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The Central Arizona Project

Jon Kyl

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THE CENTRAL ARIZONA PROJECT

**Jon Kyl
Jennings, Strouss & Salmon, Phoenix**

**New Sources of Water for Energy
Development and Growth: Interbasin Transfers**

**a short course sponsored by the
Natural Resources Law Center
University of Colorado School of Law
June 7-10, 1982**



I. Early History of CAP

A. Development of Central Arizona

1. Historic

- a. Hohokam Indians used Salt River Waters to irrigate valley lands 2000 years ago.
- b. Pima Indians living along Gila farmed by diverting the river's waters.
- c. In the 1600's, irrigation was producing food at Spanish missions throughout the state.
- d. White settlers moved to the Salt River Valley in late 1800's and diverted water for agriculture. By 1900, more than 120,000 acres in Salt River Valley were receiving water.

2. Federal Reclamation

- a. Reclamation Act was born in 1902. Federal government invested \$13 million dollars for Theodore Roosevelt Dam.
- b. Salt River Project put into irrigation 250,000 acres.
- c. Wells began tapping underground aquifers reclaiming more desert lands.

3. Development Strained Available Water Supply

- a. Increasing growth along with increased well drilling, increased acreage under cultivation to a peak of 825,000 acres by 1950 in the three central Arizona counties. By the early 1940's groundwater pumping was outstripping groundwater recharge.
 - b. Since 1950, there has been steady decrease in irrigated farm land, but continuous overdraft of 2.2 million AF annually.
- B. Colorado River Compact Adopted.
- 1. Compact Included Colorado River Basin states of Colorado, Wyoming, Utah, New Mexico, Nevada, Arizona, California.
 - a. In 1922, the four upper basin states were irrigating about 1.4 million acres of land. Lower basin 950,000 irrigated acres.
 - b. In 1922, officials of the 7 states met in Santa Fe, New Mexico, the Federal Colorado River Commission was formed to represent federal government in negotiations regarding use of the river, and Herbert Hoover was elected Chairman of what became known as the Colorado River Compact.

c. Based upon estimated 15 million acre feet of water moving through the Colorado River System, the Compact decided that this water should be divided equally between "upper and lower basin" states.

(1) Upper Basin - Colorado, Wyoming, Utah, New Mexico.

(2) Lower Basin - Arizona, California, Nevada.

(3) Each of 2 basin groups would have a total of 7.5 million acre-feet.

2. In 1923, the Compact was ratified by 6 of the 7 basin states.

a. Exception was Arizona where few people understood the Compact. Many in Arizona felt they could unilaterally control the Colorado River within the state's borders.

b. In 1925, Arizona, California, and Nevada tried to effect a three-state compact for dividing the waters - they failed to agree.

C. Boulder Canyon Project Act provided construction of Boulder Canyon Dam (Now Hoover Dam)

1. Signed into law by President Coolidge, 1928.

2. Boulder Canyon Project proclamation:

- a. California limited to 4.4 million AF/year.
- b. Arizona 2.8 million AF/year.
- c. Nevada 300,000 AF/year.

D. Treaty Between U. S. and Mexico.

- 1. While controversy was mounting between some of the river basin states, Mexico sought a permanent and assured share of the Colorado River Water.
- 2. A Colorado River Treaty was negotiated between the U.S. and Mexico in 1944. It allocated to Mexico 1.5 million acre-feet of the river's water per year.
 - a. California violently opposed the treaty; Arizona did not.
 - b. This added to the already significant animosities between the two states over division of the river water.
- 3. At this moment, the Mexican Treaty is of vital concern, because since 1944 Mexico had developed far more land than can be effectively irrigated with the 1.5 million acre-feet.
 - a. Therefore, Mexico is asking for more of the river's water.
 - b. Also, under terms of the treaty, Mexico is assured of the 1.5 million acre-feet from "any and all sources."

E. Arizona v. California Litigation

1. The Supreme Court battle between Arizona and California over construction of the CAP spanned more than a decade.
 - a. The U. S. Senate had twice passed bills to authorize the CAP, but those bills had never gotten through the House of Representatives because of California political power. California was concerned that Arizona would use the CAP to complete the diversion of the 2.8 million acre-feet of Colorado River water which had been allocated to Arizona.
 - b. In 1951, a House Committee ordered the two states to settle their argument either through direct negotiations or before the Supreme Court. The dispute was submitted to the court by Arizona in 1951.
2. But the court then decided the case was far too complex to be heard by the justices themselves. So it appointed a Special Master to hear the hundreds of technical witnesses and ultimately report his findings of fact, and recommend a decree.

3. After the evidence had been presented and argued the trial phase of the case ended in 1958. However, Special Master Simon H. Rifkind took nearly another 2 years to write his report to the Supreme Court Justices.
4. There followed a series of extended oral arguments before the court itself--before the court' official opinion was handed down on June 3, 1963. Arizona v. California, 373 U.S. 546 (1963).
 - a. The formal decree was issued on March 9, 1964.
 - b. The Supreme Court upheld Arizona's right to use 2.8 million acre-feet of mainstream Colorado River water.
 1. plus 46 percent of any surplus above 7.5 million acre-feet allocated to the Lower Basin states which might be available in any year.
 2. California's use right was limited to 4.4 million acre-feet, plus 50 percent of any surplus.

3. Organized water users in Southern California have contracted for delivery of far more (962,000 acre-feet more) than the 4.4 million acre-feet to which the state has a legal right.

II. Enactment, Financing and Construction of CAP. (Public Law 90-537, 82 Stat. 885; Sept, 30, 1968)

A. Congressional Approval

1. In 1944, Bureau of Reclamation proposed three plans for importing Colorado River water.
 - a. Marble Canyon Plan - build a dam in Marble Canyon, move water through tunnels to the Verde River, then to Phoenix via a series of smaller dams.
 - b. Bridge Canyon Plan - build a dam in Bridge Canyon to store water; move the water through tunnels and canals south across the Bill Willams River, and then east to Phoenix.
 - c. Parker Pump Plan - third alternative (and least expensive) was to lift water from Lake Havasu behind Parker Dam and pump via aqueducts to Phoenix.

