ARIZONA WATER BANKING AUTHORITY

WEDNESDAY, OCTOBER 21, 1998
ARIZONA DEPARTMENT OF WATER RESOURCES

PLEASE PRINT

	NAME	REPRESENTING
1	Don Pope	Yuma County Water Users' Association (Study Comm.)
2	Jim Downing	MVWCDD
3	Rock Cramer	Vickers Farms
4	Jay Moyes	Meyer Hendricks, for MVWCDD
5	Cliff Neal	CAWCD
6	Dorothy Tanner Farm	Vidler
7	Greg Bushner	Hydro Systems
8	Tom Harbour	CAWCD
9	Fred Duren	Hunt-Zollars
10	John Mihlik	West Maricopa Combine, Inc.
11	Mark Myers	Metro Water - Tucson
12	Harry Kuzgerian	MWD of So. Cal
13	Barbara Gerhart for Bob Lynch	IEDA
14	Joy Cannon	Town of Parker
15	Eric Berkowsky	Sun West Holdings
16	Tom Shelh	ADR Staff
17	John Hetrick	SRP
18	Chuck	B-E
19	John Boyer	APS
20	Jaun Cummings	PHX AMA.
21	Tom Wotring	USBR
22	Tim Kacerek	CAWCD
23	Courtney Brand	Dames & Moore
24	Christine Close	Dames & Moore
25	Jan Lane	Az State Land Dept.
26	Kurt Fritsch	Col. River. Comm. of Nevada
27	Tim Thompson	Integrated Water Technologies
28	Paul Orme	CAIDD/MSIDD
29	Bill Allen	Gdym

ARIZONA WATER BANKING AUTHORITY

WEDNESDAY, OCTOBER 21, 1998
ARIZONA DEPARTMENT OF WATER RESOURCES

PLEASE PRINT

30	Bill Sullivan	ON File
31	G.L. Stevens	ON FILE
32	Bill Swan	self - on file
33	Floyd Marsh	Scottsdale - on file
34	Stephanie Geclach	Stantech Consulting
35	DAVID IWANSKI	AGRI-BUSINESS COUNCIL
36	Mary Quinn	Ellis Baker
37	Doug C. Nelson	on file HRWA
38	Bob McCain	ON FILE ANNUAL
39		
40		
41		
42		
43		
44		
45		
46		
47		
48		
49		
50		

Arizona Water Banking Authority

500 North Third Street, Phoenix, Arizona 85004
Telephone 602-417-2418
Fax 602-417-2401

FINAL AGENDA

Wednesday, October 21, 1998
9:30 a.m.

Arizona Department of Water Resources
Third floor conference room

I. Welcome/Opening Remarks

II. Adoption of Minutes of September 16 Meeting

III. Discussion of the 1998 Plan of Operation and Staff Activities

IV. Vidler Water Company Offer

V. Recharge Presentations

VI. Interstate Issues

VII. 1999 Annual Plan of Operation

VIII. Study Commission

IX. Call to the Public

Future Meeting Dates:
Wednesday, November 18, 1998
Wednesday, December 16, 1998

Persons with a disability may request a reasonable accommodation, such as a sign language interpreter, by contacting the Arizona Water Banking Authority at (602) 417-2418 or (602) 417-2455 (T.T.Y.). Requests should be made as early as possible to allow time to arrange the accommodation.

ARIZONA WATER BANKING AUTHORITY
Draft Minutes

September 16, 1998
Arizona Department of Water Resources

Welcome / Opening Remarks
Chairman Pearson opened the Arizona Water Banking Authority (AWBA) meeting. All members of the Authority were present except Representative Gail Griffin.

Adoption of Minutes of August 19 Minutes
The August 19 minutes were adopted as submitted.

Discussion of the 1998 Annual Plan of Operation and Staff Activities
Tim Henley, Manager of the AWBA, discussed operation of the AWBA and monthly water deliveries for August. Mr. Henley explained that August deliveries were low (around 27,800 af) and reiterated his comments from last month's meeting that a combination of wet weather and CAP pool water issues make it unlikely that the AWBA will meet its recharge goals for 1998. At this time the AWBA has recharged about 140,000 af of water. The AWBA will probably recharge a total of 250,000 acre feet of water in 1998.

Other Issues
Kim Kunasek of the AWBA described the progress of the CAWCD/USBR lawsuit. The first phase of the trial (contract interpretation) is complete, and both parties are awaiting disposition of this first phase before the trial proceeds to the next phase. Judge Carroll is working on the ruling at this time, and an order should be forthcoming soon.

The Upper Santa Cruz Water Users Groups completed its feasibility study in August. The USCWUG was formed to explore the feasibility of augmenting existing groundwater supplies with CAP water in the Sahuarita-Green Valley area. The USCWUG consists of representatives of water users, government agencies, and other stakeholders in the area. The project generally identified alternatives and costs for delivering CAP water to potential users. The group conducted preliminary investigations, performed route studies and conceptual designs, performed preliminary design of optimal alternatives, performed financial feasibility analyses of optimal routes, and prepared the final report. It is available if anyone would like to review it.

Mr. Henley stated that by the end of September, the CAP requires their customers to submit their water requirements to them. Those requests will be discussed with the AWBA to determine how much capacity will be available to the AWBA. This process will begin in October.

Approval of the Draft Tucson Facilities Plan
Mr. Henley stated that some changes from last month's meeting include expanded comments on the ranking of certain facilities based on the degree to which they can achieve the AWBA's goals. Another chart contains refined criteria for ranking each facility and the goals the facility can achieve as either excellent, good, minimal, or not likely.

Mr. Henley explained that certain funds can only be used for certain purposes, which builds in an institutional limit on recharge spending in Tucson. Based on the direct facilities and some of the cost to recharge in Tucson, the total comes to approximately $60.00 per acre-foot. With the four-cent tax, the AWBA could probably recharge approximately 20,000 af annually for drought protection. The four-cent tax is used to firm the M&I subcontractors supplies for the Tucson area. Mr. Henley also explained that Tucson needs about 700,000 - 750,000 af (30,000 - 35,000 af stored annually for the next 20 years) of water to protect against shortages on the Colorado River for the next 100 years. Because the four-cent tax is not sufficient to meet this need, the AWBA will need to spend general fund monies in the Tucson AMA.

The withdrawal fees are to help meet the water management goals of the area as defined by the Arizona Department of Water Resources. General funds can also be utilized to assist in Indian settlements.

Tom Griffin, Vice-Chairman, believes the AWBA should consider earmarking the general fund monies in the future. Mr. Griffin is concerned that without direction regarding proportion of funds that may be used for specific purposes, some potential recipients of general fund monies could be shortchanged. Mr. Henley responded that the Study Commission has examined this use indirectly and will make recommendations encompassing this concept in its report to the Legislature in November.

Mr. Henley also mentioned that the AWBA will need to consider different ways of approaching groundwater savings facilities in Tucson to meet its goals.

Mark Myers, member of the Study Commission stated that he is pleased with the changes that the AWBA has made to the facility plan.

The Authority members adopted the Tucson AMA Facility Plan as presented. Mr. Henley stated that the Facility Plan will be available on the AWBA webpage.

Presentation by Vidler Water Company

Dorothy Timian-Palmer, Chief Operating Officer of Vidler Water Company, made a short presentation. Ms. Palmer explained that Vidler has a pilot project permit to store up to 10,000 af of water over two years at its MBT Ranch site and is currently in the process of obtaining a full-scale permit to store 20,000 af annually. Vidler would like the AWBA staff to begin negotiations to store water at MBT Ranch as soon as possible. Vidler will be recharging water as early as October 1998. They anticipate recharging 10 af of water per day.

Mr. Henley commented that the AWBA does not have a storage permit for MBT Ranch at this time. The AWBA will submit a permit application and begin working on a draft agreement shortly. The AWBA staff has concerns about the cost.

Grady Gammage, Jr., Authority member, asked how Vidler Water Company would rate under the AWBA's storage site criteria. Mr. Henley stated that for shortage protection it would possibly be good, as it could provide some drought protection. From a groundwater management standpoint, it would not be rated high, as MBT Ranch is not in an AMA. From an Indian settlement standpoint it would not be rated high, as Indian settlements are generally better if they are closer to the reservations. On an interstate storage standpoint it would be rated excellent, depending on opportunities to recover the water.

Chairman Pearson asked the AWBA staff to prepare a policy paper detailing the implications of storing water outside the AMA and storing water with privately owned companies and addressing recovery issues.

Update on Study Commission Activities

Herb Dishlip updated the AWBA on upcoming activities of the Study Commission. Mr. Dishlip explained that the full report from the Study Commission will be forthcoming in November 1998, and the AWBA intends to recommend legislation to give the AWBA additional powers and duties.

Update on Interstate Discussions

Federal Rule Governing Interstate Water Banking

As of this date, the federal rule governing interstate water banking has not yet been released.

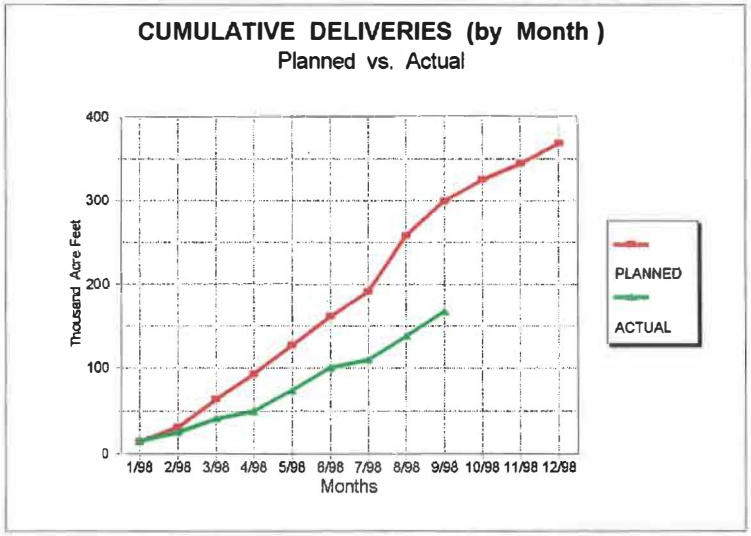
California 4.4 Plan

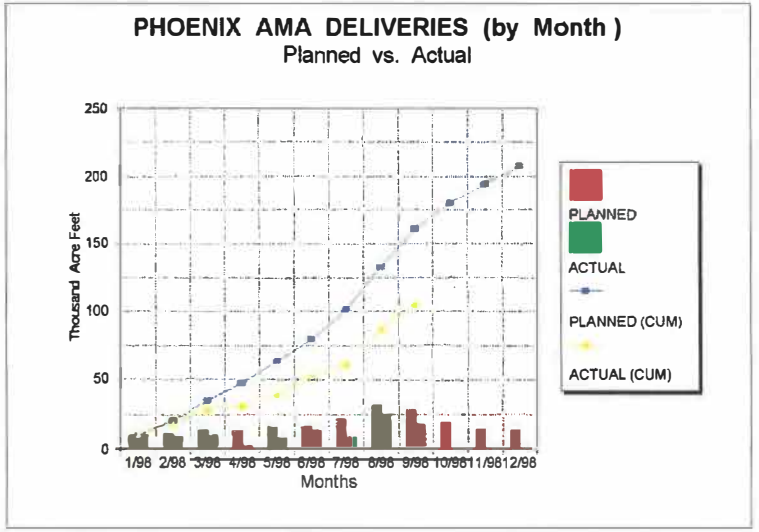
The financial component of the deal between the San Diego County Water Authority and the Imperial Irrigation District has been finalized. The agreement allows water saved through farm irrigation conservation techniques to be transferred through the MWD canal to San Diego County. This will help California get close to its 4.4 maf allocation, which is has been exceeding by almost 800,000 af annually.

