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6 **BEFORE THE ARIZONA CORPORATION COMMISSION**

7 **CARL J. KUNASEK**  
8 **COMMISSIONER-CHAIRMAN**  
9 **JAMES M. IRVIN**  
10 **COMMISSIONER**  
11 **WILLIAM A. MUNDELL**  
12 **COMMISSIONER**

13 **IN THE MATTER OF THE JOINT )**  
14 **APPLICATION OF SUN CITY WATER )**  
15 **COMPANY AND SUN CITY WEST )**  
16 **UTILITIES COMPANY FOR )**  
17 **APPROVAL OF CENTRAL ARIZONA )**  
18 **PROJECT WATER UTILIZATION )**  
19 **PLAN AND FOR AN ACCOUNTING )**  
20 **ORDER AUTHORIZING A )**  
21 **GROUNDWATER SAVINGS FEE AND )**  
22 **RECOVER OF DEFERRED CENTRAL )**  
23 **ARIZONA PROJECT EXPENSES. )**

**DOCKET NO. W-01656A-98-0577**  
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**STATEMENT OF CAP TASK FORCE**  
**AS INTERVENOR**

24 **STATEMENT OF THE CAP TASK FORCE**

25 **General Background**

26 In 1997, Citizens Utility acting through its subsidiaries, Sun City Water  
27 Company and Sun City West Utilities Company, (hereinafter "Citizens") filed a rate  
application with the Corporation Commission to recover its sunk costs of retaining an  
allocation of CAP water for Youngtown, Sun City and Sun City West (hereinafter, the  
"Retirement Communities"). A number of organizations in the Retirement  
Communities opposed that application, largely on the basis that the utility had done  
nothing to make that CAP water allocation "used and useful" to the ratepayers.

Subsequently, the Commission issued an order in which it in effect deferred a  
decision on the matter pending certain planning work to be done by Citizens as

1 regards how it would propose to make beneficial use of the CAP water which would  
2 be obtained as part of its allocation for Sun City and Sun City West.

3 Citizens, in recognition of the very strong public feelings expressed by  
4 ratepayers in the Retirement Communities regarding beneficial use of CAP water as  
5 a prerequisite to any reimbursement to the utility, decided that to respond to the  
6 ruling of the Commission, the prudent thing for it to do was to seek out a consensus  
7 from the Youngtown, Sun City and Sun City West communities regarding how best to  
8 make use of its CAP water allocation. Accordingly, Citizens approached all the major  
9 organizations in Youngtown, Sun City and Sun City West and asked them to  
10 participate in a "CAP Task Force" to review all the issues associated with the use of  
11 CAP water and to come up a plan that would have the backing of the communities'  
12 leadership with regard to how CAP water could best be put to beneficial use in the  
13 community. All of the organizations in Youngtown, Sun City and Sun City West  
14 responded to that call, and a list of the original participants is attached as Exhibit A.

15 (1)

16 It is important to recognize that going into the Task Force study process, a  
17 number of the participants were not "sold" on the idea of using CAP water at all, and  
18 one of the threshold considerations of the Task Force was a determination as to  
19 whether CAP water use was even desirable for use in the Retirement Communities.

20 The CAP Task Force met regularly over a period of three months, and  
21 listened to various water and hydrogeological experts from which it sought expert  
22 testimony on the issues surrounding the use of CAP water. All the task force  
23 meetings were open to the public and notices of the meetings were advertised.

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24  
25 (1) One of those organizations, the Sun City Taxpayers Association ("SCTA"), dropped its participation just  
26 prior to the groups' reaching a consensus, and never signed off on the recommendations of the Task  
27 Force.

1 Public input on the topics under discussion was sought in each meeting. The Task  
2 Force, based on all the information which it had gathered, then formulated six  
3 potential plans for making use of CAP water. It sought further input from  
4 governmental officials, engineers, attorneys, and other people who were  
5 knowledgeable on CAP water matters in order to better define the pro's and con's of  
6 each of the options. The Task Force then held public forums and sought, through  
7 the media and other communications channels, to reach out to obtain public opinion  
8 on the options that were being considered.

9 The CAP Task Force identified the continued overdraft of its underground  
10 aquifer as a major problem facing the Retirement Communities, and quantified the  
11 serious problems in subsidence and water quality degradation that would result from  
12 that excessive groundwater pumping unless some effective remedial action were  
13 taken.

14 The Department of Water Resources has repeatedly documented the  
15 continuing drop in the water table in the general area of the Retirement Communities.  
16 The amount of this drop in any given year will depend to some extent on the amount  
17 of natural recharge. But the rate of the drop over time has been strongly affected by  
18 the simple fact that the Retirement Communities are taking out of the aquifer more  
19 water than is coming back in. And a similar overdraft situation which has occurred  
20 among neighboring communities has worsened the rate of drop of the aquifer table.  
21 Estimates vary on just how fast the rate of the drop really is, but ten feet per year  
22 seems to be a consensus figure. The ADWR takes the longer view that whatever the  
23 rate is, current practices will result in a drop in the groundwater table within twenty  
24 years of about three hundred feet. And such a drop would immeasurably compound  
25 the problems of subsidence and poor water quality for the Retirement Communities.

26 The subsidence of the land directly to the South and West of the Retirement  
27 Communities was documented in the report of the CAP Task Force and in reports

1 from ADWR in great detail. Drops in land level, earth fissures and cracks, and  
2 damage to existing infrastructure (e.g. roads and water, sewer and gas lines) in the  
3 area emanating out from the Luke cone of depression have all been well  
4 documented. The latest County map of subsidence in the West Valley is attached as  
5 a reference as Exhibit F. It shows that the subsidence threat to the Retirement  
6 Communities is both real and immanent. It is the Intervenor's position that direct  
7 recharge into the underground aquifer of the threatened communities is the only  
8 approach which will have a chance of combatting this creeping subsidence  
9 phenomenon.

10 The Retirement Communities currently enjoy relatively good water in the sense  
11 that the underground water currently being pumped is comparatively free of dissolved  
12 minerals. But it is well known that as the depth from which water is pumped  
13 increases, the quality of the water begins to degenerate. This is because the deeper  
14 the groundwater, the more likely it is to contain dissolved minerals of various kinds.  
15 Those minerals create "hard" water, which is also generally bad tasting. It also  
16 results in greater levels of mineral deposits in pipes, hot water heaters and other  
17 water infrastructure, leading to higher maintenance costs. It is also believed that the  
18 health effects of such hard water would be materially negative as compared to the  
19 present quality of water available to the residents of the Retirement Communities.  
20 And here again, the only remedy for protecting the quality of the existing water supply  
21 is to reduce the current level of excess groundwater pumping.

22 The studies and deliberations of the CAP Task Force concluded that concerns  
23 regarding the falling water table could no longer be ignored, and that the twin threats  
24 of subsidence and water quality degradation were on the threshold of making serious  
25 and substantial impacts on the quality of life of the residents of the Retirement  
26 Communities.

