BORREGO WATER DISTRICT

GROUNDWATER MANAGEMENT PLAN

September 25, 2002

This Groundwater Management Plan was presented at a hearing on September 25, 2002 and adopted by the Board of Directors of the Borrego Water District on October 18, 2002.

Charles Lewis

President of the Board of Directors

Eleanor Shimeall

Secretary/Treasurer

BORREGO WATER DISTRICT

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BORREGO WATER DISTICT
GROUNDWATER MANAGEMENT PLAN

Adopted 2002

EXECUTIVE SUMMARY

This plan was adopted by the Board of Directors of the Borrego Water District to guide the district in resolving the current overdraft of the district's and valley's sole source of water – the valley aquifer. The plan is printed in notebook format so that it may be revised by the Board from time to time.

> *The plan is based upon, first, a Technical Report prepared and reviewed over a two year period and adopted in March 2001 and, second, the specific Goals and Programs presented in a series of five public hearings in 2001 and 2002 and adopted in April 2002 by the Board of Directors of the BWD.*

The Technical Report was prepared by the staff and consultants of the Borrego Water District and knowledgeable local residents under the oversight of a Technical Committee. The information in that report comes from various studies and reports prepared on the aquifer over the last twenty years by federal, state and county agencies and private consulting firms and individuals. The alternatives considered for the Goals and Objectives and for the Programs and Projects were developed by the Borrego Water District staff based upon the recommendations of the designated Policy Committee, public input and Board directives.

The groundwater management study that resulted in this plan was undertaken in response to local concerns over the overdrafting of the aquifer and the recorded drop in water levels in valley wells. The aquifer has an estimated 4,800 acre-feet (one acre-foot is one acre of land covered with water to one foot of depth) of inflow annually from rain in the adjacent mountains. However, it is estimated that occupants of the valley are currently using approximately 22,300 acre-feet of water a year. Seventy percent of this (15,590 acre-feet) is used by approximately 4,000 acres of agriculture, twenty percent (4,435 acre-feet) by golf courses and commercial landscaping and the remaining ten-percent (2,272-acre feet) by residential and commercial uses. This is creating an estimated overdraft of 17,500 acre-feet a year. The County of San Diego staff has been monitoring twelve unused wells in the valley for nearly twenty years and report an average annual drop in well water levels of two feet a year. As these wells are not being pumped it is an accurate measure of the level of water in the adjacent area of the aquifer.

In their routine measuring of well levels in August 2002, however, they found that the water level in the unused well they monitor in the agricultural area had fallen by eight feet in six months. In contrast, the water level in a similarly unused well in the south end of the valley

adjacent to La Casa del Zorro where there is no intensive agricultural activity had not fallen at all.

Assuming that this major decline in the agricultural area is only a one-time anomaly, it can be assumed that the current overdraft does not create an immediate emergency situation as the aquifer is estimated to have 1,686,210 acre-feet or more of usable water remaining in it – nearly 100 years life at current levels of use. There will be substantial increases in extractions prior to that time, however. Even at current levels of usage, half of the water in the upper and middle aquifers will be depleted in as few as 35 years. This will result in additional pumping cost and the necessity for new wells as the water level and water quality drops.

Unlike some desert states, water law in California gives the overlying landowners the right to the groundwater under their property. The water district primarily owns the water rights under certain residential areas as those rights were retained by the original developer and assigned to the Borrego Springs Water Company, which was acquired by the water district in 1997.

California law also offers little authority for managing a groundwater basin. The current study has been undertaken under what is commonly referred to as AB 3030 (Assembly Bill 3030), which was enacted by the legislature in 1992. The intent was for water districts to obtain the voluntary agreement of large water users regarding how much groundwater they would extract and how much they would rely upon purchasing imported water. Borrego is probably unique in that it is trying to use this legislation to do groundwater planning even though it is an isolated basin that has no access or right to any imported water, neither Colorado River water nor Northern California water.

Under AB 3030, the District has two years in which to adopt a plan. The program was approved by the District Board of Directors in November 1999 and extended for an additional two years in December 2001. A technical committee of knowledgeable state, county and local staff and private individuals was created to oversee the study. That draft report was completed in December 2000 and after review and revisions by the Technical Committee sent on to the Board of Directors for review in February 2001. A citizens Policy Committee also reviewed the report and made a recommendation for an implementation program to the Board of Directors. The Board then held a series of public meetings to explain the existing and projected situation and solicit public input. This resulted in the adoption of Goals and Objectives and a Priority Listing of Programs and Projects to implement those Goals and Objectives.

As an alternative to this planning approach, some local residents recommended going directly to a lawsuit to adjudicate water rights. The District Board and counsel felt that such a step was confrontational and too expensive for such a small district as a first step and that AB 3030 offered a better first option to solve the overdraft problem.

In the Technical Study period arguments were presented that the estimated inflow of water was underestimated and that there is constant underground replenishment. Subsequently, the Borrego Water District contracted with the U. S. Geological Survey to time date water in wells in three locations in the valley. In the two samples where this proved feasible, it was estimated that the

water had been deposited 800 to 2,000 years ago. Therefore, the valley is not using water that is being replenished but mining water that has been in the aquifer for a millennia or more.

One of the most controversial issues of the entire study and hearings was whether the District should attempt to obtain water from adjacent basins or state water projects or try to reduce water use in the valley to replenishment levels. As 70 percent of the water is estimated to go to agricultural use, to implement a reduction would require reducing agricultural water use. This became the major issue of the planning process.

In the study and hearings it was determined that obtaining water from state projects and transporting it to the Borrego Valley was prohibitively expensive and much more expensive than fallowing agricultural lands. Also, there is no additional water available as these projects are already over-subscribed. Obtaining water from adjacent areas such as San Felipe Creek, Clark Dry Lake and Ocotillo Wells is possible but also has extreme limitations. There is only limited water and, in most cases it is of poor quality. Also, the facilities to transmit and treat it would be extremely expensive for such a small district. Recharging the valley through check dams and infiltration ponds is not judged to have much impact. The use of reclaimed water also would only have minimal impact.

The alternative approach, therefore, is to reduce groundwater use in the valley and preserve the remaining supply. Reduction is certainly possible with residential, commercial and golf course uses but these uses only account for 25 to 30 percent of the valley's water use. Further, conservation in agriculture seems very difficult and would still have only a minor impact. Limiting the expansion of farmland and eventually fallowing some existing farmland is probably the only way to have a major impact. To limit the expansion of agricultural uses it would be necessary for the County Board of Supervisors to take action, as they are the local government and land use authority for this unincorporated area. Over the last 30 years they have placed limits on urban expansion in various areas under their jurisdiction, but never on the conversion of land to agriculture due to its adverse impact upon groundwater resources.

Limiting the expansion of agriculture would limit the increase in the depletion, but for a long-term solution it will also be necessary to fallow land, which involves acquiring the land or the water rights of present farming operations.

In public meetings the Policy Committee developed a matrix to evaluate the alternative approaches. It concluded that reducing the extraction of water, rather than trying to import more, was the only realistic approach. That is the central recommendation they made to the BWD Board of Directors.

Those recommendations were used as the basis for a series of public meetings to inform the residents and property owners of the valley of the existing and projected situation and possible remedies. Based upon those recommendations and information developed at the meetings, staff developed a list of Goals and Objectives that were reviewed in public hearings, modified and adopted by the Board of Directors of the BWD. Finally, staff developed a list of programs and projects that could be undertaken to implement the adopted goals. Those were considered,

modified and prioritized in a series of public hearings. Implementation of the adopted Programs and Projects will take place at future Board hearings. Funds are allocated as part of the budget process each spring. The use of those funds, including $100,000 for Fiscal Year 2002/2003, will be decided by the Board throughout the year as projects are brought forth for public review.

PREFACE

This Groundwater Management Plan is not presented as the ultimate answer to the groundwater problems of the Borrego Valley. The plan presents the information presented in the Groundwater Management Technical Report, and the Goals, Objectives and Programs for Groundwater Management adopted by the Board in public meetings following the publication of that report.

It is a guide for action. Specific actions will depend upon opportunities that arise to implement the adopted objectives and programs. Borrego Water District staff and others will need to bring information about those opportunities to the Board so that it may consider them. Also, the plan will need to be revised from time to time as conditions and opportunities change. Therefore, it is printed in a notebook format to allow for that change.

Most important in the development of this plan has been the interest and participation of local residents. The Board of Directors of the Borrego Water District wishes to thank all of those who assisted in this effort. Their continued participation is vital to the implementation of any plan.

Borrego Water District - September 2002

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Faye Grosekemper	Director	Fritz Stradling, General Counsel
Roger Anderson	Director	

ACKNOWLEDGEMENTS

Much of the content of this plan is taken from the Groundwater Management Study Technical Report adopted by the Board of Directors of the Borrego Water District in March 2002. That report was a collaborative effort by consultants, the staff of the Borrego Water District and Borrego Springs residents with technical knowledge. They included BWD Chief Engineer Linden Burzell, General Manager Tom Weber, Engineering Technician, Jerry Rolwing and District Counsel, Fritz Stradling among others. Borrego Valley residents with technical knowledge that assisted in writing the report included Clark Shimeall, a retired professor of geology, Tim Giles, a hydrogeologist, and Joan Rosen, an individual with extensive experience in public participation programs. Judith Cook, Assistant General Manager, and Eleanor Shimeall, BWD Director, did the final proofreading and editing. *Special thanks also go to Carl Hauge, Chief Hydrogeologist for the State of California Department of Water Resources, and John Peterson, San Diego County Hydrogeologist, for their years of dedicated work on the groundwater problems of the Borrego Valley.*

PART 1: REASONS FOR A GROUNDWATER PLAN FOR THE BORREGO VALLEY

1.1 PLANNING FOR THE FUTURE

For approximately fifty years, groundwater levels in the Borrego Valley have been dropping in response to a continuing overdraft of the aquifer, which is the valley's sole source of water other than the very sparse rainfall. Based upon the results of studies over the last twenty years, there is no immediate crisis; however, in the County's August 2002 scheduled monitoring of unused wells to test water levels, they found that the water level in the well they monitor in the agricultural area had fallen eight feet in six months. Standard decline has been approximately two feet a year. At the two-foot figure, the usable groundwater supply could last approximately 100 years. The cost of extracting water will increase greatly throughout that time frame as the water levels decline. Also, it is projected that even with current levels of use, one-half of the water in the upper and middle aquifers will be depleted in 35 years.