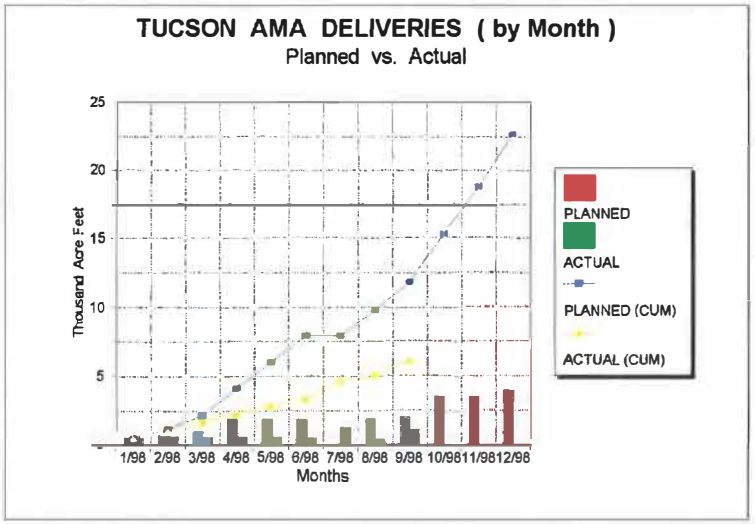
Call to the Public

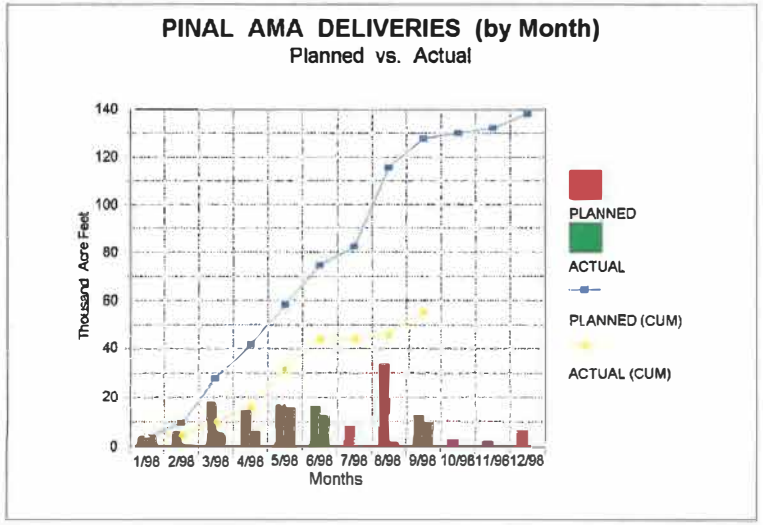
The next meetings are scheduled for October 21 and November 18. The meeting was adjourned at 11:00 a.m.

1998 PLAN OF OPERATION









1998 PLAN OF OPERATION BY ENTITY

Actual deliveries updated 15-Oct-98

		jan	feb	mar	apr	may	jun	jul	aug	sep	oct	total	
Phoenix AMA													
	GRUSP	8,032	8,551	5,284	0	5,237	5,904	5,595	6,325	5,910	6,400	57,238	GRUSP
	RWCD	0	0	0	0	0	0	0	0	0	0	0	RWCD
	NMIDD	2,233	286	2,247	0	0	4,959	271	12,811	7,390	3,500	33,697	NMIDD
	QCID	0	0	0	0	0	0	0	3,589	3,536	2,000	9,125	QCID
	MWD	0	0	2,373	2,399	2,701	2,604	2,665	2,866	1,748	1,412	18,768	MWD
	CHCID	0	0	0	0	22	0	0	0	0	100	122	CHCID
	TID	0	0	0	0	0	0	0	0	0	350	350	TID
Subtotal		10,265	8,837	9,904	2,399	7,960	13,467	8,531	25,591	18,584	13,762	119,300	
Pinal AMA													
	CAIDD	0	0	0	0	0	0	0	0	323	1,145	1,468	CAIDD
	MSIDD	2,430	0	0	0	8,792	3,247	0	1,799	5,730	730	22,728	MSIDD
	HIDD	1,819	708	5,284	5,905	6,901	9,302	0	0	3,461	700	34,080	HIDD
Subtotal		4,249	708	5,284	5,905	15,693	12,549	0	1,799	9,514	2,575	58,276	
Tucson AMA													
	Avra Valley	0	0	0	0	0	0	675	374	318	900	2,267	Avra Valley
	CAVSARP	531	579	576	597	600	537	652	54	57	420	4,603	CAVSARP
	Pima Mine	0	0	0	0	0	0	0	0	688	0	688	Pima Mine
	Lower Santa Cruz	0	0	0	0	0	0	0	0	0	0	0	L. Santa Cruz
Subtotal		531	579	576	597	600	537	1,327	428	1,063	1,320	7,558	
TOTAL		15,045	10,124	15,764	8,901	24,253	26,553	9,858	27,818	29,161	17,657	185,134	

Water Recharge Outside the AMA

Introduction

Each year, the Arizona Water Banking Authority (AWBA) pays the delivery and storage costs to bring Arizona's unused Colorado River water into central and southern Arizona through the Central Arizona Project (CAP). The water is stored underground in existing aquifer by direct recharge or is used by irrigation districts in lieu of pumping groundwater by indirect recharge. Water banking provides benefits such as drought protection, enhanced water management, assistance with Indian water rights settlements, and benefits for communities outside the CAP service area.

The AWBA has numerous indirect recharge partners (irrigation districts) and stores CAP water at underground storage facilities in the Phoenix and Tucson AMAs. To make optimal use of the CAP, the AWBA is considering recharging water at several storage sites outside the AMA. Recharge outside the AMA involves new considerations in addition to the issues present when recharge occurs within the AMA. This paper discusses each issue.

I. Water Storage Permits

A. Indirect Recharge

In order to accrue long-term storage credits for indirect recharge, the AWBA must show that the entity that uses AWBA surface water in lieu of groundwater actually refrained from pumping groundwater that the entity had a right to pump. Since groundwater is only managed within the AMA, the ADWR cannot restrict new groundwater pumping outside the AMA, which is necessary to compute long-term storage credits based upon exchanging groundwater for surface water. Additionally, groundwater conservation is not an issue in many areas outside the AMA; thus, from a policy perspective, the AWBA focuses its resources on encouraging the use of surface water where groundwater is not readily available or is in decline. To do otherwise would essentially augment the water supply rather than replace diminished groundwater levels.

Because of the way long-term storage credits are accrued and calculated and because of the uncertainty surrounding long-term storage credit calculation for indirect recharge outside the AMAs, the AWBA should only pursue direct recharge outside the AMAs.

B. Direct Recharge

The AWBA must obtain water storage permits from the ADWR for water storage at underground storage facilities whether or not a facility is located within the AMA. To assure adequate monitoring, the AWBA must enter into agreements with private owners of underground storage facilities that detail the process for monitoring equipment, maintaining equipment, and collecting data. Hydrologic data is critical for computation of long-term storage credits and for issuance of full-scale water storage permits.

1. Monitoring

As part of the underground storage facility permit application process, underground storage facility owners or operators are required to provide a description of the impact of recharge activity on the area of hydrologic impact. While the area of hydrologic impact within the AMA encompasses the entire AMA. Because there are no restrictions on pumping outside the AMA, the AWBA needs additional assurance that water recharged at an underground storage facility will be available for recovery. An underground storage facility owner or operator outside the AMA must provide the AWBA with data on adjacent or nearby water usage to enable the AWBA to evaluate water recovery opportunities at a later time.

The underground storage facility owner and operator should be required to include information on a wide range of possible effects of recharge activity. These effects could include reduced groundwater levels from neighboring uses and also the potential for increased groundwater levels, which could encourage new uses. The AWBA will need to draft agreements that contain assurance that at a minimum, the underground storage facility operators will not undertake any new uses of water, such as farming, to take advantage of increased groundwater levels.

II. Storage Costs

The AWBA currently has three sources of funding: revenues from a groundwater pumping fee, revenues from an ad valorem tax of 4¢ per $100 of assessed property value, and a general fund appropriation from the Arizona Legislature. Under current law, the AWBA cannot use revenues from groundwater pumping fees for recharge outside the AMA. As a matter of policy, the AWBA has only applied revenues from the four-cent *ad valorem tax* in the counties within the AMA where the monies were collected. General fund monies can be used outside the AMA for protection against drought and other purposes. Under current law, only general funds may be used to earn long-term storage credits to firm supplies for CAP shortage protection. The AWBA currently received a $2 million general fund appropriation last year.

Recharge outside the AMA involves different cost and funding components than recharge within the AMA. Most costs associated with recharge are covered by the rate the AWBA pays to the CAWCD for each acre foot of water it purchases. When water is stored outside the AMA, however, a $15 per acre foot tax is imposed by the CAWCD if that water is recovered for non-CAP users (for example, Nevada). If the AWBA must pay an additional $15 per acre foot for water storage outside the AMA that it does not pay for water storage inside the AMA, even less water can be recharged for each water banking dollar.

