
• STATE WATER BANK		X	
• SAWRSA CLAIMS SETTLEMENT	X		
3. RECREATIONAL USES	No public access. Recreation for San Xavier District is excellent.		
4. ENVIRONMENTAL BENEFITS	Excellent possibilities for revegetation and creating wildlife habitat.		

FINAL DRAFT

CURRENT STATUS	RRC SITE NO. 8 DESCRIPTION/DATA/ASSUMPTION
1. SITE EVALUATION	Surface reconnaissance & evaluation, and infiltration tests are needed.
2. BOREHOLES/TEST-PITS	Some from adjacent CAP construction.
3. EXISTING OR PROPOSED FUNDING (\$,SOURCES)	Unknown.
4. PILOT PERMIT STATUS	No permit.
5. FINAL STORAGE FACILITY PERMIT ISSUED	No permit.
6. OTHER PERMITS APPLIED FOR/ISSUED	None.

RECHARGE FACILITY DESCRIPTION & BASIC ASSUMPTIONS

Preliminary information based on conceptual project design and cost estimates.

RRC SITE NO. 9

FACILITY NAME: SCR @ SAN XAVIER DISTRICT

<p>FACILITY DESCRIPTION</p>	<p>This project is a potential alternative that the Tohono O’odham Nation and the San Xavier District may pursue for feasibility and implementation sometime in the future. The Tohono O’odham Nation has not formally considered this idea or endorsed it in any way.</p> <p>The project involves recharge in the main channel of the Santa Cruz River starting where the river crosses Pima Mine Road and extending north to Valencia Rd. The in-channel recharge capacity is 8448 AF/yr. or 11.66 cfs. A 16" diameter pipeline, 8227' long, would be required to deliver this flow along Pima Mine Rd. from the CAP terminus to the west side of the Santa Cruz River. A new 36" pipeline, however, starting at the CAP Terminus at Pima Mine Rd., and proceeding east along Pima Mine Road will be constructed to serve the Pima Mine Road Surface Basin Project. This line will be 36-inch diameter except for a segment, about 2260 ft in length hung on the bridge crossing the Santa Cruz River, which will be reduced to 24" for structural reasons.</p>
<p>BASIC ASSUMPTIONS</p>	<p>The new pipeline is being constructed primarily to service the off channel recharge at Pima Mine Rd (PMR). Therefore, the pipeline cost to the point of discharge for this project can be shared by both projects. There is a potential third project, the FICO-Sahuarita Groundwater Savings Facility, which could also share in the cost of the 9,436 lf of 36" and 2260 lf of 24" pipeline to the PMR project. The Tucson Recharge Feasibility Assessment by CH2M Hill has been used to provide applicable data, indicating a total capacity of 8500 AF/yr (Santa Cruz River: 1.0 mile of Reach 2 @ 860 AF/yr/mi = 860 AF/yr; 6.25 miles of reach 3 @ 730 AF/yr/mi = 4563 AF/yr; and 2.75 miles of reach 4 @ 1100 AF/yr/mi = 3025 AF/yr).</p>

FINAL DRAFT

TECHNICAL CRITERIA	RRC SITE NO. 9 DESCRIPTION/DATA/ASSUMPTION
1. INFILTRATION RATE (FT/DAY)	Range 1.37 to 6.7 feet/day.
2. VOLUME OF POTENTIALLY RECOVERABLE WATER IN VADOSE ZONE BELOW RECHARGE FACILITY (AF)	Total volume in recent alluvium, Ft. Lowell and Upper Tinaja formations: reach 2: 27,000 AF/mile (1.0 miles) = 27,000 AF reach 3: 28,000 AF/mile (6.25 miles) = 175,000 AF reach 4: 20,000 AF/mile (2.75 miles) = <u>55,000 AF</u> 257,000 AF
3. DEPTH TO GW (FT)	127
4. TOTAL HISTORICAL GWL DECLINE (FT)	150
5. POTENTIAL TO ALLEVIATE SUBSIDENCE	Should have a positive but minimal effect. Recharge will be up gradient of South and Central wellfields.
6. GW QUALITY IMPACTS A. AMBIENT WATER QUALITY B. POTENTIAL TO DEGRADE NATIVE GW C. POTENTIAL SOURCES OF CONTAMINATION (LAND-FILLS, EXISTING PLUMES, TDS IMPACTS, ETC.) D. MIGRATION OR CONTAINMENT OF CONTAMINANT PLUMES	A. Ambient water quality is unknown. B. To the extent that CAP water has a higher TDS level than GW, some degradation should be experienced. The effects should not be drastic due to the amount of recharge water mixing with GW. C. There are areas of known high nitrate levels in the groundwater located to the southeast and high sulfate levels to the west that could potentially migrate to this recharge area. D. Creation of a recharge mound by this project may serve to mitigate the migration of the nitrate plume to the southeast and the sulfate plume to the west.
7. OTHER TECHNICAL ISSUES (TRANSMISSIVITY OF AQUIFER, IMPERMEABLE LAYERS IN VADOSE ZONE, SURFACE ELEVATION OF FACILITY (MSL), ETC.)	Unknown.
8. ESTIMATED ANNUAL RECHARGE VOLUME	8,500 AF/yr.

Note: Data contained herein is assumed, only and requires corroboration. Additional data may be collected by the T.O.N. and the San Xavier District at some future date in order to determine the feasibility of this proposed concept.

ECONOMIC FACTORS	RRC SITE NO. 9 DESCRIPTION/DATA/ASSUMPTION
<p>1. CAPITAL COSTS</p> <p>A. DESCRIBE CONVEYANCE SYSTEM COMPONENTS (PIPES (CAPACITY/DIAMETER, PUMPS (CAPACITY, HEAD, BHP), SPECIAL CONSTRUCTION CONSTRAINTS)</p> <p>B. DESCRIBE RECHARGE FACILITY COMPONENTS (EARTHWORK, LENGTH OF REACH/AREA OF BASINS, ON-SITE CONSTRUCTION, PIPING & CONTROL SYSTEM, OTHER)</p>	<p>1. Capital costs = \$1,189,780. Annual costs for 20 yrs @ 8% = \$121,183 or \$14.26/AF. <u>In reality, since the CAP turnout and a 36" pipeline will be constructed for the PMR project, the capital cost reduces down to \$448,500 or \$45,681 annually = \$5.37/AF</u></p> <p>A. Since the cost of the pipeline to the point of discharge is covered under another project, the major cost will be an outlet structure. The outlet structure is needed to control localized erosion caused by the discharge. Estimated cost \$200,000. 400 feet of pipe + valving, etc. = \$50,000.</p> <p>B. Releases will be curtailed during natural flow events. Three 4" groundwater monitoring wells will be installed (\$75,000)</p>
<p>2. AVERAGE ANNUAL O&M COSTS</p>	<p>Annual o & m costs = \$40,000 or \$4.71/AF.</p> <p>There is no need for a pump. The CAP terminus is @ elevation = 2800' MSL, and any available CAP pumping head remaining at the terminus can be used.</p> <p>Total annual cost for recharge = \$5.37 + \$4.71 = \$10.08/AF</p>
<p>3. LAND & RIGHT OF WAY ACQUISITION (AVAILABILITY, OWNERSHIP, COST, ACRES REQUIRED, LAND USE COMPATIBILITY, PRIOR LAND USE)</p>	<p>Not required. Land is owned by Tohono O'odham Nation, San Xavier District and allottees, or by Pima county Flood Control District.</p>
<p>4. ENVIRONMENTAL CONSTRAINTS</p>	<p>Archeological mitigation is expected during construction of outlet structure. Increased flooding potential due to project is anticipated to be minimal. Excellent potential for creation of riparian habitat.</p>
<p>5. REGULATORY CONSIDERATIONS (ADWR, ADEQ, PCFCD, FEMA, COE, F&WL, SAWRSA, ETC.)</p>	<p>This project will most likely not be allowed to begin operation until mitigation for endangered fish species is complete.</p>

ECONOMIC FACTORS	RRC SITE NO. 9 DESCRIPTION/DATA/ASSUMPTION
6. RECOVERY ASSUMPTIONS	Assume water will be recovered by existing wells that belong to the San Xavier District. The wells are located along the SCR down gradient from the point of discharge.
7. TIME REQUIRED TO IMPLEMENT	Critical path may run through construction of fish barriers on the Santa Cruz River, which is expected to take two to three years to complete.

EXTENT OF REGIONAL BENEFITS	RRC SITE NO. 9 DESCRIPTION/DATA/ASSUMPTION		
1. MULTIPLE USERS OF CONVEYANCE, RECHARGE, AND/OR RECOVERY FACILITIES	Possible opportunity to share recharge capacity with Tohono O'odham Nation.		
2. RECHARGE OBJECTIVES THAT CAN BE MET BY THIS FACILITY	<u>OBJECTIVE</u>	<u>YES</u>	<u>NO</u>
	• RECOVERY FOR POTABLE USE	X	
	• FOR NON-POTABLE USE	X	
	• ANNUAL STORAGE/RECOVERY	X	
	• LONG-TERM STORAGE, RECOVERY @ SAME LOCATION	X	
	• SHORT-TERM STORAGE, RECOVERY @SAME LOCATION	X	
	• SHORT-TERM STORAGE, RECOVERY @DIFFERENT LOCATION	X	
	• RECHARGE/NO RECOVERY	X	
	• CAWCD RELIABILITY STORAGE		X
	• WATER PROVIDER RELIABILITY STORAGE	X	
	• ASSURED WATER SUPPLY RECHARGE		X
	• RIPARIAN ENHANCEMENT	X	
	• SUBSIDENCE CONTROL	X	
	• CONTAIN/MANAGE POOR QUALITY GROUNDWATER	X	
• STATE WATER BANK	-	X	
• SAWRSA CLAIMS SETTLEMENT	X		
3. RECREATIONAL USES	No public access to segment owned by the T.O.N. Recreation for San Xavier District is excellent. Limited recreational opportunities may exist outside of Reservation, at the downstream end of the recharge area.		
4. ENVIRONMENTAL BENEFITS	Excellent possibilities for revegetation and creating wildlife habitat.		

FINAL DRAFT

CURRENT STATUS	RRC SITE NO. 9 DESCRIPTION/DATA/ASSUMPTION
1. SITE EVALUATION	Unknown.
2. BOREHOLES/TEST-PITS	Unknown.
3. EXISTING OR PROPOSED FUNDING (\$,SOURCES)	Unknown.
4. PILOT PERMIT APPLIED FOR/ISSUED	No.
5. FINAL STORAGE FACILITY PERMIT ISSUED	No.
6. OTHER PERMITS APPLIED FOR/ISSUED	No.

RECHARGE FACILITY DESCRIPTION & BASIC ASSUMPTIONS

Preliminary information based on conceptual project design and cost estimates.

RRC SITE NO. 10

**FACILITY NAME: PANTANO, TANQUE VERDE & RILLITO RIVER
IN-CHANNEL PROJECT**

<p>FACILITY DESCRIPTION</p>	<p>Convey treated CAP to Pantano, Tanque Verde & Rillito stream channels for recharge using City's reclaimed water system. As described in City of Tucson's March 1996 <u>Assessment of CAP Recharge Alternatives</u>, 30,000 AF/yr of treated CAP water would be delivered to the reclaimed water system to meet reclaimed water demands and for recharge in: the Rillito River between La Cholla & Tucson Blvd. and between Swan & Craycroft; the Tanque Verde River between Craycroft & Houghton; and the Pantano River between Craycroft & Paseo Dorado and between 22nd St. & Escalante. CAP water would flow to the Hayden-Udall Treatment Plant and, after treatment, be pumped to the Clearwell Reservoir. Treated CAP water would then flow, by gravity, easterly to the reclaimed system through the existing potable 96" main in 22nd St., then northerly in the existing potable 66" main in Greasewood, from 22nd St to Ironwood, and then easterly, in a new 24" & 36" reclaimed water main in Ironwood, to the existing reclaimed main at Copper & Coyote. The segments of potable system being used must be isolated from the rest of the potable system, requiring new potable main construction to augment the remaining potable system capacity. The existing reclaimed water system would deliver approximately 5490 AF/yr to the Rillito River at Roger & Tucson Blvd., 3900 AF/yr to the Pantano River at Paseo Dorado & Kolb, 2300 AF/yr to the Pantano River at Escalante east of Camino Seco, and 5310 AF/yr to the Tanque Verde River at Speedway & Houghton.</p>
<p>BASIC ASSUMPTIONS</p>	<p>The capacity of the eastern leg of the reclaimed water distribution system is 20.45 MGD. Since the average reclaimed water demand is only 5.25 MGD, there is enough excess capacity to deliver an average of 15.20 MGD (17,000 AF per year) to the stream channels for recharge. The seasonal fluctuation in irrigation demand would result in more than average recharge during the winter months and less than average recharge during the summer months when turf demands are at their highest.</p>

FINAL DRAFT

TECHNICAL CRITERIA	RRC SITE NO. 10 DESCRIPTION/DATA/ASSUMPTION
1. INFILTRATION RATE (FT/DAY)	<p>From the Phase A Tucson Recharge Feasibility Assessment Report (1989, CH2M HILL), the following are the applicable projected long-term annual recharge volumes:</p> <p>Rillito River: 7,590 AF/yr Pantano River: 4,100 AF/yr Tanque Verd: <u>5,310</u> AF/yr Total 17,000 AF/yr</p>
2. VOLUME OF POTENTIALLY RECOVERABLE WATER IN VADOSE ZONE BELOW RECHARGE FACILITY (AF)	<p>From the Phase A Tucson Recharge Feasibility Assessment Report (1989, CH2M HILL), the following are the applicable projected volumes of potentially recoverable groundwater in the vadose zone:</p> <p>Rillito River: reach # 1 = 1.5 mi @ 6,000 AF/yr/mi = 9,000 AF; #2 = 2.7 mi @ 9,100 = 24,570 AF; #3 = 2.0 mi @ 11,000 = 22,000 AF; Pantano River: Reach # 2: 5.0 mi @ 4,300 = 21,500 AF; Tanque Verde River reach # 2: 4.83 mi @ 3,200 = 15,456 AF. The projected total = 92,526 AF</p>
3. DEPTH TO GW (FT)	<p>From the Phase A Tucson Recharge Feasibility Assessment Report (1989, CH2M HILL), the following are the applicable depths to groundwater:</p> <p>Rillito River: reach # 1 = 34 ft; #2 = 94 ft; #3 = 113 ft; Pantano River: Reach # 2 = 229 ft; Tanque Verde River: reach # 2 = 29 ft.</p>
4. TOTAL HISTORICAL GWL DECLINE (FT)	<p>From ADWR records, the following are the applicable groundwater declines:</p> <p>Rillito River: reach # 1 = 70 ft; # 2 = 35 ft; # 3 = 50 ft; Pantano River: reach # 2 = 75 to 120 ft; Tanque Verde River: reach # 2 = 20 to 70 ft.</p>
5. POTENTIAL TO ALLEVIATE SUBSIDENCE	Yes.

TECHNICAL CRITERIA	RRC SITE NO. 10 DESCRIPTION/DATA/ASSUMPTION
<p>6. GW QUALITY IMPACTS</p> <p>A. AMBIENT WATER QUALITY</p> <p>B. POTENTIAL TO DEGRADE NATIVE GW</p> <p>C. POTENTIAL SOURCES OF CONTAMINATION (LANDFILLS, EXISTING PLUMES, TDS IMPACTS, ETC.)</p> <p>D. MIGRATION OR CONTAINMENT OF CONTAMINANT PLUMES</p>	<p>A. The ambient water quality at the proposed locations varies, but is generally good. Stream segments have been selected to avoid existing landfills and areas of contamination.</p> <p>B. The higher TDS in CAP water will result in the ultimate increase in salinity of native groundwater.</p> <p>C. Minimal, but monitoring should be part of project adjacent to known landfill/wildcat dumps.</p> <p>D. The upper segment of the Pantano River area is up-gradient of a contaminant plume, and high levels of TDS and Nitrate at the Broadway landfills, and mounding effects may result in migration of this plume.</p>
<p>7. OTHER TECHNICAL ISSUES (TRANSMISSIVITY OF AQUIFER, IMPERMEABLE LAYERS IN VADOSE ZONE, SURFACE ELEVATION OF FACILITY (MSL), ETC.)</p>	<p>None.</p>
<p>8. ESTIMATED ANNUAL RECHARGE VOLUME</p>	<p>17,000 AF/yr.</p>

ECONOMIC FACTORS	RRC SITE NO. 10 DESCRIPTION/DATA/ASSUMPTION
<p>1. CAPITAL COSTS A. DESCRIBE CONVEYANCE SYSTEM COMPONENTS (PIPES (CAPACITY/DIAMETER), PUMPS (CAPACITY, HEAD, BHP), SPECIAL CONSTRUCTION CONSTRAINTS)</p> <p>B. DESCRIBE RECHARGE FACILITY COMPONENTS (EARTHWORK, LENGTH OF REACH/AREA OF BASINS, ON-SITE CONSTRUCTION, PIPING & CONTROL SYSTEM, OTHER)</p>	<p>1. City of Tucson estimated capital costs = \$4,744,000. Annual costs over 20 years @ 8% = \$483,194 or \$28.42/AF</p> <p>A. The Tucson Water cost estimate includes the following: 1.2 miles of 24" and 36" pipe (\$3,417,000); augmentation pipelines (\$246,000); flow valve control assemblies (\$484,000); pressure sustaining valve assemblies (\$328,000); reservoir level control valves (\$69,000); and disinfection (\$200,000).</p> <p>B. The recharge components of this project consist of control valves, discharge lines and energy dissipating outlet structures at each of the four points of discharge into the river channels.</p>
<p>2. AVERAGE ANNUAL O&M COSTS (ENERGY, CONVEYANCE SYSTEM MAINTENANCE, RECHARGE SYSTEM MAINTENANCE)</p>	<p>The City of Tucson estimated O & M costs = -\$78,000 This proposal contemplates the substitution of treated CAP water for treated effluent in the reclaimed water system, thereby shutting down the reclaimed water treatment facility. The cost savings in not operating the reclaimed plant would off-set the operating cost of the CAP water treatment plant, with a net savings of \$230,000 annually. The annual maintenance cost for this project is estimated to be \$152,000. The use of CAP for turf irrigation, however, would count against the city's GPCD requirement, which is not the case for effluent. In order to avoid violation of the GPCD requirement, the City can blend both reclaimed water and treated CAP water in the reclaimed water system. This would require operation of both treatment plants which negate the above savings, and result in additional permit requirements (APP).</p> <p>Total annual cost for recharge = \$ 28.42/AF</p>

ECONOMIC FACTORS	RRC SITE NO. 10 DESCRIPTION/DATA/ASSUMPTION
3. LAND & RIGHT OF WAY ACQUISITION (AVAILABILITY, OWNERSHIP, COST, ACRES REQUIRED, LAND USE COMPATIBILITY, PRIOR LAND USE)	None required.
4. ENVIRONMENTAL CONSTRAINTS (ARCHEOLOGICAL, AESTHETIC, HABITAT-RELATED, FLOODING POTENTIAL, OTHER)	No known archeological or habitat-related constraints. Saturation of the recent alluvium in the reaches of recharge, however, could affect the duration of flows following flood peaks and result in rejected natural recharge at these locations.
5. REGULATORY CONSIDERATIONS (ADWR, ADEQ, PCFCD, FEMA, COE, F&WL, SAWRSA, ETC.)	404 permit from the Corps of Engineers is required for any earthwork in the stream channels. Underground Storage Facility/Water Storage Facility permits from ADWR will be required to receive recharge credits.
6. RECOVERY ASSUMPTIONS (LOCATION OF RECOVERY SYSTEM, DEPTH TO GWL, TRANSMISSIVITY OF AQUIFER, POTENTIAL USE OF EXISTING WELLS & PIPELINES, REQUIREMENT FOR TREATMENT, ETC.)	All recovery facilities existing.
7. TIME REQUIRED TO IMPLEMENT (PERMITS, DESIGN, CONSTRUCTION, ETC.)	Six months for construction of potable and reclaimed waterline construction.