Current levels of usage, however, will not remain static. California is projected to have a 30 percent increase in population within the next twenty-five years. That will result in an urban population of over 20 million within a few hours drive of the Borrego Valley. Coachella Valley is a projected growth area. With that level of urbanization in the state, living in Borrego will be even more desirable as a refuge from urban pressures. The Borrego Valley has nearly 5,000 unused residential lots either improved or approved for future development. There are also large areas of vacant land designated with density appropriate for multi-family units and mobilehome parks. Even with very low-density land use designations, a complete build-out would accommodate approximately 25,000 population, which is five times the current estimated winter population of 5,000.

California's growth will take place while the water resources of the state, for both urban and agricultural uses, are being reduced. Northern California water transfer is being reduced for environmental reasons. Access to Colorado River water must be reduced from 5.2 million-acre feet to 4.4 million-acre feet as California has been relying upon using that portion of Arizona's allocation not used by Arizona in the past. That overuse is no longer possible due to the growth in Arizona and the construction of the Central Arizona Project, which can now transfer Colorado River water to that state's urban areas.

Borrego will not only experience pressure for urban development, but it could also experience pressure for conversion of more land to agriculture. As people coming to California do not want to live in urban high rises and urban areas do not want such conversions, much of the future growth in California will take place on agricultural land where low density development is possible and water resources are available. This is already happening in the northern San Joaquin Valley and in the Coachella Valley. Both the increases in water prices, particularly in coastal agricultural areas, and the conversion of

land from agriculture to urban uses throughout the state, will create pressure for the conversion of existing raw land in Borrego to agriculture. In the Borrego Valley, agricultural land is cheap and water is available just for the cost of drilling, pumping and maintaining the well. As an example of the possible change, one of the largest agricultural nurseries in Thermal has purchased over 1,000 acres of mainly fallow farmland in the Borrego Valley. The conversion of just this one ownership to agriculture will result in a 25 percent increase in agricultural land use in the valley and a nearly 50 percent increase in the overdraft of the basin's water supply. A great deal of land remains available for such conversion.

Therefore, there is a need to act now to plan for the future use of the valley's groundwater resource. With such planning, the Borrego Valley can have a more reliable source of water than the rest of Southern California, which is dependent upon the annual snow pack in the Sierras. Without it, the area will be depleted of its only source of water in the coming decades.

1.2 TRENDS FROM THE PAST

Even without the impact of the projected California growth, water resources have declined in the Borrego Valley since World War II when major agriculture and residential uses were introduced. As an example of the change of the last fifty years, in a recent article in the Borrego Sun, a former resident of "Old Borego", located in the southern end of the valley, stated that in the early 1960s the water level in their well was at 16 feet below ground level except when the Di Giorgio Corporation irrigated its extensive grape vineyards in the northern area of the Valley. Water levels at this general location are now approximately 100 feet below ground level. Water levels in wells throughout the valley monitored by San Diego County over the last twenty years show an average drop of two feet a year. Figure 1 depicts water level hydrographs over the past 55 years and water level data collected by John Peterson, San Diego County Department of Planning and Land Use can be found in the Technical Report, Appendix "A."

Agriculture has always been and remains the single largest water user in the valley. The current agricultural activity, consisting primarily of lemon and grapefruit groves, palm nurseries and potato farms, uses approximately 70 percent of the groundwater extracted each year. There are also four golf courses in the valley that use approximately 20 percent of the extracted groundwater uses. Urban development (sometimes called municipal use), consisting of approximately 1,500 developed residential lots, mobile home and recreational vehicle parks, hotels and commercial developments, use the remaining 10 percent of the extracted water.

All these uses are dependent upon the remaining accumulated groundwater in the aquifer and its replenishment in the form of inflow of runoff from rainfall in the surrounding mountains. The inflow from all the surrounding areas is estimated by the US Geological Survey as approximately 4,800 acre-feet per year (one acre-foot equals approximately

326,000 gallons, or one acre of land filled to one foot of water). The total annual groundwater used by agriculture, golf courses and urban development is projected at 22,000 acre-feet per year. That annual difference of about 17,000 acre-feet of water comes from extracting water accumulated in the underground aquifer over millions of years. The remaining reserve of water in the aquifer, which is not precisely known, has been estimated as approximately 1.6 million acre-feet of "usable water". Whatever the amount, it is known that the water levels are dropping substantially and that trend will increase with any type of growth – urban or agriculture.

Based upon these figures, if there is no additional development of agriculture or urban uses the life of the aquifer would be approximately 95 years. However, even a partial build-out of the remaining approved or existing golf courses and residential lots in the valley and a minimal addition of only 1,000 more acres of agriculture will result in a 100 percent increase in the overdraft and a reduction in the life span of the aquifer by several decades depending upon the rate of the development. That fact has led to an increased call in recent years for groundwater management planning. Past estimates projected a current life of approximately 125 years but those estimates depended upon extracting water from the lower or deepest strata of the aquifer. That lower aquifer is now viewed as an extremely low rate production zone due to the types of soils within it. Total calculations for the life of the aquifer are further explained in the Technical Report, Appendix "E".

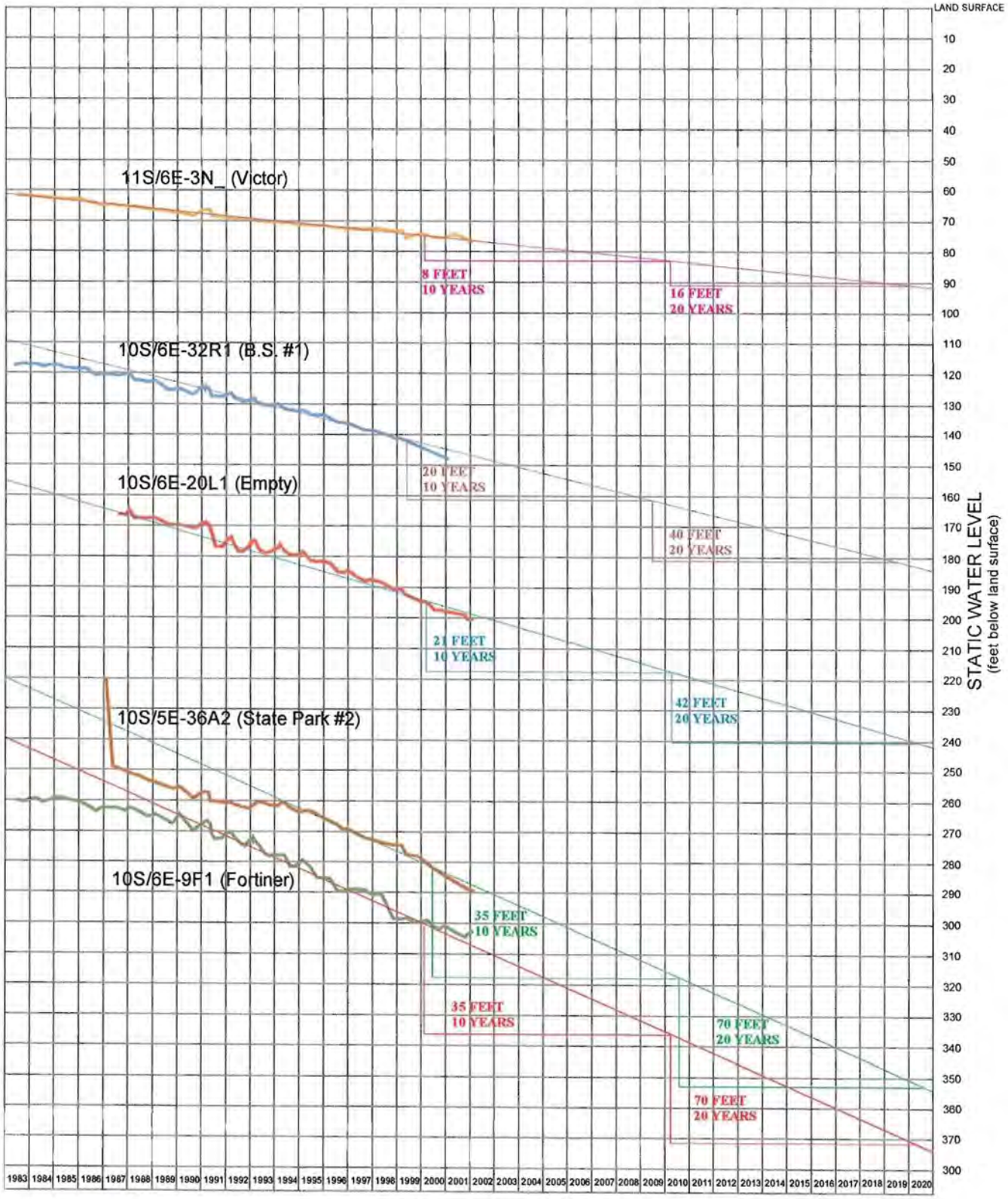
1.3 THE IMPACT OF LAND OWNERSHIP PATTERNS IN THE VALLEY ON GROUNDWATER MANAGEMENT PLANNING.