Obtaining satisfactory pricing for recharge is critical. The AWBA must maximize each recharge dollar to obtain the greatest water benefits possible for each dollar spent on recharge. While the AWBA purchases excess CAP water from the CAWCD for $43 per acre foot, direct recharge of that water costs an additional $17 (average) per acre foot. While water storage costs increase, the

AWBA general fund appropriation has remained the same. As a result, the amount of water that the AWBA can recharge over time is reduced.

Private entities constructing direct recharge facilities will incur land acquisition, construction, and equipment costs. These entities wish to recoup their costs as quickly as possible through the water storage rates they charge at their facilities. These rates would be higher than the rates the AWBA is accustomed to paying because the AWBA has historically recharged at publicly-owned facilities where recouping construction costs is not the highest priority. While private entities wishing to store water may be in a position to pay a "market rate" or higher for water storage, the AWBA may not always be in a position to pay these higher rates. The AWBA's duty and its foremost consideration must be to maximize each recharge dollar available in the water banking fund.

Ultimately, privately owned entities facilities outside the AMA may be most appropriate for interstate water banking. The AWBA can most easily recoup all of the higher costs (water purchase, recharge, CAWCD tax, any other costs) from other states because the other states recharging water in Arizona must by law fully reimburse the AWBA for all costs associated with interstate water banking.

III. Private Ownership

A. Recovery

Future recovery of water recharged in underground storage facilities is a critical component of the AWBA's choice of a recharge site. If the AWBA stores water outside the AMA, the AWBA and/or the underground storage facility must have a contractual agreement with the CAWCD that will enable water recovery from the CAP canal at any given time. For example, if the AWBA stores 10,000 acre feet of water in La Paz County outside the AMA, the entity on whose behalf the AWBA has earned long-term storage credits must be allowed to redeem the long-term storage credits and obtain an equivalent quantity of water from the CAP canal. Recovery of water stored outside of an AMA can only occur if recovery will take place within the same irrigation non-expansion area, groundwater basin or groundwater sub-basin in which the water was stored. *See* A.R.S. § 45-834.01(3)(1996).

To date, the AWBA has never stored water in a privately owned recharge facility. Virtually all underground storage facilities the AWBA uses are owned and operated by the CAWCD (CAVSARP, Avra Valley Recharge Project, Pima Mine Road). Storing water at CAWCD-owned and operated facilities provides an additional level of security because water purchase, storage, and recovery are all coordinated by the same entity. Unlike a privately owned company, the CAWCD is a special district established by law with statutory duties and powers. In contrast, a privately owned company is susceptible to losses, bankruptcy, changes in ownership, and dissolution.

In each agreement to store water at an underground storage facility located outside the AMA, the AWBA must obtain certainty that on-site recovery wells will be available to the AWBA when it needs to recover water and pump it into the CAP canal. One way to achieve this certainty is to obtain easements that will guarantee the AWBA access to recovery wells regardless of the ownership of the land. This approach could alleviate some concerns that a private entity operating an underground storage facility will be "here today gone tomorrow."

Well location is also critical to a successful recovery effort. Recovery wells must be located in an area where water can be successfully and cost-effectively recovered. If other entities storing water at the underground storage facility pump excessive water, the AWBA's ability to recover water when needed may be affected.

Ultimately, water storage outside the AMA is "transparent" to the CAP user because water is pumped from the area where water is stored into the canal then recovered by a downstream user. The AWBA must enter into agreements with owners or operators of underground storage facilities that provide guaranteed access to recovery wells (perhaps by obtaining an easement) and to obtain certainty that at least on-site water usage will not change. The AWBA should consider a wide range of recovery scenarios (neighboring uses, potential increase in groundwater levels, others) prior to agreeing to store water at any particular location.

IV. Water Quality

In order to recover water that has been recharged, the entity undertaking recovery must pump groundwater into the CAP canal. Because water is pumped back into the canal at the time of recovery, these transactions are transparent to the CAP customer because the water that is stored outside the AMA and the water that is later recovered and pumped back into the CAP canal for downstream users is legally identical. In addition, the quantity of water stored and recovered is the same. However, unless water is stored and recovered from the same location (e.g., CAVSARP), the molecular composition of the water stored (CAP or other surface water or effluent) and the water recovered (groundwater) is likely to differ. Further research will need to be completed to determine whether commingling groundwater, effluent, and CAP water could cause problems for treatment plants.

Recovery could require some additional monitoring of water quality. Like the other issues raised in this discussion, water quality monitoring could be addressed in contracts between the underground storage facility and the CAWCD.

In addition to technical or logistical issues, the public perception of water banking and eventual water recovery is critical to the success of water banking statewide but especially outside the AMA. By law, groundwater cannot be transported from outside the AMA into the AMA. By banking water outside the AMA then recovering those credits inside the AMA, the AWBA will need

to emphasize that groundwater is not being removed from communities outside the AMA for the benefit of communities inside the AMA. The water that is being recharged outside the AMA is surface water that would not have been present there without the AWBA. In fact, the five percent cut to the aquifer is a benefit to communities where recharge occurs. The "water transfer" label may be applied by those who doubt the validity of artificial recharge and who suspect that water banking is disguised water transfer. A careful explanation of water banking as shortage protection or as supply augmentation (if the role of the AWBA changes) should easily demonstrate that water being banked and recovered within the AMA is water that would not otherwise have made it to the aquifer in the outside AMA area where it was stored.

To assure adequate public notice, the AWBA should provide an overview of its plans to recharge water in areas outside the AMA to the county board of supervisors for the county in which the underground storage facility is located. The AWBA has made and will continue to make similar presentations to the various groundwater users advisory councils in the respective AMAs.

VIDLER WATER COMPANY, INC.
www.vidlerwater.com

September 25, 1998

Mr. Tim Henley
Manager
State of Arizona Water Banking Authority
500 North Third Street
Phoenix, AZ 85004

Re: MBT Ranch, Arizona—underground water storage

Dear Mr. Henley:

Dorothy Timian-Palmer and I appreciated the opportunity to open discussions with you and Ms. Kunasek this past week regarding the pricing of water recharge, storage and recovery at our MBT Ranch facility. This letter presents Vidler Water Company's offer to be a water storage vendor to the Arizona Water Banking Authority whereby Vidler Water Company will store up to 10,000 acre-feet of the AWBA's water at Vidler's MBT Ranch pilot recharge facility.

The purpose of Vidler Water Company's pilot scale project is to demonstrate the hydrologic feasibility for a recharge project located in the Harquahala Valley. The project as conceived will evaluate several different methods of recharge and operating parameters. The pilot scale facility will consist of three recharge basins approximately four acres each. Water flowing into each basin will be metered as will the standing water levels within each basin.

The development of the pilot scale MBT Ranch Recharge Facility will provide the foundation for the full scale facility in the same vicinity as the pilot project site. Following the success of the recharge pilot program, it is Vidler Water Company's intent to bring on line a full scale project capable of recharging and recovering a minimum of 100,000 acre-feet per year with a storage capacity exceeding 1,000,000 acre-feet. Using the MBT Ranch Recharge Facility, Vidler Water Company intends to develop a facility that it may lease to interested parties for intra-state water storage and to political subdivisions through the Arizona Water Banking Authority for inter-state water storage.

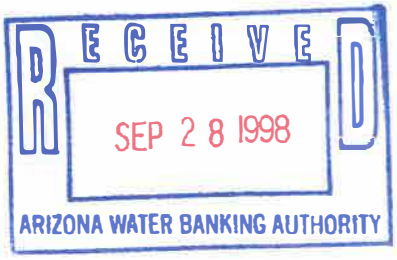
Vidler recognizes the benefit received from the AWBA for providing the water to Vidler's pilot recharge project. In exchange, Vidler proposes to recharge and store under its pilot permit up to 10,000 acre-feet of the AWBA's water at no cost to the AWBA. The fee to recover up to the first 10,000 acre-feet will be equal to the cost of energy.

Please let me know if you need any other information and advise me of issues that need additional research. I look forward to speaking with you in the near future.

Sincerely,

Michael J. Schlehuber
Chief Financial Officer

Cc: John Hart
Dorothy Timian-Palmer, P.E.
Disque Deane, Jr.



875 Prospect Street, Suite 301 • La Jolla, CA 92037 • Tel 619.456.5610 • Fax 619.551.0944

APS BOUSE PILOT RECHARGE PROJECT

PRESENTATION TO ARIZONA WATER BANKING AUTHORITY

PREPARED FOR

ARIZONA PUBLIC SERVICE COMPANY

PREPARED BY

BOOKMAN-EDMONSTON ENGINEERING, INC.

October 21, 1998

EXECUTIVE SUMMARY

Introduction

Arizona Public Service Company (APS) owns approximately 12,400 acres of land located nine miles east of the community of Bouse in the Ranegras Plain Groundwater Basin of western Arizona. The property was originally purchased for the purpose of constructing a coal-fired electric generating station. The electric market has changed, and the original plans for the facility have been abandoned. APS has been investigating other possible uses for the property and has determined that the construction of recharge basins for an Underground Storage Facility (USF) would enhance the value of the property and provide a benefit to APS and the State of Arizona.

Location

The proposed recharge basins would be located in Sections 7 and 8, Township 6 North, Range 15 West. These sections were chosen due to their proximity to the Central Arizona Project (CAP) Aqueduct, their distance from private wells in the area (the closest private well is approximately two miles away from the proposed site), the availability of existing wells for monitoring and future recovery, and more favorable subsurface stratigraphy. The site is located upstream of all the major CAP water users and, as such, is ideally located to firm up water supplies for CAP water users or to provide water to CAP water users in lieu of Colorado River water being diverted by out-of-state water users.

The land was previously used for agricultural purposes with wells drilled to supply center-pivot sprinkler irrigation in the late 1970s. Farming activities were incrementally abandoned, with farming at the site ceasing in 1987.

The site is fairly remote, is not located within a 100-year floodplain, is not known to have experienced land subsidence, and does not have any underground storage tanks.

Facilities

The proposed pilot project consists of diverting CAP water from the CAP Aqueduct to infiltration basins. The water will be diverted using a siphon structure located on the CAP right-of-way, conveyed through approximately 1,300 feet of 18-inch diameter PVC pipe and 6,900 feet of two 12-inch diameter aluminum pipes, and discharged into three spreading basins of three acres each.