27 Finally, the Task Force went through an evaluation process to determine the

1 best approach to the use of CAP water for the Sun City and Sun City West  
2 communities, and found that it was able to reach a very clear consensus on its  
3 recommendations as to what should be done. The recommendations of the Task  
4 Force were threefold, as follows:

5 1. Citizens should retain the CAP allocation for the Retirement Communities,  
6 provided that it were put to beneficial use in the manner recommended by the Task  
7 Force.

8 2. The one option that was acceptable for using CAP water was to transport it  
9 for use on the golf courses of the Retirement Communities. That would allow the golf  
10 courses to stop pumping an equivalent amount of groundwater.

11 3. In the short-term, while the infrastructure to deliver the CAP water to the  
12 golf courses was being built, an arrangement between Citizens and the Maricopa  
13 Water District to use the CAP allotment in a groundwater savings project would be  
14 acceptable.

15 On October 1, 1998, Citizens filed with the Corporation Commission a copy of  
16 the findings and recommendations of the Task Force and requested approval of the  
17 Commission of those recommendations.

18 Subsequently, one Commissioner informally indicated his concern that  
19 Citizens, in making its application to have the recommendations of the CAP Task  
20 Force accepted by the Commission, might not be expressing the majority views of the  
21 Retirement Communities' residents on the issues involved. As a result, the  
22 organizations (with the sole exception of SCTA) who had originally supported the  
23 formation of the CAP Task Force and who had adopted its recommendations, elected  
24 to sponsor this intervention in the case by the "CAP Task Force", whose members  
25 are a sub-set of the panel who made up the original CAP Task Force.

26 This statement by the CAP Task Force is intended to confirm the support of  
27 the Retirement Communities behind the recommendations of the Task Force, and to

1 present evidence of that community support. This statement is also intended to  
2 clarify certain questions which have informally arisen with Commission staff regarding  
3 various aspects of the recommendations.

4 Further, since various alternate suggestions regarding CAP water use have  
5 been informally raised, this statement is also intended to re-express that the CAP  
6 Task Force would definitely be opposed to certain alternate strategies regarding CAP  
7 water.

8 Lastly, while the CAP Task Force respects that Citizens would intend to act  
9 with the utmost of good faith in implementing the recommendations of the CAP Water  
10 Task Force, we request that certain safeguards be put into the final order of the  
11 Commission should it decide to approve the use of CAP water by Citizens according  
12 to the recommendations proposed by the Task Force. Those safeguards are  
13 discussed in detail in Section 6 below.

14  
15 **2. Recommendation of this Intervenor**

16 This recommendation of the CAP Task Force has two essential elements.  
17 First, it endorses the value of using CAP water in both Sun City and Sun City West  
18 as a way of reducing groundwater pumping. Second, it makes clear that there is  
19 really only one feasible way of achieving a reduction in the current groundwater  
20 overdraft, and that was to bring the CAP water to the golf courses and have them  
21 curtail an equivalent amount of pumping.

22 The original CAP Task Force report detailed the reasons why CAP water was  
23 essential to the Retirement Communities. Subsidence and water quality concerns  
24 were the two major reasons for the recommendation of the Task Force, but there  
25 were a number of other reasons as well.

26 However, it is important to note that the recommendation to use CAP water  
27 was inextricably tied to a reduction in groundwater pumping. That is, the one real

1 water issue in the Retirement Communities is the current overdrafting of groundwater.  
2 The effects of the overdrafting of groundwater pumping in the aquifer which serves  
3 the Retirement Communities have been exacerbated by the huge increase in  
4 groundwater pumping by the high-growth communities immediately adjacent to the  
5 Retirement Communities (e.g. Peoria, Surprise). But the Task Force recognized the  
6 one essential and inescapable fact that the Retirement Communities themselves are  
7 currently pumping substantially more in acre feet of water per year than natural  
8 recharge is replenishing. And that overdraft is their responsibility.

9 If the Retirement Communities are to escape the worst effects of their overdraft  
10 in groundwater pumping, then CAP water must be used in a manner which clearly  
11 and directly reduces the current amount of groundwater pumping.

12 That simple and essential linkage between the use of CAP water and  
13 groundwater pumping may seem obvious, but it is essential to understanding the  
14 position put forth in this Statement by the CAP Task Force. Accordingly, the CAP  
15 Task Force wanted, for the record, to reiterate that linkage as being the key reason  
16 for its recommendation.

17 This linkage between CAP water and groundwater overdraft is also seen in the  
18 challenge which the Phoenix Active Management Area (PAMA) has posed to the  
19 Retirement Communities (and many other communities) to achieve safe yield. Each  
20 successive version of the PAMA Management Plan has emphasized that the day is  
21 rapidly coming when the PAMA will begin to enforce its legal mandate to bring a halt  
22 to groundwater overdrafting. The Retirement Communities have been forewarned for  
23 years now that fines and other legal penalties are in the immediate offing unless  
24 substantial action is not taken to remedy the overdrafting. If the Retirement  
25 Communities were to fail to use the available CAP allocation to directly address the  
26 overdrafting of its groundwater, it would be a clear negative signal to the regulatory  
27 authorities that punitive action would have to be considered.

1 And it is our belief that the negative effects of the enforcement actions which  
2 could be taken by the regulatory authorities under the current law would be a far  
3 worse situation than the costs of bringing CAP water to the local area golf courses to  
4 reduce groundwater pumping.

5 Based on the above, the CAP Task Force urges the Commission to consider  
6 this essential linkage between the use of CAP water and the need to directly reduce  
7 groundwater pumping beneath the Retirement Communities.

8  
9 **3. Why Recharge of CAP Water at a Remote Site is NOT Acceptable.**

10 The concept of recharging CAP water is currently in use in many areas of the  
11 Valley. For example, it is possible under Arizona law to obtain "recharge Credits" for  
12 recharging surface water such as CAP water into the groundwater table, and those  
13 credits (often referred to as "paper water") can then be used by a developer to meet  
14 the code's requirements for an assured water supply. Many developments around  
15 the valley currently use this stratagem as a way of assuring that they have provided  
16 subsequent buyers with an assured water supply. It has been suggested that such a  
17 recharge would be an appropriate use of the Sun Cities' CAP water allotment.

18 The Task Force strongly disagrees with the use of such a "Paper water"  
19 stratagem.

20 Several possible sites for such a recharge of CAP water have been suggested,  
21 all of them remote from the Retirement Communities' boundaries. However, any  
22 such remote recharge will not directly benefit the underground aquifer of the  
23 Retirement Communities. The threat to the Retirement Communities aquifer is from a  
24 spreading cone of subsidence and from the degradation of water quality which will  
25 result from the continued lowering of the groundwater table. Putting water into a  
26 remote recharge site fails to help either of those concerns because such remotely-  
27 recharged water will not reach the geographic area of the Retirement Communities

1 within the lifetime of anyone currently living there. More importantly, it would arrive  
2 too late to counter the current trends of subsidence and a dropping water table.