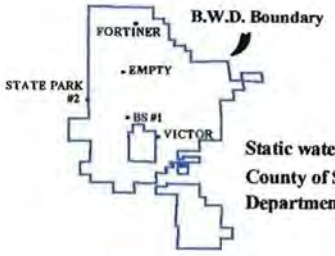
A significant factor that must be considered in the history of water use in this valley and the preparation and implementation of a groundwater management plan is the land ownership pattern and demographics of the valley. Since this valley was transferred into private ownership starting in the late 19th century, most of the land has been owned by state agencies or by individuals or corporations not living or located here. Until fifteen years ago much of the privately-held land was owned by a few large landowners. Di Giorgio Corporation used its land for agriculture, grapes, and subsequently did major subdivisions. The closely associated Burnand Family created lot-sales subdivisions, much of which have never been developed with homes, and held large areas of vacant land. Much of the remaining private land in the valley has been purchased by individuals or groups at very low prices speculating on enormous increases in value due to future growth. Therefore, in the past there has been a strong emphasis on growth by landowners, but not necessarily by local residents who are few in number, probably 5,000 in the high season and under 2,000 in the summer.

The biggest water users in the valley are agriculture, golf courses and two resorts. Less than seven percent of the agricultural land is used by families living in the valley, the rest is owned and farmed by interests outside of the valley, some being national and international companies. The two major golf course projects, Ram's Hill and the Borrego Country Club, only have limited local occupancy and are owned by development firms. The De Anza golf

course, which is a membership golf course, is owned by people who only spend the winter months here. The two major resorts are owned by interests not living in the valley.

Probably more than half of the permanent residents in the valley are immigrants from Mexico that work on golf courses, at the resorts or on the farms. They do not participate in the political affairs of the community. Finally, this is overwhelmingly a retirement community and most people in retirement, even if they stay all year, did not come here to get involved in such complex issues as water rights and water use. All this places severe limits on what can be done by a local water agency with no land use authority using only local cooperation, which is the basis for groundwater management planning under existing state legislation.





LOCATION MAP

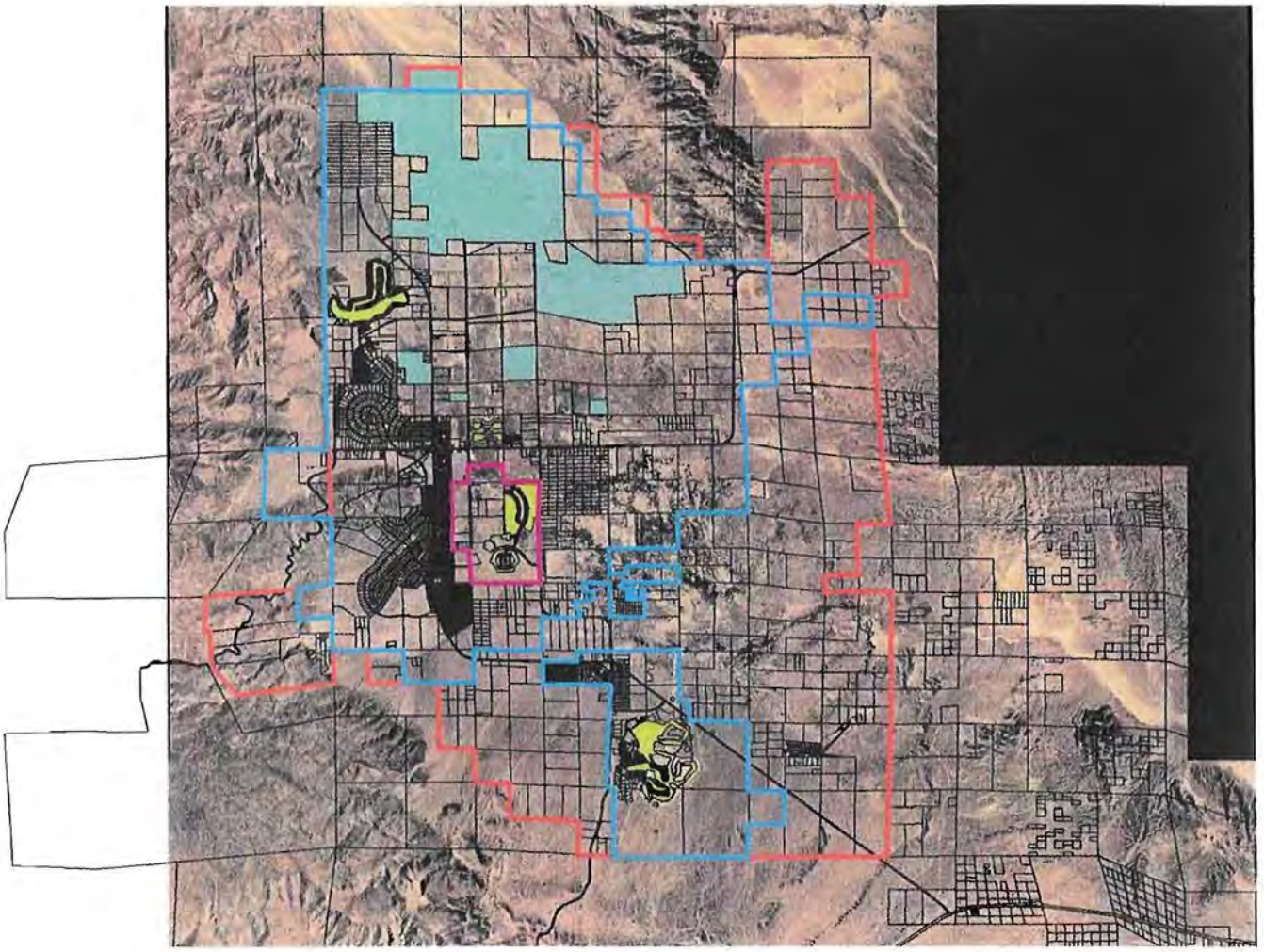
Static water level data collected by:
County of San Diego,
Department of Planning and Land Use

Borrego Water District
Groundwater Management Study

PROJECTED WATER LEVELS

San Diego County, California

Figure: 1



5 0 5 10 Miles

N

B. S. Park Community Services District
Borrego Water District
Anza-Borrego State Park
Golf Courses
Agriculture
Parcel

Borrego Water District
Groundwater Management Study
VALLEY LAND USE MAP
Figure: 2

PART 2: BORREGO VALLEY GROUNDWATER STUDIES

2. 1 STUDIES AND REPORTS

Studies of the valley's groundwater occurred as early as 1909 following the development of major agricultural wells. In the 1950s and 1960s, there were limited studies of water use, estimated recharge and water in storage by private and public entities. The first major study of the Borrego Valley aquifer that received any widespread distribution occurred in the early 1980s in response to concerns about the impact that the proposed Rams Hill Country Club project might have on the valley's groundwater resources. At that time there were strong feelings among many non-technical people that golf courses and residential development were the main uses impacting groundwater resources in the valley. That study was funded by the Di Giorgio Corporation, the developer of Rams Hill, and county and federal agencies. The study was undertaken by the United States Geological Survey and concentrated on determining the form of the aquifer and the amount of usable water that it might contain. It was to be part one of the three-part study. At that time the County of San Diego groundwater hydrologist, John Peterson, also began to monitor water levels in non-operating wells throughout the valley, a study that has continued to the present. The Borrego Water District monitors water levels in its operating wells.

Phase I of the valley study concentrated on collecting data and analyzing geological factors to produce information for a groundwater model that could project the impact of development and other factors on the resource. Their report, USGS H82-855, was published in 1982.

In 1984 the California Department of Water Resources developed and published a report on the feasibility and costs of bringing in Colorado River and Northern California water to the valley. That was updated for the current study and is included in the Technical Report appendices.

In 1988 the USGS published its report on the development of a groundwater flow model (Phase II) that could analyze historic and future impacts of water usage on the valley's resources. The model was never put into operation.

Additional minor studies and reports were prepared in response to land development proposals. Two hydrogeologists (Henderson and Netto) have developed a model that can track progress or lack of progress in controlling groundwater levels.

2.2 WORK OF THE BORREGO WATER DISTRICT SINCE IT BEGAN WATER SERVICE IN 1981.

Since the early 1980s, there have been extensive studies and monitoring of the aquifer conducted by county, state and federal agencies. Over the last decade the Borrego Water

District has explored adjacent areas to determine the availability of new groundwater resources separate from the Borrego Valley aquifer – water that could be piped to the valley to offset the overdraft. Therefore, substantial studies and information exist about the technical facts of the aquifer and adjacent areas, but it has not been used to create a single report understandable to the general public or a comprehensive groundwater management plan for the valley.

From its creation in 1961 to 1979 the Borrego Water District existed only to protect the water supplies of the valley from being exported outside of the district. The district during that time consisted primarily of the agricultural land areas. In 1979 the district was activated to provide water, sewer and flood control service to the Rams Hill Country Club project. That area is now designated as Improvement District 1 of the BWD. Improvement District 2, the Town Center Sewer, and Improvement District 3, La Casa del Zorro and Deep Well Trails, were added in the 1980s. However, that was the extent of the service area until April 1997 when the District acquired the Borrego Springs Water Company, which served the western, residential area of the valley. This action expanded the District's boundaries to a geographical base sufficient to consider undertaking a basin-wide groundwater management study. That area is now designated as Improvement District 4.