Each three-acre spreading basin will have bottom dimensions of 400 feet long by 317 feet wide. They will have 3:1 side slopes to help reduce erosion due to wave action. They will be approximately five feet deep with an operating water surface level ranging from one to four feet.

Operations

The pipelines will have the capacity to fill two basins concurrently. Initially, one basin will be in continuous operation, and the other two basins will alternate between wet and dry cycles. Operations will be automatically controlled with flow sensors in the pipes and water level sensors in the basins.

Source Water

The source water will be CAP water. The applicant is currently in conversation with the Arizona Water Banking Authority (AWBA) with the anticipated outcome that the APS Bouse facility will recharge water on behalf of the AWBA. In that event, the AWBA would receive the credits for the stored water.

Available and Collected Data

Well logs were available for eight existing wells in the area which were available and extended to depths of approximately 950 feet. Additionally, the U.S. Bureau of Reclamation (USBR or Reclamation) had soil borings to depths of 30 feet along the CAP Aqueduct alignment. APS undertook a program of soil borings on the site with nine holes logged to a depth of 11 1/2 feet, eight holes logged to a depth of 50 feet, and two deeper holes logged to depths of 80 feet and 125 feet, respectively.

An extended infiltration test was performed at the site. The infiltration test indicated that infiltration rates may be in the range of two feet per day. The pilot project will determine if a two-foot per day rate can be sustained over a several-month period of time, and if so, what kind of maintenance regime would be required.

As the site was previously farmed, the soils were tested for pesticides, with no detectable amounts found. Water quality samples were also taken from two wells on and immediately adjacent to the site. In places, the groundwater is relatively high in fluoride, although the levels do not exceed U.S. Environmental Protection Agency (EPA) secondary drinking water standards. CAP water quality is similar to the quality of the native groundwater.

Hydrogeology

The well logs and bore holes generally indicate favorable subsurface conditions for recharge and recovery. The site geology consists of Quaternary alluvium underlain by older alluvium (probably Tertiary in age) with consolidated basement rocks greater than approximately 1,100 feet below ground surface. The older alluvium consists of conglomerates interspersed with lenses of sands, gravels, and clays. The Quaternary alluvium is composed of sand and gravel, with some clay and caliche. The older alluviums yield groundwater in the vicinity of the proposed recharge site.

At the site, groundwater is found at approximately 310 feet below ground surface, leaving ample storage for recharged groundwater. It is possible that some perched groundwater exists on clay lenses as is likely the case over ten miles west of the APS Bouse pilot recharge project. The groundwater gradient is generally to the southwest at the site.

Monitoring

The monitoring plan is designed to collect data that will support the development of a full scale recharge facility and will also provide information that will identify any potential unreasonable impacts due to operation of the facility. It includes water level monitoring, water quality monitoring, and water quantity monitoring. Three monitoring wells will be sited downgradient of the three basins and will include nested piezometers. Water levels in the piezometers will be monitored weekly using water level transducers connected to a datalogger. Additionally, a dedicated cased two-inch diameter bore hole will be available for tracking the wetting front using a nuclear probe or capacitance device.

Aquifer water levels will be monitored monthly by three existing wells using a water level transducer. The frequency of water level monitoring in these wells may increase based on results obtained from water level monitoring in the piezometers.

Groundwater quality will be sampled annually from an existing well and evaluated by an Arizona Department of Environmental Quality (ADEQ) approved laboratory.

Estimated Impacts

Based on the existing well logs, well designs, and logged bore holes, a range of transmissivity of 37,500 to 85,500 gallons per day per foot (gpd/ft) was estimated.

Spreadsheet models based on the Hantush equation for rectangular recharge basins and checked with the Theis equation were used to estimate the growth of the groundwater mound. For the pilot project, it is estimated that the groundwater mound will reach a height of between 79 and 38 feet two years after the wetting front reaches the saturated aquifer.

Over the life of the pilot-scale project, a one-foot rise in the groundwater level is estimated to occur at between 2.8 and 3.4 miles from the center of the site.

It should be noted that these models will be refined for the analysis in the full-scale permit application package based on aquifer parameters data collected during the pilot project.

Objectives

The main objectives of the pilot project are as follows:

- To determine the hydrologic feasibility of recharge at the APS Bouse property site; and
- To recharge CAP water.

More specific objectives of the pilot project are as follows:

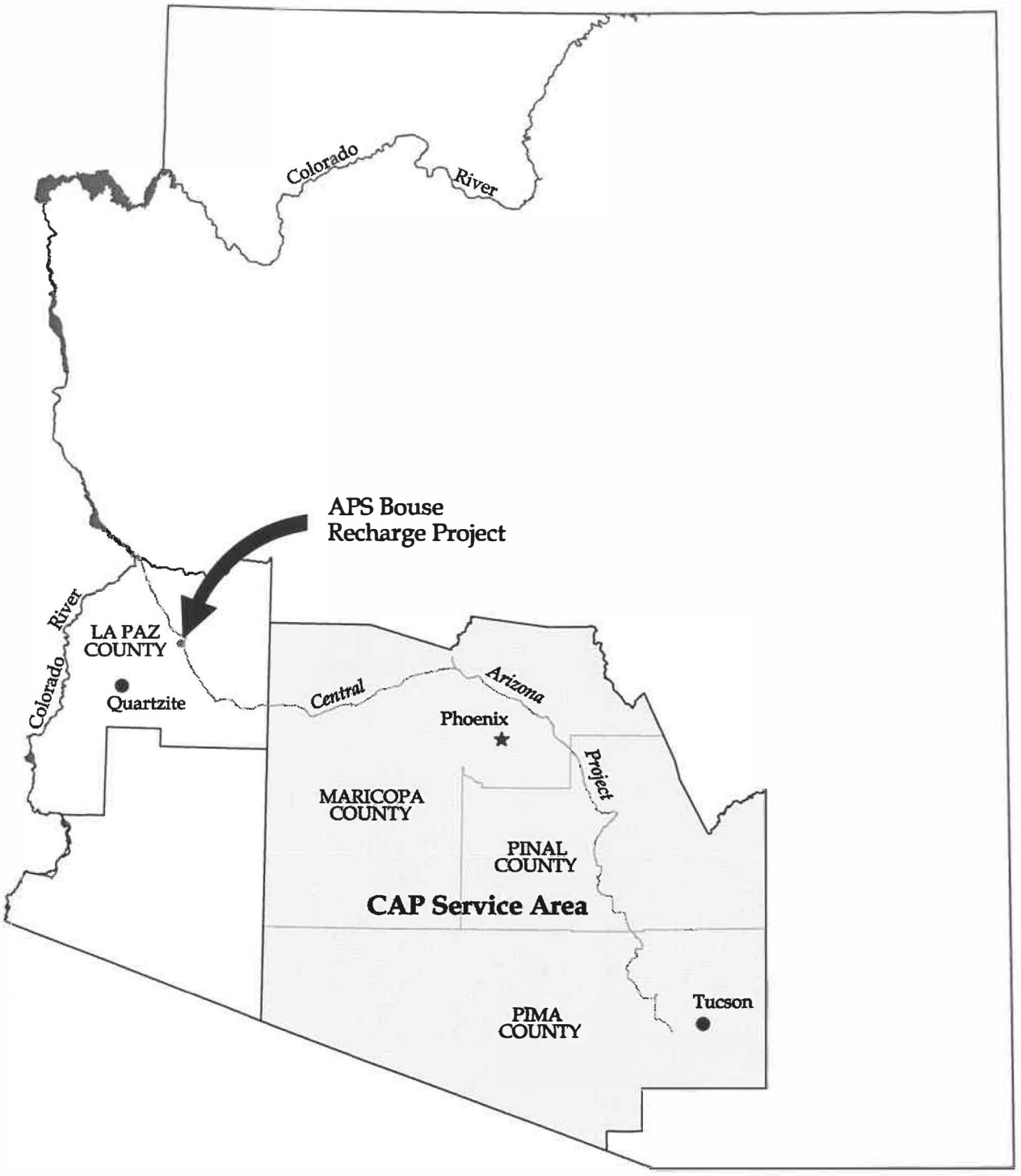
- To better evaluate aquifer parameters including vertical and horizontal transmissivity;
- To evaluate long-term infiltration rates;
- To evaluate the migration of recharged water;
- To determine the characteristics of the anticipated groundwater mound; and
- To evaluate various operating regimes.

The objectives of the full-scale recharge project are the following:

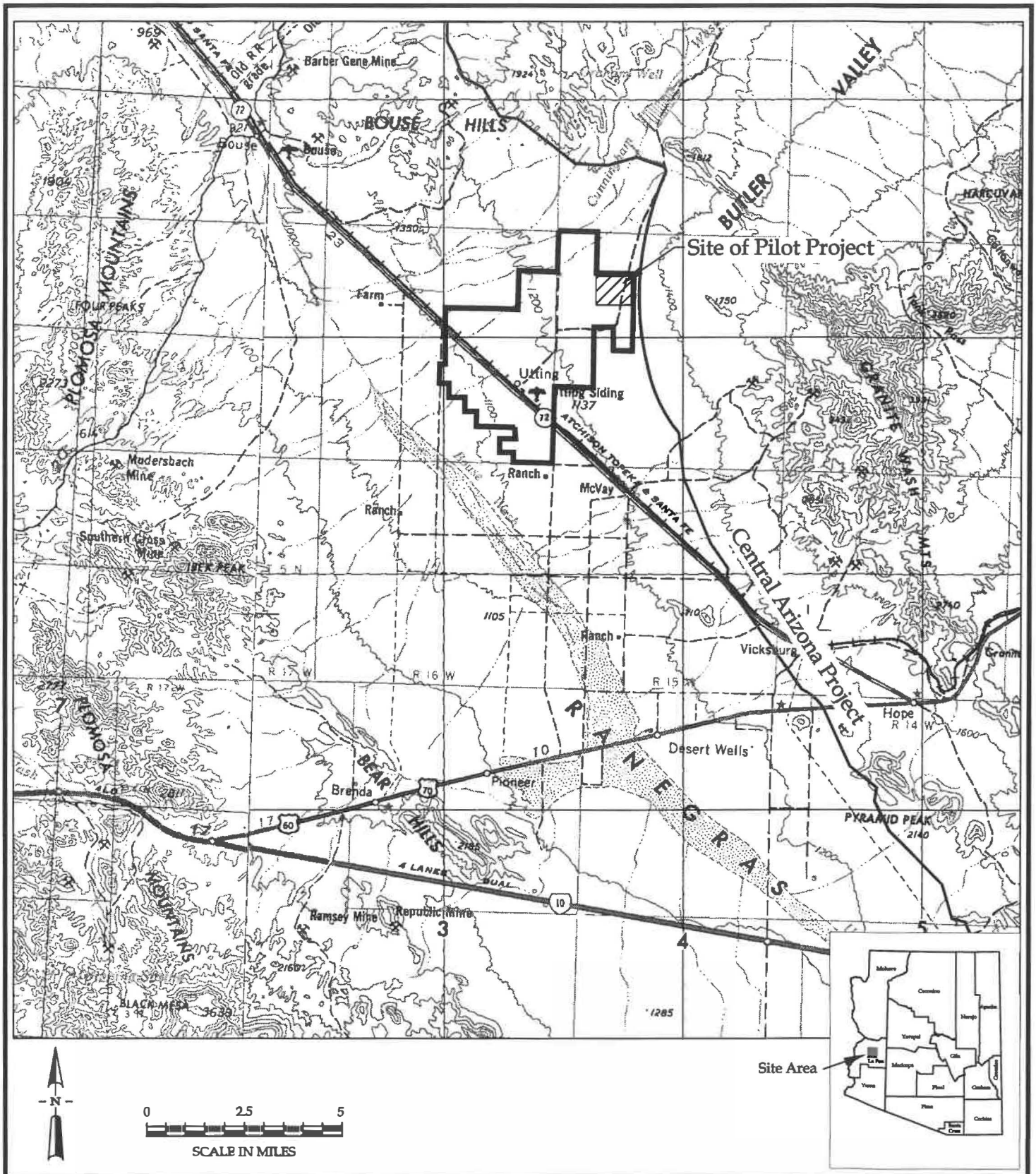
- To safely and efficiently recharge CAP water when it is available and recover it when needed; and
- To be a flexible upstream component of the AWBA's facilities.

    - Facility is upstream of CAP service area so the water recovery and delivery to CAP subcontractors is straightforward.

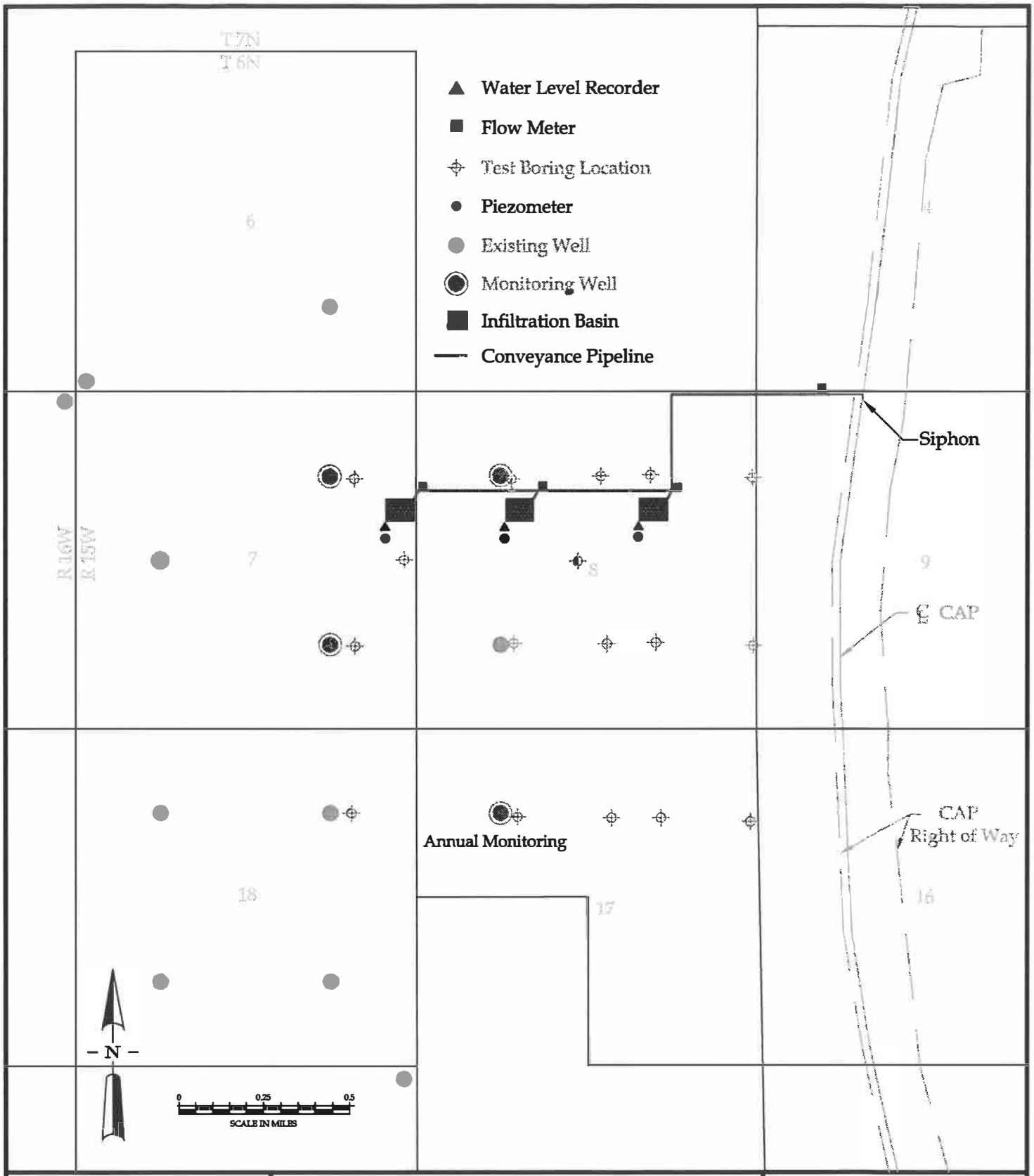
- Facility is well located for use by the AWBA in order to help "firm" water supplies for Colorado River communities.



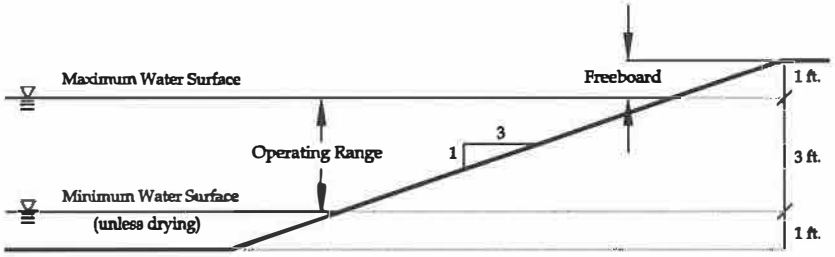
Bookman-Edmonston Engineering, Inc.	**Arizona Public Service Company Bouse Pilot Recharge Project Location Schematic**	**Figure 1**



Bookman-Edmonston Engineering, Inc.	**Arizona Public Service Company Bouse Pilot Recharge Project Location Map**	**Figure 2**

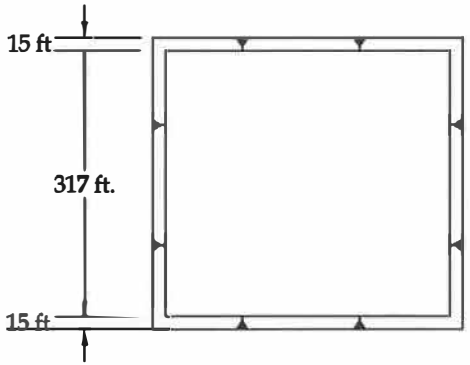


Bookman-Edmonston Engineering, Inc.	**Arizona Public Service Company Bouse Pilot Recharge Project Facilities Layout**	**Figure 3**

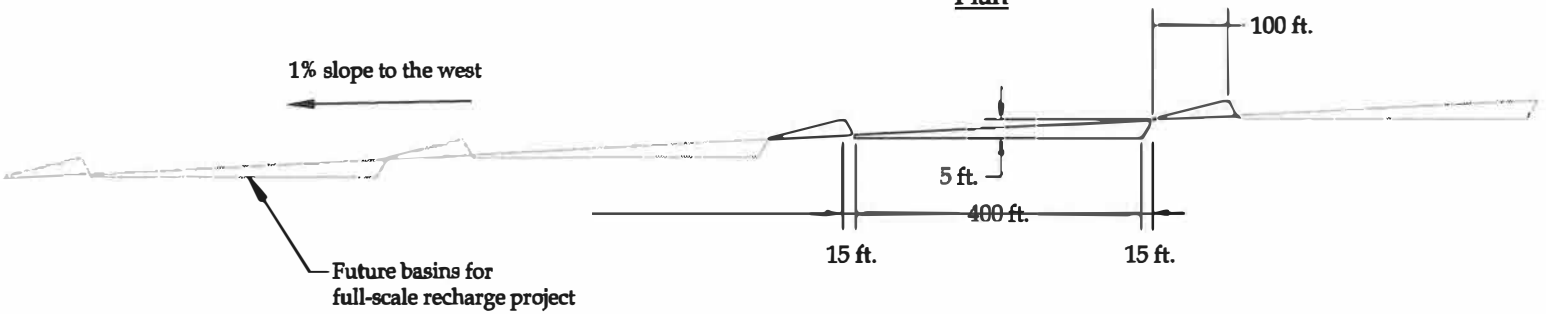


Operating Detail

BASIN INFORMATION:
Bottom Width: 400 ft.
Bottom Length: 317 ft.
Top Width: 430 ft.
Top Length: 347 ft.
Maximum Depth: 5.0 ft.
Minimum Excavation: 1.0 ft.
Pilot Basin Area ≈ 3 acres



Plan



Profile

Not To Scale

Bookman-Edmonston Engineering, Inc.	**Arizona Public Service Company Bouse Pilot Recharge Project Infiltration Basin Schematic**	**Figure 4**

WEST MARICOPA COMBINE, INC.