EXTENT OF REGIONAL BENEFITS	RRC SITE NO. 10 DESCRIPTION/DATA/ASSUMPTION		
1. MULTIPLE USERS OF CONVEYANCE, RECHARGE, AND/OR RECOVERY FACILITIES	Recharge would be a City of Tucson project, but riparian environment created by recharge present public park and recreational opportunities which can be coordinated between the City and the County.		
RECHARGE OBJECTIVES THAT CAN BE MET BY THIS FACILITY	<u>OBJECTIVE</u>	<u>YES</u>	<u>NO</u>
	• RECOVERY FOR POTABLE USE	X	
	• FOR NON-POTABLE USE	X	
	• ANNUAL STORAGE/RECOVERY	X	
	• LONG-TERM STORAGE, RECOVERY @ SAME LOCATION		X
	• SHORT-TERM STORAGE, RECOVERY @SAME LOCATION		X
	• SHORT-TERM STORAGE, RECOVERY @DIFFERENT LOCATION	X	
	• RECHARGE/NO RECOVERY	X	
	• CA WCD RELIABILITY STORAGE	X	
	• WATER PROVIDER RELIABILITY STORAGE	X	
	• ASSURED WATER SUPPLY RECHARGE	X	
	• RIPARIAN ENHANCEMENT	X	
	• SUBSIDENCE CONTROL	X	
	• CONTAIN/MANAGE POOR QUALITY GROUNDWATER		X
• STATE WATER BANK		X	
• SAWRSA CLAIMS SETTLEMENT		X	
3. RECREATIONAL USES	Yes, a river park can be developed.		
4 ENVIRONMENTAL BENEFITS	Yes, aesthetic improvement of streambeds by development of riverain park with wildlife habitat.		

CURRENT STATUS	RRC SITE NO. 10 DESCRIPTION/DATA/ASSUMPTION
1. SITE EVALUATION	County/ADWR/COT demonstration project in the Rillito River from Swan to Craycroft.
2. BOREHOLES/TEST-PITS	Some City investigations in the Pantano.
3. EXISTING OR PROPOSED FUNDING (\$,SOURCES)	Proposed City funding.
4. PILOT PERMIT APPLIED FOR/ISSUED	No.
5. FINAL STORAGE FACILITY PERMIT ISSUED	No.
6. OTHER PERMITS APPLIED FOR/ISSUED	No.

RECHARGE FACILITY DESCRIPTION & BASIC ASSUMPTIONS

Preliminary information based on conceptual project design and cost estimates.

RRC SITE NO. 11

FACILITY NAME: BRAWLEY WASH @ THREE POINTS

OFF-CHANNEL RECHARGE BASINS

FACILITY DESCRIPTION	Located 1 ½ miles southwest of Robles Junction in floodplain east of Brawley Wash (T16S.,R10E.,Section 5). Land previously part of Duval farms; now owned by City of Tucson. Approximately 73 acres of recharge basins. Additional 27 acres for maintenance facilities, levees, roads, etc.; total land area requirement approximately 100 acres.
BASIC ASSUMPTIONS	Annual Recharge @ infiltration rate = 3 ft/day is 40,000 AF/yr Recovery locally and/or in downgradient parts of Avra Valley (e.g., Avra Valley Wellfield)

TECHNICAL CRITERIA	RRC SITE NO. 11 DESCRIPTION/DATA/ASSUMPTION
1. INFILTRATION RATE (FT/DAY)	3 ft/day (substantiated by pilot project using groundwater).
2. VOLUME OF POTENTIALLY RECOVERABLE WATER IN VADOSE ZONE BELOW RECHARGE FACILITY (AF)	Approximately 3,000 AF beneath 100-acre area of recharge facility. Lateral spreading due to fine-grained layers in vadose zone is highly likely, but probably not a limiting factor. Recharge water will be stored primarily in the regional aquifer surrounding the recharge facility.
3. DEPTH TO GW (FT)	150 ft.
4. TOTAL HISTORICAL GWL DECLINE (FT)	Negligible.
5. POTENTIAL TO ALLEVIATE SUBSIDENCE	Not a problem here.

TECHNICAL CRITERIA	RRC SITE NO. 11 DESCRIPTION/DATA/ASSUMPTION
<p>6. GW QUALITY IMPACTS</p> <p>A. AMBIENT WATER QUALITY</p> <p>B. POTENTIAL TO DEGRADE NATIVE GW</p> <p>C. POTENTIAL SOURCES OF CONTAMINATION (LANDFILLS, EXISTING PLUMES, TDS IMPACTS, ETC.)</p> <p>D. MIGRATION OR CONTAINMENT OF CONTAMINANT PLUMES</p>	<p>A. Ambient concentrations: ≈ 330 mg/L TDS and 3.8 to 8.1 mg/L nitrate as (N) (source of nitrate not known).</p> <p>B. Likely to increase concentrations of TDS and decrease concentrations of nitrate.</p> <p>C. Previously farmed.</p> <p>D. Not a problem here.</p>
<p>7. OTHER TECHNICAL ISSUES (TRANSMISSIVITY OF AQUIFER, IMPERMEABLE LAYERS IN VADOSE ZONE, SURFACE ELEVATION OF FACILITY (MSL), ETC.)</p>	<p>Fine-grained layers in vadose zone can cause lateral movement within vadose zone.</p> <p>T $\approx 80,000$ gpd/ft based on aquifer test.</p> <p>S ≈ 0.20 based on aquifer test.</p> <p>Very favorable infiltration media.</p> <p>Facility elevation 2,570 feet above msl.</p>
<p>8. ESTIMATED ANNUAL RECHARGE VOLUME</p>	<p>40,000 AF/yr.</p>

ECONOMIC FACTORS	RRC SITE NO. 11 DESCRIPTION/DATA/ASSUMPTION
<p>1. CAPITAL COSTS A. DESCRIBE CONVEYANCE SYSTEM COMPONENTS (PIPES (CAPACITY/DIAMETER), PUMPS (CAPACITY, HEAD, BHP), SPECIAL CONSTRUCTION CONSTRAINTS)</p> <p>B. DESCRIBE RECHARGE FACILITY COMPONENTS (EARTHWORK, LENGTH OF REACH/AREA OF BASINS, ON-SITE CONSTRUCTION, PIPING & CONTROL SYSTEM, OTHER)</p>	<p>1. Capital costs = \$22,114,883. Annual cost for 20 yrs @ 8% = \$2,252,484 or \$56.31/AF A. CAP turnout @ Black Mountain Reservoir; 14.2 miles of 42" conveyance pipe.</p> <p>B. 73 acres of basins; may need flood protection dike; excavation required to depth of approximately 6 feet: 739,051 cubic yards, berm construction 42,917 cy; distribution piping: 783 lf of 36", 783 lf of 30", 783 lf of 24", and 12,000 lf of 12"; gates, pipes, interconnections, six 4" monitoring wells, flow measurement.</p>
<p>2. AVERAGE ANNUAL O&M COSTS (ENERGY, CONVEYANCE SYSTEM MAINTENANCE, RECHARGE SYSTEM MAINTENANCE)</p>	<p>O & M costs = \$90,000/yr or \$2.25 /AF; No pumping costs, flow by gravity from reservoir; vegetation & erosion control, groundwater monitoring, maintenance of conveyance and distribution systems.</p> <p>Total annual costs for recharge = \$56.31 + \$2.25 = \$58.56/AF</p>
<p>3. LAND & RIGHT OF WAY ACQUISITION (AVAILABILITY, OWNERSHIP, COST, ACRES REQUIRED, LAND USE COMPATIBILITY, PRIOR LAND USE)</p>	<p>Land owned by City of Tucson. No compatibility problems.</p>
<p>4. ENVIRONMENTAL CONSTRAINTS (ARCHEOLOGICAL, AESTHETIC, HABITAT-RELATED, FLOODING POTENTIAL, OTHER)</p>	<p>May need flood protection, no known environmental constraints; agricultural chemical residues not detected in pilot project.</p>

ECONOMIC FACTORS	RRC SITE NO. 11 DESCRIPTION/DATA/ASSUMPTION
5. REGULATORY CONSIDERATIONS (ADWR, ADEQ, PCFCD, FEMA, COE, F&WL, SAWRSA, ETC.)	Similar to other recharge sites; no special problems foreseen.
6. RECOVERY ASSUMPTIONS (LOCATION OF RECOVERY SYSTEM, DEPTH TO GWL, TRANSMISSIVITY OF AQUIFER, POTENTIAL USE OF EXISTING WELLS & PIPELINES, REQUIREMENT FOR TREATMENT, ETC.)	Assumes downgradient recovery in existing Avra Valley wellfield. Local depth to groundwater 150 feet but increases rapidly to the north. Limited existing City-owned wells for potential recovery. ADEQ has determined that no treatment will be required for drinking water use by municipal providers, but treatment may be provided on the users' option, i.e. to decrease salinity or hardness.
7. TIME REQUIRED TO IMPLEMENT (PERMITS, DESIGN, CONSTRUCTION, ETC.)	3 - 5 years.

EXTENT OF REGIONAL BENEFITS	RRC SITE NO. 11 DESCRIPTION/DATA/ASSUMPTION		
1. MULTIPLE USERS OF CONVEYANCE, RECHARGE, AND/OR RECOVERY FACILITIES	City of Tucson. Downgradient communities. Tohono O'odham Tribe.		
2. RECHARGE OBJECTIVES THAT CAN BE MET BY THIS FACILITY	<u>OBJECTIVE</u>	<u>YES</u>	<u>NO</u>
	• RECOVERY FOR POTABLE USE	X	
	• FOR NON-POTABLE USE	X	
	• ANNUAL STORAGE/RECOVERY	X	
	• LONG-TERM STORAGE, RECOVERY @ SAME LOCATION	X	
	• SHORT-TERM STORAGE, RECOVERY @SAME LOCATION	X	
	• SHORT-TERM STORAGE, RECOVERY @ DIFFERENT LOCATION	X	
	• RECHARGE/NO RECOVERY	X	
	• CAWCD RELIABILITY STORAGE	X	
	• WATER PROVIDER RELIABILITY STORAGE	X	
	• ASSURED WATER SUPPLY RECHARGE	X	
	• RIPARIAN ENHANCEMENT		X
	• SUBSIDENCE CONTROL		X
	• CONTAIN/MANAGE POOR QUALITY GROUNDWATER		X
• STATE WATER BANK	X		
• SAWRSA CLAIMS SETTLEMENT		X	
3. RECREATIONAL USES	None.		
4. ENVIRONMENTAL BENEFITS	Negligible.		

CURRENT STATUS	RRC SITE NO. 11 DESCRIPTION/DATA/ASSUMPTION
1. SITE EVALUATION	Complete.
2. BOREHOLES/TEST-PITS	Complete.
3. EXISTING OR PROPOSED FUNDING (\$,SOURCES)	Possible City of Tucson funding.
4. PILOT PERMIT APPLIED FOR/ISSUED	No.
5. FINAL STORAGE FACILITY PERMIT ISSUED	No.
6. OTHER PERMITS APPLIED FOR/ISSUED	No.

**GROUNDWATER SAVINGS FACILITY
DESCRIPTION & BASIC ASSUMPTIONS**

Preliminary information based on conceptual project design and cost estimates.

RRC SITE NO. 12

FACILITY NAME: CMID EXPANSION

<p>FACILITY DESCRIPTION</p>	<p>This is a groundwater savings project. CAP water will be delivered to existing agricultural areas in-lieu of using pumped groundwater. The portion of the CMID to the north of Tangerine Road would be irrigated by this project. There is an existing CAWCD permit for 10,000 AF/yr of groundwater savings but only 6000 to 8000 AF/yr is actually being applied. Expanding the pumping capacity at the existing CAP turnout at Tangerine Rd. from 26 cfs to 55 cfs can increase the amount used by an additional 6000 AF/yr. The total CMID irrigation demand is 30,000 AF/yr.</p>
<p>BASIC ASSUMPTIONS</p>	<p>8,000 AF of CAP water per year can be applied over the irrigation season with existing pumping capacity. The existing pumping capacity at Tangerine Rd. will be doubled by this project, expanding usage of CAP water to 14,000 AF per year. The existing 30" conveyance pipe to the CMID ditch and the existing CMID ditch have sufficient capacity to accommodate the increased flows.</p>

<p>TECHNICAL CRITERIA</p>	<p>RRC SITE NO. 12 DESCRIPTION/DATA/ASSUMPTION</p>
<p>1. INFILTRATION RATE (FT/DAY)</p>	<p>N/A.</p>
<p>2. VOLUME OF POTENTIALLY RECOVERABLE WATER IN VADOSE ZONE BELOW RECHARGE FACILITY (AF)</p>	<p>N/A.</p>
<p>3. DEPTH TO GW (FT)</p>	<p>100 to 300 feet.</p>
<p>4. TOTAL HISTORICAL GWL DECLINE (FT)</p>	<p>75 to 150 feet prior to 1970. Stable to rising over the last 25 years.</p>
<p>5. POTENTIAL TO ALLEVIATE SUBSIDENCE</p>	<p>Minimal.</p>

TECHNICAL CRITERIA	RRC SITE NO. 12 DESCRIPTION/DATA/ASSUMPTION
<p>6. GW QUALITY IMPACTS</p> <p>A. AMBIENT WATER QUALITY</p> <p>B. POTENTIAL TO DEGRADE NATIVE GW</p> <p>C. POTENTIAL SOURCES OF CONTAMINATION (LANDFILLS, EXISTING PLUMES, TDS IMPACTS, ETC.)</p> <p>D. MIGRATION OR CONTAINMENT OF CONTAMINANT PLUMES</p>	<p>A. Ambient water quality varies.</p> <p>B. Only that portion of applied water which goes to deep percolation would impact groundwater system. Varies locally - in some areas it would degrade - in others enhance.</p> <p>C. Currently agricultural land use prevails.</p> <p>D. N/A.</p>
<p>7. OTHER TECHNICAL ISSUES (TRANSMISSIVITY OF AQUIFER, IMPERMEABLE LAYERS IN VADOSE ZONE, SURFACE ELEVATION OF FACILITY (MSL), ETC.</p>	<p>N/A.</p>
<p>8. ESTIMATED ANNUAL GROUNDWATER SAVINGS VOLUME</p>	<p>6,000 AF/yr.</p>

ECONOMIC FACTORS	RRC SITE NO. 12 DESCRIPTION/DATA/ASSUMPTION
<p>1. CAPITAL COSTS</p> <p>A. DESCRIBE CONVEYANCE SYSTEM COMPONENTS (PIPES (CAPACITY/DIAMETER), PUMPS (CAPACITY, HEAD, BHP), SPECIAL CONSTRUCTION CONSTRAINTS)</p> <p>B. DESCRIBE RECHARGE FACILITY COMPONENTS (EARTHWORK, LENGTH OF REACH/AREA OF BASINS, ON-SITE CONSTRUCTION, PIPING & CONTROL SYSTEM, OTHER)</p>	<p>1. Capital costs = \$120,000 for purchase & installation of two new pumps and electrical controls. Annual costs for 20 yrs @ 8% = \$12,222 or \$2.04/AF</p> <p>A. Capital costs for purchase & installation of two new pumps.</p> <p>B. All infrastructure in place.</p>
<p>2. AVERAGE ANNUAL O&M COSTS (ENERGY, CONVEYANCE SYSTEM MAINTENANCE, RECHARGE SYSTEM MAINTENANCE)</p>	<p>Currently CMID is absorbing O&M costs.</p> <p>Projected O & M costs = \$4,136/yr or \$0.69/AF for additional power requirement of 118,167 KWH.</p> <p>No O&M costs to City for system infrastructure. City pays O&M for water supplied and capital costs for water supplied.</p> <p>Total annual cost for recharge = \$2.04 + \$0.69 = \$2.73/AF</p>
<p>3. LAND & RIGHT OF WAY ACQUISITION (AVAILABILITY, OWNERSHIP, COST, ACRES REQUIRED, LAND USE COMPATIBILITY, PRIOR LAND USE)</p>	<p>N/A.</p>
<p>4. ENVIRONMENTAL CONSTRAINTS (ARCHEOLOGICAL, AESTHETIC, HABITAT-RELATED, FLOODING POTENTIAL, OTHER)</p>	<p>Potential for need to pursue a Section 7 consultation.</p>

ECONOMIC FACTORS	RRC SITE NO. 12 DESCRIPTION/DATA/ASSUMPTION
5. REGULATORY CONSIDERATIONS (ADWR, ADEQ, PCFCD, FEMA, COE, F&WL, SAWRSA, ETC.)	Expansion of existing recharge permit.
6. RECOVERY ASSUMPTIONS (LOCATION OF RECOVERY SYSTEM, DEPTH TO GWL, TRANSMISSIVITY OF AQUIFER, POTENTIAL USE OF EXISTING WELLS & PIPELINES, REQUIREMENT FOR TREATMENT, ETC.)	CMID has a number of wells that could be used for recovery, possibly discharging into the CAP canal.
7. TIME REQUIRED TO IMPLEMENT (PERMITS, DESIGN, CONSTRUCTION, ETC.)	Currently in place, except for amendment to existing recharge permit for increased recharge volume.

EXTENT OF REGIONAL BENEFITS	RRC SITE NO. 12 DESCRIPTION/DATA/ASSUMPTION		
1. MULTIPLE USERS OF CONVEYANCE, RECHARGE, AND/OR RECOVERY FACILITIES	N/A.		
2. RECHARGE OBJECTIVES THAT CAN BE MET BY THIS FACILITY	<u>OBJECTIVE</u>	<u>YES</u>	<u>NO</u>
	• RECOVERY FOR POTABLE USE	X	
	• FOR NON-POTABLE USE	X	
	• ANNUAL STORAGE/RECOVERY	X	
	• LONG-TERM STORAGE, RECOVERY @ SAME LOCATION		X
	• SHORT-TERM STORAGE, RECOVERY @SAME LOCATION		X
	• SHORT-TERM STORAGE, RECOVERY @DIFFERENT LOCATION	X	
	• RECHARGE/NO RECOVERY		X
	• CAWCD RELIABILITY STORAGE	X	
	• WATER PROVIDER RELIABILITY STORAGE	X	
	• ASSURED WATER SUPPLY RECHARGE	X	
	• RIPARIAN ENHANCEMENT		X
	• SUBSIDENCE CONTROL		X
	• CONTAIN/MANAGE POOR QUALITY GROUNDWATER		X
• STATE WATER BANK	X		
• SAWRSA CLAIMS SETTLEMENT		X	
3. RECREATIONAL USES	N/A.		
4. ENVIRONMENTAL BENEFITS	N/A.		

CURRENT STATUS	RRC SITE NO. 12 DESCRIPTION/DATA/ASSUMPTION
1. SITE EVALUATION	N/A.
2. BOREHOLES/TEST-PITS	N/A.
3. EXISTING OR PROPOSED FUNDING (\$,SOURCES)	Proposed funding by CAWCD/Tucson.
4. PILOT PERMIT APPLIED FOR/ISSUED	N/A.
5. FINAL STORAGE FACILITY PERMIT ISSUED	Existing permit must be expanded to 14,000 AF/yr.
6. OTHER PERMITS APPLIED FOR/ISSUED	No, Section 7 consultation may be required.

**GROUNDWATER SAVINGS FACILITY
DESCRIPTION & BASIC ASSUMPTIONS**

Preliminary information based on conceptual project design and cost estimates.

RRC SITE NO. 13

FACILITY NAME: BKW FARMS EXPANSION

<p>FACILITY DESCRIPTION</p>	<p>This is a groundwater savings project. Historically, BKW Farms has pumped groundwater from eleven irrigation wells to supply water for growing agricultural crops. BKW Farms did not sign a contract for CAP water, but has desired to use CAP water if costs are equivalent to pumpage costs associated with groundwater.</p> <p>The subject BKW Farms' land is located in Pima County just northeast of the City of Tucson, and is completely within the Tucson AMA. The property is bordered on the north by the Santa Cruz River, on the east by the Tucson Mountains, on the west by Wentz Road alignment and on the south by Twin Peaks Road.</p> <p>BKW Farms began in 1993 to construct low-cost permanent distribution systems to bring CAP water to its irrigated farmland. This project has rapidly progressed because their fields are bisected by the CAP Tucson Aqueduct, so pipeline connections are a relatively short distance to BKW Farms' distribution lines.</p> <p>The current project permit is capped at 8,800 AF, but BKW Farms estimates future in-lieu CAP use could increase to 15,000 AF.</p>
<p>BASIC ASSUMPTIONS</p>	<p>Participation by water providers will be short-term (20 years) as wet-water recharge projects come on-line or when irrigated acreage is retired.</p>

<p>TECHNICAL CRITERIA</p>	<p>RRC SITE NO. 13 DESCRIPTION/DATA/ASSUMPTION</p>
<p>1. INFILTRATION RATE (FT/DAY)</p>	<p>N/A.</p>
<p>2. VOLUME OF POTENTIALLY RECOVERABLE WATER IN VADOSE ZONE BELOW RECHARGE FACILITY (AF)</p>	<p>N/A.</p>
<p>3. DEPTH TO GW (FT)</p>	<p>N/A, but depth-to-water is 300 feet according to Tucson Water Annual Static Water Level Report.</p>

TECHNICAL CRITERIA	RRC SITE NO. 13 DESCRIPTION/DATA/ASSUMPTION
4. TOTAL HISTORICAL GWL DECLINE (FT)	Decline is 100 to 150 feet according to Figure 5 in City of Tucson Report entitled "Assessment of CAP Water Recharge Alternatives."
5. POTENTIAL TO ALLEVIATE SUBSIDENCE	Minimal, if groundwater recovered for municipal purposes is in the same vicinity.
<p>6. GW QUALITY IMPACTS</p> <p>A. AMBIENT WATER QUALITY</p> <p>B. POTENTIAL TO DEGRADE NATIVE GW</p> <p>C. POTENTIAL SOURCES OF CONTAMINATION (LANDFILLS, EXISTING PLUMES, TDS IMPACTS, ETC.)</p> <p>D. MIGRATION OR CONTAINMENT OF CONTAMINANT PLUMES</p>	<p>A. Ambient TDS = 500 to 600 mg/l. Ambient nitrate (N)= 7 to 9 mg/l.</p> <p>B. Minimal. The agricultural efficiency @ BKW Farms is 75% to 82% so it is anticipated that very little of the applied water will result in deep percolation.</p> <p>C. None, as reported in the PAG Landfill Report (1995) for Pima County Flood Control District and recharge application for Avra Valley Pilot Recharge Project by CAWCD.</p> <p>D. None.</p>
7. OTHER TECHNICAL ISSUES (TRANSMISSIVITY OF AQUIFER, IMPERMEABLE LAYERS IN VADOSE ZONE, SURFACE ELEVATION OF FACILITY (MSL), ETC.)	N/A.
8. ESTIMATED ANNUAL GROUNDWATER SAVINGS VOLUME	6,200 AF/yr.