The boundaries of the Borrego Water District now cover approximately two-thirds of the privately held land in the valley. The major excluded areas are first, the Borrego Sink, second, the whole south slope area west of the Deep Well Trails subdivision and third, the Borrego Springs Country Club property including Club Circle. The Borrego Springs Country Club, often referred to as the Cameron Project, and the adjoining Club Circle area are served by a separate governmental entity, the Borrego Springs Park Community Service District, which provides water and sewer service in that area. They are in negotiations, however, to annex to the Borrego Water District. See Figure 6, page 40.

2.3 A LISTING OF THE STUDIES

The Major Groundwater Studies of the Basin

1982 – "Water Resources of Borrego Valley and Vicinity, California, Phase I – Definition of Geologic and Hydrogeologic Characteristics of Basin" Open-File Report 82-855 issued by the United States Geological Survey.

June 1984 – "Borrego Valley Water Management Plan" issued by the California Department of Water Resources in cooperation with San Diego County.

1988 – "Water Resources of Borrego Valley and Vicinity, San Diego County, California: Phase 2 – Development of a Ground-Water Model. Water-Resources Investigations Report 87-4199

1996 – Geophysical Studies by Agbabian Associates.

Additional Groundwater Studies and Monitoring Programs

1909 – United States Geological Survey report by Mendenhall

1915 - United States Geological Survey report by Waring

1923 - United States Geological Survey report by Brown including "watering places in and surrounding Borrego Valley

1954 - United States Geological Survey and the California Department of Water Resources report on well data by Burnham

1968 – Reconnaissance geologic map and data collected subsequent to Burnham by Moyle
1968 and 1972 – U.S. Bureau of Reclamation report estimating recharge, recoverable water in storage and average annual water level decline in Borrego Valley

March 1983 – Draft version "Preliminary Evaluation of Annual Recharge to the Borrego Valley Ground Water Basin" Technical Information Record issued by the California Department of Water Resources by Kenneth Hatai.

1993 – Review of the two U.S. Geological Survey Reports (82-855 and 87-4199) by Dr. David Huntley, Professor of Geological Studies at San Diego State University.

1980-2000 – Ongoing monitoring of Borrego Valley static water levels by John Peterson, Hydrogeologist with the County of San Diego Department of Planning and Land Use.

2001 - San Diego State University graduate thesis on the Borrego Valley Aquifer by Henderson and Netto.

PART 3: THE LEGAL FRAMEWORK FOR THE PLAN

3. 1 GROUNDWATER OWNERSHIP IN THE BORREGO VALLEY

In the Borrego Valley the overlying property owners own the groundwater under their land except for a portion of the area subdivided for residential development. That area consists of approximately 2,800 acres out of the 55,000 acres in the valley. Most of the residential areas were subdivided by a single company, The Borrego Springs Development Corporation. It retained the water rights under the land and assigned them to the Borrego Springs Water Company of which it was a principal owner. When the assets of that private company were acquired by the Borrego Water District in April 1997, it also acquired those water rights. The Borrego Water District is also the overlying property owner on other parcels of land in the valley where it has wells.

Certain significant areas of the valley are thought to have limited or no groundwater under them because they overlie only the lower aquifer, which does not yield water readily as does the upper and middle aquifers. The most significant location for this is the Rams Hill Country Club, which obtains most of its water from wells located in a more central area of the valley that are either owned by the Borrego Water District or, in the case of one major well, by Rams Hill and operated under contract by the Borrego Water District.

3. 2 CALIFORNIA WATER LAW RELATIVE TO GROUNDWATER

Counsel for the Borrego Water District, Fritz Stradling of the firm of Stradling, Yocca, Carlson and Rauth has provided the following explanation of groundwater law in California:

CALIFORNIA WATER LAW RELATIVE TO GROUND WATER by BWD Counsel

Since California became a state on September 9, 1850, there have been hundreds of legal decisions and statutes regarding the use of water and water rights. This is a brief overview of some of the legal considerations regarding the use of ground water or what the courts define as "percolating water". The laws may be applied differently in a variety of factual situations. It is not the intent of this section to relate the application of the laws to the various services in the Borrego Valley.

The courts have generally recognized three types of water rights, (i) pueblo water rights, (ii) riparian water rights and (iii) percolating water rights. The pueblo water right is the right of a city to take water as a successor of a Spanish or Mexican pueblo and to use the water occurring within the old pueblo limits for the use of the inhabitants of the city. Two cities that have such pueblo rights are the City of Los Angeles and the City of San Diego. Riparian water rights are the right of a riparian landowner (a landowner whose land

abuts a stream) to take water from a stream for use on his or her lands. A stream is water flowing through a known and defined channel, whether on the surface or on the subsurface of the ground. Percolating water is a vast mass of water confined in a basin, which does not form a part of a body of the flow, surface or subterranean, of any stream.

Although there has not to my knowledge been an adjudication of whether waters in Borrego Valley are riparian or percolating, it is generally conceded that the waters are percolating waters and not riparian waters. The court in *Katz v. Walkushaw* 141 Cal 116 (1903) described the existence of percolating water in a manner that mirrors the facts in the Borrego Valley. "It is quite manifest that this body (if it can be so styled) of percolating water cannot be called an underground watercourse to which riparian rights can attach, unless we are prepared to abolish all distinction between percolating water and the water flowing in streams with known or ascertainable banks which confine the water to definite channels. All rain-water which falls upon the hills and mountain-sides which does not flow off at once as surface water is absorbed and percolates down in the same way to the valley below."

The early view of the doctrine of percolating water rights was that the water was part of the land and belonged to the owner of land who could use or remove and control the water to the extent as any other part of the soil. At that time water was capable of assignment and of reservation in the grant of the land. *In 1903, this concept was modified in the Katz case. In that case, the court established the doctrine of correlative rights which afforded to each owner of land overlying a percolating water supply a right to the reasonable beneficial use of the water of that supply on or in connection with his overlying land with such right of use being equal to the similar rights of all other owners of land overlying the same ground water supply. In the event of an insufficiency of water for the requirements of all of the overlying landowners, the water may be apportioned among them by a court decree. If there is surplus water in the ground basin, more than the overlying landowners can put to a reasonable and beneficial use on their property, the surplus water may be appropriated by another entity, including a public water district, and be taken away from the overlying lands by the appropriator to be used on non-overlying lands.*

The foregoing legal concepts were clearly set forth in a case called *Pasadena v. Alhambra* 33 Cal (2d) 908 (1929). The law of percolating water rights can best be explained by summarizing the portion of the decision in that case, as described in "*The Hutchin's California Law of Water Rights*".

Applying the law of that case to the Borrego Valley ground water basin (the "Basin"), you would say that each and every landowner that has land overlying the Basin has a right to pump water from that Basin for the reasonable and beneficial use of that water on the owners' lands. Any person that does not have land that overlies the Basin and pumps water to his land from the Basin is an appropriator of that water. However, as noted in the *Pasadena* case, an appropriator can only appropriate surplus water and as there is an overdraft in the Basin, can an appropriator take water out of the Basin even though all of the present owners of land overlying the Basin have a sufficient amount of water to meet

their water needs? It should be noted that the law recognizes that landowners overlying a basin who are not presently using the water do not lose the right to take water from the basin for use on their land.

When a party talks about bringing an action for the adjudication of a basin, he or she is asking the court to allocate the quantities of water in the basin to the various landowners overlying a basin where there is not a sufficient amount of water to meet the needs of all of those landowners. In adjudication a court may also determine the rights of an appropriator and the rights of a proscriptor. These legal proceedings may be taken to safeguard a percolating water supply once a surplus ceases to exist and may restrain any additional user beyond the point of safe yield. Where the safe yield is less than the present and prospective needs of the overlying lands, the overlying owners are entitled to relief for protection to the extent of their individually declared rights and for protection against any exportation of the water that would unduly increase the cost or lower the ground water level below the danger point. We have seen in the past that adjudications may be necessary in certain circumstances; however, they usually take many years to reach a judgment and are expensive to conduct. Such was the case of the recent decision in *City of Barstow v. Mojave Water Agency* where it took over two years of negotiations among the water users and thereafter eight years of litigation. There is an article in Appendix "B" of the Technical Report regarding the Mojave case. It is for this reason that the Borrego Water District is pursuing the adoption of an AB 3030 plan to safeguard and supplement the water supply in the Basin for the benefit of the overlying landowners and the residents within the watershed.

For additional information on Water Rights, refer to the Technical Report, Appendix N.

3. 3 AB 3030 PLANNING APPROACH

In 1992 the State Legislature passed Assembly Bill 3030 (AB3030 of that year) and it was signed into law by Governor Wilson as sections 10750 through 10756 of the California Water Code. It is basically an effort to provide a planning tool for water districts where the users, primarily agricultural interests, rely upon groundwater as a major source of their water supply. The major criticism of this planning program is that it relies upon voluntary cooperation. The recommendations can be overturned by the vote of a majority of the landowners. Voting is based solely upon the value of the land one owns, not including the improvements or residence. In that sense it was designed primarily for agricultural districts. Its basic intent is to get these large water users to agree upon a formula for using underground water and then resort to purchasing imported water for their needs above that level. Borrego, of course, currently has no access or right to imported water. As far as is known, the provisions of AB 3030 have never been used as a planning tool for a district that has no alternative source of water supply other than groundwater. However, no other planning tool is available for Borrego at this time.