3 Moreover, at the present time, there is no legal structure which would allow the  
4 Retirement Communities to get "credit" for discharge into any recharge site, let alone  
5 a site which is remote from the actual community boundaries.

6 It has also been argued that remote recharge could be done at a location close  
7 to the CAP canal delivery point, and therefore would not require much of an  
8 investment in infrastructure to get the water to the recharge site. It could therefore be  
9 a less expensive alternative than delivering the water to the golf courses.

10 Unfortunately, this "less expensive" argument is fatally flawed since the remote  
11 recharge process would fail to protect the Retirement Communities local aquifer from  
12 the twin concerns of subsidence and a falling water table.

13 Several remote recharge sites were considered by the CAP Task Force in its  
14 deliberations, and those sites are shown, just for discussion purposes, on Exhibit C  
15 attached hereto. Several theories have been advanced as to why the use of such a  
16 remote site should be viewed as acceptable. But the one key theoretical aspect of all  
17 such arguments is the claim that if CAP water is recharged anywhere in the same  
18 general underground water basin then the Retirement Communities will also be  
19 benefitted. Unfortunately, that theoretical proposition doesn't comport with the  
20 hydrogeological facts of life in the Northwest Valley.

21 To understand why that theoretical solution to recharging CAP water is  
22 untenable, consider the following:

23 1. The hydrogeology of the Northwest valley is extremely complex, and  
24 absolutely cannot be considered as one homogeneous underground storage pool.  
25 This point was made in great detail in the studies done by Dr. Dapples in reports  
26 previously placed on file with the Commission. A listing of the study work done by  
27 Dr. Dapples is listed on Exhibit D attached hereto. Dr. Dapples' work is supported by

1 the work of Dr. Herbert Schumann, and a monograph by him on the issues at hand is  
2 attached as Exhibit E. The key conclusion that can be drawn from Dr. Dapples' work  
3 is that the only way to assure that recharged water will benefit the aquifer beneath  
4 the Retirement Communities is to do the recharge right in that area and not in some  
5 remote location. A secondary conclusion from Dr. Dapples' work is that there is still a  
6 great deal about the hydrogeology of the Northwest valley which has never been  
7 studied, and the unknowns greatly exceed what can be stated with certainty.  
8 Therefore, any claim that recharging CAP water in locations which are remote from  
9 the Retirement Communities would provide any benefit to the aquifer beneath those  
10 Communities is without any technical or factual foundation and amounts to no more  
11 than speculation.

12 2. It is clear that if a gallon of CAP water is dumped on the ground at a  
13 remote recharge site will take an extremely long time for that gallon of water to reach  
14 the geographic area of the Retirement Communities. That gallon of water has to  
15 seep downward to reach the underground aquifer and then travel horizontally to reach  
16 the Retirement Communities. The rate at which such travel would progress is a  
17 function of the soils involved and other underground geologic features, but can be  
18 measured in feet per year, even under the best of conditions. Since the nearest  
19 proposed recharge sites are from five to ten miles away from the heart of the  
20 Retirement Communities' aquifers, the transmission time from a remote recharge site  
21 to where the water would be of direct benefit would take place over centuries.

22 3. There is some technical basis for arguing that simply looking at what  
23 happens to a gallon of real water that is recharged doesn't tell the whole story  
24 regarding underground transmission rates. There is, for example, the understanding  
25 that, in certain circumstances, the recharge of water to the aquifer will create a  
26 pressure cone which extends outward from the recharge point and serves to  
27 accelerate the rate of underground transmission. However, no studies have been

1 done regarding how such a pressure cone could develop in the Northwest valley  
2 geology, and there is really nothing but technical speculation available regarding just  
3 how such a pressure cone could develop and how it would benefit the Retirement  
4 Communities. More importantly, those who have speculated on the possible effect of  
5 such a pressure cone only postulate increases in an underground transmission rate  
6 of less than an order of magnitude greater than natural recharge, and hence we are  
7 still talking (at best) about underground propagation in the order of decades. And  
8 that time constant would mean that irreparable harm would have occurred to the  
9 Retirement Communities long before remotely-recharged CAP water could be of any  
10 benefit to them.

11 4. There has also been speculation that the use of a remote recharge site  
12 which discharged CAP water directly into the Agua Fria water channel could improve  
13 underground transmission rates to the benefit of the Retirement Communities. Here  
14 again, no firm studies or technical information is available which would give any  
15 sense of certainty as to what will happen if CAP water is recharged into the Agua  
16 Fria. At least one expert has noted that the likely flow of any such water will be into  
17 the depressed areas which presently exist in the underground water table of the  
18 Northwest Valley such as the Luke depression area. Such a flow effectively by-  
19 passes the Retirement Communities' aquifer and, while beneficial to the region as a  
20 whole, would be of little direct benefit to the Retirement Communities on anything  
21 less than a geologic time scale.

22 The above comments and conclusions are based on the testimony presented  
23 to the CAP Task Force by the technical experts, which it had make presentations to  
24 it. Subsequently, the Task Force had this technical area studied by Herbert  
25 Schumann of Herbert H. Schumann and Associates and he is in the process of  
26 finishing a monograph on the subject of underground transmission rates which the  
27 Task Force will ask leave of the Commission to submit as additional testimony on or

1 before September 18, 1999.

2 The Task Force has, based on the above analysis, concluded that there is  
3 really only one effective way to make use of CAP water in a manner that will directly  
4 benefit the Retirement Communities and that is to turn off the current pumping of  
5 groundwater to the maximum extent possible, and replace that pumping with CAP  
6 water delivered directly to the golf courses that are currently doing the pumping. Any  
7 other of the approaches to the use of CAP water which have been considered simply  
8 do not allow the Retirement Communities to deal with the triple problems of  
9 subsidence, falling groundwater tables and regulatory demands to achieve safe yield.

10  
11 **4. Are the Infrastructure Cost Estimates Reasonable?**

12 Part of the information considered by the CAP Task Force in making its  
13 recommendations was the estimated costs of the infrastructure which would be  
14 needed to bring CAP water to the golf courses in both Sun City and Sun City West.  
15 An independent engineering consultant (Brown and Caldwell) was retained to study  
16 the costs of that infrastructure, and they gave the Task Force a detailed study of the  
17 work involved in completing that infrastructure, along with preliminary cost estimates.

18 Task Force members whose professional background included extensive  
19 experience in cost estimation for construction projects spent considerable time in  
20 reviewing those cost estimates. Their work resulted in a refined and revised estimate  
21 on the part of Brown and Caldwell, which were then reviewed and approved by the  
22 Task Force at large.

23 Subsequent to Citizens' filing of the CAP Task Force report with the  
24 Corporation Commission, there were informal questions raised by staff members as  
25 to the accuracy of the Brown and Caldwell cost estimates. In response to those  
26 questions, the Sun City Home Owners Association, supported by a grant from the  
27 Arizona Department of Water Resources, contracted with a separate, independent

1 engineering firm (Entranco) to review the Brown and Caldwell estimates and make  
2 their own assessment of the projected infrastructure costs.