ECONOMIC FACTORS	RRC SITE NO. 13 DESCRIPTION/DATA/ASSUMPTION
<p>1. CAPITAL COSTS A. DESCRIBE CONVEYANCE SYSTEM COMPONENTS (PIPES (CAPACITY/DIAMETER), PUMPS (CAPACITY, HEAD, BHP), SPECIAL CONSTRUCTION CONSTRAINTS)</p> <p>B. DESCRIBE RECHARGE FACILITY COMPONENTS (EARTHWORK, LENGTH OF REACH/AREA OF BASINS, ON-SITE CONSTRUCTION, PIPING & CONTROL SYSTEM, OTHER)</p>	<p>A. Capital Costs = \$75,000. Annual Cost over 20 years @ 8% = \$7639, or \$1.23/AF for 36" pipe and concrete ditch connection structures for crossings at Sandario, Avra Valley and Sanders roads.</p> <p>B. None.</p>
<p>2. AVERAGE ANNUAL O&M COSTS (ENERGY, CONVEYANCE SYSTEM MAINTENANCE, RECHARGE SYSTEM MAINTENANCE)</p>	<p>Anticipated O & M costs for the improved system are \$14,699/yr or \$2.37/AF for an estimated total power requirement of 74,594 kwh/yr, and \$10,000 for system maintenance.</p> <p>Total annual cost = \$1.23/AF + \$2.37/AF = \$3.60/AF</p>
<p>3. LAND & RIGHT OF WAY ACQUISITION (AVAILABILITY, OWNERSHIP, COST, ACRES REQUIRED, LAND USE COMPATIBILITY, PRIOR LAND USE)</p>	<p>Land is owned by BKW Farms or leased from State Land Department for agricultural purposes.</p>
<p>4. ENVIRONMENTAL CONSTRAINTS (ARCHEOLOGICAL, AESTHETIC, HABITAT-RELATED, FLOODING POTENTIAL, OTHER)</p>	<p>Land has already been deemed acceptable and permitted for groundwater savings permit. The facility is out of the 100 year floodplain.</p>
<p>5. REGULATORY CONSIDERATIONS (ADWR, ADEQ, PCFCD, FEMA, COE, F&WL, SAWRSA, ETC.)</p>	<p>Existing facility is already permitted and BKW adheres to an operational plan reference within the facility permit.</p>

ECONOMIC FACTORS	RRC SITE NO. 13 DESCRIPTION/DATA/ASSUMPTION
6. RECOVERY ASSUMPTIONS (LOCATION OF RECOVERY SYSTEM, DEPTH TO GWL, TRANSMISSIVITY OF AQUIFER, POTENTIAL USE OF EXISTING WELLS & PIPELINES, REQUIREMENT FOR TREATMENT, ETC.)	N/A.
7. TIME REQUIRED TO IMPLEMENT (PERMITS, DESIGN, CONSTRUCTION, ETC.)	Construction will be completed under Existing permit conditions by May 1997.

EXTENT OF REGIONAL BENEFITS	RRC SITE NO. 13 DESCRIPTION/DATA/ASSUMPTION		
1. MULTIPLE USERS OF CONVEYANCE, RECHARGE, AND/OR RECOVERY FACILITIES	Yes, Tucson Water, CAWCD, and Metro Water District are current users of the facility. The State Water Bank and possibly other water providers if permit is expanded in volume.		
2. RECHARGE OBJECTIVES THAT CAN BE MET BY THIS FACILITY	<u>OBJECTIVE</u>	<u>YES</u>	<u>NO</u>
	• RECOVERY FOR POTABLE USE	X	
	• FOR NON-POTABLE USE	X	
	• ANNUAL STORAGE/RECOVERY		X
	• LONG-TERM STORAGE, RECOVERY @ SAME LOCATION		X
	• SHORT-TERM STORAGE, RECOVERY @SAME LOCATION		X
	• SHORT-TERM STORAGE, RECOVERY @DIFFERENT LOCATION	X	
	• RECHARGE/NO RECOVERY		X
	• CAWCD RELIABILITY STORAGE	X	
	• WATER PROVIDER RELIABILITY STORAGE	X	
	• ASSURED WATER SUPPLY RECHARGE	X	
	• RIPARIAN ENHANCEMENT		X
	• SUBSIDENCE CONTROL		X
	• CONTAIN/MANAGE POOR QUALITY GROUNDWATER		X
• STATE WATER BANK	X		
• SAWRSA CLAIMS SETTLEMENT		X	
3. RECREATIONAL USES	N/A.		
4. ENVIRONMENTAL BENEFITS	N/A.		

CURRENT STATUS	RRC SITE NO. 13 DESCRIPTION/DATA/ASSUMPTION
1. SITE EVALUATION	Completed prior to issuance of recharge permit.
2. BOREHOLES/TEST-PITS	N/A.
3. EXISTING OR PROPOSED FUNDING (\$,SOURCES)	Existing facilities constructed under a combination of monies from BKW Farms, City of Tucson and ADWR augmentation grant funds.
4. PILOT PERMIT APPLIED FOR/ISSUED	N/A.
5. FINAL STORAGE FACILITY PERMIT ISSUED	First permit issued by ADWR for 8,800 AF/year.
6. OTHER PERMITS APPLIED FOR/ISSUED	BKW Farms would like to increase the facility permit volume, once agricultural demand is demonstrated combined with confirmed interest from participants with secure funding to cost share in the construction and operation of the new improvements.

**GROUNDWATER SAVINGS FACILITY
DESCRIPTION & BASIC ASSUMPTIONS**

Preliminary information based on conceptual project design and cost estimates.

RRC SITE NO. 14

FACILITY NAME: AVRA VALLEY IRRIGATION DISTRICT

FACILITY DESCRIPTION	Proposed groundwater savings facility. Irrigation of 6,000 agricultural acres. Features include: CAP turnout, main conveyance by canals, pipe/canal lateral distribution to acreage, and associated structures.
BASIC ASSUMPTIONS	Demand is based on 6,000 acres of irrigation and a per acre utilization rate of 3.3 AF/ac/yr. There is no existing regional distribution system.

TECHNICAL CRITERIA	RRC SITE NO. 14 DESCRIPTION/DATA/ASSUMPTION
1. INFILTRATION RATE (FT/DAY)	NA.
2. VOLUME OF POTENTIALLY RECOVERABLE WATER IN VADOSE ZONE BELOW RECHARGE FACILITY (AF)	NA.
3. DEPTH TO GW (FT)	300 to 400 ft.
4. TOTAL HISTORICAL GWL DECLINE (FT)	100 to 150 ft during 1950-1994.
5. POTENTIAL TO ALLEVIATE SUBSIDENCE	None.

TECHNICAL CRITERIA	RRC SITE NO. 14 DESCRIPTION/DATA/ASSUMPTION
<p>6. GW QUALITY IMPACTS</p> <p>A. AMBIENT WATER QUALITY</p> <p>B. POTENTIAL TO DEGRADE NATIVE GW</p> <p>C. POTENTIAL SOURCES OF CONTAMINATION (LANDFILLS, EXISTING PLUMES, TDS IMPACTS, ETC.)</p> <p>D. MIGRATION OR CONTAINMENT OF CONTAMINANT PLUMES</p>	<p>A. Ambient water quality varies, but is generally good.</p> <p>B. Salinity from the CAP may degrade native GW if over-application of irrigation water leaches accumulated salts from agricultural use into the aquifer.</p> <p>C. NA.</p> <p>D. NA.</p>
<p>7. OTHER TECHNICAL ISSUES (TRANSMISSIVITY OF AQUIFER, IMPERMEABLE LAYERS IN VADOSE ZONE, SURFACE ELEVATION OF FACILITY (MSL), ETC.)</p>	<p>None.</p>
<p>8. ESTIMATED ANNUAL GROUNDWATER SAVINGS VOLUME</p>	<p>19,800 AF/yr.</p>

ECONOMIC FACTORS	RRC SITE NO. 14 DESCRIPTION/DATA/ASSUMPTION
<p>1. CAPITAL COSTS A. DESCRIBE CONVEYANCE SYSTEM COMPONENTS (PIPES (CAPACITY/DIAMETER), PUMPS (CAPACITY, HEAD, BHP), SPECIAL CONSTRUCTION CONSTRAINTS)</p> <p>B. DESCRIBE RECHARGE FACILITY COMPONENTS (EARTHWORK, LENGTH OF REACH/AREA OF BASINS, ON-SITE CONSTRUCTION, PIPING & CONTROL SYSTEM, OTHER)</p>	<p>1. Capital costs = \$3,361,800. Annual cost over 20 yrs @ 8% = \$342,412 or \$17.29/AF</p> <p>A. Costs for lined canal mains are: \$35/ft for 24-in bottom width (b.w.) (9,000 ft, 50 cfs), \$30/ft for 20-inch b.w. (7,700 ft, 35-30 cfs), \$25/ft for 18-inch b.w. (3,600 ft, 20 cfs). Two siphons under roadways at \$250,000 total. Associated structures: 4 well boxes with gates at \$200,000 total. Turnout at 50 cfs \$200,000. Irrigation lateral canals/pipe costs are: \$20/ft for 12 to 18-inch b.w. (22,500 ft, 4-20 cfs) and \$110/ft for 30-inch pipe (5,000 ft, 20 cfs); associated structures at \$100,000 total; and twenty distribution boxes and gates at \$10,000 each for a total of \$200,000.</p> <p>B. A 20,300 lf canal that generally follows pre-existing road alignments is the majority of the earth work. Two siphons for the road alignment and for the China Wash mitigate most drainage effects.</p>
<p>2. AVERAGE ANNUAL O&M COSTS (ENERGY, CONVEYANCE SYSTEM MAINTENANCE, RECHARGE SYSTEM MAINTENANCE)</p>	<p>O & M costs = \$80,000 or \$4.04/AF</p> <p>The CAP turnout will feed a gravity system, therefore no power costs are anticipated. O&M costs are: one FTE at \$30,000 per year and materials at \$50,000 per year.</p> <p>Total annual costs for recharge = \$17.29 ÷ \$4.04 = \$21.33/AF</p>
<p>3. LAND & RIGHT OF WAY ACQUISITION (AVAILABILITY, OWNERSHIP, COST, ACRES REQUIRED, LAND USE COMPATIBILITY, PRIOR LAND USE)</p>	<p>Most land is in AVID. ASLD land could be used. Roadway right of way may add to costs.</p>
<p>4. ENVIRONMENTAL CONSTRAINTS (ARCHEOLOGICAL, AESTHETIC, HABITAT-RELATED, FLOODING POTENTIAL, OTHER)</p>	<p>None.</p>

ECONOMIC FACTORS	RRC SITE NO. 14 DESCRIPTION/DATA/ASSUMPTION
5. REGULATORY CONSIDERATIONS (ADWR, ADEQ, PCFCD, FEMA, COE, F&WL, SAWRSA, ETC.)	Possible Section 404 permit to construct wash crossings .
6. RECOVERY ASSUMPTIONS (LOCATION OF RECOVERY SYSTEM, DEPTH TO GWL, TRANSMISSIVITY OF AQUIFER, POTENTIAL USE OF EXISTING WELLS & PIPELINES, REQUIREMENT FOR TREATMENT, ETC.)	N/A.
7. TIME REQUIRED TO IMPLEMENT (PERMITS, DESIGN, CONSTRUCTION, ETC.)	About one year.

EXTENT OF REGIONAL BENEFITS	RRC SITE NO. 14 DESCRIPTION/DATA/ASSUMPTION		
1. MULTIPLE USERS OF CONVEYANCE, RECHARGE, AND/OR RECOVERY FACILITIES	Benefits accrue directly to the irrigation acreage if water and structure costs are below present costs of supplying groundwater.		
2. RECHARGE OBJECTIVES THAT CAN BE MET BY THIS FACILITY	<u>OBJECTIVE</u>	<u>YES</u>	<u>NO</u>
	• RECOVERY FOR POTABLE USE	X	
	• FOR NON-POTABLE USE	X	
	• ANNUAL STORAGE/RECOVERY		X
	• LONG-TERM STORAGE, RECOVERY @ SAME LOCATION		X
	• SHORT-TERM STORAGE, RECOVERY @SAME LOCATION		X
	• SHORT-TERM STORAGE, RECOVERY @ DIFFERENT LOCATION	X	
	• RECHARGE/NO RECOVERY		X
	• CA WCD RELIABILITY STORAGE	X	
	• WATER PROVIDER RELIABILITY STORAGE	X	
	• ASSURED WATER SUPPLY RECHARGE	X	
	• RIPARIAN ENHANCEMENT		X
	• SUBSIDENCE CONTROL		X
	• CONTAIN/MANAGE POOR QUALITY GROUNDWATER		X
• STATE WATER BANK	X		
• SAWRSA CLAIMS SETTLEMENT		X	
3. RECREATIONAL USES	NA.		
4. ENVIRONMENTAL BENEFITS	NA.		

CURRENT STATUS	RRC SITE NO. 14 DESCRIPTION/DATA/ASSUMPTION
1. SITE EVALUATION	N/A.
2. BOREHOLES/TEST-PITS	N/A.
3. EXISTING OR PROPOSED FUNDING (\$,SOURCES)	Proposed CAWCD/City of Tucson funding.
4. PILOT PERMIT APPLIED FOR/ISSUED	No.
5. FINAL STORAGE FACILITY PERMIT ISSUED	No.
6. OTHER PERMITS APPLIED FOR/ISSUED	No.

**GROUNDWATER SAVINGS FACILITY
DESCRIPTION & BASIC ASSUMPTIONS**

Preliminary information based on conceptual project design and cost estimates.

RRC SITE NO. 15

FACILITY NAME: FICO-SAHUARITA

<p>FACILITY DESCRIPTION</p>	<p>This proposed groundwater savings project involves the conveyance of 20,000 AF/yr of untreated CAP water from the CAP terminus at Pima Mine Road to the upper end of FICO-Sahuarita farm with intermediate outlets for irrigation. There are three other projects that can be served from the CAP turnout at the terminus: ASARCO-Sahuarita (9000 AF/yr), which is west of the terminus, and the Santa Cruz River @ San Xavier District (8448 AF/yr) and Recharge Basins @ Pima Mine Rd (23,000 AF/yr) projects, which are east of the terminus. A new 36" pipeline is being designed from the terminus easterly along Pima Mine Rd to the Basins @ PMR. This line will be 36" in diameter except for a segment (estimated to be 2260' long, about 300' of which is hung on the bridge crossing the Santa Cruz River) which will be reduced to 24". The cost of this line could be shared by the three projects which are east of the terminus. The size of this line, however, is not large enough to deliver the peak flow (66.85 cfs) required by FICO. After construction of the Pima Mine Road Basins project, service to FICO would involve the replacement of the 24" segment with 36" pipe buried under the Santa Cruz River and construction of a new pumping station on the east side of the bridge.</p>
<p>BASIC ASSUMPTIONS</p>	<p>It is assumed that construction of this project occurs subsequent to the construction of the Pima Mine Road Basins project as currently designed. Irrigation of 3100 acres pecans & 300 acres other crops. Annual use: 20,000 AF <u>Delivery Rates</u> June 15 to Sept 15: 30,000 gpm (66.85 cfs) Sept 15 to Nov 10: 10,000 gpm (22.28 cfs) Nov 10 to Mar 15: none Mar 15 to Jun 15: 10,000 gpm (22.28 cfs)</p>

TECHNICAL CRITERIA	RRC SITE NO. 15 DESCRIPTION/DATA/ASSUMPTION
1. INFILTRATION RATE (FT/DAY)	N/A.
2. VOLUME OF POTENTIALLY RECOVERABLE WATER IN VADOSE ZONE BELOW RECHARGE FACILITY (AF)	N/A.
3. DEPTH TO GW (FT)	200 - 300 ft.
4. TOTAL HISTORICAL GWL DECLINE (FT)	2 to 3 ft/yr
5. POTENTIAL TO ALLEVIATE SUBSIDENCE	Yes.
6. GW QUALITY IMPACTS A. AMBIENT WATER QUALITY B. POTENTIAL TO DEGRADE NATIVE GW C. POTENTIAL SOURCES OF CONTAMINATION (LANDFILLS, EXISTING PLUMES, TDS IMPACTS, ETC.) D. MIGRATION OR CONTAINMENT OF CONTAMINANT PLUMES	A. Ambient water quality is generally good. B. CAP water is higher in TDS than ambient groundwater, but only a small percentage of irrigation water should travel to the aquifer. C. Over application of irrigation water could result in leaching of nitrates, pesticides and herbicides from the vadose zone. Proper irrigation techniques would minimize this hazard. D. There is a sulfate plume to the northwest and a nitrate plume to the northeast which could migrate if groundwater mounding is caused by over irrigation.
7. OTHER TECHNICAL ISSUES (TRANSMISSIVITY OF AQUIFER, IMPERMEABLE LAYERS IN VADOSE ZONE, SURFACE ELEVATION OF FACILITY (MSL), ETC.)	None.
8. ESTIMATED ANNUAL GROUNDWATER SAVINGS VOLUME	20,000 AF/yr.

ECONOMIC FACTORS	RRC SITE NO. 15 DESCRIPTION/DATA/ASSUMPTION
<p>1. CAPITAL COSTS A. DESCRIBE CONVEYANCE SYSTEM COMPONENTS (PIPES (CAPACITY/DIAMETER), PUMPS (CAPACITY, HEAD, BHP), SPECIAL CONSTRUCTION CONSTRAINTS)</p> <p>B. DESCRIBE RECHARGE FACILITY COMPONENTS (EARTHWORK, LENGTH OF REACH/AREA OF BASINS, ON-SITE CONSTRUCTION, PIPING & CONTROL SYSTEM, OTHER)</p>	<p>1. Capital costs = \$6,686,746. Annual costs over 20 yrs @ 8% = \$681,070 or \$34.05/AF A. Capital costs include replacement of 2260 lf of 24" pipe with 2260 lf of 36" pipe (\$282,500), installed in 2000 lf of 48" sleeve (\$750,000), 15,150 lf of 36" pipe (\$1,893,750) from the Pima Mine Road Basins project to the midpoint of FICO, and 15,840 lf of 30" pipe (\$1,742,400) from the midpoint of FICO to its southern end, and a new lift station (98 cfs @ 3600 BHP).</p> <p>Note: 1. Pipeline and pump station could be upsized and extended to deliver to Green Valley golf courses, FICO Continental Farm (9000 AF/yr), Cyprus Sierrita Mine, etc. 2. Tucson Water has well field and 2-36" pipelines 2 miles downstream for recovery and gravity delivery to Tucson metropolitan area of groundwater saved.</p> <p>B. N/A.</p>
<p>2. AVERAGE ANNUAL O&M COSTS (ENERGY, CONVEYANCE SYSTEM MAINTENANCE, RECHARGE SYSTEM MAINTENANCE)</p>	<p>O & M costs = \$428,401 or \$21.42/AF for electrical power, and maintenance. Note: The cost of power could be eliminated by redesigning the Pima Mine Rd pipeline as a 48" line. The CAP turnout is at elevation 2800, with about 13 psi of pressure, and the south end of the FICO farm is at elevation 2750, so there is a 80 ft of head available.</p> <p>Total annual costs for recharge = \$34.05+\$21.42 = \$55.47/AF</p>
<p>3. LAND & RIGHT OF WAY ACQUISITION (AVAILABILITY, OWNERSHIP, COST, ACRES REQUIRED, LAND USE COMPATIBILITY, PRIOR LAND USE)</p>	<p>None.</p>

ECONOMIC FACTORS	RRC SITE NO. 15 DESCRIPTION/DATA/ASSUMPTION
4. ENVIRONMENTAL CONSTRAINTS (ARCHEOLOGICAL, AESTHETIC, HABITAT-RELATED, FLOODING POTENTIAL, OTHER)	Floodplain use permit, Section 404 permit, Section 7 consultation.
5. REGULATORY CONSIDERATIONS (ADWR, ADEQ, PCFCD, FEMA, COE; F&WL, SAWRSA, ETC.)	Groundwater Savings Facility Permit, Groundwater Storage Permit required.
6. RECOVERY ASSUMPTIONS (LOCATION OF RECOVERY SYSTEM, DEPTH TO GWL, TRANSMISSIVITY OF AQUIFER, POTENTIAL USE OF EXISTING WELLS & PIPELINES, REQUIREMENT FOR TREATMENT, ETC.)	Recovery by existing City of Tucson well field downstream.
7. TIME REQUIRED TO IMPLEMENT (PERMITS, DESIGN, CONSTRUCTION, ETC.)	12 to 24 months.