Counsel for the Borrego Water District has provided the following analysis of the AB 3030 legislation as a planning tool:

ANALYSIS of AB 3030 by BWD Legal Counsel

Pursuant to AB 3030 (enacted in 1992), the legislature established (Part 2.75 of Division 6, commencing at Section 10750 of the Water Code of the State of California) (the "Code") a means for a local agency to adopt or implement a groundwater improvement plan or groundwater management program (herein referred to as the "AB 3030 Plan"). A local agency is any public agency that provides water service to all or a portion of its service area, which includes a groundwater basin. The Borrego Water District (the "District") would be the logical local agency to instigate a groundwater management plan.

Before the District can adopt a resolution of intention to draft a groundwater management plan, it had to hold a public hearing. (Note: the process is detailed in counsel's text printed in the Technical Report, but deleted here). At the public hearing held in November, 1999, all persons desiring to be heard were heard and at the conclusion of the hearing the Board adopted the Resolution of Intention, Resolution No. 99-11-1, to draft a groundwater management plan. As the study was not completed within the allowed two years, in December 2001 the Board adopted a second Resolution to extend the study for two more years.

What authority does the District have to implement an adopted plan? The District may adopt rules and regulations (Section 10753.8). The District cannot make a binding determination of water rights of any person or entity (Section 10753.8). *Section 10753.8 implies that the District can limit or suspend extractions of producers if replenishment programs or other alternative sources of water are not available. As there is no alternate source of water for Borrego, it would follow that the District has the authority to limit or suspend water extractions. However, we question the authority of the District to enforce such a limitation or suspension of extractions against a producer that does not agree to such limitation.*

To finance a groundwater management plan, the District may fix and collect fees and assessments. Section 10754.2 provides that the local agency may impose "equitable annual fees." We are not sure how the District will determine what is an equitable fee. Before the District may fix a fee or levy an assessment, it must be authorized to do so by a majority of the votes cast at an election. The code does not prescribe who votes at such an election. Counsel is not certain who would vote to establish fees. It is argued that it would be a registered voter vote with a majority vote able to approve the fees. Would it be the registered voters only residing in the District or would it be all resident voters in the groundwater basin?

In regard to assessments, the Code provides that such assessments shall be "based on the amount of groundwater extracted from the groundwater basin within the area included in the groundwater management plan." This would suggest an assessment for each

producer based on the amount of water produced. Is the assessment on producers of special benefit to the producers assessed or are these assessments of a general benefit to the community? The way this question is answered may result in making it impractical for a local agency to levy such an assessment if the assessment is considered to be of special benefit to the producers. We believe that any assessment would have to be approved by a majority of producers voting prior to the conclusion of a hearing on the assessment as provided in Proposition 218 (Article XIIID of the California Constitution). The votes would be weighted according to the proportional obligation of the affected property. If only the producers vote, would they vote to make such an assessment. If the assessment is of general benefit, it may not be an assessment, as Proposition 218 provides that "only special benefits are assessable . . ."

Section 10754 of the Water Code of the State of California provides that a local agency that adopts a groundwater management plan has the authority of a water replenishment district pursuant to Part 4 (commencing within Section 60220) of Division 18 of the Water Code and may fix and collect fees and assessments for groundwater management in accordance with Part 6 (commencing at Section 60300) of said Division 18 (the "Act"). Part 6 of the Act gives a water replenishment district the authority to levy a replenishment assessment to purchase water for the replenishment of groundwater. This replenishment assessment is similar to the replenishment assessment that can be levied by the Orange County Water District. Although the District, if it adopts a groundwater management plan, has the authority to use the provisions of a water replenishment district can the District levy a replenishment assessment (an assessment on the producers of water for each acre-foot of groundwater to be produced in the ensuing year) which is not used to purchase replenishment water, especially when there is no replenishment water available?

The Act does not require a vote to levy replenishment assessments. If the replenishment assessment is not a special benefit assessment, Proposition 218 would not require a vote, however, if it is a general benefit assessment, does Proposition 218 now prohibit the levy of a general assessment pursuant to the Act?

The Act seems to provide that a replenishment assessment can only be levied to purchase replenishment water yet a water replenishment district has the power for the purpose of replenishing the groundwater to (a) buy and sell water, (b) exchange water, (c) distribute water to persons in exchange for ceasing or reducing groundwater extractions, (d) spread, sink and inject water into the underground, (e) store, transport, recapture, reclaim, purify, treat or otherwise manage and control water for the beneficial use of persons or property within the district and (f) build the necessary works to achieve ground water replenishment. More research needs to be done to determine if the replenishment assessment can be expended for any of the above purposes. As an alternative to seeking legislation to amend the California Water District Law to provide for the levy of a water production assessment that can be used for any purpose (see below), we may consider legislation to amend the Act to accomplish the District's objective.

The advantages of an AB 3030 plan are: (i) provides a vehicle for the District to formulate a groundwater management plan, (ii) can involve entities and private parties overlying the groundwater basin outside the District, (iii) provides a means of establishing fees (which may be equivalent to a pump tax) and assessments, and (iv) provides for agreements between the District and producers and the District and the Services District. The disadvantages seem to be (i) no authority over the adjudication of water rights, (ii) uncertainty as to the method and enforceability to fix and collect fees and levy and collect assessments, (iii) question of the authority of the District to enforce the implementation of a groundwater management plan, especially on non-participating producers, and (iv) no control over use of land within the groundwater basin.

This is the end of counsel's legal analysis.

PART 4: THE PLANNING PROCESS

4.1 THE PLANNING PROGRAM APPROVED BY THE BWD BOARD OF DIRECTORS

After several months of discussion, all of which was reported in the "Borrego Sun", and the required two public hearings, the Board of Directors of the Borrego Water District voted unanimously on November 22, 1999, to undertake a two-year groundwater management study as the basis for consideration of adopting a groundwater management plan for the Borrego Valley. At least one member of the community, a retired attorney with experience in water issues, had presented arguments for proceeding to litigation to establish water rights in the valley. This approach was felt to be too confrontational as a first step as well as too lengthy and expensive. Final adoption of the planing approach was done through approval of Resolution No 99-11-01 which states that the District will undertake a groundwater management study under the provisions of AB 3030 and that the study will be done under the direction of a Technical Committee to determine the content of such a planning program and that recommendation for such a committee will be considered at the Board meeting in December, 1999.

At the December meeting, a report from the District's General Manager proposed creating two oversight committees:

> First, a Technical Committee to be made up of people from the community and public agencies who are knowledgeable in the subject to develop and recommend the work program and to provide technical assistance and guidance for the writing of a technical report to be used as the basis for decision-making in the process.
>
> Second, a Policy Committee to be made up of lay persons representing various interest and geographical areas of the community with the responsibility of setting overall policy direction for the study and ultimately making recommendation to the BWD Board of Directors regarding the programs to include in a plan.

The Board of Directors also voted to have the Policy Committee adopt a goal for the study at its first meeting. At that meeting, held on February 11, 2000, the following goal was adopted:

> *The goal of this study is to provide a long-range groundwater management plan for the Borrego Valley that will minimize the overdrafting of the aquifer and enhance the recharge capabilities while providing a dependable supply of water for the reasonable growth of the valley. This plan should do so in a manner that is equitable to the current users of the aquifer and economically feasible for future users.*

4.2 THE TECHNICAL COMMITTEE

The total membership of the Technical Committee was as follows:

Sam Fortiner: Chairman: Member of the BWD Board and farmer

The Borrego Water District: Staff and Consultants
- Linden R. Burzell, BWD Engineer
- Fritz Stradling, BWD General Counsel
- Tom Weber, General Manager
- Jerry Rolwing, Engineering Technician

Other Public Agencies:
- Carl Hauge, California Department of Water Resources
- Peter Martin, USGS, Water Resources Division
- John Peterson, San Diego County Department of Planning and Land Use

Agricultural Representatives:
- Steve Smiley, Manager, Seley Ranch
- (Invitations were extended to others)

Golf Course Communities:
- Robert Zierden, General Manager, Borrego Springs Park CSD
- Bob Moore, Superintendent, de Anza Desert Country Club
- (Invitations were extended to others)

Local Residents with Technical Backgrounds:
- Clark Shimeall, retired geology professor
- Jack Laughlin, hydrogeologist/engineer

Major contributions to the study were made by Jack Laughlin, engineer, who did much of the work in preparing the work program. He resigned when he retired, as he would not be able to attend meetings.

4.3 THE POLICY COMMITTEE

The total membership of the Policy Committee was as follows:

Roger Anderson: Chairman President of the Board of the BWD, 1997-2001

Borrego Springs Park Community Services District:
- Tom Coffey, Member of the Board
- Bob Zinser, Member of the Board

Borrego Springs Sponsor Group (Community Planning Group):
Don Robidoux

Community Revitalization Committee & Borrego Springs Community Association:
Dr. John Strong

De Anza Golf Estates Resident:
Bob Reniers

State Park:
Tina Townsend, Anza Borrego Desert State Park Planner

Leo "Rik" Henrikson, a retired, prominent San Diego attorney with a background in water law, was a leading proponent of the study and a member of the committee until he passed away in the summer of 2000.

4.4 A CHRONOLOGY OF THE PLANNING EFFORT

The planning effort began in January 2000. Much of the planning effort involved researching, updating and organizing the information that has been developed over the last twenty years through private and public studies. This information was organized, evaluated and updated by the Technical Steering Committee for presentations to the Technical and Policy Committees.

Due to the isolation of the Borrego Valley and the fact that many residents live here only part time, it was determined quite early in the study that it was necessary to rely upon a Steering Committee to guide most of the Technical Work and maintain communication with those outside of the valley preparing parts of the study. That Steering Committee consisted of Chairman Fortiner, BWD General Manager Tom Weber, BWD Chief Engineer Lin Burzell and local geologist Clark Shimeall. Until he resigned from the planning effort due to personal demands on his time, the effort was greatly aided by the work of local resident, Jack Laughlin. Between February 11, 2000 and September 15, 2000, there were 4 meetings of the full Technical and Policy Committees, in February, March, June and September at which the information was presented, reviewed and approved. All meetings were noticed and well publicized in the local newspaper and were open to the public.