3 A copy of the Entranco engineering report is attached as Exhibit B. The  
4 Entranco study confirms that the estimates made in the Brown and Caldwell report  
5 are reasonable, and that the necessary infrastructure can be completed for the  
6 approximate costs used by the CAP Task Force in its deliberations.

7 Accordingly, the CAP Task Force feels that its recommendation regarding the  
8 use of CAP water on the golf courses is supported by the Entranco study, and  
9 confirms its support of that option.

10  
11 **5. Evidence of Community Support for Putting CAP Water to Use on the Golf**  
12 **Courses.**

13 In the course of coming to its conclusions and recommendations, the CAP  
14 Task Force kept all of its deliberations completely open to the public, and public input  
15 was invited at each meeting. Before an conclusion was reached, "Public Forums"  
16 were held in which the public was given access to the kind of information which had  
17 been made available to the Task Force, and further comment was invited. The intent  
18 of the Task Force was not only to seek public input but also to start a process of  
19 public education on the water issues facing the Retirement Communities.

20 The Task Force, upon reaching its conclusions, published a report on all its  
21 findings and included a 32-page summary statement of its recommendations. This  
22 was given a wide circulation in the community.

23 Newspaper coverage of the conclusions of the Task Force was encouraged,  
24 and a number of articles appeared in the local media which discussed the  
25 conclusions of the Task Force. Copies of many of those articles are available for  
26 review by the Commission should they request.

27 The Task Force, in conjunction with the local organizations with governance

1 responsibility for the Retirement Communities then sponsored a substantial number of  
2 talks, presentations and other community outreach programs to get as wide an  
3 audience as possible to review the conclusions of the Task Force. A complete listing  
4 of all the various presentations which have been made is available upon request.

5 Throughout this public education process, it became clear to participating Task  
6 Force members that the general public in the Retirement Communities, once they  
7 came to grips with the facts behind the water situation in their communities, was  
8 giving their overwhelming support to the recommendation of the Task Force. This  
9 support was by no means unanimous, but the level of support was so strong that the  
10 Task Force determined to try to measure just how deep that support was.

11 Accordingly, two different informal polls were taken to get a sense of the depth of that  
12 support. The results of those polls show an overwhelming level of support (80%) for  
13 the use of CAP water on the golf courses in lieu of groundwater pumping. No claim  
14 is made for the scientific accuracy of those polling materials, but they do provide a  
15 clear and unmistakable expression of public support for the plan to put CAP water to  
16 work in the only effective means possible. A complete report of that polling work is  
17 available upon request.

18 In pursuing its course of public education on the use of CAP water, the Task  
19 Force members have also observed another very real phenomenon: as soon as  
20 people became aware of the nature of the water problems facing them, then they had  
21 no problem understanding and being willing to commit to the complete solution to  
22 those problems. The strength of those public expressions of support has been the  
23 basis for much of the perspective presented in this Statement.

## 24 25 **6. Safeguards Requested from the Commission.**

26 The CAP Task Force, as an intervenor, supports the request being made by  
27 Citizens Utility regarding approval from the Commission to recover its costs for the

1 CAP water allocation which it has maintained. However, there are two important  
2 safeguards which the Intervenor believes should be a specific part of any Order  
3 granted by the Commission to Citizens, as follows:

4 **(A) CAP Water Must Be Brought to the Golf Courses and Used There in**  
5 **Lieu of Groundwater Pumping.**

6 The entire thrust of this Intervenor's argument has been to make it clear that  
7 the only acceptable use of the Citizens CAP allotment is to use it in a manner which  
8 will directly benefit the Retirement Communities. The only arrangement which has  
9 been shown to directly improve the underground water table which serves the  
10 Retirement Communities is to use the water on the golf courses of Sun City and Sun  
11 City West so that they can stop their groundwater pumping. Only by stopping  
12 groundwater pumping do you directly improve the Retirement Communities' aquifer.

13 It is therefore essential that the Commission's order require a commitment  
14 from Citizens Utility to build the infrastructure necessary to bring the CAP water to the  
15 golf courses of Sun City and Sun City West. Any other resolution of the use of CAP  
16 water would be unacceptable.

17 **(B) Limited Time Frame to Complete the Necessary Infrastructure.**

18 The Task Force is concerned that the utility could drag out the completion of  
19 the infrastructure required to deliver the CAP water to the golf courses, and asks that  
20 the utility be given a firm deadline for completion of that infrastructure of no more  
21 than 42 months from the date of the Commission's Order. The Order should also  
22 contain a firm penalty, in the form of rebates to its customers, in the event that  
23 deadline is missed, regardless of the reason.

24  
25 **7. Conclusion**

26 The CAP Task Force has endorsed the use of CAP water in the Retirement  
27 Communities as a much-needed way to help address the challenge of their falling

1 water table and the resultant twin problems of subsidence and worsening water  
2 quality.

3 This Statement has focused on the fact that the one clearly effective way to  
4 address those problems is to stop the current level of groundwater pumping. And the  
5 only way to achieve that decrease in groundwater pumping is to use CAP water in  
6 lieu of current pumping being done for the golf courses in the Retirement  
7 Communities.

8 Lastly, we have shown that the increased costs of making that effective use of  
9 CAP water by bringing the water to the golf courses will meet with the approval of a  
10 substantial majority of the ratepayers in the Retirement Communities.

11 DATED this 10<sup>th</sup> day of September, 1999.

12 Respectfully Submitted,

13 **BEYER, McMAHON & LaRUE**

14   
15 \_\_\_\_\_  
16 William G. Beyer, Esq.

17 **AN ORIGINAL AND TEN COPIES**  
18 of the foregoing mailed this  
19 10th day of September, 1999  
20 to:

21 Docket Control  
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25 **COPIES** of the foregoing mailed/  
26 hand delivered this 10th day of  
27 September, 1999 to the following:

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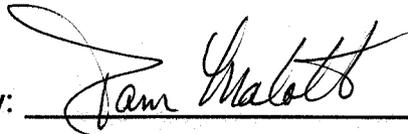
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27 Phoenix, Arizona 85004-1103

By:  \_\_\_\_\_

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- A. List of CAP Water Task Force Participants
  - B. Entranco Report
  - C. Location of Remote Recharge Sites
  - D. Listing of Dr. Dapples' Papers
  - E. Schumann White Paper
  - F. County Map of Subsidence

EXHIBIT A

CAP TASK FORCE FOR INTERVENTION

MEMBERS

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**REVIEW AND EVALUATION OF THE  
BROWN & CALDWELL COST ESTIMATE FOR  
CONVEYANCE OF COLORADO RIVER WATER FOR  
USE ON THE SUN CITIES RECREATION CENTERS GOLF  
COURSES**