EXTENT OF REGIONAL BENEFITS	RRC SITE NO. 15 DESCRIPTION/DATA/ASSUMPTION		
1. MULTIPLE USERS OF CONVEYANCE, RECHARGE, AND/OR RECOVERY FACILITIES	City of Tucson, and the CAWCD could share the groundwater savings facility. There is the potential for conveyance facilities to be upsized for serving FICO-Continental farm, Green Valley golf courses, Cypress-Pima Mine, etc.		
2. RECHARGE OBJECTIVES THAT CAN BE MET BY THIS FACILITY	<u>OBJECTIVE</u>	<u>YES</u>	<u>NO</u>
	• RECOVERY FOR POTABLE USE	X	
	• FOR NON-POTABLE USE	X	
	• ANNUAL STORAGE/RECOVERY		X
	• LONG-TERM STORAGE, RECOVERY @ SAME LOCATION		X
	• SHORT-TERM STORAGE, RECOVERY @SAME LOCATION		X
	• SHORT-TERM STORAGE, RECOVERY @DIFFERENT LOCATION	X	
	• RECHARGE/NO RECOVERY		X
	• CAWCD RELIABILITY STORAGE	X	
	• WATER PROVIDER RELIABILITY STORAGE	X	
	• ASSURED WATER SUPPLY RECHARGE	X	
	• RIPARIAN ENHANCEMENT		X
	• SUBSIDENCE CONTROL		X
	• CONTAIN/MANAGE POOR QUALITY GROUNDWATER		X
• STATE WATER BANK	X		
• SAWRSA CLAIMS SETTLEMENT		X	
3. RECREATIONAL USES	None.		
4. ENVIRONMENTAL BENEFITS	None.		

CURRENT STATUS	RRC SITE NO. 15 DESCRIPTION/DATA/ASSUMPTION
1. SITE EVALUATION	None.
2. BOREHOLES/TEST-PITS	N/A.
3. EXISTING OR PROPOSED FUNDING (\$,SOURCES)	None.
4. PILOT PERMIT APPLIED FOR/ISSUED	None.
5. FINAL STORAGE FACILITY PERMIT ISSUED	None.
6. OTHER PERMITS APPLIED FOR/ISSUED	None.

**GROUNDWATER SAVINGS FACILITY
DESCRIPTION & BASIC ASSUMPTIONS**

Preliminary information based on conceptual project design and cost estimates.

RRC SITE NO. 16

FACILITY NAME: ASARCO-MISSION

<p>FACILITY DESCRIPTION</p>	<p>Deliver CAP water to the proposed ASARCO water recycling pond at Pima Mine Road, west of the existing CAP Terminus, in-lieu of existing pumped groundwater. In 1995 ASARCO-Mission pumped 10,770.7 AF of groundwater (using a total of 17,335.3 AF of Type I and Type II groundwater rights). An additional 2982.3 AF of water was pumped from Indian wells. The maximum that could have been pumped, therefore, is 20,317.6 AF. In 1995 the mine reported the usage of 12,852.7 AF of freshwater used for milling operations and 12 AF for domestic use, plus an additional 18,342.6 AF of recycled water for other uses.</p>
<p>BASIC ASSUMPTIONS</p>	<p>It is assumed that CAP water could be used in-lieu of the quantity of groundwater used for milling operations in 1995, which is approximately 13,000 AF. Groundwater could continue to be used for domestic purposes, and ASARCO would construct the necessary modifications to their water distribution system.</p>

<p>TECHNICAL CRITERIA</p>	<p>RRC SITE NO. 16 DESCRIPTION/DATA/ASSUMPTION</p>
<p>1. INFILTRATION RATE (FT/DAY)</p>	<p>N/A.</p>
<p>2. VOLUME OF POTENTIALLY RECOVERABLE WATER IN VADOSE ZONE BELOW RECHARGE FACILITY (AF)</p>	<p>N/A.</p>
<p>3. DEPTH TO GW (FT)</p>	<p>200 to 300 ft.</p>
<p>4. TOTAL HISTORICAL GWL DECLINE (FT)</p>	<p>3 to 4 ft/yr.</p>
<p>5. POTENTIAL TO ALLEVIATE SUBSIDENCE</p>	<p>Yes.</p>

TECHNICAL CRITERIA	RRC SITE NO. 16 DESCRIPTION/DATA/ASSUMPTION
<p>6. GW QUALITY IMPACTS</p> <p>A. AMBIENT WATER QUALITY</p> <p>B. POTENTIAL TO DEGRADE NATIVE GW</p> <p>C. POTENTIAL SOURCES OF CONTAMINATION (LANDFILLS, EXISTING PLUMES, TDS IMPACTS, ETC.)</p> <p>D. MIGRATION OR CONTAINMENT OF CONTAMINANT PLUMES</p>	<p>A. Ambient water quality data is unavailable.</p> <p>B. N/A.</p> <p>C. N/A.</p> <p>D. Existing high sulfate plume is possibly being contained by existing well pumping. Reduction of this existing well pumpage by in-lieu use of CAP water may cause this plume to migrate.</p>
<p>7. OTHER TECHNICAL ISSUES (TRANSMISSIVITY OF AQUIFER, IMPERMEABLE LAYERS IN VADOSE ZONE, SURFACE ELEVATION OF FACILITY (MSL), ETC.)</p>	<p>None.</p>
<p>8. ESTIMATED ANNUAL GROUNDWATER SAVINGS VOLUME</p>	<p>13,000 AF/yr.</p>

ECONOMIC FACTORS	RRC SITE NO. 16 DESCRIPTION/DATA/ASSUMPTION
<p>1. CAPITAL COSTS A. DESCRIBE CONVEYANCE SYSTEM COMPONENTS (PIPES (CAPACITY/DIAMETER), PUMPS (CAPACITY, HEAD, BHP), SPECIAL CONSTRUCTION CONSTRAINTS)</p> <p>B. DESCRIBE RECHARGE FACILITY COMPONENTS (EARTHWORK, LENGTH OF REACH/AREA OF BASINS, ON-SITE CONSTRUCTION, PIPING & CONTROL SYSTEM, OTHER)</p>	<p>1. Capital Costs = \$981,500. Annual costs over 20 years @ 8% = \$99,969 or \$7.69/AF. A. Capital costs include modification to CAP turnout (\$50,000), modifications to the existing ASARCO piping system (\$50,000), 4440 lf of 24" pipe (\$555,000); and a new 8000 gpm, 225 BHP pumping station (\$100,000).</p> <p>B. N/A.</p>
<p>2. AVERAGE ANNUAL O&M COSTS (ENERGY, CONVEYANCE SYSTEM MAINTENANCE, RECHARGE SYSTEM MAINTENANCE)</p>	<p>O & M costs = \$156,299 or \$12.02/AF, including costs for pipeline and pumping station maintenance and electrical power.</p> <p>Total annual cost of groundwater savings = \$7.69/AF + \$12.02/AF = \$19.71/AF.</p>
<p>3. LAND & RIGHT OF WAY ACQUISITION (AVAILABILITY, OWNERSHIP, COST, ACRES REQUIRED, LAND USE COMPATIBILITY, PRIOR LAND USE, PRIOR LAND USE)</p>	<p>None.</p>
<p>4. ENVIRONMENTAL CONSTRAINTS (ARCHEOLOGICAL, AESTHETIC, HABITAT-RELATED, FLOODING POTENTIAL, OTHER)</p>	<p>None.</p>

ECONOMIC FACTORS	RRC SITE NO. 16 DESCRIPTION/DATA/ASSUMPTION
5. REGULATORY CONSIDERATIONS (ADWR, ADEQ, PCFCD, FEMA, COE, F&WL, SAWRSA, ETC.)	None.
6. RECOVERY ASSUMPTIONS (LOCATION OF RECOVERY SYSTEM, DEPTH TO GWL, TRANSMISSIVITY OF AQUIFER, POTENTIAL USE OF EXISTING WELLS & PIPELINES, REQUIREMENT FOR TREATMENT, ETC.)	Recovery at existing city wells.
7. TIME REQUIRED TO IMPLEMENT (PERMITS, DESIGN, CONSTRUCTION, ETC.)	12 to 18 months.

EXTENT OF REGIONAL BENEFITS	RRC SITE NO. 16 DESCRIPTION/DATA/ASSUMPTION		
1. MULTIPLE USERS OF CONVEYANCE, RECHARGE, AND/OR RECOVERY FACILITIES	None.		
2. RECHARGE OBJECTIVES THAT CAN BE MET BY THIS FACILITY	<u>OBJECTIVE</u>	<u>YES</u>	<u>NO</u>
	• RECOVERY FOR POTABLE USE	X	
	• FOR NON-POTABLE USE	X	
	• ANNUAL STORAGE/RECOVERY		X
	• LONG-TERM STORAGE, RECOVERY @ SAME LOCATION		X
	• SHORT-TERM STORAGE, RECOVERY @ SAME LOCATION		X
	• SHORT-TERM STORAGE, RECOVERY @ DIFFERENT LOCATION	X	
	• RECHARGE/NO RECOVERY		X
	• CAWCD RELIABILITY STORAGE	X	
	• WATER PROVIDER RELIABILITY STORAGE	X	
	• ASSURED WATER SUPPLY RECHARGE	X	
	• RIPARIAN ENHANCEMENT		X
	• SUBSIDENCE CONTROL		X
	• CONTAIN/MANAGE POOR QUALITY GROUNDWATER		X
• STATE WATER BANK	X		
• SAWRSA CLAIMS SETTLEMENT		X	
3. RECREATIONAL USES	None.		
4. ENVIRONMENTAL BENEFITS	None.		

FINAL DRAFT

APPENDIX F. Permitted Recharge Facilities
Table 1- Permitted Recharge Facilities

Permit No./ Facility Name	Type of Recharge	Recharge Volume (AF)*	Source Water	Credits Accrued (AF)	Associated Permits	Project Status/ Comments
72-538100 CAWCD/CMID	GSF	10,000	CAP	2,650 as of 12/31/94	73-538100 73-547710	Facility is permitted and operating. Tucson Water & CAWCD are supplying water. One of the two entities may apply to increase the permit volume.
72-538133 CAWCD / Tucson Water / MDWID / BKW Farms	GSF	8,800	CAP	2,014 as of 12/31/94	73-538133 73-545928 73-555750	Facility is permitted & operating. CAWCD and Tucson are supplying water. Augmentation grant awarded to construct delivery ditch - \$51,000.
71-535587 Tucson Water - 1st Pilot Injection Project	IW	10,000	CAP	2,394.9 as of 12/31/93	73-535587	Facility is permitted. No injection was done in 1994 or 1995 due to Mayor & Council decision to cease CAP deliveries.
71-537406 Tucson Water - 2nd Pilot Injection Project	IW	10,000	CAP	2.2 as of 12/31/93	73-537406	Facility is permitted. Reported 1574 AF in 1994. No injection since 10/1/94 maintenance outage and Mayor & Council decision to cease all deliveries of CAP.
71-520083 Sweetwater USF	SB	6,500	Effluent	80.1 as of 12/31/93	73-520083	Facility is permitted. Have applied to increase # of basins to reach max permitted amount of 6,500 AF. Expansion will include wetland facility in addition to recharge basins.
71-551092 CAWCD / MDWID Avra Valley Pilot Project RRC Site No. 3	SB	10,000	CAP	NA	73-551092 73-552745	Capacity of full scale facility may be limited by fine grained layers. Part of Northwest Replenishment Program. Permit issued in July, 1996.

*Estimated recharge volume based on preliminary site facility descriptions.

GSF-Groundwater Savings Facility

IW-Injection Wells

IC-In-channel

SB-Spreading Basins

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**Table 2 - Proposed Recharge Facilities
(Not Evaluated by RRC)**

Permit No./ Facility Name	Type of Recharge	Recharge Volume (AF)*	Source Water	Credits Accrued (AF)	Associated Permits	Project Status/ Comments
71-545944 Tucson Water - Santa Cruz River Managed Project	IC	9,307	Effluent	NA	73-545943	Application found incomplete/incorrect on 1/5/95. Field trip was held with applicant in February, 1995 to resolve some issues. Two objections received 4/3/96. Final complete/correct determination is pending.
64-544777 SaddleBrooke	IW	621	Effluent	NA	NA	Application found incomplete/incorrect on 10/13/94. Applicant has indicated project will not be pursued.
71-545220 Pima County Wastewater Santa Cruz River	IC	~ 17,000?	Effluent	NA	NA	Applicant has requested that this application be put on hold. Application is based in part upon the County recharging the SAWRSA effluent.
High Plains Effluent Recharge Project	SB	600	Effluent	NA	NA	Research project for riparian enhancement supported by High Plains and Water Protection Fund money. Sponsors include Pima County, Tucson Water, Marana. No application submitted. Pre-application meetings have been held.
Tucson Water /BKW- Central Avra Valley Groundwater Savings	GSF	750	CAP	NA	NA	Proposed. Associated with CAV-SARP Project. (A modification of 72-538133)
Picacho Pecans/Kai 72-7558092	GSF	10,000	CAP	NA	NA	Application received 6/5/96.
Tucson - San Xavier Surface Basins	SB	10,000	CAP	NA	NA	Proposed. Negotiations with District and Nation are ongoing.
Pima County - Avra Valley & Green Valley Wastewater Treatment facilities	SB	1,500	Effluent	NA	NA	Proposed. County has had discussions with potential buyers of San Ignacio golf course. County would recharge effluent from plants, sell credits to GV Water Co, operate golf course well as recovery well.

*Estimated recharge volume based on preliminary site facility descriptions.

GSF-Groundwater Savings Facility

IW-Injection Wells

IC-In-channel

SB-Spreading Basins

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**Table 3- Proposed Recharge Facilities
(Evaluated by RRC)**

Permit No./ Facility Name	Type of Recharge	Recharge Volume (AF)*	Source Water	Credits Accrued (AF)	Associated Permits	Project Status/ Comments
Pima Co., Metro Water, etc. - Lower Santa Cruz River Replenishment Project RRC Site 1	SB IC	44,000	CAP and Effluent	NA	NA	Part of overall NW Replenishment Program. Studies are underway and partially supported with a \$296,000 augmentation grant. Additional funding/in-kind services provided by BOR and other NW area interests. Pre-application meeting held on 11/27/95.
Metro Water, Pima Co. - Oro Valley Canada Del Oro Recharge Project RRC Site 2	SB IC	25,000	CAP	NA	NA	Area is under investigation. Studies are being supported by two augmentation grants for ~ \$75,000 and part of another grant for \$296,000. Additional funding/in-kind services provided by BOR and other NW area interests. Part of Northwest Replenishment Program.
Tucson Water/CAWCD - Pima Mine Road Project RRC Site 4	SB	10,000	CAP	NA	NA	Application submitted on 12/20/95. Incomplete/incorrect, letter was sent 3/1/96.
Tucson Water-Central Avra Valley Storage & Recovery (CAV-SARIP) 71-557981 RRC Site 5	SB	60,000	CAP	NA	NA	Pilot. Application submitted on 5/29/96 for 500 AF. Found complete/correct on 6/7/96. Three objections received and denied.
Tucson Water - South Avra Valley RRC Site 6	SB	44,000	CAP	NA	NA	Proposed.
West of CAP @ Tangerine Rd. RRC Site 7	GSF	50,000	CAP	NA	NA	Proposed.
Tucson/BOR-San Xavier Arroyos RRC Site 8	IC	9,000	CAP	NA	NA	Proposed. Use natural arroyos within San Xavier District to recharge water released from blowoff structures. District and Tohono O'odham Nation may pursue project.

* Estimated recharge volume based on preliminary site facility descriptions.

GSF-Groundwater Savings Facility

IW-Injection Wells

IC-In-channel

SB-Spreading Basins

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FINAL DRAFT

**Table 3- Proposed Recharge Facilities
(Evaluated by RRC)**

Permit No./ Facility Name	Type of Recharge	Recharge Volume (AF)*	Source Water	Credits Accrued (AF)	Associated Permits	Project Status/ Comments
Tucson Water - Santa Cruz River at Pima Mine Road RRC Site 9	IC	8,500	CAP	NA	NA	Proposed. Pipeline required from CAP terminus to river. Tohono O'odham Nation and San Xavier District may pursue project.
Pantano, Tanque Verde Rillito River RRC Site 10	IC	17,000	CAP	NA	NA	Proposed.
Tucson Water - Brawley Wash at Three Points RRC Site 11	SB	40,000	CAP	NA	NA	Proposed. Pilot tests show good recharge rates, but site is not close to CAP canal.
Cortaro Marana Irrigation District Expansion RRC Site 12	GSF	6,000	CAP	NA	75-538100 73-547710	Expansion of existing GSF from 10,000 AF/year to 16,000 AF/year.
BKW Farms Expansion 72-538133 RRC Site 13	GSF	6,200	CAP	NA	73-538133 73-545928 73-555750	Expansion of existing GSF from 8,800 AF/year to 15,000 AF/year.
Avra Valley Irrigation District RRC Site 14	GSF	20,000	CAP	NA	NA	Preliminary meeting held in late 1994. No application submitted to date.
Farmers Investment Co. RRC Site 15	GSF	20,000	CAP	NA	NA	Conceptual phase. Pipeline construction required.
ASARCO - Mission RRC Site 16	GSF	9,000+	CAP	NA	NA	Proposed.

* Estimated recharge volume based on preliminary site facility descriptions.

GSF-Groundwater Savings Facility

IW-Injection Wells

IC-In-channel

SB-Spreading Basins

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**Table 4- Newly Proposed Recharge Facilities
(Not Evaluated by RRC)**

Permit No./ Facility Name	Type of Recharge	Recharge Volume (AF)*	Source Water	Credits Accrued (AF)	Associated Permits	Project Status/ Comments
Tanner Gravel Pit	SB	7,000	CAP	NA	NA	Proposed.
Tucson Airport Remediation Project (TARP)-Santa Cruz River	IC	10,000	Remediated GW	NA	NA	Proposed.
Alvernon/Rillito Storm Drain	IC	50,000	CAP	NA	NA	Proposed.
Pascua Yaqui	SB	10,000	CAP	NA	NA	Proposed.
Avra Valley Gravel Pit	SB	10,000	CAP	NA	NA	Proposed.
Ajo Detention Basin	SB	10,000	CAP	NA	NA	Proposed.

* Estimated recharge volume based on preliminary site facility descriptions.