Originally, the Technical Committee and the Policy Committee had separate meetings on the same day. It was subsequently found to be to the advantage of both to have everyone attend the Technical Committee meeting and then have a short meeting of the Policy Committee, afterward, to discuss matters of interest to the committee and to take votes on direction for the study.

4.5 THE OBJECTIVES OF THE TECHNICAL STUDY

The first objective for the Technical Committee was to review all of the pertinent reports and data available on the Borrego Valley aquifer, water inflow and water use in order to determine the aquifer's life if water use continued at the present rate or at a projected increased use. This information came primarily from the public and private studies prepared over the last twenty years and the increased monitoring and mapping that the District and County has undertaken in recent years. Also, new information was presented by two hydrogeologists doing graduate study at San Diego State University. There was a need to update, organize and evaluate all this information so that it could be used as a basis for preparing projections of the aquifer's life under various scenarios.

The second objective was to identify and evaluate various projects that could be undertaken to increase the quantity of water available or to reduce water use so that one or more combinations of projects or procedures could be utilized to achieve a better balance of water use with water availability. It was particularly important to identify the cost and the specific beneficiary of these alternative projects and programs in order for the Policy Committee and BWD Board to make valid judgements. The proposals that were evaluated came from the BWD Board, members of the Technical Committee, the Policy Committee and the public. The study attempted to evaluate all proposals presented without prejudice.

4.6 THE SCOPE OF THE STUDY

The study covered the entire Borrego Valley groundwater basin as described in the United States Geological Survey Report 82-255 (1982). The Study also evaluated the feasibility of obtaining water from outside the area for importation into the Borrego Valley to supplement the natural recharge.

4.7 APPROVAL OF THE TECHNICAL REPORT

A draft report was distributed in December 2000. In February 2001 the Technical Committee unanimously approved the final draft of the report and sent it on to the Policy Committee to be used as a basis for recommending a groundwater plan program to the Board of Directors of the water district.

4.8 DEVELOPMENT OF THE POLICY COMMITTEE RECOMMENDED PROGRAM

The Policy Committee then held public meetings in March and April and evaluated all the alternative solutions presented in the Technical Report and proposals made by the public at those meetings. The evaluation was done using a matrix prepared by member Tina Townsend, a planner, that considered the costs of the alternatives, the amount of impact each would have, who would benefit, and who would pay among other factors. The actual matrix and the votes are on file in the office of the Borrego Water District. Their final

recommended program was unanimously approved by the Policy Committee and sent to the Board of Directors of the BWD on May 10, 2001.

4.9 THE POLICY COMMITTEE RECOMMENDED GROUNDWATER MANAGEMENT PROGRAM

Citizens' Policy Committee
Recommended Groundwater Management Program

We recognize that the Borrego Water District possesses limited economic resources. In consideration of that factor and weighing the relative urgency of the groundwater situation, we recommend that the following be adopted as a Groundwater Management Plan. We believe that this initial plan will take the first steps necessary to protect and preserve the Borrego Valley's groundwater resources, and could ultimately evolve into a long-term solution to the problem.

1. *Urge the adoption of a moratorium by the San Diego County Board of Supervisors on the conversion of land in the Borrego Valley to agricultural uses until new land use categories regarding water use are adopted for the valley.*

2. *Work in coordination with the local agencies and organizations to influence the San Diego County Planning Department and the San Diego County Board of Supervisors in the adoption of desert land use designations that are sensitive to the limited water resources of the Borrego Valley.*

3. *Work toward the adoption of a regulation requiring all new development in the Borrego Valley to mitigate for water extracted from the Borrego Valley aquifer by purchasing water rights on land currently in agricultural use for the Borrego Valley.*

4. *Institute a tiered water rate structure for urban uses with a baseline allowance to encourage conservation.*

5. *Institute a regulation requiring any property owner requesting annexation to an Improvement District in order to receive water service from the Borrego Water District to assign their groundwater rights to the BWD.*

6. *Develop and promote an informational campaign urging water conservation among all water users. The campaign would include information on basic domestic water conservation tactics, drought resistant landscaping, drought resistant golf course design, retrofitting of golf course water systems, low water use agricultural methods, and other conservation approaches.*

7. *Explore the acquisition of agricultural property from willing sellers.*

4.10 THE PRIMARY OPPOSITION TO THE RECOMMENDED PROGRAM

In the public meetings that developed this program the agricultural interests in the valley presented two basic positions in opposition to this program. They were (1) opposition to any limitation on the expansion of agricultural uses in the valley (2) opposition to relying upon reducing water use in the valley, particularly water used by agricultural uses, rather than finding ways to import more water to the valley.

It was the position of the Policy Committee that there was no identifiable source of sufficient water that could be imported into the valley, and even if water were available for importation, the cost of the infrastructure would be prohibitive to a district the size of the BWD. The concept of bringing water from adjacent basins such as Clark Dry Lake and Ocotillo Wells was dismissed, as the amount of water was limited, the quality good only for farming and the cost beyond any reasonable price for water with such a limited use.

4.11 BWD MEETING TO ADOPT A DRAFT PROGRAM

With the Technical Report completed and a Recommended Program presented by the Policy Committee, the Board of Directors set up a series of public meetings to present the information and get public input in the fall when many winter residents return to the valley.

These meetings were publicized by front page articles in the local newspaper "The Borrego Sun", by large advertisements by the Borrego Water District in that newspaper and by five mailouts of brochures to all post office customers in the 92004 zip code area, which includes the whole Borrego Valley and the adjoining community of Ocotillo Wells.

These meetings were as follows:

November 2001 – A town hall meeting attended by more than 150 persons. The total registered voters in the valley are listed as approximately 1,400. At this meeting a board of experts presented all the information that had been reviewed and included in the technical report. This included representatives from federal, state and county offices and the Coachella Water District.

December 2001 – As the two year period for development of a groundwater plan under the provisions of AB 3030 was coming to an end, the Board of Directors held a noticed public hearing regarding continuing the process. At that meeting public testimony was heard regarding the program and at the conclusion the board adopted a resolution continuing the groundwater management study for two more years.

January 2002 – A meetings were held to get input on setting Goals and Objectives for the plan and goals. At a subsequent meeting they were adopted. Those are the goals and objectives presented in this plan.

February 2002 – A meeting was held to discuss Alternative Programs and Projects to carry out the goals and objectives. Final action on these was postponed until March when the programs and projects could be considered concurrent with ways to finance them.

March 2002 – A meeting was held to adopt the programs and projects and means of financing. It was determined that rather than give a specific list a matrix should be used to prioritize the programs so that the plan would remain flexible in implementation.

That prioritized list is included in Part Nine of this plan.

4.12 DEVELOPMENT OF THE DRAFT PLAN AND ADOPTION OF A PLAN

Using the information in the Technical Report and the goals, objectives, programs and projects adopted by the BWD Board of Directors, BWD staff prepared a draft plan for public review in the fall of 2002. It was submitted to the California Department of Water Resources for review. Their recommended changes and additions were made and the plan was scheduled for adoption at the September 25, 2002 meeting of the Borrego Water District Board of Directors. Two subject areas that the Department of Water Resources recommended adding are included below as Items 4.13 and 4.14.

4.13 THE GROUNDWATER MANAGEMENT PLANNING PROCESS – A CHRONOLOGY OF THE PUBLIC MEETINGS

November 22, 1999 – First public hearing on groundwater management was held at the Palm Canyon Resort. Borrego Water District Board of Directors unanimously adopt Resolution No. 99-11-1 to establish a groundwater management program under California Assembly Bill 3030 (1992).

December 15, 1999 - Borrego Water District Board of Directors approve the formation of two groundwater management committees. The Technical Committee, comprised of members with technical background, will gather technical data and review historical studies for inclusion in a "Technical Report." The Policy Committee, comprised of local public officials, will review the data from the "Technical Report" and make recommendations to the Board of Directors.

February 11, 2000 – The first meeting of the Policy Committee took place at the Palm Canyon Resort at 10:00 in the morning. This meeting explained the purpose of the Policy Committee and introduced its members. The committee members are: Roger Anderson, Chair, Sam Fortiner of the Borrego Water District; Tom Coffey, Bob Zinser of the Borrego Springs Park Community Services District; Don Robidoux, Borrego Springs Sponsor Group; John Strong, Borrego Springs Community Association; Kathy King, local business person; Bob Reniers, DeAnza Country Club; Tina Townsend, Anza-Borrego Desert State Park. The committee adopted the following goal: *" The goal of this study is to provide a*

long-range groundwater management plan for the Borrego Valley that will minimize the overdrafting of the aquifer and enhance recharge capabilities while providing a dependable supply of water for the reasonable growth of the valley. This plan should do so in a manner that is equitable to the current users of the aquifer and economically feasible for the future users. To achieve this goal the study will need to consider both ways to reduce the use of groundwater in the valley as well as ways to obtain additional water from within and outside the aquifer."

February 17, 2000 – The first meeting of the Technical Committee took place at the Palm Canyon Resort at 10:00 in the morning. This meeting explained the purpose of the Technical Committee and introduced its members. The committee members are: Sam Fortiner, Chair, Linden Burzell, Fritz Stradling, Tom Weber, Jerry Rolwing of the Borrego Water District; Carl Hauge, CA Dept. of Water Resources; Peter Martin, U.S. Geological Survey; John Peterson, San Diego County Dept. of Planning and Land Use, Gary Walter, Anza-Borrego Desert State Park; Steve Smiley, Seley Ranch; Robert Zierden, Borrego Springs Park Community Services District; Bob Moore, DeAnza Country Club; Clark Shimeall, local retired geologist. The Technical Committee was issued "Groundwater Management Study Technical Committee Work Book". The committee reviewed the contents of the Work Book and discussed a "Draft Work Program".