**PREPARED**

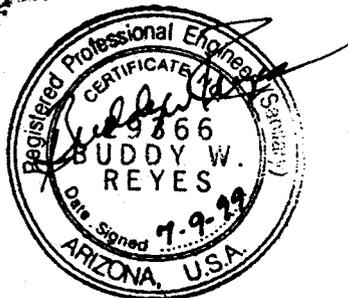
**For**

**THE HOME OWNER'S ASSOCIATION OF SUN CITY,  
AN ARIZONA NON-PROFIT CORPORATION**

**By**

**ENTRANCO ENGINEERS  
7740 N. 16<sup>th</sup> Street, Suite 200  
Phoenix, AZ 85020**

*"This printed information was produced in accordance with a water conservation (or augmentation) program which was either partially or entirely funded by the State of Arizona Department of Water Resources Conservation Assistance (or Augmentation) Fund."*



July 1999

## **INTRODUCTION**

This report summarizes an evaluation of a cost analysis performed by Brown and Caldwell (B&C) Engineers for Citizens Water Resources (part of Citizens Utilities Company). The B&C cost analysis was performed as part of a larger undertaking by the task force representing eight community organizations in the Sun City communities to address the availability of water in the future. Sun City communities have been solely dependent on the supply of groundwater for all their water needs. This practice has depleted the supply of water in the underground aquifer faster than it can be replenished. The culmination of the efforts by the task force is the acceptance of a plan to transport nearly 6 million gallons per day of Central Arizona Project (CAP) water from a canal approximately 8 miles north of Sun City to Sun City and Sun City West. The CAP water, which is Colorado River water, will be used on the Sun Cities recreation centers' golf courses. This will reduce groundwater pumping and help the underground aquifer to recover.

This evaluation is being performed as part of an Arizona Department of Water Resources (ADWR) grant, No. AUG98PH04-00, that was awarded the Sun City Home Owner's Association to review costs associated with the project to transport Colorado River water and to educate the public about the project.

## **GENERAL REVIEW OF BROWN AND CALDWELL REPORT**

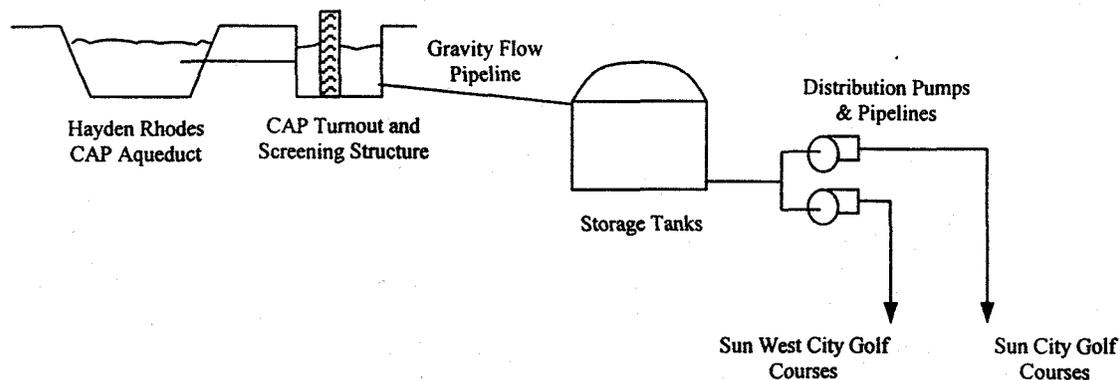
The primary purpose of the B&C cost analysis was to develop cost estimates and compare six options that would make use of the 6,561 acre-feet (ac-ft) of the Sun Cities and Youngtown communities' Central Arizona Project (CAP) water allocation. ENTRANCO's review of B&C's cost analysis, described herein, focused on one option only, the Groundwater Savings Project or Exchange with Sun Cities recreation centers golf courses option. The following are the key aspects of the Sun Cities recreation centers golf course option:

1. The cost estimate was based on a plan and not a final design.
2. The intent of this option is to use CAP water to save groundwater for use by residents and reduce groundwater consumption (pumping) by Sun Cities recreation centers golf courses.
3. No treatment would be required, other than screening to remove debris and occasional disinfecting to control algae in golf course lakes and reservoirs.
4. The B&C estimates, including the Sun Cities recreation centers golf course option, were prepared to allow comparison of the costs of six options developed by the task force.
5. As applicable, the costs for construction were based on the Engineering News Record Construction Cost Index, one of several construction cost estimating guides.
6. Citizens' engineers compared the estimate to similar projects they have completed and concurred with the assumptions, unit costs and overall basis of the estimate.
7. Costs for acquisition of land for pipeline right-of-ways were provided by Citizen's Utilities and converted to an allowance of \$16 per linear foot of installed pipe. This allowance was applied to sections of the pipeline.
8. Estimates for the options analyzed by B&C excluded costs that were common to all six options. The common costs excluded were costs for CAP water, savings from reduced groundwater pumping and other costs that were common to all six options.

9. The estimates that were provided by B&C were used by Citizens to forecast monthly rate increases. However, Citizens forecast included the additional burden resulting from depreciation, federal, and state taxes, the cost of capital and any other costs, noted in item 8 above, that were omitted in the B&C cost comparison.
10. B&C noted that, due to the multiple facilities and numerous undefined elements of construction, their cost estimate for the Sun Cities recreation centers golf course option should be considered preliminary, and an opinion of probable cost. They also noted that the estimate was conservative, but actual location of facilities, alignment, and right-of-way for the distribution system pipelines could have an impact on costs.
11. B&C assumed that the existing Sun City West Water Reclamation Plant (WRP) effluent irrigation pumping station is usable after rehabilitation.
12. Sun Cities recreation centers golf courses will be billed at a rate equivalent to 80 percent of the costs they currently pay for groundwater pumping. The costs for transporting CAP water will be offset by this revenue.

### EVALUATE "DESIGN" ASSUMPTIONS

The B&C cost estimate was based on a plan not a final design. The basis and assumptions for the plan (depicted below) and ENTRANCO's comments (italicized), are delineated in the paragraphs that follow:



### CAP WATER CONVEYANCE, STORAGE AND DISTRIBUTION SYSTEM

1. B&C estimated that the seasonal peak irrigation demands would be 133 percent of the annual CAP allocation.  
*Assuming that the subject golf courses will be satisfying most their irrigation water needs with CAP water, we agree with B&C's decision to size the gravity pipeline at 133 percent of the annual CAP allocation.*
2. B&C assumed that no treatment would be required, other than screening to remove debris and occasional disinfecting to control algae in golf course lakes and reservoirs.