GSF-Groundwater Savings Facility

IW-Injection Wells

IC-In-channel

SB-Spreading Basins

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Phoenix AMA Proposed Underground Storage Facility (USF) Projects, August 15, 1996

Project	(F)ull/(P)ilot (Pr)oposed/ (In)-Process	TYPE OF FACILITY	LEGAL LOCATION	SUB-BASIN LOCATION	SOURCE WATERS	PROPOSED VOLUME	MAP NUMBER
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Proposed Projects Utilizing CAP Water

CAWCD/Agua Fria	F/Pr	Unknown	Unknown	WSRV	CAP	50,000	20
Scottsdale Water Campus	F/Pr	Constructed Facility (Vadose Zone Injection Wells)	4N 4E Sec 25 SE of SE1/4	ESRV	CAP/Effluent	37,337	11
Peoria/Skunk Creek	F/In	Constructed Facility (Vadose Zone Injection Wells/Infiltration Basins)	3N 1E Sec 2,11	WSRV	CAP/SRP/SW	30,000	27
W. Maricopa Combine	F/In	Managed Facility	3N 5W Sec 1, 11-14 4N 4W Sec 19,20,30,31 4N 5W Sec 25, 36	Hassayampa	CAP	25,000	34
Goodyear	F/In	Constructed Facility (Infiltration Basins)	2N 2W East 1/2 Sec 9 & 16	WSRV	CAP (MWD)	20,000	22
SW Facility Beardsley Terminus	F/Pr	Unknown	Unknown	WSRV	CAP	20,000	32
Surprise/MWD McMicken Dam Extension	F/Pr	Constructed Facility (Infiltration Basins)	4N 2W Sec 34	WSRV	CAP	7,500	13
Del Webb Grande Avenue	F/In	Constructed Facility (Recharge Trenches)	4N 1W Sec 19,20, 29-32 4N 2W Sec 24-26,35,36	WSRV	CAP/SW	4,000	15
Superstition Mtns.	F/In	Managed Facility	1S 8E Sec 8 NW of SE of NW1/4	ESRV	CAP	2,352	33
CAWCD/Queen Creek	F/Pr	Unknown	Unknown	ESRV	CAP	Unknown	35

Proposed Projects Utilizing Effluent

Phoenix/91st Ave. WWTP	F/Pr	Constructed Facility (Infiltration Basins)	Unknown	WSRV	Effluent	141,000	29
Mesa/Queen Creek Wash	F/Pr	Constructed Facility (Infiltration Basins)	Unknown	ESRV	Effluent	47,000	31
Phoenix/23rd Ave. WWTP	F/Pr	Constructed Facility (Infiltration Basins)	Unknown	WSRV	Effluent	35,000	28
Mesa/NWWRP	F/Pr	Constructed Facility (Infiltration Basins)	1N 5E Sec 4 South 1/2	ESRV	Effluent	17,922	7
Phoenix/Cave Creek Project	F/Pr	Unknown	4N 3E Sec 14 NW of NW1/4	ESRV	Effluent	8,961	21
Tempe Kyrene	F/Pr	Constructed Facility (Injection Wells)	1S 4E Sec 10 SE1/4	ESRV	Effluent	6,700	14
Glendale Western Area Recharge	F/Pr	Unknown	Unknown	WSRV	Effluent	6,500	25
Chandler Regional Park	F/Pr	Constructed Facility (Injection Wells) (Pilot in Progress)	2S 5E Sec 10 SE of NE1/4	ESRV	Effluent	5,600	3
Surprise WWTP	F/Pr	Constructed Facility (Infiltration Basin)	3N 1W Sec 22 SW 1/4	WSRV	Effluent	3,360	12
Peoria Beardsley	F/Pr	Constructed Facility (Infiltration Basins)	4N 4E Sec 30 SE of NE of NW1/4	ESRV	Effluent	2,240	23
Pima Utilities/ Sun Lakes	P/Pr	Constructed Facility (Injection Wells)	2S 5E Sec 29	ESRV	Effluent	800	30
Goodyear WWTP	P/Pr	Unknown	Unknown	WSRV	Effluent	336	26
SRP/ASU Mobile In Situ (Grant)	P/Pr	Constructed Facility (Injection Well)	Various	Various	Various	Various	N/A

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Phoenix AMA Permitted Groundwater Savings Facilities (GSF's), August 15, 1996

PERMIT TYPE/NO. (DURATION)	PERMIT HOLDER	PROJECT DESCRIPTION	ASSOCIATED WATER STORAGE PERMIT NO.s AND PERMIT HOLDER	SUB-BASIN LOCATION	SOURCE WATERS	PERMITTED VOLUME	TOTAL WSP VOLUME	CAP VOLUME	EFFLUENT VOLUME
GSF 72-553133 (6/1/96 to 12/31/05)	Salt River Project	Indirect recharge of up to 200,000 acre feet annually of CAP water within the Salt River Project boundaries. TEMPE WSP WILL GO OUT WITHIN 2 WEEKS	73-555520: Glendale 73-557848: Del Webb 73-557418: CAWCD 73-553133.2 Paoria 73-553133.1 Scottsdale 73-553133.3 TEMPE	ESRV	CAP	200,000	310,000	310,000	
GSF 72-545695 (2/23/95 to 12/31/10)	RWCD	Indirect recharge of up to 100,000 acre feet annually of CAP water and effluent through RWCD's water users.	73-547123: Chandler 73-545895.2: Chandler 73-545895.1 CAWCD 73-545895.3 Mesa	ESRV	CAP Effluent	100,000	143,100	140,000	3,100
GSF 72-533659 (1/1/05 to 1/1/22)	City of Tempe	Indirect recharge of up to 85,000 acre feet annually of CAP water at New Magma Irrigation District. Will be converting to a WSP.	73-533659: Tempe	ESRV	CAP	85,000	85,000	85,000	
GSF 72-534888 (4/21/92 to 12/31/95) Note: Permit Expired - Permittee filed for extension.	CAWCD	Indirect recharge of up to 40,000 acre feet annually of CAP water at New Magma Irrigation District. Will lose this GSF permit but keep WSP.	73-534888: CAWCD	ESRV	CAP	40,000	40,000	40,000	
GSF 72-558246	MWD	Indirect Recharge of up to 20,000 acre feet annually in 1996 and 40,000 in 1997. Only two years project		WSRV	CAP	30,000			
GSF 72-534550 (7/17/92 to 12/31/95) Note: Permit Expired - Permittee filed for extension.	CAWCD	Indirect recharge of up to 28,000 acre feet annually of CAP water at Queen Creek Irrigation District.	73-534550: CAWCD	ESRV	CAP	28,000	28,000	28,000	
GSF 72-534439.0001 (6/18/96 to 12/31/06)	Tonopah Irrigation District	Indirect recharge of up to 15,000 acre feet annually of CAP water at Tonopah Irrigation District. Project replaces CAWCD GSF 72-534439	73-534439: CAWCD 73-534439.1: Goodyear	Hassayampa	CAP	15,000	25,000	25,000	
GSF 72-534438 (3/10/92 to 12/31/95) Note: Permit Expired - Permittee filed for extension.	CAWCD	Indirect recharge of up to 5,000 acre feet annually of CAP water at San Tan Irrigation District.	73-534438: CAWCD	ESRV	CAP	5,000	5,000	5,000	
GSF 72-534753 (4/21/92 to 12/31/95) Note: Permit Expired - Permittee filed for extension.	CAWCD	Indirect recharge of up to 3,000 acre feet annually of CAP water at Chandler Heights Citrus Irrigation District.	73-534753: CAWCD	ESRV	CAP	3,000	3,000	3,000	
GSF 72-530370 (10/23/91 to 12/31/24)	Pima Utilities	Indirect recharge of up to 1500 acre feet annually of effluent at Sun Lakes Community Association.	73-530370: Pima Utilities	ESRV	Effluent	1,500	1,500		1,500
GSF 72-534978 (8/20/92 to 12/31/22)	LPSCO	Indirect recharge of up to 840 acre feet annually of effluent at Suncor Farms.	73-534978: LPSCO	WSRV	Effluent	840	840		840

Proposed GSF's					
Applicant	(F)/U/(P)ilot (P)roposed/ (In) Process	PROJECT DESCRIPTION	SUB-BASIN LOCATION	SOURCE WATERS	PROPOSED VOLUME
Phoenix/ Roosevelt ID	F/Pr	Roosevelt Irrigation District	WSRV	Effluent	20,000

* Data for Select GSF's	ESTIMATED CAPACITY (Minimum)	ESTIMATED CAPACITY (Maximum)	VOLUME USED 1996 (As of Aug)	VOLUME AVAILABLE 1996	VOLUME AVAILABLE 1997 (Minimum)	VOLUME AVAILABLE 1997 (Maximum)
RWCD 72-545695	70,000	100,000	80,000	Unknown	70,000	100,000
SRP 72-553133	75,000	150,000	14,000	30,000	100,000	150,000

Phoenix AMA Permitted Underground Storage Facilities (USF's) Using Other Source Water, August 15 1996

PERMIT TYPE/NO (DURATION)	PERMIT HOLDER	PROJECT DESCRIPTION	ASSOCIATED WATER STORAGE PERMIT NO.s AND PERMIT HOLDER	TYPE OF FACILITY	LEGAL LOCATION	SUB-BASIN LOCATION	SOURCE WATERS	MAP NUMBER	PERMITTED VOLUME	TOTAL WSP VOLUME	SURFACE WATER VOLUME	EFFLUENT VOLUME
USF 71-518105 (3/31/88 to 3/31/08)	City of Mesa	ANNWRP. Recharge of up to 8,963 acre feet of effluent annually at the Mesa NW Water Reclamation Plant through recharge basins. The plant and project are located adjacent to the Salt River, East of Price Road.	73-518105; Mesa	Basins	1N 5E Sec 18	ESRV	City of Mesa Effluent	7	8,963	8,963		8,963
USF 71-520379 (1/1/96 to 10/18/13)	Town of Gilbert	Recharge of up to 3,314 acre feet annually of effluent from the Gilbert Wastewater Treatment Plant through basins and an injection well located near Warner and McQueen Roads.	73-520379; Gilbert	Basins, Injection Well	1S 5E Sec 12 NW SW	ESRV	Gilbert Effluent	6	3,314	3,314		3,314
USF 71-541455 (3/2/94 to 3/2/14)	City of Chandler	Intel Project: Recharge of up to 3,100 acre feet annually of effluent from the Intel plant through injection wells. The project is located in South Chandler, South of Ocotillo Road and East of Cooper Road.	73-547123; Chandler	Injection Wells	2S 5E Sec 24 SW SE NE	ESRV	Intel Effluent	2	3,100	3,100		3,100
USF 71-534362 (4/4/93 to 4/14/43)	Del E. Webb	Recharge of up to 3,042 acre feet annually of effluent from the Sun City West wastewater treatment plant into infiltration basins adjacent to the plant. The plant and project are located adjacent to the Agua Fria River, East of 115th Avenue.	73-534362; Del Webb	Basins	4N 1E Sec 30	WSRV	Sun City West Effluent	4	3,042	3,042		3,042
USF 71-546845 (5/2/96 to 5/2/16)	Ocotillo Management Group	Recharge of up to 2,500 acre feet of effluent from the City of Chandler's Ocotillo Wastewater Treatment Plant. Recharge occurs through overflow dry-wells. The project is located at the Ocotillo development in South Chandler. The project replaces pilot project 71-505527.	73-546844; Ocotillo	Overflow Dry Wells	2S 5E Sec 17 NW & SW Sec 18 NE & SE	ESRV	Chandler/Ocotillo Effluent	9	2,500	2,500		2,500
USF 71-551762 (4/22/96 to 4/22/98)	City of Tempe	Kyrene Wastewater Treatment Plant: Pilot recharge of up to 1,000 acre feet annually of CAP water and recovered effluent from Tempe's potable distribution system through injection wells at Tempe's Ken McDonald Golf Course.	73-551761; Tempe	Injection Wells	1S 4E Sec 10 SE	ESRV	Kyrene Effluent	14	1,000	1,000		1,000
USF 71-551877 (1/17/96 to 1/17/98)	City of Surprise	South Wastewater Treatment Plant: Pilot infiltration testing of up to 314 acre feet of effluent over 2 years through a basin. The project is located at the South Surprise Wastewater Treatment Plant.	73-551877; Surprise	Basin	3N 1W Sec 22 SW	WSRV	South Surprise Effluent	12	314	314		314
USF 71-551727 (1/12/96 to 1/12/97)	Del Webb Home Construction	Grano Avenue: Pilot recharge of 100 acre feet of MWD surface water over one year through trenches. Project is located at the Grano Avenue development site in the City of Surprise.	73-551728; Del Webb Home Construction	Trenches	4N 1W Sec 30 SE SE	WSRV	MWD Surface Water	15	100	100	100	

** Indicates Pilot Project

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Phoenix AMA Permitted Underground Storage Facilities (USF's) Using CAP Water, August 15 1996

PERMIT TYPE NO. (DURATION)	PERMIT HOLDER	PROJECT DESCRIPTION	ASSOCIATED WATER STORAGE PERMIT (WSP) NO. & AND PERMIT HOLDER	TYPE OF FACILITY	LEGAL LOCATION	SUB-BASIN LOCATION	SOURCE WATERS	MAP NUMBER	PERMITTED VOLUME	TOTAL WSP VOLUME	CAP VOLUME	SURFACE WATER VOLUME	EFFLUENT VOLUME
**USF 71-516371 (12/24/90 to 12/31/90)	Salt River Project	GRUSP: Recharge of up to 200,000 acre feet annually of CAP water, Salt and Verde River water and Coy of Mesa effluent through in-channel basins in the Salt River just below the CAP interconnect at the Granite Reef Dam. To date, only CAP water has been stored at the facility.	73-516371.01: SRP 73-516371.02: SRP 73-516371.03: Mesa 73-516371.04: Chandler 73-516371.05: Gilbert 73-516371.06: Phoenix 73-516371.07: Tempe 73-516371.08: CAWCD 73-547504: SRP 73-548828: Chandler 73-548829: SRP 73-550863: Tempe	In Channel Basins	2N 6E Sec 13,14,21,22,23,24,27,28,29,30	ESRV	CAP, Salt and Verde, Coy of Mesa Effluent	5	200,000	ERR	461,235	770,439	31
**USF 71-540417 (12/31/90 to 12/31/97)	City of Avondale	Wetlands: Recharge of up to 10,000 acre feet annually of CAP water through infiltration basins after undergoing treatment in constructed wetlands. The project is still in the development/construction stages. The project is located adjacent to the Agua Fria River, just North of McDowell Road.	73-540417: Avondale	Basins after Wetlands Treatment	1N 1W Sec 1.2 2N 1W Sec 35,36	WSRV	CAP	1	5,000	5,000			
**USF 71-545917 (5/2/95 to 12/31/97)	City of Scottsdale	East Pima Site: Recharge of up to 5000 acre feet annually of CAP water through vadose zone injection wells. The project is located in North Scottsdale, North of Union Hills Drive and East of Pima Road.	73-545918: Scottsdale	Vadose Zone Injection Wells	4N 5E Sec 30 SE SE SE	ESRV	CAP	11	5,000	ERR	5,000		
USF 71-545915 (2/23/94 to 12/31/95)	City of Scottsdale	Water Campus: Pilot recharge of up to 5000 acre feet annually of CAP water through vadose zone injection wells. The project is located in North Scottsdale, North of Union Hills Drive and West of Pima Road.	73-545916: Scottsdale	Vadose Zone Injection Wells	4N 4E Sec 25 SE SE	ESRV	CAP	11	5,000	ERR	5,000		
**USF 71-552711 (3/21/96 to 3/21/98)	City of Surprise	McMicken Dam: Pilot infiltration testing of up to 2000 acre feet of CAP water over 2 years on the North side of the McMicken Dam.	73-553176: Surprise	Basin	4N 2W Sec 34	WSRV	CAP	13	2,000	ERR			
USF 71-535755 (9/22/93 to 9/2/98)	City of Mesa	Spook Hill: Infiltration of 2000 acre feet annually of CAP water through a multi-purpose lake at the City Park. The park and facility are located in the Southwest corner of Red Mountain District Park in East Mesa.	73-535755: Mesa	Multi Purpose Lake/ Vadose Zone Injection Wells	1N 7E Sec 18 NE	ESRV	CAP	8	2,000	ERR	2,000		
USF 71-520487 (3/9/88 to 12/31/89)	City of Phoenix	Recharge of up to 600 acre feet annually through injection wells located at 43rd Avenue and Greenway. This project was permitted, but experienced operational problems in its early stages. Operation has been discontinued.	73-520487: Phoenix	Injection Wells	3N 2E Sec 10 SW SE NW	WSRV	CAP	10	600	ERR	600		
**USF 71-555251 (6/17/96 to 6/17/96)	City of Chandler	Chandler Regional Park: Pilot recharge of up to 250 acre feet of CAP water from Chandler's potable system annually. Recharge occurs through vadose zone wells.	73-555252: Chandler	Vadose Zone Injection Wells	2S 5E Sec 10 SE NE	ESRV	CAP	3	250	ERR			

** Indicates Pilot Projects

*Data for GRUSP (71-516371)			
Volume recharged 1995	Volume Available 1996	Volume Available 1997 (Minimum)	Volume Available 1997 (Maximum)
80,000	30,000	100,000	120,000

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1996 CAP WATER RATES

	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>
COST COMPONENTS					
M&I Capital Charges ^{1/}	\$30/af	\$39/af	\$48/af	\$48/af	\$54/af
Ag Capital Charges ^{2/}	2/af	2/af	2/af	2/af	2/af
Water Delivery Costs					
Fixed OM&R ^{3/}	48/af	Determined annually			
Pumping Energy ^{4/}	<u>29/af</u>	Determined annually			
	<u>\$77/af</u>				
DELIVERY RATES					
A) M&I	\$63/af	\$67/af	\$71/af	\$82/af	\$87/af
Ag					
B) Pool 1 (200,000 af)	29/af	30/af	31/af	32/af	33/af
C) Pool 2 (200,000 af)	19/af	20/af	21/af	22/af	23/af
D) Pool 3 (≈50,000 af)	36/af	Determined annually			
E) CAWCD Indirect Recharge	32/af	Determined annually			
F) M&I Incentive Recharge ^{5/}	34/af	Determined annually			
G) Federal	77/af	Determined annually			

(Qualifications for A through G footnoted on reverse side)

- ^{1/} Paid on full allocation regardless of water deliveries, not included in delivery rates.
- ^{2/} Paid on actual deliveries and included in delivery rates.
- ^{3/} \$45 million fixed OM&R costs ÷ 950,000 af of projected deliveries ≈ \$48/af. This amount is collected on all ordered water whether delivered or not.
- ^{4/} \$27 million pumping energy costs ÷ 950,000 af of projected deliveries ≈ \$29/af. This amount is collected only for water actually delivered.
- ^{5/} See reverse side for rules regarding eligibility for and use of M&I incentive recharge water.

(over)

Qualifications for Classes of Water

- A) M&I--The delivery rate for M&I subcontractors. For M&I users who are not subcontractors we add the capital charge and create an Excess M&I contractor rate for "as available" water.
- B) Pool 1--All Ag entities who originally signed a subcontract.
- C) Pool 2--Those Ag entities that waived their subcontract rights in two-party agreements with CAWCD; CAWCD waived the Ag take-or-pay requirements. Excludes those Ag entities that relinquished their subcontracts to others for the benefit of their district, i.e., Harquahala Valley Irrigation District, Roosevelt Water Conservation District, and HoHoKam Irrigation District.
- D) Pool 3--Any Ag customer who meets basic qualifications including those who want more than their allocated share of Pool 1 and Pool 2 water.
- E) CAWCD Indirect Recharge--A program CAP used with most of the irrigation districts within the Phoenix, Pinal, and Tucson AMAs. CAP gains the recharge credits and has had a limited pool of 50,000 af.
- F) M&I Incentive Recharge--A special program offered to M&I subcontractors only. They must have valid Arizona Department of Water Resources permits and must gain recharge/storage credits from this activity. CAP is participating with some Ag entities in 1996 in a limited fashion.
- G) Federal--For federal purposes (Indians, USBR construction water, etc.)

DISCUSSION PAPER

CAP WATER PRICING FOR ARIZONA WATER BANKING AUTHORITY

Background: Perhaps the single most significant information necessary for the Arizona Water Banking Authority (AWBA) to develop an annual plan is the price that CAWCD will charge for delivery of the excess CAP water. The water pricing information, along with information regarding the funds available from the various funding sources, will set one of the limits on how much water can be banked. This information needs to be available by early September each year so that an operating plan can be developed for the next calendar year.

The AWBA has three primary sources of fundings; each with certain restrictions regarding the storage and use of the water purchased with those funds. The largest funding source will be the \$.04 ad valorem tax collected in Maricopa, Pinal, and Pima Counties, the same counties that are the CAWCD base service area. In 1997, these taxes will provide an estimated \$7.5 million; \$6.0 million in Maricopa County, \$1.25 million in Pima County, and \$250,000 in Pinal County. These funds can only be used to purchase and store water for the benefit of the county where collected.

The second fund source is an appropriation from the state legislature. The FY 1997 appropriation was \$2.0 million; however, during long-term planning exercises, it has been assumed that as much as \$8.0 million might be appropriated. These funds can be used to purchase and store water that can be used to benefit any Colorado River water user in Arizona, e.g., Bullhead City, Lake Havasu City, or any CAP M&I subcontractor. When a future need arises, the user must buy the water from the AWBA. The AWBA can use those funds to restore the bank water supplies when excess water is available.

The third source of funds will be a tax on pumped groundwater in the Phoenix, Pinal and Tucson Active Management Areas (AMAs). The tax will first be collected in 1998. It will be \$2.50/af in the Phoenix and Tucson AMAs and will start at \$.75/af in the Pinal AMA but will grow to \$2.50/af in increments of \$.25 per year. The estimated total for 1998 is \$3.6 million. This money can be used to purchase and store water for the benefit of the AMA where it was collected. The AMA boundaries do not coincide with county or other political subdivision boundaries. However, the CAP service area includes essentially all of the three AMAs.

Much of the water stored will be stored through in lieu storage projects (groundwater savings facilities) with participating irrigation districts (IDs). It is anticipated that the ID will pay some price for the water. This income to the AWBA will reduce the need for spending the other basic funds.

It is anticipated that at some future date, the AWBA will be banking (storing) some water for California or Nevada. In those cases, the participating state will pay all related costs of storage and recovery.