March 24, 2000 – The Technical Committee met at the Palm Canyon Resort at 10:00 in the morning. A presentation was given by Carl Hauge of the California Department of Water Resources on the updated costs associated with conveying imported water to the Borrego Valley. Wes Danskin of the U.S. Geological Survey warned the group that as more water is extracted the probability of subsidence increases. John Peterson of the San Diego County Department of Planning and Land Use explained the water hydrographs depicting the decline in water levels over the past 20 years. Mr. Peterson further explained that as the water level continue to drop, that the cost of extraction the water will increase substantially. Jack Laughlin, a local retired engineer, reviewed three areas of a work program for the Technical Committee to proceed.

June 16, 2000 – The Technical Committee met at the Palm Canyon Resort at 10:00 in the morning. Linden Burzell, chief engineer for the Borrego Water District, outlined the feasibility of the Clark Lake Desalinization Project. Clark Shimeall, a local retired geologist, presented two studies for the Technical Committee. The first project involved exploring for additional water supplies from the Ocotillo Wells area. The second detailed the Agbabian Project, which studied the northern portion of the basin. A presentation was given by two San Diego State University geology graduate students, Tom Henderson and Steve Netto, who are completing their thesis work on the Borrego Valley. Gary Bender of University of California – Riverside discussed the use of mulch in the citrus groves as a method of reducing irrigation water.

September 13, 2000 – Members of the Technical Committee met with David Huntley, professor of Geology at San Diego State University, Peter Martin, U.S. Geological Survey, John Peterson and Laura Bloom of the San Diego County Department of Planning and Land

Use at the County's Ruffin Road Complex in San Diego. This meeting provided some consensus in the use of water level data and historical aquifer recharge limits. Several obstacles were pointed out in regards to the possible local water enhancement projects. It was decided by the group that age dating the groundwater would be useful data in determining whether the groundwater was ancient or if it came from recent rainfall occurrences.

September 15, 2000 – The Technical Committee met at the Palm Canyon Resort at 10:00 in the morning. Status reports were given on the following projects: database and mapping, meeting at the County office on Sept. 13th, aquifer characteristics, catchment basin feasibility, questionnaire for golf courses and agriculture property and a discussion of less water intensive crops.

December 2000 – The draft Technical Report was completed and distributed.

February 2, 2001 – The Technical Committee reviewed and made comments on the Groundwater Management Report at the Palm Canyon Resort at 10:00 in the morning. A motion was made and unanimously approved to forward the revised report to the Policy Committee.

February 23, 2001 – The Policy Committee met at the Palm Canyon Resort at 2:00 in the afternoon to review the Groundwater Management Report and to develop a plan to send to the Borrego Water District Board of Directors. Lin Burzell outlined the list of possible alternatives from Part Five of the Report.

March 7, 2001 – The Policy Committee met at the Palm Canyon Resort at 2:00 in the afternoon to discuss the AB 3030 procedure and possible recommendations to the Borrego Water District Board of Directors.

March 27, 2001 – The Policy Committee met at the Palm Canyon Resort at 2:00 in the afternoon to discuss the issues related to the list of possible alternatives from Part Five of the Report. Tina Townsend of the Anza-Borrego Desert State Park developed a matrix to evaluate each alternative as to aspects of importance, cost and level at which the alternative solved the problem.

April 17, 2001 – The Policy Committee met at the Palm Canyon Resort at 2:00 in the afternoon to review the summary of findings and the draft recommendations to be presented to the Borrego Water District Board of Directors. Some additions were included to the draft recommendations before the committee voted to approve the recommendations.

May 23, 2001 – The Borrego Water District Board of Directors vote 3-2 to support a letter written by the Community Sponsor Group, seeking restrictions on conversion of land in the Borrego Valley to high water uses.

November 14, 2001 – The "Town Hall Meeting" was held in the multi-purpose room at the Borrego Springs Elementary School at 6:30 in the evening. The first of four public hearings on the groundwater management program was designed to inform the citizens of the community of the facts related to the groundwater situation. Various public agencies were represented on the panel to answer all questions from the crowd of approximately 150 people.

December 19, 2001 – The Borrego Water District Board of Directors adopted a second resolution of intention to establish a Groundwater Management Program in order to comply with the two year time limitation on creating a program.

January 23, 2002 – The second public groundwater management hearing was held at the multi-purpose room at the Borrego Springs Elementary School at 6:30 in the evening. This event was designed to inform the citizens of the "Goals and Objectives" for a plan. Seven goals and objectives were recommended by the Policy Committee for the Borrego Water District Board of Directors to vote. The citizens were allowed to submit their preferred goals by making their selections on the public notice flier and returning to the District office. Approximately 57 people attended this forum.

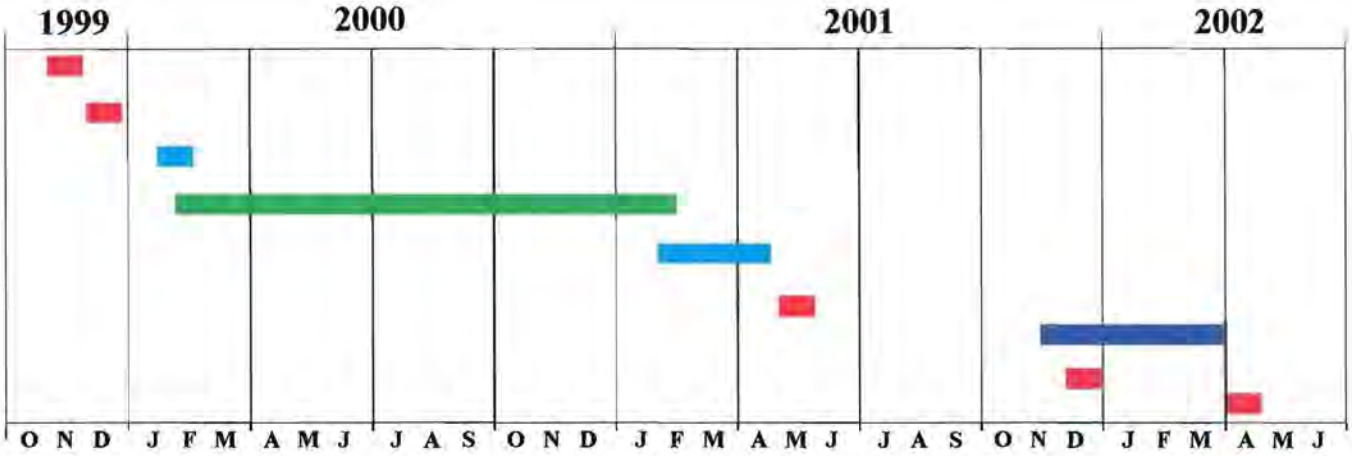
February 27, 2002 – The third public groundwater management hearing was held at the multi-purpose room at the Borrego Springs Elementary School at 6:30 in the evening. This forum addressed the possible programs to be used to meet the goals and objectives. Once again, the seven goals were reiterated and the public was invited to speak on the issues. Approximately 47 members of the public were in attendance.

March 27, 2002 – The fourth and final public groundwater management hearing was held at the multi-purpose room at the Borrego Springs Elementary School at 6:30 in the evening. The agenda for this meeting dealt with the financing of the programs to alleviate the groundwater overdraft. Several presentations were given to the audience of 87 people, including: the purchase of farmland, adjudicating the aquifer through the court system and implementing a tiered water rate structure for the Borrego Water District customers.

April 24, 2002 – The Borrego Water District Board of Directors met at council chambers of the Borrego Springs Fire Department to finalize the groundwater management programs list. The following programs adopted are in order of priority: programs to reduce agriculture and golf course water use without purchasing water rights, programs to publicize water conservation, programs to obtain funding to purchase water rights in the valley, have staff work with county planning department and other county agencies to limit the expansion of land use that requires high water use, have staff work with State and Regional Water Quality Control Board staffs regarding water quality issues, programs providing more information about the aquifer, programs that create economic incentives to reduce water use, programs that evaluate the feasibility of obtaining water from other basins and lawsuit to adjudicate the water basin.

Borrego Water District
GROUNDWATER MANAGEMENT TIMELINE

Figure: 3



- Scheduled Board of Directors' Meetings
- Technical Committee Meetings
- Policy Committee Meetings
- Town Hall Meetings

4.14 COMPLIANCE WITH CALIFORNIA DEPARTMENT OF WATER RESOURCES DRAFT GUIDELINES FOR A GROUNDWATER MANAGEMENT PLAN

In August 2002 the draft Groundwater Management Plan was submitted to the California Department of Water Resources (DWR) staff for their review. As a result of that review they supplied the Borrego Water District staff with a copy of the guidelines they were developing for "Components of a Groundwater Management Plan". Those are identified below and the BWD plan compliance explained.

The DWR Draft Guidelines are printed in italics below and the BWD response listed in standard print.

Components of a Groundwater Management Plan

A successful and useful groundwater management plan will consist of the following components.

1. *Reliability*

   The plan shall adequately demonstrate that the components of the plan will lead to reliability of the groundwater supply in the area addressed by the plan. Reliability consists of maintaining or improving the predictability and availability of economic benefits derived from groundwater while providing for beneficial uses and habitat maintenance throughout the basin.