*We agree with this assumption but called a consultant/maintenance manager for City of Scottsdale golf courses to hear first hand if any special treatment is required for irrigation with CAP water.*

*We had a telephone conversation with Scott McBeth, the current manager of the Grayhawk course. Scott has lived in the Phoenix area all of his life and has performed golf course maintenance, which includes responsibility for care and feeding of turf, for the past 30 years. He has managed the maintenance of at least six major courses in the area, plus the Briarwood course in Sun City West.*

*According to Scott, CAP water does not require any special treatment other than screening and occasional disinfection for algae control.*

3. B&C proposed to transport CAP water, via a 21-inch diameter gravity flow pipeline, from the Hayden Aqueduct-Lake Pleasant Road intersection, south along Lake Pleasant Road to Beardsley Road.

*Based on our preliminary calculations, a 24-inch diameter pipeline may be required instead of a 21-inch diameter pipe. If necessary, the cost for a 24-inch pipe could easily be covered by the 30 percent contingency that B&C added to their estimate.*

4. B&C proposed that approximately 12 million gallons of above-ground, steel tank, storage capacity be provided for daily peak irrigation demands that occur over a 12 hour period.

*In view of the fact that the water is being used for irrigation and not potable use, we agree that this volume of storage capacity is sufficient.*

5. B&C proposed that the water storage and distribution system be equipped with chlorination facilities to kill algae.

*We agree with B&C's proposal to include disinfection equipment, such as chlorination facilities, to control algae.*

6. B&C assumed that there is sufficient right-of-way and easements along the proposed route for the pipelines.

*This B&C assumption was based upon its engineering judgment and information provided by Citizens, which has extensive construction experience in the Sun City area. Based on a review of this issue with B&C and Citizens, we agree with the assumption that there is sufficient right-of-way and easements along the proposed route but recommend that the availability of right-of-way and easements be confirmed during the preliminary design effort or by way of a routing study.*

7. B&C made the assumption that the existing Sun City West Water Reclamation Plant (WRP) pumping and distribution systems, currently not in use, could be refurbished and used to distribute CAP water in Sun City West.

*Citizens is very aware of the condition of the WRP pumping and distribution systems. Therefore, we agree with B&C's assumption and proposal to refurbish the equipment and use it for distribution of CAP water.*

## **EVALUATE UNIT COSTS**

B&C used several different unit costs to develop the estimates for each option. They included the following:

1. Transmission and Distribution Pipeline Costs (the following are a few of the values included in the B&C report).

*Review and Evaluation of the Brown and Caldwell Cost Estimate  
for Conveyance of Colorado River Water*

*We believe the unit's costs for basic pipeline construction and the adders for replacement of pavement and rock excavation are good values.*

Unit Cost of Water Transmission Pipelines				
Pipe Size, Inches in Diameter	Basic Construction Cost, Dollars per Linear Foot	Pavement Replacement, Add Dollars per Linear Foot	Interference with Utilities and Traffic Control, Add Dollars per Linear Foot	Rock Excavation, Add Dollars per Linear Foot
12	35.52	6.76	6.76	7.10
16	58.16	6.76	6.76	11.63
21	80.06	8.82	6.76	16.02
24	93.20	8.82	6.76	18.64

2. Water Storage Reservoir and Chlorination System Costs

- a) Steel Storage Tanks = \$285,000 per million gallons storage.
- b) Chlorination equipment = \$35,000.

*We believe that the unit costs for the chlorination system are reasonable but would increase the unit costs for storage tanks to \$300,000 per million gallons to account for site work such as landscape, fencing and lighting requirements.*

3. Booster Pumping Station Costs

- a) Base costs for pump station = \$100,000.
- b) Costs for additional capacity = \$15,000 per million gallons per day capacity.

*We agree with all of these values.*

4. Land and Easement Acquisition Costs for pipeline installations = \$16 per linear foot of pipeline

*As stated above, we believe that the costs for acquisition of land and easements should be made a separate item and designated or referred to as an allowance until such time as the needs are clearly defined.*

5. Engineering Costs = 15 percent of construction estimate

*We agree with the estimate for Engineering costs but would add a separate item for environmental, permitting and special investigations. A special effort should be made to identify costs for these items during the preliminary design effort or as part of a routing study. The additional work and costs could result from the following:*

- a) *Crossing of State Land.*
- b) *Studies required for historical preservation and or archeological issues.*
- c) *Bureau of Land Management.*
- d) *Corps of Engineer permits crossing of washes.*

- e) *City and County requirements.*
- f) *Fish and wildlife.*
- 6. Citizens Admin, Legal, and Financing Costs = 10 percent of construction estimate  
*We must agree with this estimate since it was provided by Citizens and is based on historical cost data.*
- 7. Construction Contingencies = 30 percent of total construction estimate  
*In view of the preliminary plan and cost estimate, we agree with the application of a 30 percent contingency to all costs.*

### **EVALUATE ANNUAL COST ESTIMATES**

The annual cost determination included only those annual operations and maintenance (O&M) costs that were not common to all of the CAP water use options. The annual costs that were included are listed below:

- |  |             |
|--|-------------|
| 1. Reservoir (i.e. storage tanks) O&M costs = 2.5 percent of construction costs for tanks  | \$56,000    |
| 2. Pipeline maintenance costs = 15 percent of construction costs for pipelines   | \$12,000    |
| 3. Pump station maintenance costs = \$20,000 per pump station maintenance plus:<br>\$2,000 per each million gallons of pumping capacity and \$30 per acre-foot for powers. | \$51,000    |
| 4. Booster Pumping Power   | \$248,000   |
| 5. O&M Contingency = 20 percent of construction costs  | \$68,000    |
| 6. CAP delivery charge offset = (\$17) per acre-foot   | \$(221,000) |

This is the amount that the golf courses will be charged for CAP water they use for irrigation. It will be used to offset the costs for O&M of the delivery system.

**Total Annual Costs = \$187,000**

*Citizens included annual costs that were not included in the B&C cost comparison, such as depreciation, insurance and property taxes, in the final user costs. We believe that B&C's estimate of annual costs, delineated above, are reasonable but that these estimates must be refined at each step of design development.*