In establishing the price for CAP water to be paid by the AWBA, CAWCD must consider: 1) the cost components included in CAP water prices, i.e., (a) fixed O&M, (b) pumping energy, and c) capital repayment; 2) the source of funding being used by the AWBA; and 3) public policy issues such as (a) the amount and source of pricing subsidy, (b) the "political statement" both in state and out of state regarding Arizona's intent to use its Colorado River water, (c) amount of water "needed" for future risk protection, and (d) perceived fairness to all water customers. Two of these areas are easily identified; cost components for CAP water and the amount and source of funds available to the AWBA. The public policy issues are more complex and will be debated strongly by groups with particular interests.

The CAP water price components are determined each year as part of the CAWCD budgeting process. Staff identifies the total fixed OM&R costs and divides that by the amount of water planned to be delivered. This would normally be done prior to offering any incentive pricing to encourage use and before determining the excess water available to be purchased by the bank. The pumping energy component is determined by 1) computing the total energy needed to pump the scheduled water to the point of delivery; 2) determining the amount and cost of available energy sources; and 3) dividing cost by scheduled water deliveries to arrive at a "postage stamp" cost per af. CAWCD has available limited amounts of lower cost energy from the Hoover B contract and Hoover C (hydro power from Hoover Dam) and from generating at New Waddell Dam. These sources are scheduled for use first and the remaining needs are provided from the CAP share of the Navajo Generating Station. The CAP capital cost component has been established by the Board for all M&I subcontractors. This rate is collected for the full subcontract allocation whether the water is used or not. Current rate schedules are \$39/af in 1997, \$48/af in 1998 and 1999 and leveling at \$54/af in 2000 and thereafter until further notice. This same rate has been charged to current excess M&I water contractors for all water actually delivered.

As was discussed earlier, the amount of each funding source for the AWBA will be determined annually by CAWCD action in collecting the \$.04 tax, by legislative appropriations, and by the groundwater pump tax.

Analysis:

The question under consideration is, "Is it sound public policy to subsidize some or all of fixed OM&R and capital cost for excess CAP water delivered to the AWBA?" The availability of excess CAP water from Arizona's unused entitlement or from surplus supplies will be the greatest during the next 5 to 15 years. The more water that is stored by the AWBA, the greater the level of protection that will be provided against future shortage. In addition, in years when there is no surplus declared, increased use by Arizona will force California to further develop internal solutions for providing a full MWD aqueduct to the southern California coastal area, primarily by moving water from agriculture use to M&I use. Lower water prices for the AWBA provided by subsidized water rates will allow the AWBA to store more water with the same limited funds. The CAWCD, in the Forward Pricing Policy adopted by the Board in October 1993, elected to subsidize, from capital reserves consisting primarily of tax revenues, a portion of the fixed OM&R component for M&I water customers. In 1996, the Board adopted an incentive pricing program to provide water for recharge to the M&I subcontractors. The underlying rationale was that the cost of these subsidies were provided from the tax

revenues which are, in a large measure, collected from the customer base of our M&I subcontractors. The subsidies provide some incentive to those who are actually using CAP water and are providing a major share of the ongoing OM&R costs.

In considering the funds available to the AWBA, the \$.04 tax is from the same base as the tax revenue CAWCD uses to provide existing private subsidies and the benefit of the stored water will be directly to the CAP M&I subcontractors. Logically, it would seem appropriate to provide a subsidized water rate for water purchased with this source of funding.

The AWBA funds provided by the groundwater pump tax are assessed on groundwater users who pay CAP property tax. Some of these groundwater users have access to and are using CAP water; however, some chose not to seek CAP water and are avoiding the cost of infrastructure necessary to use CAP water. The pump tax is a disincentive to use groundwater and will provide some incentive to use groundwater wisely and efficiently. Water banked using these funds can partially offset the physical effects of groundwater overdraft. The stored water will benefit CAP subcontractors and taxpayers. It is reasonable to consider subsidizing the price of water delivered to the AWBA using this source of funds.

Funds provided to the AWBA by appropriation are not directly attributable to a specific consumer/taxpayer base. Water banked using these funds will be sold to future users on a cost recovery base. Much of the logic previously discussed for providing a subsidized water rate does not fully apply. However, the greatest economic base which is the source of much of the state's revenue is located in the CAP service area. Providing a subsidized water rate would result in a greater amount of water banked in furtherance of the overall goals of the AWBA and the Groundwater Management Act, and would send a strong message to California and Nevada that Arizona intends to use its full entitlement to Colorado River water.

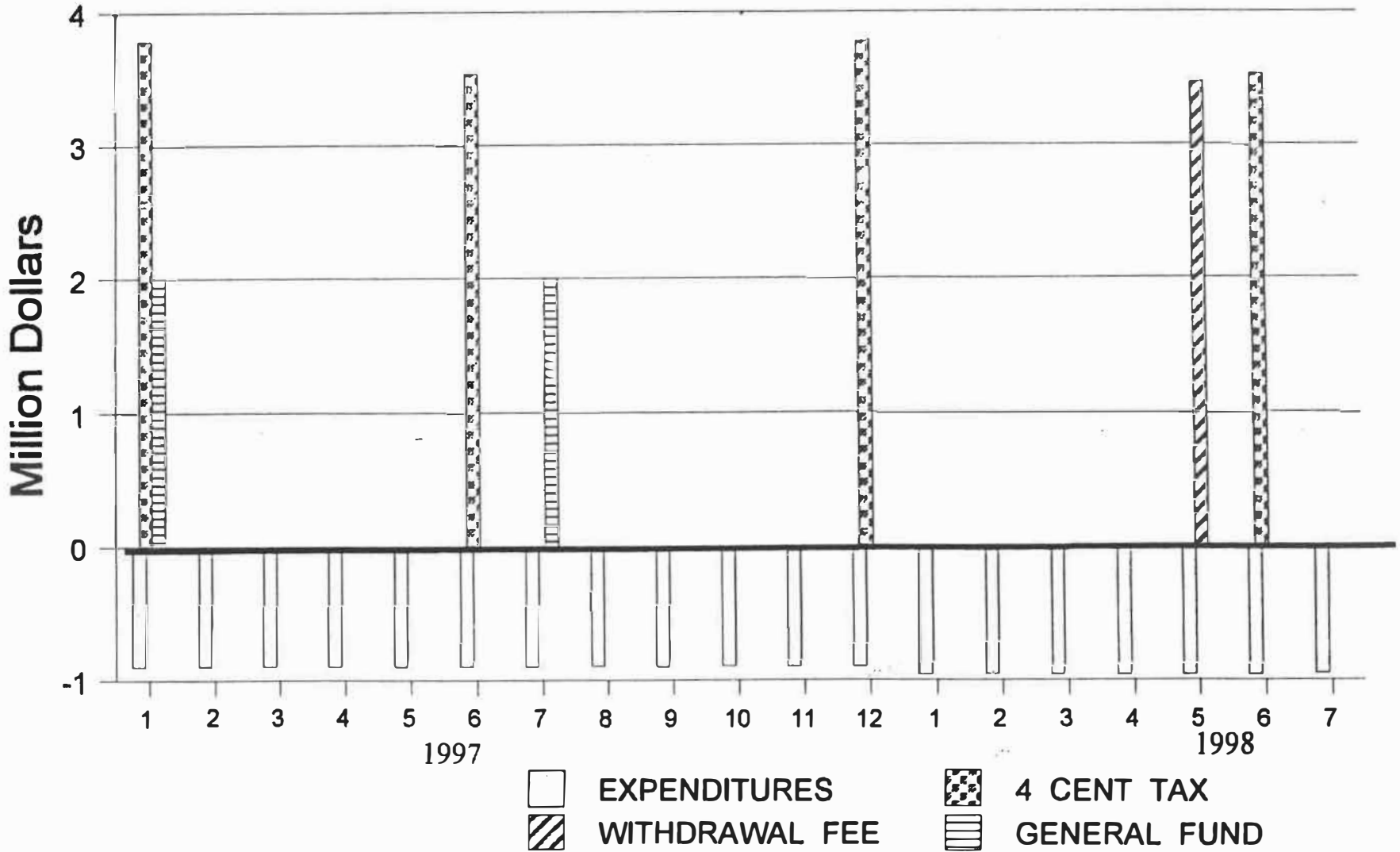
CAP capital repayment is provided by tax revenues, power sales, water service capital charges, and other revenues. It does not seem necessary or appropriate to charge the AWBA a capital charge for excess water deliveries.

Recommendations: A subsidized water rate for the AWBA should be established. The rate should consist of the postage stamp pumping energy component plus \$5. No capital rate component would be charged. The pumping energy component and the fixed OM&R component will be determined based on water schedules and costs without consideration of water offered under incentive rates or water offered to the AWBA.

This water rate should apply to all water sold to the AWBA. The rate should be offered for a three year period and considered for an extension each year to allow for necessary financial and operational planning for the AWBA and the CAWCD. Effectively, this allows the AWBA to participate in our M&I Incentive Recharge Program with the same water rate as M&I subcontractors. However, the AWBA is last in priority and can only schedule water after all other contractors have scheduled water for their use.

FY 97 & FY 98 Revenues and Expenditures

Arizona Water Banking Authority



GENERAL FUND APPROPRIATION
Arizona Water Banking Authority

FY 97 (1/1/97 to 6/30/97)

Revenues:		
4 cent tax available	=	\$ 3,790,000
Withdrawal Fee available	=	0
General Appropriation available	=	\$ 2,000,000
TOTAL Available	=	\$ 5,790,000

Water Purchases:		
1/1/97 to 6/30/97	=	\$ 4,575,000
Carryover to FY 98	=	\$ 1,215,000
Debit		0

FY 98 (7/1/97 to 6/30/98)

Carryover from FY 97	=	\$ 1,215,000
Revenues:		
4 cent tax available	=	\$ 7,334,000
Withdrawal Fee available	=	0
General Appropriation available	=	?
TOTAL Available	=	\$ 8,549,000

Water Purchases:		
7/1/97 to 6/30/98	=	\$ 10,340,000
Carryover to FY 99	=	0
Debit		\$ 1,791,000

Recommended General Fund request \$ 2,000,000 for FY 98

Preliminary 1997 & 1998 Water Deliveries and Costs

Cost Assumptions:

Potential Location:

Cost of water

CAP	- 1996 = \$36
	- 1997 = \$38
	- 1998 = \$40
AWBA	- 1996 = \$0.50
	- 1997 = \$0.50
	- 1998 = \$0.50

In-lieu Payment	- 1996 = \$18
(50/50 sharing)	- 1997 = \$19
	- 1998 = \$20
Direct Recharge	- 1996 = \$10
(CAP/SRP)	- 1997 = \$10
	- 1998 = \$10

In-lieu Recharge - Ag. Districts

Direct Recharge - Granite Reef Under-ground Storage
- Aqua Fria Under-Ground Storage

	<u>Amount</u>	<u>Cost</u>
<u>January 1, 1997 to June 30, 1997</u>		
Direct Recharge	50,000 acre feet	\$ 2,425,000
In-lieu Recharge	<u>110,000 acre feet</u>	<u>\$ 2,150,000</u>
SUBTOTAL	160,000 acre feet	\$ 4,575,000
 <u>July 1, 1997 to December 31, 1997</u>		
Direct Recharge	30,000 acre feet	\$ 1,455,000
In-lieu Recharge	<u>210,000 acre feet</u>	<u>\$ 4,100,000</u>
SUBTOTAL	240,000 acre feet	\$ 5,555,000
TOTAL 1997	400,000 acre feet	\$ 10,130,000

January 1, 1998 to June 30 1998

	<u>Amount</u>	<u>Cost</u>
Direct Recharge	50,000 acre feet	\$ 2,525,000
In-lieu Recharge	<u>110,000 acre feet</u>	<u>\$ 2,260,000</u>
SUBTOTAL	160,000 acre feet	\$ 4,785,000
 TOTAL FY98	 400,000 acre feet	 \$10,340,000

**ESTIMATE of GROUNDWATER WITHDRAWAL FEES
For Calendar Year 1997 - Collected May 1998**

	<u>PUMPING</u>	<u>FEE</u>	<u>COLLECTED</u>
Pinal AMA	400,000 acre feet		\$755,000
(District	260,000 acre feet	@ \$2.50	\$650,000)
(Non-District	140,000 acre feet	@ \$0.75	\$105,000)
Tucson AMA	290,000 acre feet	@ \$2.50	\$725,000
Phoenix AMA	800,000 acre feet	@ \$2.50	\$2,000,000
Total all AMAs	1,490,000 acre feet		\$3,480,000

ESTIMATE of FOUR CENT TAX (Maricopa, Pinal and Pima Counties)

7/96 to 12/96 =	\$ 3,790,000
1/97 to 6/97 =	\$ 3,544,000

**ARIZONA DEPARTMENT OF WATER RESOURCES
COST OF SERVICES
ARIZONA WATER BANK AUTHORITY
July 1, 1996 through June 30, 1997**

Personnel Services	162,534
Water Bank Manager I	
Water Bank Technical Administrator	
Administrative Assistant II	
Attorney IV	
Employee Related Expenditures	36,424
22.41% of Personnel Services	
Indirect	23,875
12% of Personnel Services and Employee Related Exp.	
	<hr/>
	<u>222,833</u>

**Job Duties and Labor Estimate
To Provide Operational and Technical
Support to the
Arizona State Water Bank**

Water Systems Engineer

Major Duties

1. In August and September, estimate excess CAP delivery capacities. Determine sites where recharge (direct and indirect) can occur. Develop a preliminary operations plan for the following calendar year, showing deliveries by site by month.
2. In October and November, revise preliminary operation plan. Produce final operating plan for approval by December 1.
3. During all months of year, coordinate the execution of final operating plan. Work with CAP Operators to schedule daily deliveries. Coordinate with Customer Service to track daily deliveries, and prepare monthly delivery reports. Attend occasional meetings and coordinate with AWBA personnel.

Labor Estimate

August - September: 8 hours per week (20% time)
October - January: 2 hours per week (5% time)
Total approximately 7% of an FTE

Customer Service Coordinator

Major Duties

1. In September - November, take final operating plan, and develop a 12-month delivery schedule for CAWCD Finance Department to prepare monthly invoices.
2. In January and February, create end-of-year reconciliation reports for previous calendar year.
3. During all months of year, monitor deliveries and payments. Process monthly water orders, and prepare invoice reports for CAWCD Finance Department. Update ledgers. Coordinate with Water Systems Engineer to track daily deliveries, and prepare monthly delivery reports. Attend occasional meetings and coordinate with AWBA personnel.

Labor Estimate (Assumes AWBA accounting requirements are compatible with existing CAP accounting practices.)

September, October, November: 4 hours per week (10% time)
January and February: 4 hours per week (10% time)
All other months: 2 hours per week (5% time)

Total Approximately 7% of an FTE

Hydrologist

Major Duties

1. August - November, assist Water Systems Engineer in determining recharge site availability and capacity.
2. Occasionally meet and coordinate with CAP and AWBA staff to determine recharge site plans.

Labor Estimate

August - November: 10% of time
All other months: less than 5%

Total Approximately 5% of an FTE

Administrative and Managerial Support

Total Approximately 5% of an FTE

**TOTAL LABOR ESTIMATE ABOUT 30% OF AN FTE AFTER INITIAL START-UP.
APPROXIMATELY \$25,000 PER YEAR.**

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RYLEY, CARLOCK & APPLEWHITE

A PROFESSIONAL ASSOCIATION

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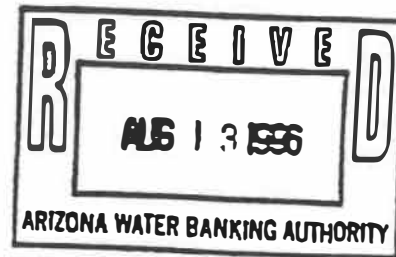
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August 13, 1996



WRITER'S DIRECT LINE: 602-4404811

* ADMITTED IN NEW YORK ONLY

By Hand-Delivery

Mr. Tim Henley
Arizona Water Banking Authority
Arizona Department of Water Resources
500 North Third Street
Phoenix, Arizona 85004

Re: Water Banking Proposal--Mohave County Water Authority; City of Mesa;
Roosevelt Water Conservation District

Dear Mr. Henley:

Enclosed herewith please find a water banking proposal which is submitted to the Arizona Water Banking Authority ("the Authority") on behalf of Roosevelt Water Conservation District, which this firm represents, the Mohave County Water Authority, and the City of Mesa (together, "the Proponents").

The enclosed proposal is not submitted for approval by the Authority at this time. Rather, it is submitted in order to raise with the Authority, in a concrete context, issues which the Authority must address in order to be able to deliver water into western Arizona by forbearance in the future.

The Proponents hope that subsequent to their presentation on August 20, the Authority will direct its staff to analyze the issues raised by the enclosed proposal, such as issues dealing with how water is ultimately to be delivered to Mohave County during times of shortage,

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8/13/96

Mr. Tim Henley
August 13, 1996
Page 2

how the Authority is to obtain the necessary forbearances in order to deliver water during times of shortage, whether it is desirable to enter into long-term agreements which address these issues, and whether there are alternatives to the proposal which accomplish the Authority's objectives and satisfy Mohave County's needs in the same or a better manner.

Although the Proponents realize that the issues raised by the proposal require study and careful analysis, they point out that the Authority will need to move expeditiously in addressing the issues raised by the enclosed proposal, for a variety of reasons, including RWCD's needs to schedule power deliveries on a firm basis during 1997 and in subsequent years; Mohave County's needs for early assurances that water will be available to it during times of shortage at costs it can afford; Mesa's need to know whether it should begin planning now to make the forbearance in the use of its CAP allocation that will be required if the proposal is adopted; and, the critical need to take advantage of currently available Colorado River water and funds to accomplish the Authority's mission of storing as much water as possible while it is available.

The Proponents thank you, your staff, and the Authority in advance for your willingness to consider the enclosed proposal and to work diligently towards an early resolution of the issues it raises. The Proponents look forward to discussing the issues and the proposal with you and your staff as soon as you are in a position to do so.

Very truly yours,



Michael J. Brophy

c: Tom Griffin
Maureen George
Jay Moyes, Esq.
Beth Miller
Michael O. Leonard

**PROPOSAL OF MOHAVE COUNTY WATER AUTHORITY,
ROOSEVELT WATER CONSERVATION DISTRICT,
AND CITY OF MESA, ARIZONA**

for

**WATER BANKING SERVICES FROM THE
ARIZONA WATER BANKING AUTHORITY**

AUGUST 20, 1996

**PROPOSAL OF MOHAVE COUNTY WATER AUTHORITY,
ROOSEVELT WATER CONSERVATION DISTRICT,
AND CITY OF MESA, ARIZONA**

for

**WATER BANKING SERVICES FROM THE
ARIZONA WATER BANKING AUTHORITY**

Introduction

This document constitutes the proposal of the Mohave County Water Authority ("Mohave"), the City of Mesa, Arizona ("Mesa"), and Roosevelt Water Conservation District ("RWCD") (together, "the Proponents") for water banking services from the Arizona Water Banking Authority ("the Water Bank").

The Proponents propose that the Water Bank store, over a period of ten years commencing on January 1, 1997, subject to the availability of funds and other conditions, 50,000 acre-feet per year of unused CAP water. The water would be stored in a groundwater savings facility operated by RWCD in the East Salt River Valley groundwater sub-basin of the Phoenix Active Management Area. Stored water would be used to supply water to Mohave during times of shortage and to Mesa as needed.

The costs of the stored water would be funded by the Water Bank using general fund appropriations for water stored for Mohave and ad valorem revenues derived in Maricopa County for the portion of the water stored for Mesa.

Mesa would ensure the Water Bank's ability to deliver water to Mohave during times of shortage by agreeing, in advance, to forebear in the use of a portion of its high priority CAP municipal and industrial ("M&I") water during times of shortage.

Mohave would repay the Water Bank's costs of buying and storing the water at the time the Water Bank distributes storage credits to Mohave during times of shortage. Mohave and

Mesa would bear all costs of recovering stored water, and, in cooperation with RWCD, would undertake the obligation to recover the stored water.

Need for Services from the Water Bank

Mohave needs to obtain water banking services from the Water Bank in order to firm up the water supplies which are available to it and its municipal members--Lake Havasu City, Bullhead City and the Mohave Water Conservation District. These municipalities are responsible for providing all water used by their citizens for domestic, commercial and other purposes.

Mohave and its members have water contracts with the United States which provide for the delivery of "fourth priority" water. According to the Bureau of Reclamation ("the Bureau"), fourth priority water contracts are subject to significant reductions during times in which deliveries of water to the Central Arizona Project ("CAP") are reduced. Specifically, the Bureau takes the position that reductions in water deliveries to Mohave and its members must be proportionate to any reductions in deliveries to CAP. For example, if CAP is shorted 10%, Mohave and its members are shorted 10%. Mohave does not agree with the Bureau's interpretation, but, in the interest of protecting its future water supplies, is participating in this proposal.