2. In 1947, Bureau recommended Parker pump plan with addition of Bridge Canyon Dam, and power plant to supply power be authorized as Central Arizona Project.
3. Congressional hearings began in 1947.
4. By 1966, all 7 Colorado River Basin states had agreed to the Project.
 - a. Concerns had been molded into single piece of compromise legislation authorizing CAP.
 - b. Bill died in House Rules Committee - which failed to schedule debate.
5. In 1967, total of 26 bills were introduced calling for authorization of CAP.
 - a. Department of Interior's report on the CAP dropped both the Marble and Bridge Canyon Dams from proposal.
 - b. These dams were supposed to generate power for pumping CAP water at various points along route.
 - c. Department of Interior proposed construction of thermal power generating plant.
6. Bill then passed the Congress, and on September 28, 1968, the Act, Public Law 90-537 was signed into law by President Lyndon Johnson.

B. Financing

1. P.L. 90-537 authorized \$832 million plus escalation based on general price increases.
2. Total appropriation to date (including budget for 1982) is \$932,358,550.
 - a. 1982 allocation is \$150,727,000 (plus \$2 million for non-Indian distribution system)
 - b. 1982-83 proposed allocation budget is \$160,490,000.
3. Total estimated cost of completion has been revised to \$2.4 billion

C. Construction - began May 6, 1973

1. Construction as percentage of expenditure to total cost was 34.8 on April 1, 1982.
2. First deliveries in Maricopa County expected in 1985; Pima County four years later.
3. All of the 190 mile long aqueduct to Granite Reef (northeast of Phoenix) is completed or under construction.

III. Objectives and Features of CAP

- A. Multi-purpose water resource development and management project to provide supplemental water to Central Arizona.

The primary objective of the CAP is to deliver most of Arizona's remaining entitlement of Colorado River water to cities, industries, and farms in central Arizona. Other project benefits are:

1. To reduce the overdraft of groundwater in central Arizona to the maximum extent possible by substituting most of Arizona's entitlement in the Colorado River for a portion of the current groundwater overdraft.
2. To provide a supply of water for municipal and industrial users in areas that have no surface water rights available and are presently using an overdrafted groundwater resource, or a source of lower quality.
3. To provide supplemental water for sustaining the agricultural resource over a longer period of time than would otherwise be possible.
4. To conserve flood flows of the Gila River system to the maximum extent practicable by the inclusion of conservation capacity in New Waddel and possibly in Buttes, Charleston, and Hooker (or alternative) reservoirs.

5. To reduce land subsidence, which is a growing problem in many parts of central Arizona, and is generally associated with the withdrawal of groundwater. It is estimated that in the period from 1970 to 2030, without the CAP, the groundwater level will decline an additional 300 feet, and the average of land subsidence will be an additional 12 feet.
6. To provide flood protection.
7. To more fully control and manage surface and groundwaters already available within the central Arizona area and southwestern New Mexico.
8. To provide the Central Arizona Indian communities with new economic and social stimulation which will accompany project deliveries of water.
9. To provide sediment control to those water systems diverting from the Salt and Gila Rivers that are now subject to unusually high operating expenses at diversion works, canal systems, and water treatment plants.
10. To alleviate the current geographical imbalance and the anticipated future demand of readily available water-orientated recreational opportunities, and to promote effective fish and wildlife management areas through water exchange.

11. To provide exchange water for water users within Arizona and to Arizona users for additional Gila depletions in the State of New Mexico.
 12. To manage project waste water.
 13. To improve distribution system efficiency by providing adequate irrigation distribution systems.
- B. Facilities for transportation to central Arizona of long-term average of 1.2 million acre feet pumped annually from Lake Havasu:
1. Havasu pumping station.
 2. Tunnels, aqueducts, siphons, other pumping stations, and flood protection facilities.
 3. Power from Navajo Generation Station (Page, Arizona) (24% of its capacity).)
 4. Main 191 mile long aqueduct to Phoenix Area is concrete-lined, capacity 3,000 cubic feet per second, 80 feet wide at the top, 24 feet at the bottom, and 16.4 feet deep. (total aqueduct system will be 371 miles long).
 5. New Waddell Dam
 - a. Regulatory storage - 660,000 AF
 - b. 890,000 AF storage total
 6. Cliff Dam

C. Safety of Dams

A. USBR Safety of Dams Study.

1. Separate study that grew out of 1978 Reclamation Safety of Dams Act - after 1976 failure at Teton Dam - Congress authorized \$100 million for necessary modifications - 13 dams including Stewart Mountain and Roosevelt deemed vulnerable to earthquake damage.
2. All final plans proposed by USBR combine dam safety with CAP regulatory storage and flood control.
3. New studies indicated 30-40 dams across nation may be affected by maximum credible earthquake figures released by USBR and new maximum inflow design studies -- legislation introduced April, 1981, by Dennis DeConcini and Morris Udall to increase SOD funding from \$100 to \$450 million.
 - a. Definition of unsafe dam: Roosevelt - not a structural weakness in sense of crack - result of new state of art design data not available at time of original design.
 - b. Protection of dam: design must withstand extreme conditions which have extremely low frequency "Noah Flood".

- c. Alternative adopted and approved by Governor's Advisory Committee and Secretary of Interior.
 - 1. Waddell Dam - Agua Fria River.
 - a. Regulatory Storage
 - b. Flood Control
 - 2. Cliff Dam - Verde River
 - a. flood control
 - b. conservation storage
 - 3. Roosevelt Dam - Salt River
 - a. flood control
 - b. conservation storage.

IV. Allocations

- A. 15 million acre-feet available divided equally between upper and lower basin states.
 - 1. California - 4.4 million a/f
 - 2. Arizona - 1.2 million a/f non-mainstream uses.
Estimated average supply in early years is 1.6 million a/f
- B. Arizona Allocations
 - 1. 1975 - Secretary Kleppe - 258,000 a/f Indian allocation; remainder non-Indian
 - 2. 1980 - Secretary Andrus - 310,000 a/f Indian allocation; remainder non-Indian

3. 1981 - Secretary Watt - affirms 310,000, but substitutes some effluent for part of Indian allocation
4. Of the non-Indian amount, agriculture will be the largest user in early years; but by 2034, M & I users will be using their 640,000 a/f allocation, thus reducing the amount available for agriculture.