PIPELINE TO THE FUTURE

PROJECT DESCRIPTION:

The PIPELINE TO THE FUTURE is a privately funded project integrating the recharge, recovery and delivery of Central Arizona Project water primarily for use by various west valley communities. The Project permits the utilization of CAP supplies, coupled with the economical recovery and delivery of the recharged CAP water as a potable water supply, eliminating the construction of independent and costly CAP delivery and treatment systems.

A. The Recharge Component.

The managed recharge facility is located in the Hassayampa River and will include a double barrel 20 inch syphon at the CAP Aqueduct located 1,000 feet Northeast of the Hassayampa Pumping Station (the "Recharge Turnout"); a buried 2,000 foot pipeline from the Recharge Turnout to a small wash which will convey the CAP water to the recharge area located in the Hassayampa River channel, and a ground water monitoring system (four monitoring wells and four piezometers). The Department of Water Resources has issued Permit No. 71-50601 authorizing the recharge of up to 25,000 acre feet of CAP water per year in the facility.

B. The Recovery Component.

Recovery will occur at one or more potential well sites located approximately 10.5 miles south of the Recharge Turnout. Additional wells could be readily developed in close proximity to the CAP Aqueduct within the area of hydrologic impact and pump the recharged water directly into the CAP Aqueduct for delivery to other CAP subcontractors in times of shortage on the Colorado River. Individual participants in the Project may also develop their own, alternative, recovery plans.

C. The Delivery Component.

West Maricopa Combine, Inc. is developing a 42 inch diameter gravity flow

pipeline from its recovery wells to participating west valley communities (approximately 26 miles). The exact location and size of the pipeline depends upon the participants, but, at minimum, will accommodate the full 25,000 acre feet of CAP water per year to be recharged.

OPPORTUNITY TO STORE WATER BANK AUTHORITY WATER:

The recharge facilities are projected to be operational no later than July 1, 1999. The Facility's design will enable the full 25,000 acre feet to be recharged over a six (6) month period. The full1999 capacity can be made available to the Arizona Water Bank Authority ("AWB") at the rate of $13.00 per acre foot.

A. Advantages of This Recharge Site for the AWB.

Shortage Protection. West valley communities participating in the recovery and delivery components of the Project could easily use AWB stored water for shortage protection. Additionally, the close proximity to the CAP Aqueduct will allow development of wells within its area of hydrologic impact for recovery and placement directly in the CAP Aqueduct for delivery to any CAP subcontractors purchasing from the AWB in times of shortage.

Enhanced Water Management. The Facility is in the Phoenix AMA and therefore would assist in reaching safe yield for the AMA. While significant groundwater usage is not present in the area today, two master planned areas of 10,000 acres each are being developed within the area of hydrologic impact. The conceptual plan for at least one of these developments has already been approved by the County. Therefore, this area will likely be significantly developed within the 100 year horizon used for assured water supply purposes.

Indian Water Rights Settlements. While the area of hydrologic impact does not encompass any Indian Communities, water recharged in this Facility may provide a flexible firming resource which could assist in reaching water rights settlements with Indian Communities, due to the recovery and delivery aspects associated with the Facility.

Interstate Water Transfers. The Recharge Facility is close to the CAP Aqueduct and is designed to work in conjunction with a recovery and delivery system for west valley CAP subcontractors. These factors will make the site excellent for participation in interstate water

transfers.

Cost. A firm price of $13.00 per acre foot for all water recharged for the AWB during 1999 is believed competitive with recharge alternatives currently available. It is based on current, per acre foot, cost estimates of: $7.00 for Operations and Maintenance; $3.00 for Capital & Interest; $1.50 for Land Lease; $1.50 for Contingencies & Profit. This cost will be reviewed and adjusted if necessary after 1999, once actual construction costs and operation costs have been developed.

1284\-1-2\documents\resentation.108

WEST MARICOPA COMBINE, INC.
PIPELINE TO THE FUTURE
RECHARGE PROJECT

Presented to
ARIZONA WATER BANKING AUTHORITY
BOARD MEETING

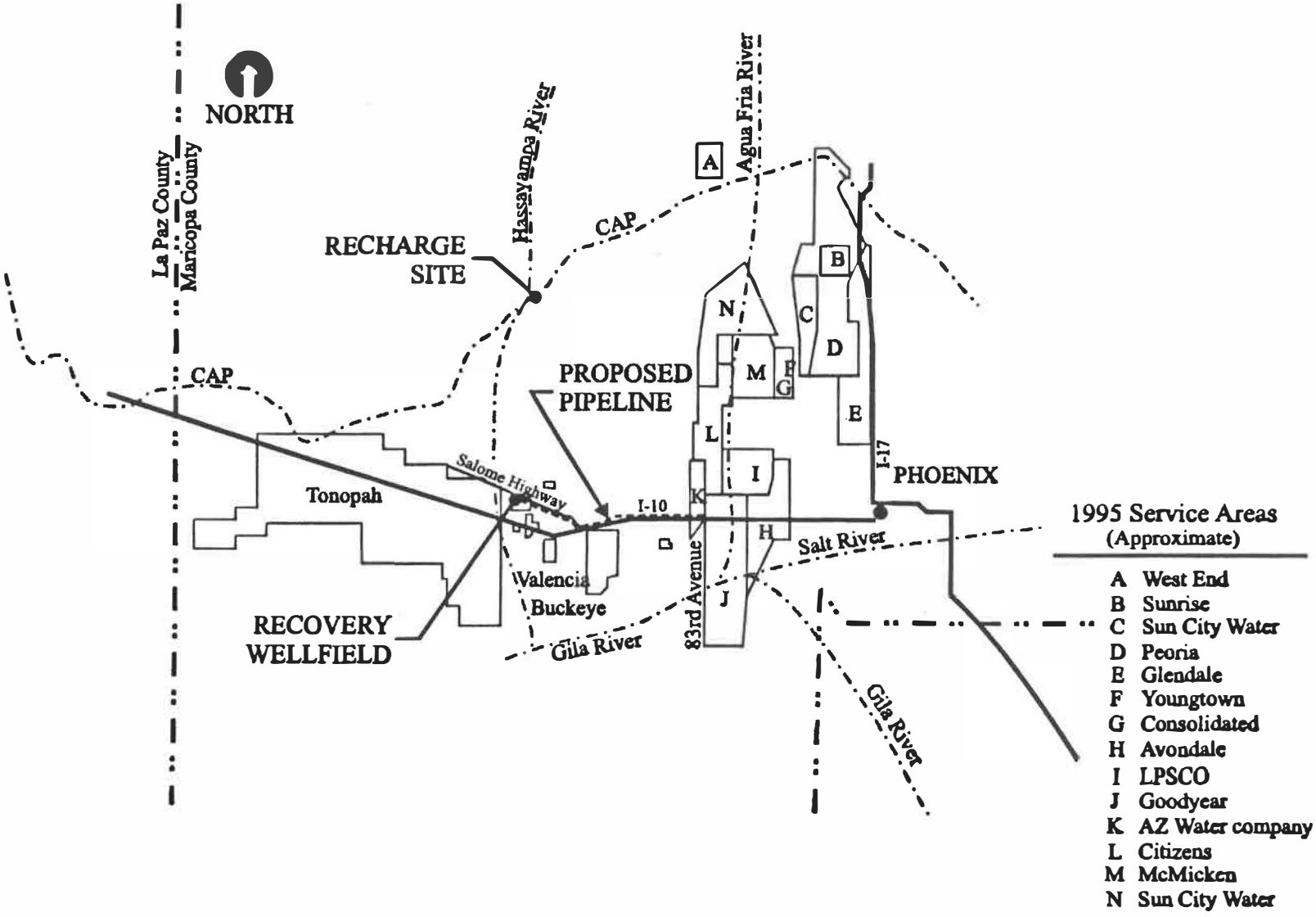
OCTOBER 21, 1998

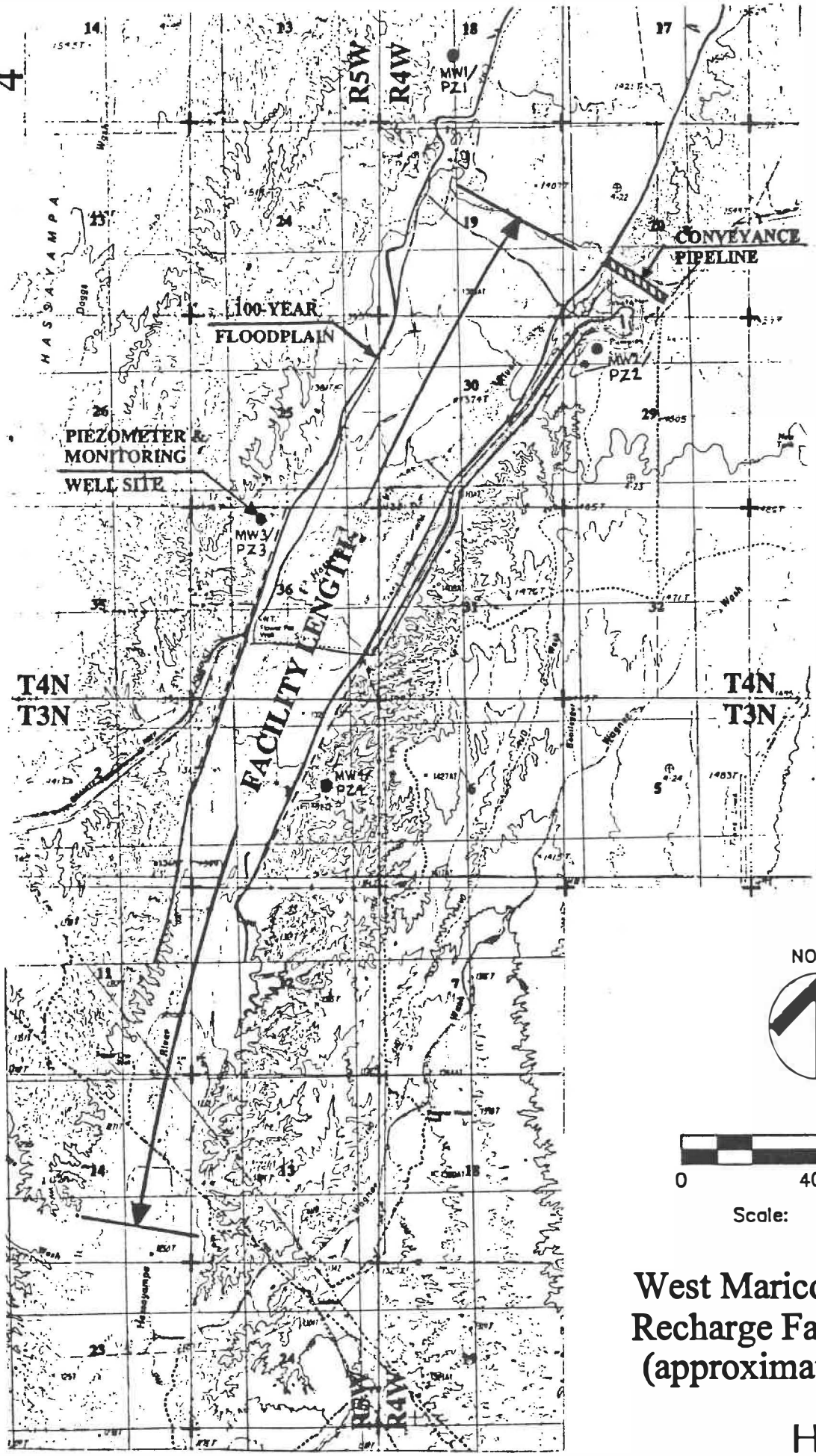
ESSENTIAL PROJECT ELEMENTS

- Recharge of CAP Supply (Hassayampa River & CAP Aqueduct)
- Recovery of Ground Water 12 Miles Downstream
- Conveyance to Customers via Pipeline