A reduction of 10% in deliveries to the CAP would affect only agricultural deliveries in Central Arizona, at least in the early years of the project. In addition, Central Arizona agricultural and municipal users can generally turn to groundwater when surface water supplies are unavailable. In contrast, the water uses of Mohave and its members are municipal, not agricultural. A reduction of 10% to Mohave means that domestic and similar uses will be required to cut back 10%. Unlike users in Central Arizona, neither Mohave nor its members can turn to groundwater in times of shortage. This is because all of the water that lies beneath their service areas is regarded by the Bureau as Colorado River water, the use of which they must reduce in times of shortage.

It is essential for Mohave to take steps now to protect itself and its members against future shortages. If steps are not taken now, it may be impossible to take them later. Assisting Mohave in addressing future shortages is one of the reasons the Water Bank was created by the Legislature. Implementation of this proposal will firm up the only water supplies available to Mohave and its members, and will assist the Water Bank in achieving its purposes.

Summary of Proposal

This proposal calls for the Water Bank to store a total of 50,000 acre-feet per year of unused CAP water for a ten year period beginning January 1, 1997. The water would be stored in a groundwater savings facility operated by RWCD in the East Salt River Valley groundwater sub-basin. RWCD would also be the recipient of water delivered to the groundwater savings facility in lieu of groundwater it would otherwise pump.

a. The Water Banking Arrangement

The water banking arrangement would be divided into two segments. In the first segment, 25,000 acre-feet per year would be stored for the purpose of protecting Mohave from shortages. The water to be stored in this segment would be paid for from general fund appropriations available to the Water Bank. Storage of water for Mohave in the period in which this arrangement is in effect would be subject to the availability of appropriated funds. RWCD, as the recipient, would pay an agreed-upon amount, between \$10 and \$20 per acre-foot, for water made available under this arrangement.

Credits accrued by the Water Bank under the arrangement would be distributed to Mohave during times of shortage. In return for the distribution of credits to it, Mohave would reimburse the Water Bank's costs of obtaining the stored water and its administrative charges at the time credits were distributed to Mohave.

Upon receipt of credits from the Water Bank, Mohave would exchange these credits with Mesa. Mesa, in turn, would forebear using up to 10,000 acre-feet per year of its CAP M&I entitlement, and the Water Bank, in conjunction with the Central Arizona Water Conservation District ("CAWCD"), would make this water available to Mohave by simply not pumping it from the Colorado River. Mesa and Mohave would be free to agree to a greater forbearance should they wish to do so. Mesa would use the credits obtained from Mohave to replace the CAP M&I water made available to Mohave. Mohave would advance to the Water Bank all funds necessary to recover the credits. These funds would, in turn, be paid by the Water Bank to Mesa to cover Mesa's costs of recovering the stored water.

In the second segment of the arrangement, as an incentive for Mesa to forebear taking a portion of its CAP entitlement, the Water Bank would recharge for Mesa's benefit within RWCD an additional 25,000 acre-feet per year of unused CAP water for a ten year period, beginning January 1, 1997. Water recharged under this arrangement would be paid for by the Water Bank using ad

valorem tax funds collected within Maricopa County and would be subject to the availability of such funds and other conditions. Credits accrued through this arrangement would be distributed to Mesa by the Water Bank at such time or times as Mesa needed the water.

b. The Need for an Incentive

An incentive of some nature is necessary in order for the proposed arrangement to work, for several reasons:

First, no CAP M&I subcontractor would normally agree to reduce its diversions of CAP M&I water, particularly immediately prior to or during a shortage, without receiving some consideration for doing so. M&I subcontractors have invested heavily in treatment plants, portions of which would go unused in a forbearance arrangement. In addition, forbearance requires the subcontractor to recover more water through wells than would ordinarily be the case in order to replace the forborne CAP supply. This requires the subcontractor to begin making arrangements now to assure the capacity will be there when needed. Consequently, there must be an off-setting benefit to justify the forbearance.

Second, Mesa would assume the obligation and accept the risk of being able to recover the stored credits, in effect assuring the Water Bank that water will be available for delivery to Mohave when necessary. Assumption of this obligation may involve construction of new wells, refurbishment of existing wells, agreements with RWCD for the use of its wells, or other arrangements, all of which would entail expense and are heavily dependent on local hydrology and water quality.

Finally, Mesa's advance agreement to forebear in the use of a portion of its CAP M&I water makes long-range planning possible for all entities involved. This advance agreement allows Mesa, in cooperation with RWCD, to begin planning the appropriate means of recovery. It provides Mohave with the basis on which to make the financial reserves necessary to carry out the arrangement and also a reasonable means of controlling costs. It assures the Water Bank's ability to deliver water during times of shortage and avoids deferring the issue of forbearance to the future when water may be significantly more expensive or unavailable.

Proposal

I. Description of Proponents

A. Mohave County Water Authority

Mohave is a municipal corporation of the State of Arizona organized under A.R.S. § 45-2201 et seq. to contract with the United States for the delivery of Colorado River water to its members in Mohave County. Its members are all municipal corporations in Mohave County which have contracts with the United States for the delivery of Colorado River water.

Mohave has contracted with the United States for the delivery of 18,500 acre-feet of Colorado River water per year. It has also entered into subcontracts for the delivery of this water to three of its members, Lake Havasu City, Bullhead City, and the Mohave Water Conservation District. Each of these subcontractors also have independent contracts with the United States for the delivery of Colorado River water. Each of these subcontractors is responsible for supplying all of the water needs of the citizens in their respective service areas.

In the proposed arrangement with the Water Bank, credits acquired by Mohave from the Water Bank would be used to firm up Mohave's members' water supplies during times of shortage.

B. Roosevelt Water Conservation District

RWCD is an irrigation district covering approximately 40,000 acres of land south of the Salt River and immediately east of the eastern boundary of the Salt River Project in Maricopa County. RWCD lands are located in the East Salt River Valley groundwater sub-basin.

RWCD receives water deliveries from the Salt and Verde Rivers by diversions at Granite Reef Dam which are delivered to RWCD through SRP's South Canal. This water, which averages about 28,000 acre-feet per year (after certain deliveries to Indian Communities), is delivered to RWCD's 32,000 irrigated acres. RWCD has sufficient well capacity to pump in excess of 100,000 acre-feet per year of groundwater. It pumps groundwater to meet the needs of its landowners to the extent that surface water and CAP water are not available to meet these needs. Although RWCD is not a subcontractor for CAP agricultural water, RWCD's delivery system is connected to the CAP Aqueduct. RWCD has taken direct deliveries of CAP water and has also been the recipient of in-lieu water delivered through its interconnection with the CAP Aqueduct.

RWCD has been issued Groundwater Savings Facility Permit No. 72-545695, which has a term extending until December 31, 2010, in the amount of 100,000 acre-feet per year. A copy of the permit is attached hereto as Exhibit "A" hereto. RWCD is also the recipient under the Permit.

Although RWCD has taken, and is now taking, delivery of CAP water during CAWCD's peak delivery season, RWCD is capable of taking delivery of significant amounts of CAP water during CAWCD's "shoulder" months when there is excess capacity in the CAP Aqueduct. RWCD's ten-year average annual water demand is as follows:

January	2,035
February	4,633
March	13,338
April	12,011
May	17,971
June	22,109
July	20,654
August	17,480
September	9,591
October	5,335
November	3,184
December	<u>2,719</u>
Total	131,060 acre-feet

The ten-year average annual water demand during the "shoulder" months of January through May and September through December is 70,817 acre-feet.

Due to its location on SRP's delivery system, the interconnection of the RWCD system with the CAP Aqueduct, RWCD's extensive well and delivery system, and RWCD's water rights in the Salt and Verde River system, RWCD is in a position to assist Mesa or the Water Bank in recovering and delivering stored water. In effect, given RWCD's geographical location and delivery system capabilities, RWCD can deliver water, by exchange or otherwise, almost anywhere in the Salt River Valley.

C. City of Mesa

Mesa is Arizona's third largest city. Its service area is situated in the East Salt River Valley groundwater sub-basin, and directly overlies a portion of RWCD. Mesa provides water service to nearly 100,000 water accounts using a combination of Salt/Verde water, water pumped from wells, and CAP water.

Mesa currently has a CAP M&I subcontract for delivery of 34,888 acre-feet per year. Mesa also has additional CAP supplies available to it for a total contracted supply of nearly 46,000 acre-feet. In 1995, Mesa was the second largest user of CAP M&I water with nearly 32,000 acre-feet delivered for a combination of direct delivery for potable purposes, direct recharge at GRUSP, and indirect recharge within RWCD.

Mesa and RWCD have already entered into agreements which allow Mesa to recharge water using RWCD's groundwater savings facility permit. Mesa has a water storage permit (#73-537356) which allows it to store up to 50,000 acre-feet of CAP water annually within RWCD. In addition, Mesa, RWCD, and the two other municipalities which overlie RWCD lands are exploring opportunities for direct recharge of CAP water and effluent on lands currently owned by RWCD.

Mesa currently maintains a system of approximately 40 wells both within and outside RWCD from which credits received in the proposed arrangement may be withdrawn. Mesa is also in the position to use RWCD wells for recovery purposes in the future as RWCD lands urbanize and those wells are no longer needed for irrigation purposes.

II. The Agreement

The agreement would be divided into two segments. The first segment would involve the Water Bank, Mohave, RWCD, and Mesa. The second segment would involve the Water Bank, RWCD, and Mesa. In addition, it would be necessary for the Water Bank to secure the agreement and participation of CAWCD in certain aspects of the arrangement.

Two charts are attached hereto as Exhibit "B". These charts present, respectively, a schematic representation of both segments of the proposed water banking agreement.

Segment One

In the first segment of the agreement, the Water Bank would agree to purchase from CAWCD 25,000 acre-feet of CAP water per year for a period of 10 years commencing on January 1, 1997. Performance of actions in the first segment would be subject to the availability of appropriated funds, the availability of water, the availability of capacity in the Aqueduct and other necessary conditions.

The source of funding for the purchase of CAP water would be monies available from the initial appropriation of \$2,000,000 to the general fund in H.B. 2494 and any subsequent general fund appropriations which might be made for the purpose of enabling the Water Bank to purchase and recharge CAP water.

The Water Bank would agree with Mohave to recharge water for the benefit of Mohave within RWCD. The Water Bank would also agree to distribute credits obtained through this recharge to Mohave during times of shortage, as requested by Mohave. The agreement would require Mohave to repay the Water Bank for administrative costs incurred by the Water Bank in reimbursing the Department of Water Resource and CAWCD for services they provide to the Water Bank, as provided by A.R.S. § 45-2424.C. and § 45-2424.D. The agreement would also require Mohave to reimburse the Water Bank for funds expended by the Water Bank to CAWCD to purchase the CAP water.^{1/} In addition, the agreement would require Mohave to advance to the Water Bank the costs associated with the Water Bank's reimbursement of Mesa for Mesa's costs in recovering the recharge credits. These reimbursements by Mohave would be made at the time the credits were distributed by the Water Bank to Mohave.^{2/}

The Water Bank would agree to obtain a water storage permit and would affiliate that permit with RWCD's groundwater savings facility permit. RWCD would agree to allow the Water Bank to use RWCD's groundwater savings facility at no cost to the Water Bank and would also agree to pay to the Water Bank, as a recipient of in-lieu water in accordance with A.R.S. § 45-2455.C., an agreed-upon amount between \$10 and \$20 per acre-foot for water made available by the Water Bank for recharge within RWCD.^{3/}

Mesa would agree with the Water Bank to forebear up to 10,000 acre-feet per annum of deliveries under its CAP M&I subcontract in return for credits distributed by the Water Bank to Mohave County and exchanged with Mesa during times of shortage. CAWCD would undertake, by agreement with the Water Bank, to deliver Mesa's M&I water to Mohave, which would entail CAWCD leaving up to 10,000 acre-feet per year of Mesa's M&I water in the Colorado River for Mohave's diversion and use. The Water Bank will need to obtain assurances from the Bureau that the forborne water will be available to Mohave. Mesa would continue to pay the capital costs associated with the M&I water, but would be paid by the Water Bank, with funds advanced by

^{1/}Under A.R.S. § 45-2457.B., it is possible that the Water Bank must be paid the costs of replacing the water as opposed to being reimbursed for the cost of purchasing the water in the first instance. The Proponents submit that the most reasonable interpretation of the statute would be to require the reimbursement of the Water Bank for the costs of obtaining the water in the first instance. If this interpretation is incorrect, the statute should be amended.

^{2/}When the agreement is drafted, it can provide that, in lieu of distributing credits directly to Mohave County, which Mohave would then convey to Mesa, the Water Bank may distribute the credits directly to Mesa on Mohave's request.

^{3/}The Proponents submit that this payment, to the extent it occurs in Segment One, should be credited against Mohave's obligation to pay for replacement water under A.R.S. § 45-2457.B., unless these funds are required to be repaid to the general fund.

Mohave, for its costs in recovering credits received in the exchange with Mohave. Mesa and Mohave would be free to agree to a greater forbearance should they wish to do so.

Segment Two

The second segment of the agreement would involve the Water Bank, Mesa and RWCD. In this segment, the Water Bank would agree to recharge an additional 25,000 acre-feet of CAP water per year for a period of 10 years, commencing January 1, 1997. Credits derived from this recharge would be held for Mesa's benefit. Water would be purchased from CAWCD using ad valorem taxes collected in Maricopa County pursuant to A.R.S. § 45-3715.03. These credits would be distributable to Mesa by the Water Bank on Mesa's request.⁴ RWCD would agree to permit the Water Bank to use RWCD's groundwater savings facility at no cost to the Water Bank or to Mesa. RWCD would also agree, as a recipient of in-lieu water, to pay an agreed-upon amount between \$10 and \$20 per acre-foot of water made available by the Water Bank pursuant to the agreement. Mesa would be responsible for the cost of recovering credits distributed to it by the Water Bank pursuant to this segment of the agreement.

The Water Bank would agree to include the proposed arrangement in its annual plan of operation under A.R.S. § 45-2456. The agreement would contain provisions conforming to the accounting and rules of operation in A.R.S. § 45-2457.

A chart showing potential recharge and recovery scenarios is attached as Exhibit "C" hereto.

III. Conclusion

The foregoing proposal is unique in at least two respects. First, it addresses -- at the front end -- the problem of creating forbearance in order to deliver water into western Arizona. Were the Water Bank to leave the resolution of this issue to the future, it might not be possible to solve then, or its resolution might prove significantly more expensive, if not prohibitively expensive. Second, the proposal solves the problem of the recovery of credits, with Mesa assuming that obligation now instead of leaving it to the Water Bank and CAWCD for resolution in the future. Most water banking arrangements will defer one or both of these issues to the future. This proposal does not.

The proposal is cost-effective in that RWCD will provide funds to offset a portion of the Water Bank's costs in acquiring CAP water and will make its system available to the Water Bank and Mesa for recharge at no cost to either.

⁴CAWCD and the Water Bank would need to agree that these credits are not necessary to provide shortage protection to other Maricopa County CAP M&I subcontractors.

The proposal has hydrologic merit because recharge will occur in the same area in which future recoveries will be made. Moreover, this is an area in which there has been, until the advent of CAP, a groundwater overdraft.

Finally, implementation of the proposal will enable the Water Bank to make significant progress towards meeting the legislative goal of recharging at least 100,000 acre-feet of water before July 1, 1997.

Firming up the supplies of cities in western Arizona was one of the specific purposes for enacting the legislation which created the Water Bank. If steps are not taken now while the opportunity exists, it may not be possible to firm up the supplies of these cities when shortages occur in the future. The needs of these cities should therefore be addressed now, while water is available and before shortages occur.

EXHIBIT A



ARIZONA DEPARTMENT OF WATER RESOURCES
GROUNDWATER SAVINGS FACILITY PERMIT

PERMIT NO. 72-545695

STATE OF ARIZONA)ss.
)
COUNTY OF MARICOPA)

This is to certify that I have examined Application No. 72-545695 and have determined that it meets the requirements of Title 45, Chapter 3.1, Article 2, for a Groundwater Savings Facility Permit. The Director hereby grants authority to the Permittee to operate a groundwater savings facility, subject to the following limitations and conditions:

Permit Limitations

Permittee:	Roosevelt Water Conservation District P. O. Box 100 Higley, Arizona 85236
Recipient:	Roosevelt Water Conservation District P. O. Box 100 Higley, Arizona 85236
Management Area: Phoenix	Subbasin: East Salt River Valley

Grandfathered Groundwater Rights within External Boundaries of Recipient under which Groundwater Withdrawals will be Curtailed:

See Exhibit C of the Roosevelt Water Conservation District (RWCD) plan of operation filed with the Department on 9/12/94.

Wells operated by Recipient from which Groundwater Withdrawals will be Curtailed:

See Exhibit A of the RWCD plan of operation filed with the Department on 9/12/94.

Maximum Savings at Facility:

100,000 acre feet per annum

Duration of Permit:

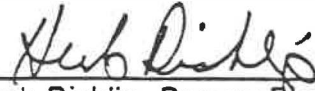
February 23, 1995 to December 31, 2010

Permit Conditions

1. The Permittee shall use the in lieu water delivered to the facility pursuant to a Water Storage Permit and this permit directly in lieu of groundwater on a gallon-for-gallon substitute basis.
2. The facility shall be operated pursuant to the Roosevelt Water Conservation District Plan of Operation for Groundwater Savings Facility Permit, submitted to ADWR on 9/12/94, which is incorporated in and made part of this permit.
3. The in lieu water delivered to the facility shall be measured with measuring devices approved by the Arizona Department of Water Resources.
4. The facility shall continue to meet the requirements of A.R.S. § 45-812.01 during operation of the facility.
5. The annual report shall be submitted no later than March 31 following the end of each completed annual reporting period. The first annual reporting period shall be from the date of this permit through December 31, 1995. Subsequent annual reporting periods shall be January 1 through December 31. The annual report shall include a copy of the Recipient's Annual Groundwater Withdrawal and Use Report indicating the Recipient's total groundwater pumping for the year and the amount of groundwater pumped by each well operated by the Recipient.
6. The Plan of Operation incorporated into this permit may be subject to modification,

depending upon the water storage permits that become affiliated with this storage facility permit and upon other circumstances.

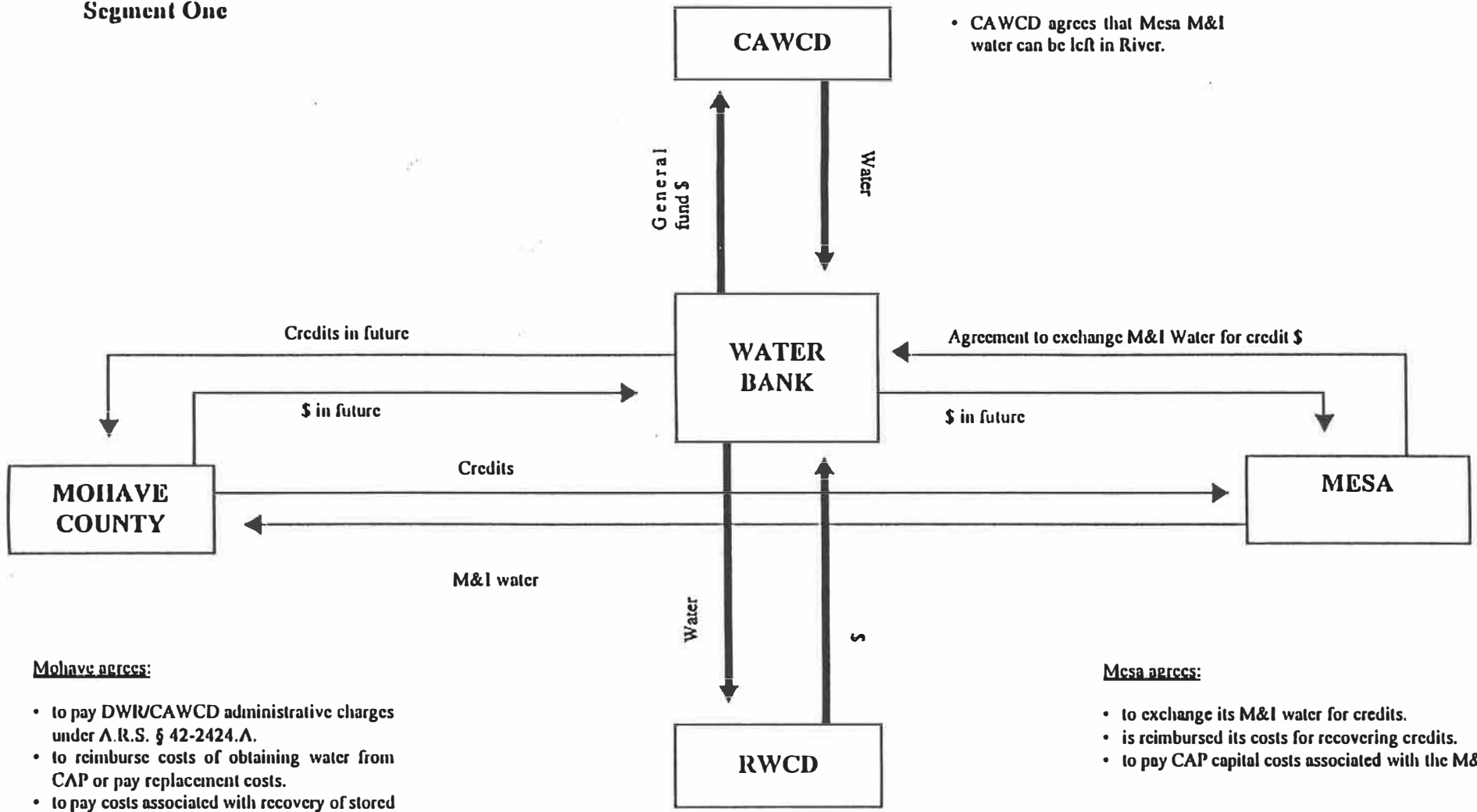
*Witness my hand and seal of office this 23rd day
of February, 1995.*



Herb Dishlip, Deputy Director.