C. Conditions

1. No new agricultural land can be irrigated with CAP water (i.e. only land irrigated between 1958-1969 can be irrigated)
2. Groundwater pumping must be reduced by the amount of CAP water used to irrigate.
3. M & I and Indian users have priority over agriculture in times of shortage.

D. See attachments

V. Costs

- A. Bureau of Reclamation has not issued final cost repayment schedule.
 1. New projection due before end of June 1982
 2. Cost repayment has two components (except for Indians)
 - a. All users will pay \$50.00 per a/f O & M

b. Additionally, for capital construction, M & I users pay \$32.50 a/f and agricultural users pay \$2.00 per a/f.

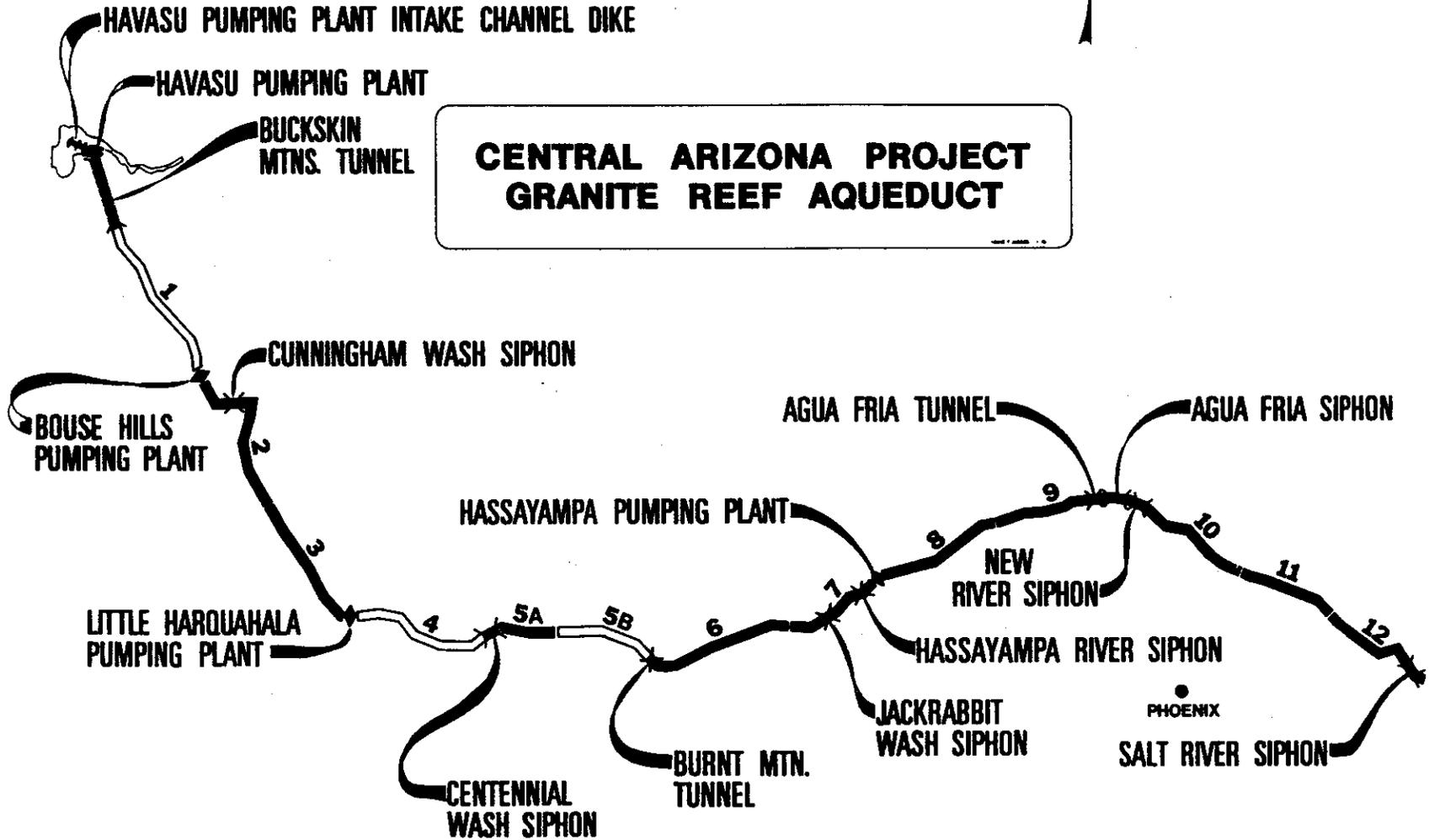
3. Fifty year pay-back period.