WEST MARICOPA COMBINE, INC.
PIPELINE TO THE FUTURE

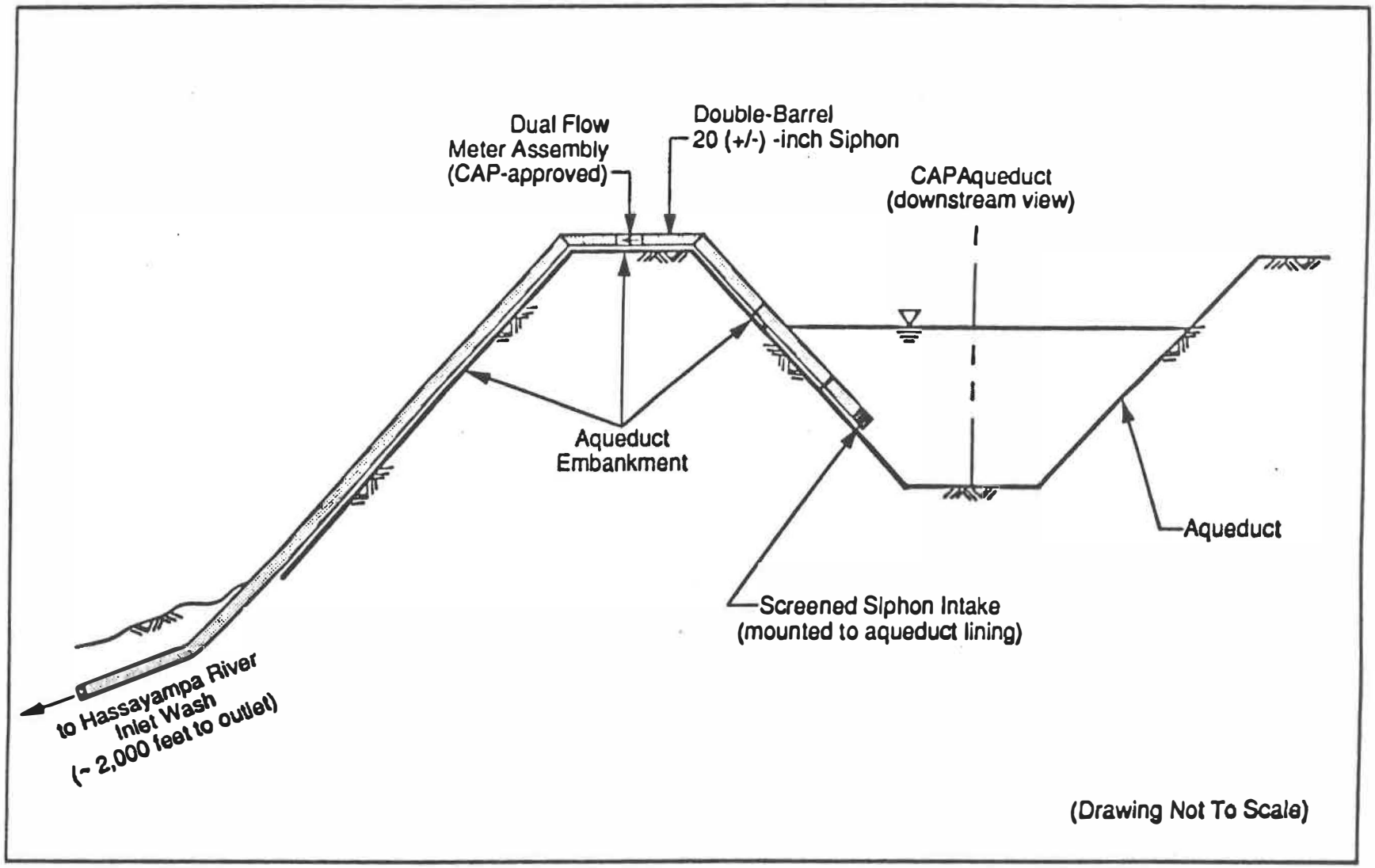
WATER PROVIDER BOUNDARIES AND PROJECT COMPONENTS



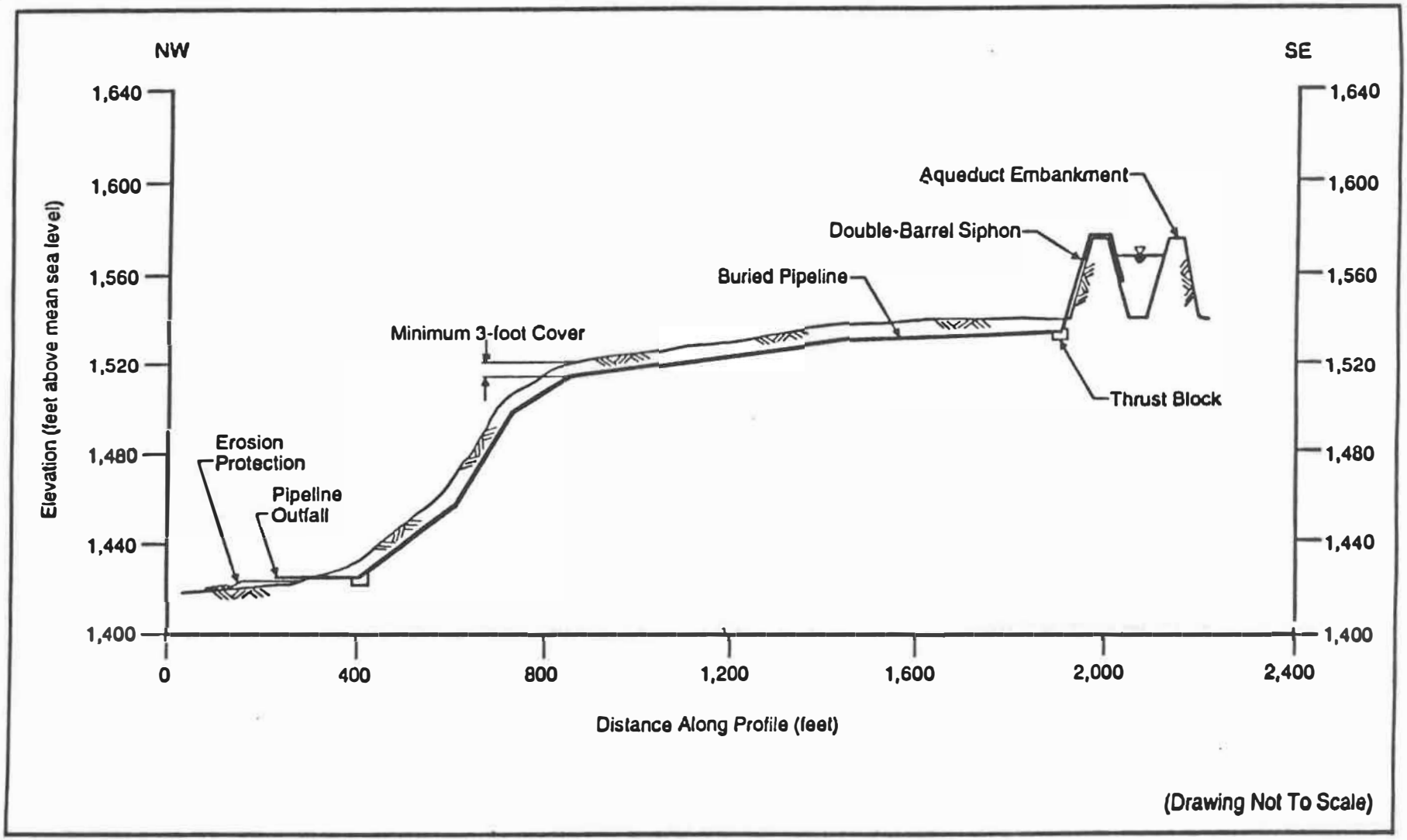


West Maricopa Combine Recharge Facility Length (approximately 6 miles)

HUITT-ZOLLARS



Turnout Facility Pre-Design
Figure 4



Conveyance Pipeline Pre-Design
Figure 5

MONTGOMERY WATSON

WESTSIDE CAP ALLOCATIONS FOR PROSPECTIVE PIPELINE PARTICIPANTS

CAP CONTRACTOR	ALLOCATIONS (1) (acre-feet/year)
West Maricopa Combine	107
Arizona Water Co.	968
Buckeye	123
Citizens Utilities	17,654
Goodyear	8,221
LPSCO	7,531
Phoenix	28,471
Glendale	14,183
CAGRD	-----
Arizona Water Banking	-----
Total	**77,258 (69.0 mgd)**

(1) Total pending allocations

DELIVERED WATER QUALITY WILL BE GOOD

CONSTITUENT	MCL	CONCENTRATION (1) GROUND WATER (2)	CAP (3)
Sodium		69	96
Calcium		12	75
Magnesium		2	30
Chloride		18	88
Sulfate		26	270
Fluoride	4.0	3.0	0.3
Nitrate	10	2.3	---
Hardness		39	310
Alkalinity		140	136
TDS		230	668
pH (units)		8.2	8.3