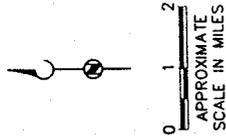
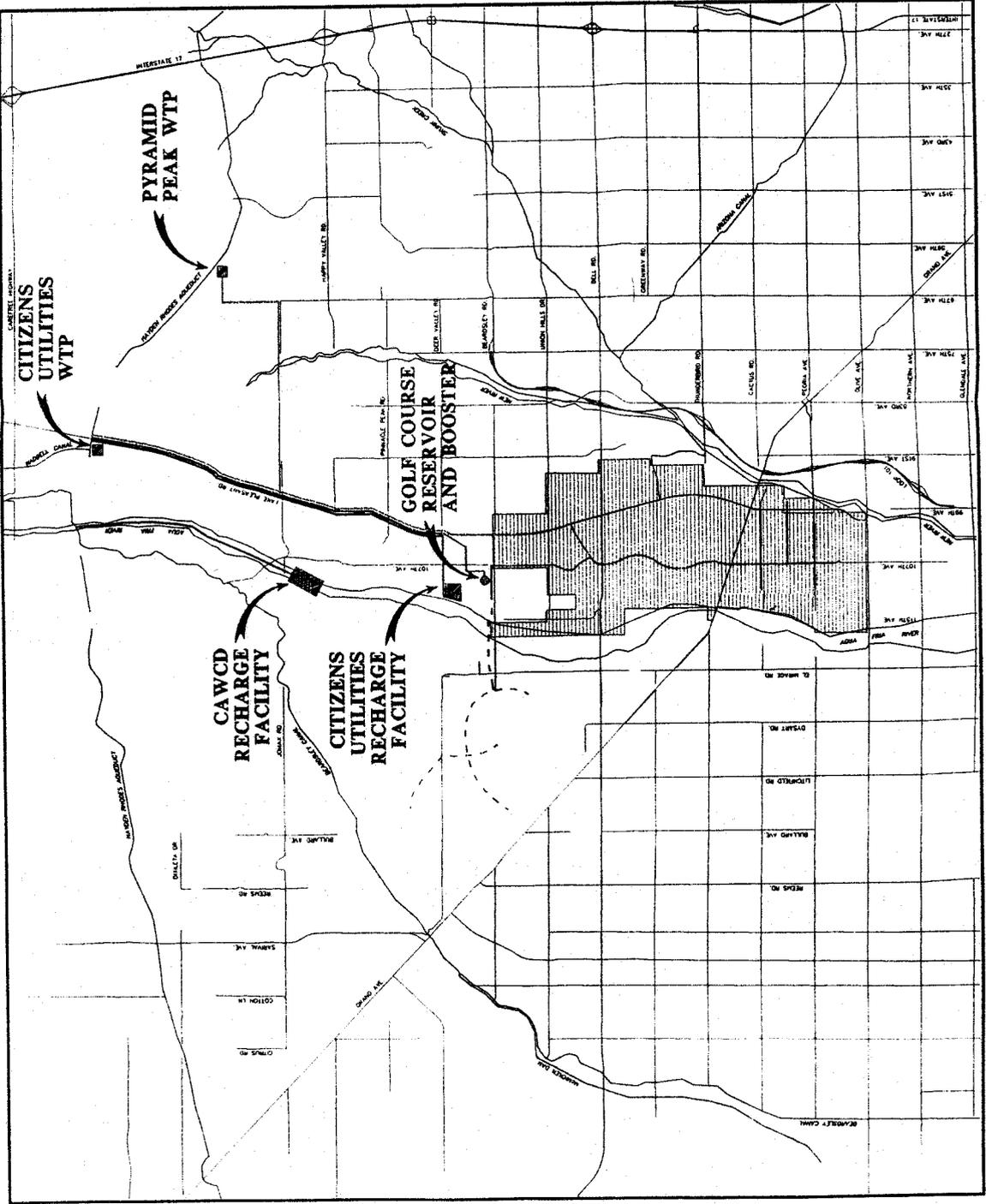
### **FINDINGS AND RECOMMENDATIONS**

We agree with the B&C cost analysis but offer the following recommendations and comments:

- 1. We recommend that a design and routing study be performed as soon as possible and that the cost estimate be refined as part of this work.
- 2. We recommend that requirements and associated costs for the following items be identified as part of the preliminary design or routing study effort:
  - a) Interfering utilities and the costs to relocate or the additional construction costs for pipeline.

- b) Requirements for permitting and studies (i.e. environmental, archeological, historical preservation, fish & wildlife, 404 NWP, etc.).
  - c) Land purchase requirements for right-of-way and easements.
3. The additional costs for items such as increased pipeline sizes, site work for the storage reservoirs and the cost for items noted in paragraph 2 above, should be covered by the 30 percent contingency added to capital costs and 20 percent added to the annual cost.

ENTRANCO's evaluation of the B&C cost analysis is based on: A thorough review of B&C's report and data; conversations with B&C's and Citizens' project managers; comparison of unit costs with the Arizona Department of Transportation construction database, the Means Cost Catalog, and material costs provided by suppliers; conversations with Blue Stake regarding utilities located along the proposed route of the pipeline; and our engineering judgment.



CITIZENS WATER RESOURCES

EXPLANATION

- CERTIFICATED AREA
- SUN CITY WATER COMPANY
- SUN CITY WEST UTILITIES COMPANY
- IRRIGATION
- EXISTING IRRIGATION
- POTABLE WATER
- RECHARGE

CAP TASK FORCE  
POTENTIAL CAP WATER  
USE OPTIONS

EXHIBIT D

LISTING OF PAPERS BY  
E.C. DAPPLES

GEOLOGY OF GROUNDWATERS IN THE WEST SALT RIVER VALLEY SUB-BASIN  
VOLUME 1 - NO. 1, MAY 1988

GEOLOGY OF GROUNDWATERS IN THE WEST SALT RIVER VALLEY SUB-BASIN  
VOLUME 1 - NO. 2, JANUARY 1990

GEOLOGY OF GROUNDWATERS IN THE WEST SALT RIVER VALLEY SUB-BASIN  
VOLUME 1 - NO. 3, NOVEMBER 1993

GEOLOGY OF GROUNDWATERS IN THE WEST SALT RIVER VALLEY SUB-BASIN  
VOLUME 1 - NO. 4, DECEMBER 1994

COMPOSITION OF SURFACE WATERS OF THE WATERSHEDS OF THE SALT  
AND GILA RIVERS INFLUENCING THE WEST SALT RIVER VALLEY  
VOLUME II - NO. 1, MAY 1997

Copies available from:

Sun City Home Owners Association  
10401 West Coggins Drive  
Sun City, Arizona 85351

**LAND SUBSIDENCE AND EARTH FISSURES IN THE  
WEST SALT RIVER VALLEY,  
MARICOPA COUNTY, ARIZONA <sup>1</sup>**

**Herbert H. Schumann<sup>2</sup>**

**Introduction**

Large areas of land subsidence and resultant earth fissures, that are caused by ground-water depletion, present serious geologic hazards in the West Salt River Valley of south-central Arizona. Differential land subsidence and earth fissures have damaged buildings, roads and railroads, water wells, irrigation canals and flood control structures. Local flood hazards have been exacerbated and the potential for ground-water contamination has been increased as the result of land subsidence and earth fissures.

The area has a hot desert climate, receives little precipitation and has abundant sunshine. Because of the high temperatures and the lack of precipitation, irrigation is necessary to grow crops. Water supplies come from surface-water diversions and from the pumping of ground water.

In the West Salt River Valley, surface water is diverted from Lake Pleasant, located behind Waddell Dam on the Agua Fria River at the northern edge of the area, to irrigate crops. However, flow in the Agua River is not sufficient to meet the requirements for irrigation. Large quantities of ground water are pumped from the underlying alluvial aquifer system to meet the needs for municipal, industrial, and irrigation water supplies.