B. No pay back for flood control and safety of dams features

3 NUMBER DESIGNATES REACH
 COMPLETED OR UNDER CONSTRUCTION
 FUTURE CONSTRUCTION

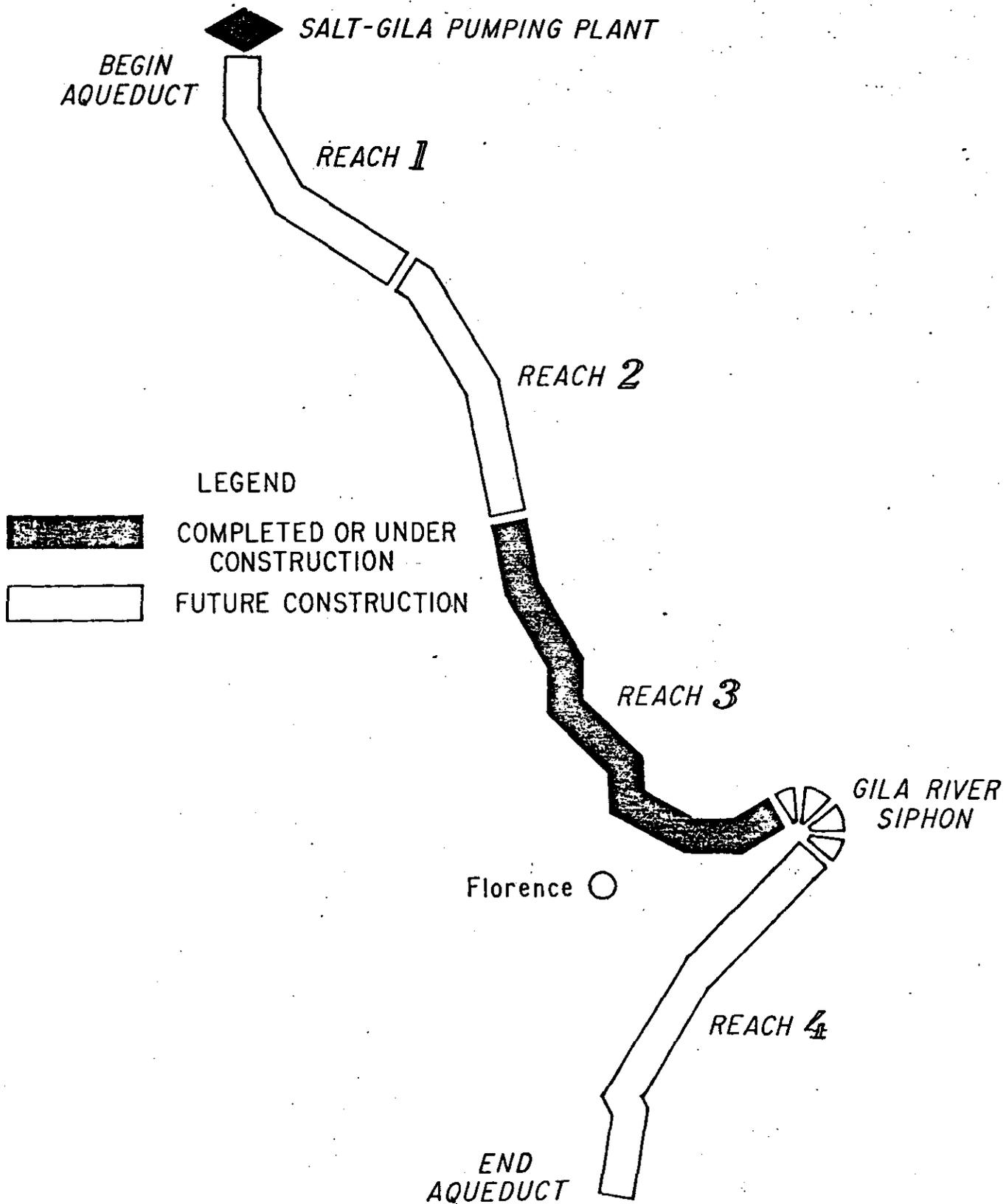


**CENTRAL ARIZONA PROJECT
 GRANITE REEF AQUEDUCT**



CENTRAL ARIZONA PROJECT

SALT-GILA AQUEDUCT



TUCSON
ELEV. 2300

PHOENIX
ELEV. 1000

-19-

HAVASU

**LAKE
HAVASU**
ELEV. 447

BOUSE HILLS

**LITTLE
HARQUAHALA**

HASSAYAMPA

SALT-GILA

**N.W.
TUCSON**

824'

118'

113'

192'

84'

521'

GRANITE REEF AQUEDUCT

190 MILES

SALT-GILA

50 MILES

**TUCSON
(UNDER
STUDY)**

52 MILES

**300
MILES**

PROJECTED CAP WATER DELIVERIES (1985-2034) ^{1/}
ALTERNATIVE ALLOCATIONS OF CAP WATER

Alternative	Water Deliveries (1,000 acre-feet)		
	Indian Use	M & I	Non-Indian Ag.
1. No Action	5,763	14,025	45,944
2. Kleppe	11,153	19,384	33,891
3. Andrus	13,505	16,631	34,337
4. Andrus - M&I ^{3/}			
CAP w/o effl. exch.	13,284	20,093	31,295
Effl. exchange	-CAP 3,415	+CAP 550 ^{4/}	+CAP 2,865
Total CAP	9,869	20,643	34,160
+ Effl.	4,268		
Total Water	14,137		
5. Andrus-Indian	13,803	17,377	33,382
6. Proposed Action			
CAP w/o Effl. exch.	13,350	18,964 ^{5/}	32,334
Effl. exchange	-CAP 3,728	+CAP 615 ^{6/}	+CAP 3,113
Total CAP	9,622	19,579	35,447
+ Effl.	4,693		
Total Water	14,315		

- ^{1/} The projected deliveries are a function of the Colorado River water availability estimates and local surface water inflow evaluated by means of a CAP monthly water budget operations computer model.
- ^{2/} The allocation alternatives not only vary the formula by which the water is divided among the many users but also vary the total amount of water that can be delivered. This is because the CAP operations model is constrained by aqueduct capacities, reservoir capacities, monthly demand schedules, and the geographic location of each user with respect to the CAP system.
- ^{3/} The effect of the effluent exchange is also a function of the Colorado River water availability estimates and local surface water inflows. The total amount of CAP water relinquished by the Indian tribes and the distribution of the relinquished water among M&I and non-Indian agricultural users is significantly affected by the date of initial onset of shortage conditions, the magnitude of the M&I allocation at the time that shortage conditions begin, and the duration of continuous shortage conditions.
- ^{4/} Increased CAP deliveries occurring to the M&I sector from treated effluent exchanges would be shared by 8 identified contributors of effluent (Chandler, Glendale, Litchfield Park, Mesa, Phoenix, Scottsdale, Sun City, and Tempe).
- ^{5/} Assumes water deliveries in early years based on need for projected population size. This figure would increase if M&I entities exercise their right to take greater amounts of CAP water (up to their maximum allocation) in early project years.
- ^{6/} Increased CAP deliveries occurring to the M&I sector from treated effluent exchanges would be shared pro-rata by all M&I allottees, according to Arizona DWR recommended M&I allocations, January 18, 1982.