(1) Concentrations in mg/l, unless noted.
(2) Well B (1-5) 7abb
(3) July 30, 1992, analysis at Aqueduct mp 7.98, near Parker, AZ

SUMMARY OF BENEFITS

- CAP Utilization (25,000 AF/year)
- Includes Recovery and Delivery Components
- Close to CAP Canal
- Excellent For Shortage Protection
- Excellent For Interstate Water Transfers
- Assists Water Management Goals
- Potential for Indian Settlements
- Reasonable Cost ($13.00/AF)

McMULLEN VALLEY
WATER CONSERVATION & DRAINAGE DISTRICT

P.O. BOX 70 • SALOME, AZ 85348
PHONE (520) 859-3647
FAX (520) 859-3145

HYDROLOGIC REPORT FOR THE
MCMULLEN VALLEY WATER CONSERVATION AND DRAINAGE DISTRICT
VICKSBURG FARMS STORAGE FACILITY PERMIT

EXECUTIVE SUMMARY FOR ARIZONA WATER BANKING AUTHORITY

The project objectives are to store up to 40,000 acre feet annually of Colorado River Water using existing irrigation wells as injection wells; and later recover up to 25,000 acre feet annually of stored water using existing irrigation wells as recovery wells. Water for storage will be wheeled through the Central Arizona Project Canal to turn outs to be constructed for delivery by pipelines to be constructed to the wells. Recovered water will be delivered through those same pipelines back to the canal for wheeling by CAWCDD to end users.

We believe that local community residents and businesses, as well as entitlement holders storing water at this facility, should be provided the highest possible level of assurance that their water is both safe and readily recoverable. To this end, the requirements and restrictions that will be imposed on this project are designed to assure that there will be more water available at a higher pumping level depth than there otherwise would be if this project did not proceed.

Total volume stored, over 20 years of storage, is projected to be 800,000 acre feet.

Irrigation pumping will continue throughout the project life; but, **irrigation pumpage plus recovery pumpage will be limited to 35,000 acre feet per year, the contractually imposed maximum annual pumpage to accommodate the goals of this project.** If storage at 40,000 acre feet per year for 20 years is followed by recovery at 25,000 acre feet per year for 32 years, the resulting depth to water will be approximately **160** feet less than it would be without the project.

Annual recovery volumes by individual stored water owners will be based on the percentage of total stored water owned. For example, if an owner has stored 50,000 acre feet of total stored water of 100,000 acre feet, that owner's maximum annual recovery will be 12,500 acre feet.

Charges for transporting water for storage from the CAP Canal and injection are estimated to be from $11.00 to $22.00 per acre foot depending on annual storage volumes and required levels of water treatment, if any.

Charges for recovery and delivery of stored water to the CAP Canal are estimated to be from $55.00 to $105.00 per acre foot, depending on annual recovery volumes, in present value dollars.

It should be noted that these costs do not include wheeling costs imposed by CAWCDD for delivery of water for storage or recovered water. The wheeling pricing policies of CAWCDD will have a significant effect on the total cost of stored water.

The facility will be ready to store 10,000 acre feet annually in January, 1999 at a cost not to exceed $11.00 per acre foot. The facility will be ready to store 40,000 acre feet annually by January, 2000 at a cost not to exceed $22.00 per acre foot.

The southern portion of the Renegras Plain Basin is not in an AMA or INA.

MCMULLEN VALLEY WATER CONSERVATION & DRAINAGE DISTRICT BOARD OF DIRECTORS

Arizona Water Banking Authority

500 North Third Street, Phoenix, Arizona 85004
Telephone 602-417-2418
Fax 602-417-2401

October 20, 1998

Bureau of Reclamation
Administrative Record
Lower Colorado Regional Office
P.O. Box 61470
Boulder City, NV 89006-1470

RE: Arizona Water Banking Authority Comments on the Definition of "Authorized Entity; 43 CFR Part 414

Dear Sir:

On September 21, 1998, the Bureau of Reclamation (Bureau) published notice of the reopening of the comment period on the proposed rule, 43 CFR Part 414. The notice solicited comments on the definition of "Authorized Entity" in that proposed rule. You have specifically requested comment on whether the definition should be "clarified" to specify that an Authorized Entity, including a state water bank, must hold an entitlement to Colorado River water. You have also requested comment on whether an entitlement for interstate banking purposes could be based on an Interstate Storage Agreement entered into pursuant to the proposed rule. The Arizona Water Banking Authority (AWBA) hereby submits the following comments on these issues.

As always, Arizona advocates maintaining the integrity of the existing Law of the River. Therefore, the AWBA does not disagree with the proposition that all diversions of Colorado River water from the mainstream must be pursuant to an entitlement. The AWBA, however, disagrees with the Bureau's proposal to specify that a state water bank must hold an entitlement in order to qualify as an Authorized Entity for banking purposes. The AWBA believes that such a requirement is unnecessary, improperly describes the role of the Authorized Entity in the Storing State and will unnecessarily restrict interstate banking.

From Arizona's perspective, the crucial role of the Authorized Entity in the Storing State is to facilitate the "recovery" of banked water by the Consuming State. Although any entity with legally available Colorado River water may store water, there is no entity in Arizona, other than the AWBA, that can legally make water available to the Consuming State.

It is Arizona's position that, under its 1944 Contract with the Secretary of the Interior (Secretary) and the *Arizona v. California* Decree, the state itself holds the right to the diversion and use within Arizona of 2.8 maf per year of Colorado River water. No individual entitlement holder within Arizona has the right to waive any part of the state's rights under the 1944 Contract and the Decree. An individual entitlement holder might agree to waive its right to divert its entitlement, but the state would not have waived its right to have its full 2.8 maf apportionment

delivered to other entitlement holders within the state. Therefore, there would be no unused apportionment to be delivered to a Consuming State when that state attempted to recover water previously banked. The AWBA is the only entity authorized by the Arizona legislature to waive temporarily, for the purposes of interstate banking, the state's right to its full 2.8 maf apportionment. *See* A.R.S. § 45-2471(D).

Therefore, the Bureau's emphasis on the Authorized Entity in the Storing State needing its own entitlement is misplaced and inappropriately shifts the focus of the Authorized Entity's role from the "recovery" phase of interstate banking to the "storage" phase. Further, to the extent that the Bureau believes there is an existing legal requirement that a state banking entity hold its own entitlement in order to fulfill its responsibilities, the Bureau's concern is unwarranted.

Not all end users of Colorado River water are required by the Secretary to hold entitlements or contracts directly with the Secretary. The Metropolitan Water District of Southern California delivers water to numerous cities in California which do not have direct contractual relationships with the Secretary. In addition, the Colorado River Basin Project Act, which authorized and governs the Central Arizona Project (CAP) from which the AWBA obtains water for storage, provides that direct contractual relations between the Secretary and end-users of CAP water is discretionary:

> Irrigation and municipal and industrial water supply under the Central Arizona Project within the State of Arizona may, in the event the Secretary determines that it is necessary to effect repayment, be pursuant to master contracts with organizations which have power to levy assessments against all taxable real property within their boundaries. The terms and conditions of contracts or other arrangements whereby each such organization makes water available from the Central Arizona Project available to users within its boundaries shall be subject to the Secretary's approval, and the United States shall, **if the Secretary determines such action is desirable to facilitate carrying out the provisions of this chapter**, have the right to require that it be a party to such contracts or that contracts subsidiary to the master contracts be entered into between the United States and any user.

43 U.S.C. § 1524(b) (emphasis added). Therefore, under this provision, there is no requirement that the AWBA have a direct contractual relationship with the Secretary in order to fulfill its responsibilities to store unused Arizona apportionment.

The AWBA has entered into an agreement with the Central Arizona Water Conservation District (CAWCD) that allows the AWBA to take water for banking purposes that would otherwise be unused in Arizona. This agreement is consistent with the existing legal framework for the Colorado River and the CAP. Therefore, the AWBA can fulfill its responsibilities without holding its own entitlement.

The AWBA does not currently have the express authority to obtain an entitlement for Colorado River water; further, it is questionable whether such authority could be obtained. The AWBA statutes clearly provide that the AWBA is to store only water that would otherwise be unused in Arizona. *See* A.R.S. § 45-2401(F)(1). The AWBA's role as a storer of water is intended to be temporary and to diminish over time as more of Arizona's apportionment is put to direct use by water users in Arizona. This role is appropriately served by its current agreement with CAWCD.

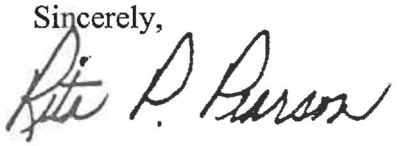
The character of the AWBA would be significantly changed if it held its own permanent entitlement to Colorado River water with its own priority position within the state's apportionment. It is questionable whether a consensus could be built in Arizona to alter the AWBA's role from a storer of otherwise unused water to a competitor with the legal right to deprive lower priority entitlement holders of their Colorado River water. Therefore, continued insistence by the Bureau that an Authorized Entity in a Storing State hold its own entitlement might prevent the AWBA, the only entity in Arizona with the legal authority to allow "recovery" of banked water by a Consuming State, from participating in interstate banking agreements.

Because there is no need for an Authorized Entity in a Storing State to hold its own entitlement, there is no need for a provision in the proposed rule which allows the Interstate Storage Agreement to serve as the basis for that entitlement. The AWBA is currently legally authorized to obtain Colorado River water that would otherwise be unused in Arizona for all of its banking purposes, both in-state and interstate. No further legal authority is needed.

Because it is unnecessary, overly-restrictive and inappropriately describes the role of the Storing State Authorized Entity, the Bureau should not include a requirement in the proposed rule that an Authorized Entity in a Storing State hold its own entitlement to Colorado River water. The AWBA re-endorses the proposed language for the definition of "Authorized Entity" submitted to the Bureau on April 1, 1998, during the initial comment period.

Thank you for your consideration of these comments.

Sincerely,



Rita P. Pearson, Chairperson
Arizona Water Banking Authority

cc: Tom Griffin, Vice Chair, AWBA
Bill Chase, Secretary, AWBA
Dick Walden
Grady Gammage, Jr.

RPP:clc:kd