**Geohydrology**

The West Salt River Valley was produced by large-scale normal faulting, which produced a series of rugged mountains and adjacent alluvial basins throughout southern Arizona. The rocks that form the mountains are generally impermeable and act as barriers to ground-water movement.

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<sup>1</sup>Paper presented at the 9<sup>th</sup> Annual Symposium of the Arizona Hydrological Society, Prescott, AZ, September 12-14, 1996.

<sup>2</sup>Herbert H. Schumann, Herbert H. Schumann and Associates,  
1007 East Lilac Drive, Tempe, AZ 85281 Tel. (602) 945-6577.

million dollars. Preliminary estimates of the cost to rehabilitate the Dysart Drain exceeded 16 million dollars.

### **Earth Fissures**

Differential land subsidence has caused large vertical tensional breaks in the alluvial sediments, locally known as "earth cracks" or earth fissures. Earth fissure zones occur on the periphery of the areas of maximum land subsidence and can be as much as two miles long. Earth fissures occur on three sides of Luke AFB in the West Salt River Valley (Schumann and Genualdi, 1988).

Because earth fissures often occur on the periphery of the areas of maximum land subsidence, they tend to transect natural drainage patterns and can capture large volumes of surface flow. Erosion by water flowing into earth fissures and piping along the trend of the fissures can produce gullies more than 15 feet deep and 30 to 40 feet wide. Large open fissures pose serious safety hazards to people and to animals. Earth fissures extend to large depths below the gullies and provide vertical pathways for rapid downward movement of contaminants toward the water table.

### **Summary and Conclusions**

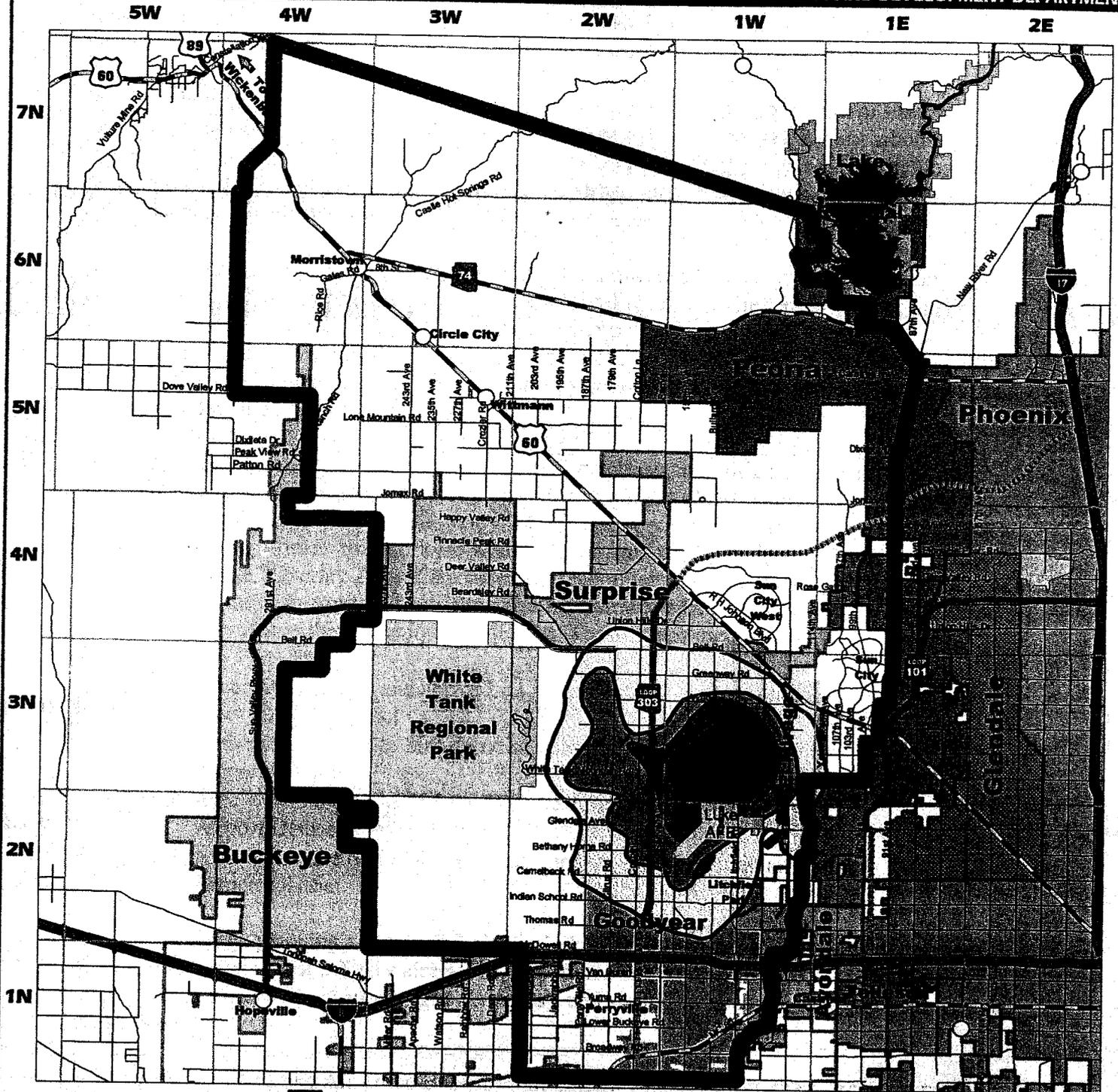
Ground-water depletion in the West Salt River Valley has caused more than 18 feet of land subsidence and associated earth fissures that present serious geologic hazards and have caused millions of dollars in damage. If depletion of the aquifer system continues; additional land subsidence will occur and the formation of additional earth fissures can be expected.

### **References Cited**

- Eaton, G.P., Peterson, D.L., Schumann, H. H., 1972, Geophysical geohydrological, and geochemical reconnaissance of the Luke Salt Body, central Arizona: U.S. Geological Survey Professional Paper 753, 28 p.
- Poland, J. F., Lofgren, B. E., and Riley, F. S., 1972, Glossary of selected terms useful in studies of the mechanics of aquifer systems and land subsidence due to fluid withdrawal: U.S. Geological Survey Water-Supply Paper 2025, 9 p,
- Schumann, Herbert H., and Genualdi, Robert B., 1988, Land subsidence, earth fissures, and water-level change in southern Arizona: Arizona Bureau of Geology and Mineral Technology Map Report 23, 1 sheet.

MARICOPA COUNTY

PLANNING AND DEVELOPMENT DEPARTMENT



**Earth Fissure**  
 Change in Elevation  
 (1957-91)

- 1 ft.
- 2 - 5 ft.
- 6 - 10 ft.
- 11 - 15 ft.

- Planning Area Boundary
- County Boundary
- County Park
- Interstate Freeway
- Proposed Freeway
- State Road
- Arterial Street



# Land Subsidence and Earth Fissures

Figure 10

0 1 2 3 4 5 6 Miles

## White Tank / Grand Ave. Area Plan