State of Arizona

DEPARTMENT OF WATER RESOURCES

99 E. Virginia Avenue, Phoenix, Arizona 85004



BRUCE BABBITT, Governor
WESLEY E. STEINER, Director
January 18, 1982

Honorable James Watt
Secretary of the Interior
Department of the Interior
Washington, D.C. 20240

Dear Mr. Secretary:

Shortly after authorization of the Central Arizona Project, Secretary Udall asked the state of Arizona to recommend the allocation of CAP water among competing applicants. The responsibility for developing and forwarding the state's recommendations for the allocation of this important resource among the various potential users was assigned by the Governor to the Arizona Interstate Stream Commission, a predecessor agency of the Department of Water Resources. Before the state's recommendation could be developed, it was necessary for the Secretary to finalize the allocations of waters to the Central Arizona Indian tribes. On October 18, 1976, acting Secretary of Interior Frizzell finalized with minor amendments the allocation to Indian tribes promulgated earlier by Secretary Morton. The Arizona Water Commission then proceeded to develop its recommendations for allocation of the remaining supply among non-Indian users.

On June 22, 1977, the Water Commission sent to Secretary Andrus its recommended allocations of supplies to non-Indian M&I users. On August 31, 1979, the recommended allocation to non-Indian agricultural users was forwarded. At that time we felt that we had fulfilled our commitment to recommend apportionment of CAP supplies among non-Indian users in Arizona.

On August 8, 1980, Secretary Andrus published a proposed allocation to the Indian tribes which differed substantially from that recommended by Secretary Frizzell and thereby invalidated the state's recommended allocations.

On the basis of Secretary Andrus' proposed allocation to the Indians and understandings gained from meetings with the Secretary's staff, we proceeded to develop revised allocations to non-Indian users. Public hearings were held once again by the Arizona Water Commission and recommended allocations were made ready for transmittal to the Secretary. However, the Indian allocation finalized by Secretary Andrus on December 10, 1980 differed from our assumption in its treatment of priorities of Indian water and effluent exchanges, once again upsetting the validity of our proposed allocations.

Think Conservation!

Office of Director 255-1554

Administration 255-1550, Water Resources and Flood Control Planning 255-1566, Dam Safety 255-1541,

Flood Warning Office 255-1548, Water Rights Administration 255-1581, Hydrology 255-1586.

Your announcement of November 12, 1981, accepting the existing nine Indian contracts and proposing an acceptable process for allocation to the Gila River Indian tribe provided a basis for the Department of Water Resources to again develop state recommended allocations of non-Indian CAP water supplies.

On December 2, 1981, the Department distributed for review and comment its revised recommended allocation. On December 16, 1981, the Arizona Water Commission held a public hearing on the proposed allocation and on January 4, 1982, following minor modification, endorsed the recommended allocation. The Department of Water Resources, for the State of Arizona, advances this allocation for your consideration and urges your approval.

In summary, the Department recommends that:

1. Each of the municipal applicants for CAP water be offered a sub-contract for the water amount shown for that applicant on Table 1. The applicant should be allowed to contract for up to the identified amount at any time during the contract repayment period.
2. Each of the industrial and other applicants shown on Table 2 be offered sub-contracts for the water amounts listed. For each sub-contractor, early year allocations have been identified where the greater quantities indicated may be contracted.
3. Each of the applicants for agricultural water shown on Table 3 be offered sub-contracts for the percentage listed of available agricultural water supplies.
4. Allocations to sub-contractors for municipal and industrial water be conditioned to provide that the sub-contract contain the provision that if the sub-contractor in the future effects a direct exchange of effluent as a substitute for CAP water which has a M&I priority, that their contractual entitlement with the Central Arizona Water Conservation District shall be reduced in like quantity.
5. The conversion of agricultural use to M&I use recognize that in some instances M&I water has already been allocated as a part of the M&I allocation to lands that will, for a period of time, receive a CAP agricultural supply and that no additional allowance be granted for conversions of lands of this character identified on Table 4.

6. The allocation be considered a first offering to potential sub-contractors and that the Department be requested to reallocate all supplies not contracted for.

The Department of Water Resources is recommending that 640,000 acre-feet of CAP supply be allocated to municipal and industrial sub-contractors. This is based on the Department's estimate that the firm water supply from the Central Arizona Project will be 630,000 acre-feet per year under year 2034 conditions and that at least 100,000 acre-feet of effluent will be provided to the Indian contractors as a substitute supply under provisions of their contracts with the Secretary of Interior. Allocation of this quantity also assumes that the users of CAP water, through conjunctive operation with other available supplies, will be able to withstand shortages in delivery of up to 20% of their contracted amount.

The nine contracts which have been entered into between the Secretary and the Indian tribes provide that 90% of the agricultural delivery and all of the tribal homeland allocations have a priority equivalent to non-Indian M&I uses. The proposed allocation to the Gila River Indian tribe grants 75% of the tribal allocation a priority equivalent to non-Indian M&I uses. As a result, a total of 258,323 acre-feet of Indian water will have a priority equal to non-Indian M&I. The contracts with the Indians also set forth the equation under which water supplies are to be allocated in times of shortage. This equation established an Indian allocation of 33.62% of the water supply after non-Indian agriculture has ceased to be supplied.

The recommended allocation of 640,000 acre-feet is derived from the Department's recommendation to distribute 800,000 acre-feet of M&I priority water. With effluent exchanges, the Indian allocation is about 160,000 acre-feet with normal water supply ($258,323 - 100,000 = 158,323$). This leaves only 640,000 acre-feet remaining from the 800,000 acre-feet to be distributed among non-Indian M&I applicants.