EXHIBIT B

Segment One



• CAWCD agrees that Mesa M&I water can be left in River.

Mohave agrees:

- to pay DWICAWCD administrative charges under A.R.S. § 42-2424.A.
- to reimburse costs of obtaining water from CAP or pay replacement costs.
- to pay costs associated with recovery of stored water
- to pay costs to be paid in future when water is used.

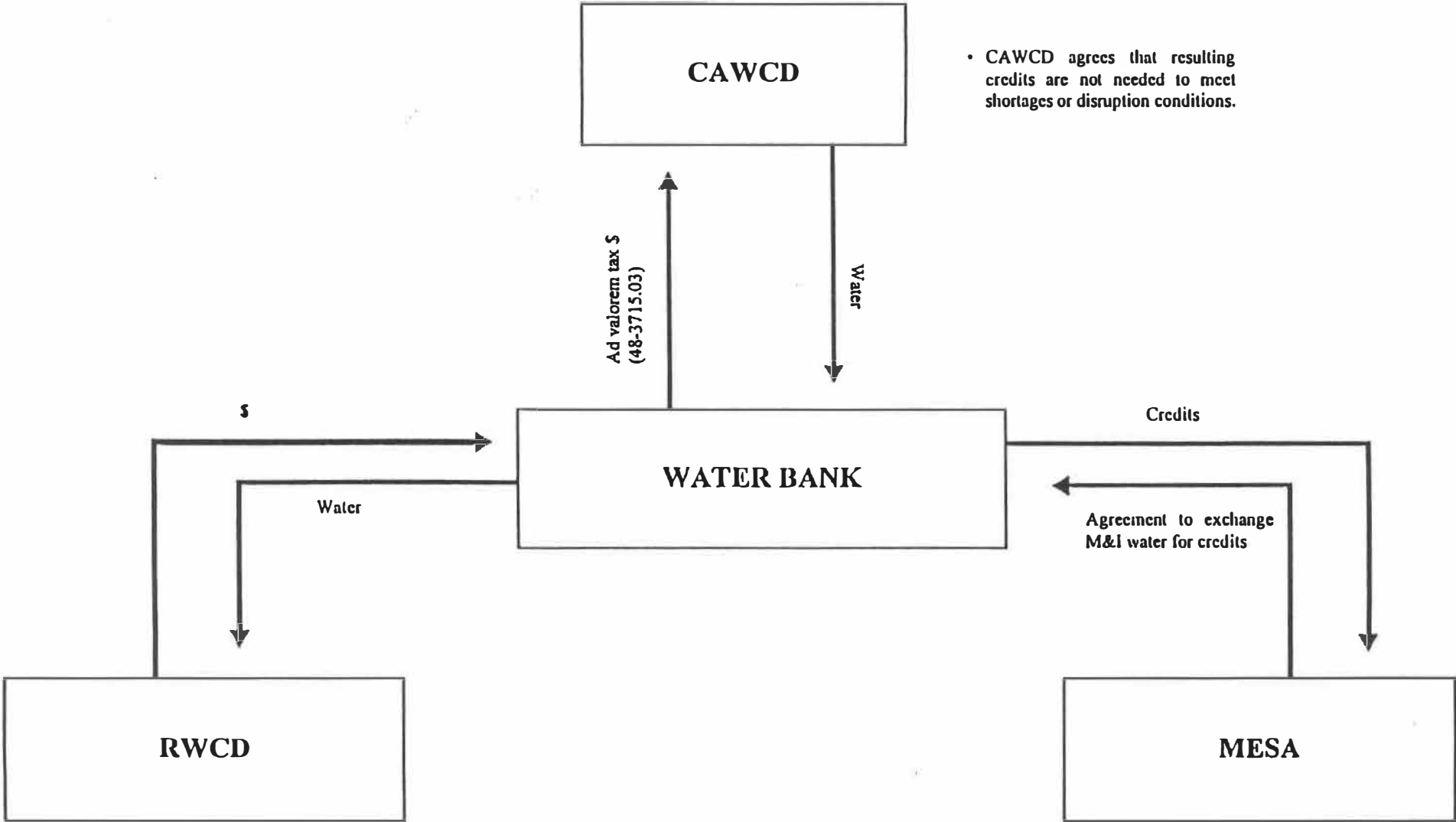
Mesa agrees:

- to exchange its M&I water for credits.
- is reimbursed its costs for recovering credits.
- to pay CAP capital costs associated with the M&I water.

RWCD agrees:

- to permit the Bank's use of its storage facility.
- to pay the Bank \$ as a "recipient" of stored water.

Segment Two



- CAWCD agrees that resulting credits are not needed to meet shortages or disruption conditions.

- RWCD permits use of storage facility
- RWCD pays funds to Water Bank as an in-lieu recipient

EXHIBIT C

ARIZONA DEPARTMENT OF WATER RESOURCES
Office of Colorado River Management

PROPOSED TOUR OF LOWER COLORADO REGION FACILITIES AND HABITATS
October 17-18, 1996

Purpose of the Proposed Lower Colorado Region Tour

In conjunction with recent activities of the Steering Committee of the Lower Colorado River Multi-Species Conservation Program (MSCP) a proposed tour of Lower Colorado region facilities and habitats is being arranged. The MSCP Steering Committee is comprised of representatives of the lower basin states of Arizona, California, and Nevada, and the United States Department of the Interior, and other Colorado River stakeholders. The purpose of the proposed tour is two-fold. First, to better acquaint the MSCP participants and other interested parties with the existing uses and operation of water and hydroelectric power facilities in the lower Colorado region. Second, to more fully understand the complex issues associated with the recent listings of endangered species and designations of critical habitat within the region.

Proposed Tour Dates

Thursday and Friday, October 17-18, 1996

Proposed Tour Format

The tour would consist of a caravan of buses carrying the tour participants to selected sites along the lower Colorado region. At each of the sites a host agency, or agencies, would make a presentation to the group and answer questions. Informal break-out sessions could be held on the buses and in conjunction with the lunch breaks and evening dinner session.

Proposed Tour Schedule

Thursday - October 17, 1996

1. Morning Session: Meet in Las Vegas, Nevada (at McCarran International or one of the casinos) and board buses to begin tour. Visit the following sites: Hoover Dam and power-plant; Willow Beach Natl. Fish Hatchery; Presentation by Hualapai Tribe of Native Fishes Rearing Facility; Davis Dam and power-plant and Lake Mohave Native Fish Work Group presentation.
2. Lunch (Katherine's Landing, Davis Dam?)
3. Afternoon Session: Tour of Arizona Game & Fish Department's Colorado River Nature Center; Fort Mojave Indian Tribe facilities?; Havasu National Wildlife Refuge; Lake Havasu Fisheries Improvement Program presentation; Central Arizona Project Havasu

Pumping Plant; Parker Dam and power-plant; Western Area Power Administration power scheduling presentation; Metropolitan Water District of Southern California Whittsett Pumping Plant; MWD's Gene Pumping Station

4. Dinner, Additional Presentations, and spend the night at Gene Camp.

Friday - October 18, 1996

1. Morning Session: Headgate Rock Diversion Dam and power-plant; Colorado River Indian Tribes facilities and uses; Cibola Natl. Wildlife Refuge; Imperial Natl. Wildlife Refuge; Imperial Dam and diversions.
2. Lunch (Mittry Lake Wildlife Area?)
3. Afternoon Session: Gila Project and Salinity issues; Yuma Desalting Plant and Reclamation water order scheduling presentation; Morelos Dam, Limitrophe Section and Mexican water quantity and quality issues.
4. Conclude Tour. Buses back to Phoenix, Arizona

Lower Colorado River Multi-Species Conservation Program

It's long been said that the Colorado River is the lifeblood of the West. Today, the Colorado River supplies vital water and power resources for more than 20 million people in Arizona, California and Nevada.

Recently, concerns have been raised about the reliability of these water and power resources following the U.S. Fish and Wildlife Service's 1994 designation of critical habitat for four endangered fish species in the Colorado River Basin.

In response, representatives of the three states, along with the various water and power agencies along the lower Colorado, have formed a regional partnership, which is developing a first-of-its kind multi-species conservation program aimed at protecting sensitive, threatened and endangered species of fish, wildlife and their habitat.

Description:

▼ The multi-species conservation program will work toward the recovery of listed species through habitat and species conservation, and attempt to reduce the likelihood of additional species listings under the Endangered Species Act.

▼ The proposed long-term program also will accommodate current water diversions and power production and optimize opportunities for future water and power development.

▼ Planned to be implemented over a 50-year period, the comprehensive program will address future federal agency consultation needs under the Endangered Species Act's Section 7, and non-federal agency needs for endangered species incidental take authorization approval under the Act's Section 10.

▼ Over a three-year planning period for the development of a comprehensive program, interim conservation measures will be implemented to address the immediate critical needs for certain endangered species. Interim measures to benefit the endangered razorback sucker and bonytail chub are proposed for the first year.

Location:

The program covers the mainstem of the lower Colorado River from below Glen Canyon Dam to the Southerly International Boundary with Mexico. The program area includes the 100-year flood plain and reservoir full-pool elevations.

Biological scope:

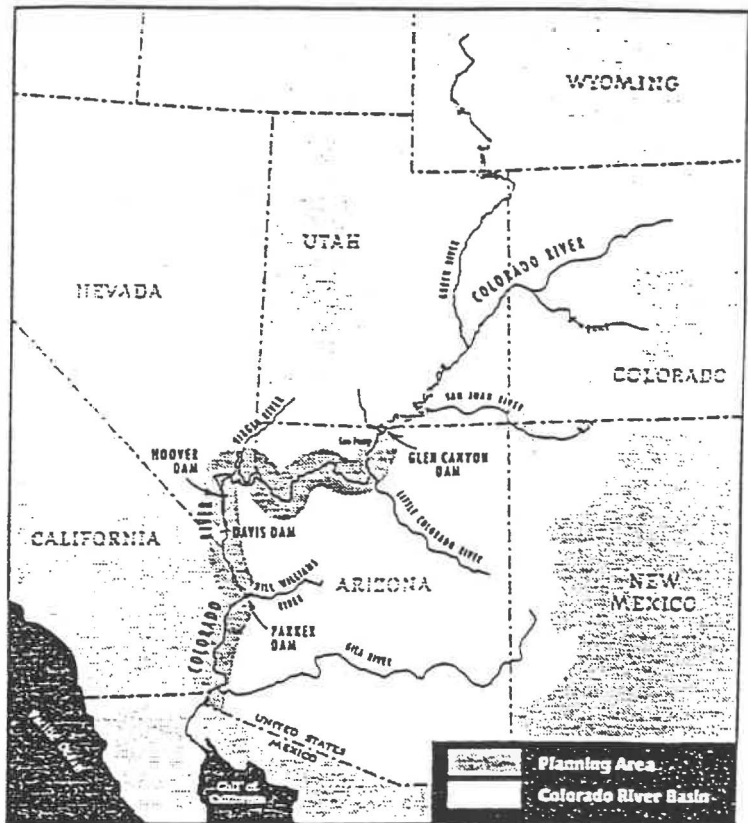
More than 100 federal or state-listed, candidate and sensitive species and their associated habitats, ranging from aquatic, wetland and riparian habitats, to upland areas will be addressed.

The program will address the biological needs of mammals, birds, fish, amphibians and reptiles, as well as invertebrates and plants.

Stakeholders:

The program involves a broad-based state/federal/tribal/private regional partnership, which includes water, hydroelectric power and wildlife management agencies in Arizona, California and Nevada. The stakeholders include:

U.S. Department of the Interior:
 Fish and Wildlife Service
 Bureau of Reclamation
 National Park Service
 Bureau of Land Management
 Bureau of Indian Affairs



Map showing planning area

Arizona:

Department of Water Resources
 Department of Game and Fish

California:

Colorado River Board of California
 Department of Fish and Game

Nevada:

Colorado River Commission of Nevada
 Nevada Division of Wildlife

Lower Colorado River Basin Indian Tribes

Various water and hydroelectric power resource management agencies within the three Lower Basin states.

The program also is seeking the participation by conservation groups. American Rivers, the Environmental Defense Fund, the Defenders of Wildlife, the Grand Canyon Trust and The Nature Conservancy have participated informally in the program's early planning efforts.

Program cost:

Projected at about \$4.5 million over three years for planning needs and implementation of the interim conservation measures. Equitable federal/non-federal cost-sharing is being pursued.

ARIZONA WATER BANKING AUTHORITY

Proposed Agenda Items

September 10, 1996 - 9:30 a.m. to 12:30 p.m.
City of Tucson - Mayor and Council Chambers

Presentation on draft interim Storage Facilities Inventory
Adopted by Authority

Presentation on 1997 Annual Plan of Operation
Initially adoption by Authority for Presentation to GUAC's
(presentations to Phoenix, Pinal and Tucson GUAC's prior to Oct. 15)

Continued discussion of IGA between Authority/DWR/CAWCD

Presentation on FY 97 Annual Operating Budget (Oct-June)
Adoption by Authority

Presentations by DWR and CAWCD on types of recharge and programs / groundwater storage

Presentation by Tucson AMA Regional Recharge Committee on recharge program in the Tucson area (Kathy Jacobs)

KEY DATES / TIME LINE

(updated 8/20/96)

1996

April 30

HB 2494 - Chapter 308 signed by Governor Symington

July 9

Appointments made to the Arizona Water Banking Authority and Study Commission

July 31

Annual Reports hand-delivered to Governor, President, Speaker

August 20

AWBA Meeting - Arizona Department of Water Resources
Presentation and recommendation on draft Storage Site Criteria for water storage
Discussion on status of working draft outline of IGA
Discussion on status of interim Storage Facilities Inventory
Discussion on cost of water (in-direct /direct)
Discussion on 1997 Annual Plan of Operation
Discussion and approval of FY 98 General Fund appropriation request
Presentation on Mohave County Water Authority, Roosevelt Water
Water Conservation District (RWCD), City of Mesa proposal
Presentation on proposed Lower Colorado River Tour

August 23

Presentation of Arizona Water Banking Authority to Tucson GUAC by Authority staff

Week of August 26

1997 Annual Plan of Operation draft finalized for presentation at September 10 meeting

August 27

Mailing of September 10 tentative agenda and finalized meeting minutes from July 18 meeting to Authority members and mailing list
Mailing of tentative agenda for September 11 meeting of the Arizona Water Banking Authority Study Commission

August 30

Deadline for materials for September 10 meeting
FY 98 General Fund appropriation request submitted to Governor, President and Speaker

KEY DATE / TIME LINE

Page 2

September 2

Mailing of materials to Authority members for September 10 meeting

September 4

Presentation of Arizona Water Banking Authority to Phoenix GUAC by Authority staff?

September 10

AWBA Meeting - Tucson

Interim Storage Facilities Inventory adopted by Authority

1997 Annual Plan of Operation initially adopted by Authority for Presentation to GUAC's (presentations to Phoenix, Pinal and Tucson GUAC's prior to Oct. 15)

Continued discussion of IGA between Authority/DWR/CAWCD

FY 97 Annual Operating Budget (Oct-June) adopted by Authority

Presentations by DWR and CAWCD on types of recharge and programs / groundwater storage

Presentation by Tucson AMA Regional Recharge Committee on recharge program in the Tucson area (Kathy Jacobs)

September 11

Arizona Water Banking Authority Study Commission Meeting - ADWR

September 19

Presentation of 1997 Annual Operating Plan to Pinal GUAC by Authority staff

September 20

30 day written comment period for draft Storage Site Criteria ends

Presentation of 1997 Annual Operating Plan to Tucson GUAC by Authority staff

Week of September 23

Storage Site Criteria for water storage finalized, incorporating public comment, for presentation to Authority at October 16 for adoption

September 30

Mailing of October 16 tentative agenda and finalized meeting minutes from August 20 to Authority members and mailing list

October

First half of 4 cent tax revenues due to County Treasurer offices

October 2

Presentation by Authority to Phoenix GUAC on 1997 Annual Plan of Operation

KEY DATE / TIME LINE

Page 3

October 7

Deadline for materials for October 16 meeting

October 8

Mailing of materials to Authority members for October 16 meeting

October 16

AWBA Meeting - Lake Havasu City

Storage Site Criteria for the storage of water adopted by Authority

1997 Annual Plan of Operation suggested revisions presented based on public comments received

Formal application to be used for all proposals reviewed and adopted by Authority

Continued discussion and approval of draft IGA by Authority

Presentation on Mohave County Water Authority, RWCD, City of Mesa proposal

Discussion on Interstate Water Banking

October 17-18

Lower Colorado River Tour

Week of October 21

Presentation to SRP by Authority staff (John Keane)

October 24

Presentation of draft IGA to CAWCD Water Planning and Policy Committee (tentative)

November

First half of 4 cent tax due to Authority

Week of November 4

1997 Annual Plan of Operation finalized based on comments received from

presentations to GUAC's and the Authority

November 4

Mailing of November 20 tentative agenda and finalized meeting minutes from September 10 meeting to Authority members and mailing list

November 7

Presentation of draft IGA to CAWCD Board for recommendation and approval

November 8

Deadline for materials for November 20 meeting

KEY DATE / TIME LINE

Page 4

November 11

Mailing of materials for November 20 meeting to Authority members

November 20

AWBA Meeting - Yuma

1997 Annual Plan of Operation adoption by Authority

Recommendations and final approval of IGA by Authority

Discussion on Interstate Water Banking

December 1

ANNUAL PLAN OF OPERATION (45-2456 p.37 lines 25-43, p.38 lines 1-39)

1997 Plan of Operation submitted to Governor, President and Speaker

December 2

Mailing of December 18 tentative agenda and finalized meeting minutes from October 16 meeting to Authority members and mailing list

December 6

Deadline for materials for December 18 meeting

December 9

Mailing of materials for December 18 to Authority members

December 18

AWBA Meeting - Department of Water Resources

Authority consideration and possible approval of applications submitted to-date

Discussion on Interstate Water Banking

1997

March

General Fund appropriation for Authority determined by Legislature

March 1

INVENTORY OF EXISTING STORAGE FACILITIES DUE

(45-2452 p.34 lines 41-44, p.35 lines 1-31)

Determination if existing facilities meet Authority's needs for next 10 years

If Facilities Inventory concludes additional facilities are needed - the Authority must develop plan for the development of additional storage facilities

(45-2453 p.35 lines 33-42, p.36 lines 1-41)

KEY DATE / TIME LINE

Page 5

April

Any additional requests or changes in Cost of Services budgets submitted by Authority to DWR and CAWCD for FY 98

May 1

DWR/CAWCD submit Cost of Services budget proposals for FY 98 to Authority
Revised Cost of Services budget proposals approved by Authority (if necessary)
FY 98 Annual Operating Budget preliminarily reviewed by Authority

June

FY 98 Annual Operation Budget adopted by Authority

July 1

TARGET TO STORE 100,000 AF OF COLORADO RIVER WATER
(45-2451 p.34 lines 31 - 39)
Fiscal Year 1998 begins - General Fund appropriations available

August 1

ANNUAL REPORT DUE TO GOVERNOR, PRESIDENT, SPEAKER
(45-2426 p.33 lines 38-44 p.34 lines 1-15) Submit to Governor, President and Speaker
Possible inclusion of request for General Fund appropriation for FY 99
Report amount of water stored / state reasons if not 100,000 acre feet
(45-2451 p.34 lines 31-39)

November 1

STUDY COMMISSION INTERIM REPORT DUE
Interim report developed by Study Commission must be filed with the legislature

December 1

ANNUAL PLAN OF OPERATION (45-2456 p.37 lines 25-43, p.38 lines 1-39)
Authority shall adopt a plan for calendar year 1998

1998

November 1

STUDY COMMISSION FINAL REPORT DUE
Final report must be filed with the legislature