The selection of 800,000 acre-feet as the quantity to distribute is based on the Department's belief that the Colorado River water supply system should be stressed, but not to the point that M&I contracts establish delivery requirements that will necessitate extensive withdrawals from storage below minimum power pool in Lake Mead and/or will force substantial reductions below the firm yield of 630,000. The Department's proposal will cause users in year 2034 to be subject to a 20% shortage in supply about 36% of the time. This will occur at a time when users are receiving about 140 gallons per capita per day from all dependable supplies available and will necessitate additional drafts on groundwater and could impinge adversely on safe yield management goals then in effect. Based on these considerations, we question the management prudence, both fiscal and water-supply wise, of imposing a normal M&I demand in excess of 800,000 AF/YR under 2034 conditions.

Honorable James Watt
January 18, 1982
Page Four

The proposed exchange of effluent to allow allocation of a larger quantity of water is of vital importance. By the year 2005 it is estimated that approximately 280,000 acre-feet per year of effluent will be available from the Phoenix and Tucson metropolitan areas and that this amount will grow to approximately 460,000 acre-feet per year by year 2034. Less than 200,000 acre-feet of this amount are currently under contract. Hence, the conclusion that ample effluent will be available for exchange after the turn of the century. The Department's preliminary planning studies indicate that at least 100,000 acre-feet of exchange with the Indian tribes will prove engineeringly and economically feasible.

Since the fall of 1980, the Department's allocation of CAP water to M&I interests have been predicated on the assumption that 100,000 acre-feet of effluent exchange would be effected by the time shortages are expected to occur, with the benefits flowing proportionately to all M&I sub-contractors. In water short years, the municipal and industrial supply would be 100,000 acre-feet per year greater with the pooling concept than without. In normal and surplus water years, the supply available to non-Indian agriculture would be 100,000 acre-feet greater than without the pooling concept.

The major cities have objected that the pooling concept is confiscatory and unfair in that it removes from their jurisdiction a valuable resource and returns to the cities actually contributing the effluent for exchange less than an acre-foot for each acre-foot of effluent exchanged. They have expressed an interest in retaining the option to make the exchanges directly with the Indian reservation, with all the benefits rebounding to the entity making the exchange. We are recommending that the cities retain the option to exchange directly with the Indians, provided they pay all of the costs and their CAP contract entitlement is reduced in the amount of the exchange. The allocations are based upon distribution of CAP municipal water on an equal per capita basis to all sub-contractors. Each allocation is based on the anticipated population times a uniform per capita use rate minus all dependable water supplies otherwise available to the applicant. Exchange of effluent for a portion of the Indian's CAP supply would increase the dependable supply available to the applicant who opts to exchange directly rather than through the pool. If the sub-contractor's contractual entitlement with the CAWCD is not reduced by the amount of the exchange, the allocations would be distorted and the city making the exchange would receive more CAP water per capita than the cities and other users unable to effect exchange because of location.

Because the proposed exchange of effluent will require expanded responsibility for the Central Arizona Water Conservation District, the District Board of Directors has been asked to approve the concept. The Board has this matter under review.

Our recommendations allocate about 77% of the total M&I allocations to cities, towns and water service organizations which have currently definable growth patterns and water needs. Approximately 16% of the supply is allocated to the copper mining and electric power industries. The remaining major allocation is the State Land Department for new developments on state lands throughout the project service area. Small allocations are recommended for the Arizona Game and Fish Department for the filling of small impoundments along the alignment of the CAP aqueduct system. A small allocation is also recommended to the Maricopa County Board of Supervisors. This allocation would be used as the water supply for county park developments.

Municipal allocations are based primarily on proration of the amounts determined necessary to supply the populations projected by the Arizona Department of Economic Security for each of the applicant's service areas, at a use rate of 180 gallons per capita per day (gpcd). This rate was applied uniformly to all applicants below an elevation of 3,000 feet. The requirements of applicants with service areas above 3,000 feet were determined at 165. The resulting values were considered the base needs. The dependable supply available to each applicant from sources other than CAP was subtracted from the base need to determine the allocation. Allocations to applicants who must negotiate exchanges with upstream water rights owners to effect delivery of CAP water were increased 20% to accommodate exchange requirements aimed at compensating for water quality differentials.

The CAP need for the power companies was estimated by the Department as the product of projections of anticipated electrical energy use in Arizona and average water use per unit of energy produced less the total amount of existing water supplies available to the companies. Based on this approach, the Department estimates that Arizona Public Service and Salt River Project will have a combined base need of 55,400 acre-feet of water to provide cooling for electrical generating power plants in year 2034. Tucson Electric Company will have a base need for approximately 5,700 acre-feet in 2034.

For the mining industry, the base need was based on current use rates at each of the mines and in some cases was increased to supply anticipated new developments. Allocations to the mines located south of Tucson were based on the assumption that 50% of their need for additional supply could be met from effluent from the city of Tucson. Hence, the allocation of Central Arizona Project water was 50% of the pro rata need.

The base need for the State Land Department was established at 50,000 acre-feet per year. This supply is allocated to provide a water supply for new developments on state lands lying outside the service areas of the cities and private water companies and not included in the allocations for those cities.

The Rio Salado Project Authority requested 21,000 acre-feet of project water. While we recognize the desirability of the Rio Salado Project, we have not included an allocation of M&I water to the project because that allocation would have to come from the already short supplies identified for the cities and the project's needs can be met eventually with treated effluent.

It was necessary to reduce the year 2034 base need for all M&I applicants by 21% to constrain the total M&I allocation to 640,000 acre-feet. This was done uniformly by proration except in situations where the applicant requested less water than the computed base need, where the lesser amount was allocated.

No recommendations have been made for municipalities for the years prior to 2034. Many applicants have indicated a desire to contract in the early years for quantities greater than their base needs as determined by the Department. It is recommended that contractors not be constrained from contracting for amounts up to their maximum allocations during any of the project repayment years.

For industrial sub-contractors, the allocations indicate a maximum early year allocation, tapering off in later years. Because industrial users may have high early year water demands, it is recommended that applicants be offered contracts in the early years for their full base need.

The proposed agricultural allocation is essentially the same as recommended to the Secretary of the Interior on August 31, 1979. One application was deleted, while a small quantity of water is recommended for the U.S. Forest Service to use as an exchange for the rights to develop stockponds in the upper watershed areas.

The agricultural recommendations are shown only as percentages of available supply. Most changes from the 1979 recommendations are the result of new population projections which affect the amount of lands eligible to receive CAP water. In some areas current projections show more urban growth on agricultural land than anticipated in 1979. These projections result in a lesser allocation to affected contractors.

The master contract between the Central Arizona Water Conservation District and the Secretary of Interior provides that "Irrigation water ... may be made available by the Secretary for M&I purposes if and to the extent that such water is no longer required by the sub-contractor for irrigation purposes and shall be made available in all cases where lands receiving project water have been converted to municipal or industrial use." The contract, however, is silent and no policy has been developed to date on the rate of conversion. (The Department of Water Resources is evaluating this matter and will be recommending a conversion policy and rate in the near future.)

Several conversions from agricultural to M&I purposes in the future must take into account the fact that the M&I applicants will be serving water to new urban developments on lands which fall both within their intended service areas and those of irrigation districts allotted CAP agricultural supplies. Absent an adopted policy for conversion from agricultural to M&I contracts and absent the guarantee that all proposed agricultural contractors will sign for a CAP supply, it is not possible at this time to evaluate the extent that conversions will take place and reflect such conversions in the recommended allocations to M&I users. Potential M&I contractors who expand onto adjoining agricultural lands for which they were allotted a CAP supply will receive a disproportionately large supply of CAP water if granted an additional supply through conversion of agricultural supplies. This should not be allowed to happen. Contract provisions should include a mechanism to restrict conversions when M&I service was included in the original M&I allocation. The Secretary has the authority to approve or disapprove conversions. It is recommended that the sub-contracts be negotiated with agricultural contractors where the needs of anticipated populations have already been satisfied through the M&I allocations, contain the provision that the Secretary will withhold approval of conversions on the lands covered by the M&I allocations. The attached Table 3 shows agricultural applicants which are expected to have lands urbanized and served CAP water by municipal contractors and the expected average to be served which have already been accounted for in the M&I allocations.

Population projections used in the allocation process are the official state projections as issued by the Arizona Department of Economic Security. The projections used herein were issued in 1979 and later adjusted to reflect the 1980 census. Other than the allocation to the State Land Department, all municipal allocations were derived from these projections.

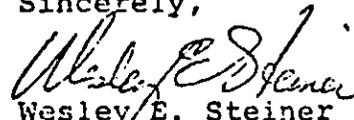
Several of the applicants have complained that the population projections used in the allocation process are out of date and arbitrary, primarily because no population has been officially forecast for several new developments or the population forecasts for existing cities and private water companies are considered too low. Over the past 12 years that the Department, and the Arizona Water Commission before it, have been developing allocations, several different population projections have been utilized without effecting any significant change in distribution throughout the project service area. The differences in our allocations over the years have resulted from the amount of water supply allocated and the fact that each new projection enabled a few new developments to enter the allocation. New Department of Economic Security projections are scheduled to become available in late February. We do not anticipate that the new projections will occasion any significant shift, but rather that population forecasts will generally increase over all of the project service area.

HONORABLE James Watt
January 18, 1982
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The Department anticipates that some applicants will not execute project water contracts - particularly those at extreme distances from the project aqueduct or those requiring difficult exchanges. Because of the demand for CAP water, it is recommended that the Secretary, following the initial effort to execute subcontracts, give the Department the opportunity to reallocate the M&I waters not contracted for. We would propose to do so in a manner that would accommodate any discrepancies identified by the new population estimates. We will reallocate based upon the new population forecast, with those entities that have demonstrated an inability to contract for project water excluded. The uncontracted for supply will be distributed to make up discrepancies in this allocation, including recognition of the needs of new developments such as Farmers Water Company and the Vanguard development within the Phoenix Service area.

If there is anything that we can do to assist you in your evaluation of our recommendations, please call on us.

Sincerely,


Wesley E. Steiner
Director

CC: All Applicants
Bill Plummer
Ed Hallenbeck
Attachments

TABLE 1

Recommended Allocations of CAP Water to
 Cities, Towns, and Water Service Organizations
 (acre-feet/year)

APPLICANT	ALLOCATION 2034
Avondale	4099
Berneil Water Company	432
Big Valley Water Company	0 ^{1/}
Buckeye	25 ^{2/}
Camp Verde Water Company	1443
Carefree Ranch Water Company	954
Carefree Water Company	400
Cave Creek Water Company	1600
Chandler	3668
Chandler Heights Irrigation District	315
Chaparral City Water Company	6978
Clearwater Company	2849
Community Water Company of Green Valley	1100
Consolidated Water Utility	3932
Cortaro-Marana Irrigation District	47
Cottonwood Water Company	1789
Crescent Valley Water Company	2697
Del Lago Water Company	786
Desert Ranch Water Company	139
Desert Sage Water Company	5933
Desert Sands Water Company	768
Eagle Water Company	0 ^{1/}
Eloy	2171
E & R Water Company	161
Farmers Water Company	0 ^{3/}
Florence	1641
Florence Gardens	407
Flowing Wells Irrigation District	4354
Foothills Water Company	1652

Table 1 - continued

APPLICANT	ALLOCATION 2034
Gila Bend	0 ^{4/}
Gilbert	7235
Glendale	14083
Globe	3480
Goodyear	2374
Green Valley Water Company	1900
Harquahala Valley Irrigation District	0 ^{1/}
Ironwood Water Company	393
Litchfield Park Service Company	5580
Maricopa Mountain Water Company	108
Mayer-Humboldt Water Company	332
McMicken Irrigation District	9513
Maricopa County Municipal Water Conservation District #1	0 ^{5/}
Mesa	20129
Midvale Farms Water Company	1500
New Pueblo Constructors Water Company	237
New River Water Company	2359
Nogales	3949
North Valley Water Company	393
Palm Springs Water Company	2919
Paradise Valley Water Company	874
Payson	4995
Peoria	15000
Phoenix	116239
Pinnacle Paradise Water Company	0 ^{6/}
Prescott	7127
Queen Creek Irrigation District	944
Ranch Lands Water Company	393 ^{7/}
Rio Verde Utilities, Inc.	812
San Tan Irrigation District	236
Scottsdale	19702
Sunrise Water Company	944
Sunshine Water Company	16

Table 1 - continued

APPLICANT	ALLOCATION 2034
Tempe	4315
Trails End Water Service	226
Tucson	151064 ^{7/}
Turner Ranches	3932
West End Water Company	157
West Phoenix Water Company	91
Williams Air Force Base	833
Youngtown	380
71 Arizona Water Company	
Apache Junction	6000
Casa Grande	8884
Coolidge	2000
Miami-Claypool	1829
76 White Tank	968
Citizens Utility Company	
Agua Fria	1439
Rio Rico	2683
79 Sun City	<u>15835</u>
TOTAL	494744

FOOTNOTES - TABLE 1

- 1/ Insufficient population projected to reside in this area to warrant an allocation.
- 2/ Urbanization of land with a dependable supply causes Buckeye allocation to decrease over the 50-year repayment period. Therefore, it is recommended that the maximum allocation be 434 acre-feet until 2005 then reducing to the recommended amount in the year 2034.
- 3/ At this time there is no population projection for this applicant's service area. However, the applicant has obtained concurrence for its master development plan from Pima County and we anticipate that when the 1982 population projections are released that this applicant will receive an allocation when supplies not contracted for are reallocated.
- 4/ Due to the great distance from the aqueduct to Gila Bend, an alternative local source of water can be developed and treated as necessary at a lower cost than Project water.
- 5/ M&I water will be served by Citizens Utility Company.
- 6/ The City of Scottsdale has purchased the Pinnacle Paradise Water Company and has received an allocation to serve water to this area.
- 7/ It is recommended that during the contracting period the population projections for Pima County be reviewed to determine if new projections modify the distribution of population between the City of Tucson and Ranch Lands Water Company. Substantial changes can be accounted for in the reallocation following initial subcontracting.

TABLE 2
 Recommended Allocations of CAP water to the
 Mining Industry, Power Companies, and Other Interests
 (acre-feet/year)

APPLICANT	ALLOCATION	
	Early Years ^{1/}	2034
POWER		
Arizona Electric Power Cooperative	0	0
Arizona Public Service-Salt River Project	55400	43218 ^{2/}
Tucson Electric Power	0	<u>0</u>
Power - Subtotal		43218
MINES		
Anamax-Helvetia	0	0 ^{3/}
Anamax-Twin Buttes	6105	4444
Asarco-Hayden	833	582
Asarco-Mission	4161	0 ^{4/}
Cities Service Company	3285	2271
Cyprus-Pima	7263	5339
Duval	11628	8549
Inspiration Copper	4647	2906
Kennecott	28611	22028
Phelps-Dodge	20866	<u>14665</u>
Mines - Subtotal		60784
RECREATION		
Arizona Game & Fish Department	755	324
Maricopa County	852	<u>665</u>
Recreation - Subtotal		988
OTHER		
Phoenix Memorial Park		5
Rio Salado		0 ^{5/}
State Land Department		<u>39006</u>
Other - Subtotal		39090
TOTAL		144080

FOOTNOTES - TABLE 2

- 1/ These amounts are allocated until such time that all M&I contracts total 640,000 acre-feet.
- 2/ Distribution between the two entities to be effected during contract negotiations.
- 3/ Sufficient local dependable water supply available.
- 4/ Asarco-Mission did not request water in year 2034.
- 5/ While the request for an allocation is valid for the Rio Salado Project, a portion of the CAP water allocated to cities involved in this project can provide the needed water supply in the early years with effluent taking over in later years as the cities need their full CAP entitlements to meet municipal needs.

TABLE 3

Recommended Allocations of CAP Water to
Agricultural Applicants
(percent of available supply)

APPLICANT	ALLOCATION		
	1985	2005	2034
Arcadia Water Company	0.13	0.14	0.15
Avra Valley Association	3.69	3.84	4.21
Central Arizona Irrigation District	18.01	18.73	20.55
Chandler Heights Irrigation District	0.28	0.28	0.30
Cortaro-Marana Irrigation District	2.14	2.05	1.99
FICO	1.39	1.44	1.58
Harquahala Valley Irrigation District	7.67	7.98	8.75
Hohokam Irrigation District	6.36	6.61	7.25
La Croix	0.04	0.04	0.05
Maricopa-Stanfield Irrigation District	20.48	21.30	23.35 <i>revised 1-20-82</i>
Marley, Kemper Jr.	0.04	0.04	0.05
McMicken Irrigation District	7.28	5.60	2.61
MCMWCD #1	4.66	3.37	2.88
New Magma Irrigation District	4.34	4.52	4.96
Queen Creek Irrigation District	4.83	4.99	5.42
Rood, W.E.	0.04	0.04	0.05
Roosevelt Irrigation District	2.61	2.72	2.98
RWCD	5.98	5.92	4.84
Salt River Project	2.97	3.05	0.00
San Carlos Irrigation District	4.09	4.25	4.66
San Tan Irrigation District	0.77	0.80	0.86
Tonopah Irrigation District	1.98	2.06	2.26
U.S. Forest Service	<u>0.22</u>	<u>0.23</u>	<u>0.25</u>
TOTAL	100.00	100.00	100.00

TABLE 4

Projected Urbanization of Agricultural Lands
That Have Received M&I Allocations

Agricultural Applicant	Projected Irrigated Acres Urbanized 1985-2034	Affected M&I Applicant
Chandler Heights I.D.	235	Same
Cortaro-Marana I.D.	2,635	Same
McMicken I.D.	23,587	City of Glendale Consolidated Water Co. Litchfield Park Serv. Co.
MCMWCD #1	17,076	Citizens Utility Co. Sun City
Queen Creek I.D.	589	Same
RWCD	8,939	City of Mesa City of Gilbert
San Tan I.D.	187	Same