   BWD COMPLIANCE

   The Borrego Valley is dependent upon the groundwater stored in its aquifer. The use of that groundwater is dependent upon the type of land uses in the valley. The greatest water users are agriculture and golf courses. The Borrego Water District has no control over land use regulation. The plan, however, recognizes that this is the critical issue and directs the BWD staff to work with the County government and other public agencies so that they recognize that future land use regulations must reflect the need to limit heavy water use activities. The Board and staff of the District have been involved in this aspect of implementation for the last two years and it will be an on-going effort.

2. *Public Input*

   The governing body shall develop a procedure that ensures consideration of all perspectives that might have a stake in groundwater management within the area of the governing body's jurisdiction, and where appropriate, within the extended region that might be affected by actions of that governing body.

An advisory committee of representatives of stakeholders within the area of the governing body shall be appointed. The advisory committee shall establish a schedule for meeting to obtain stakeholders' perspectives and shall report regularly to the governing body that appointed the committee.

BWD COMPLIANCE

The BWD undertook an extensive public input program as part of this planning process. That program is identified in Section 4.13, above. Continued public input will be assured by scheduling reviews of the implementation annually or more often.

3. *Regional groundwater management*

The governing body shall describe the procedures it will follow to ensure that its management decisions will not deleteriously affect groundwater resources in those parts of the basin that are outside the governing body's jurisdiction. This will require that the governing body meet with, and coordinate with, other water management agencies within the basin.

In addition, the technical staffs of each governing body shall meet to work out technical details that will facilitate management decisions of each of the governing body's elected or appointed representatives. Such coordination meetings shall be held regularly but not less than two times per calendar year.

BWD COMPLIANCE

The Borrego Valley has three agencies providing public water. They are the Borrego Water District, the Borrego Springs Park Community Services District (BSP CSD) and the Borrego Air Ranch. The BWD invited participation by the other two in the development of this plan. The air ranch declines but the board and staff of the BSP CSD participated fully. In addition, they are currently in the process of seeking annexation to the BWD and there is constant interaction.

4. *Integrated Planning*

Groundwater is affected by, and affects, other resources. The governing body shall coordinate with other agencies that are managing resources within the basin. Management activities may include, but are not limited to, the following:

- *Source water protection*
- *Potentially contaminating activities*
- *Land use*
- *Surface and groundwater storage*

- *Water conveyance facilities*
- *Recharge*
- *Quality of surface water and groundwater*
- *Transportation*
- *Water purveyors, agricultural, municipal, industrial*
- *Conjunctive management of water*
- *Waste disposal – solid, municipal sewage, on-site sewage treatment and disposal*
- *Water recycling*

BWD COMPLIANCE

The Borrego Water District has authority for water, sewer, flood control and mosquito abatement services. The district currently contracts with the USGS to monitor groundwater inflows into the valley. In addition there is close coordination with County staff in the planning and public works department. It is an intent to maintain and expand that contact with these and other agencies as part of the implementation process.

5. *Management objectives*

The governing body shall establish management objectives for the basin or subbasin they manage. The objectives shall provide a "value system" for the basin that identifies changes that are unacceptable.

Management objectives shall establish threshold values for acceptable changes in groundwater levels, groundwater quality, inelastic land subsidence, and changes in stream flow and habitat. Maintaining reliability in some basins may require objectives for other parameters.

Threshold values that are not to be exceeded shall be established for each of these parameters. Basin and subbasin management objectives may differ from basin to basin, or even within different parts of basins, but all objectives shall support the goal of supply reliability.

BWD COMPLIANCE

The BWD Groundwater Management Plan identifies the Goals and Objectives of the plan. The draft objectives were listed in more quantifiable standards, but as the District does not control land use and that is a major factor in meeting standards, it was felt that at this time specific figures may not be appropriate until implementation begins. The goals, objectives, programs, projects and impact of the plan will be reviewed annually for consideration of revision.

6. *Data monitoring and evaluation*

The governing body shall develop a monitoring program within its area that collects data on groundwater levels, groundwater and surface water quality, land surface subsidence, and stream flow. These data will be evaluated by the governing body and used to manage the basin to ensure supply reliability.

The governing body may use technical consultants to evaluate the data and make recommendations, or they may appoint a technical advisory committee consisting of local expertise to evaluate the data and recommend management actions.

The frequency and location of data collection, and the evaluation of the data shall be based on scientifically sound groundwater principles.

BWD COMPLIANCE

The County of San Diego has a monitoring program on twelve unused wells in the valley and the BWD contracts with the USGS to monitor water inflows in the adjacent canyons. It is the intent of the district to apply for grants to expand monitoring functions as part of the implementation program.

7. *Implementation*

The governing body shall develop procedures for identifying and dealing with noncompliance with management objectives. Provision shall be made to allow voluntary actions to correct noncompliance with the management objectives.

Methods for implementing management objectives must be consistent with the authority of the governing body.

BWD COMPLIANCE

Again, as an isolated basin with no access to imported water much of the implementation of any plan is dependent upon the cooperation of County and State agencies. Continuing contact is part of the implementation program as is an annual review.

8. *Periodic re-evaluation*

The governing body shall adopt a schedule for periodic re-evaluation of the plan to whether or not the adopted management objectives are ensuring supply

reliability. Recommendations of the technical advisory committee and the citizens advisory committee shall be considered by the governing body during this re-evaluation.

After such a re-evaluation, it may be necessary to modify the management objectives to ensure supply reliability. At a minimum, the plan shall be re-evaluated every five years. However, evaluation of the data may indicate that the plan should be modified more frequently.

BWD COMPLIANCE

Re-evaluation will take place at least once a year as identified in Part 10 of this plan.

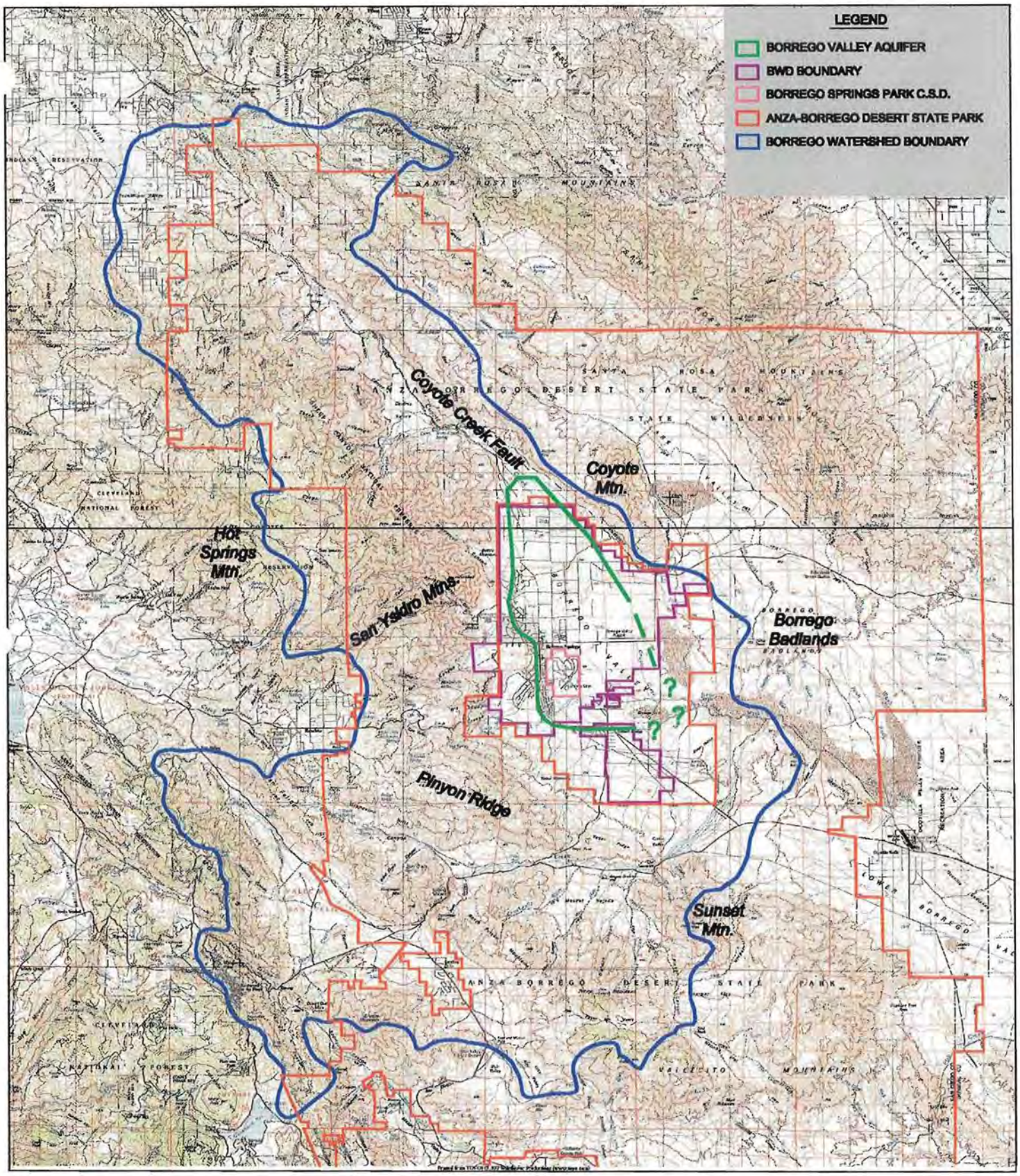
PART 5: THE EXISTING CONDITIONS

5.1 THE PHYSICAL CHARACTERISTICS OF THE VALLEY AND THE AQUIFER

The Borrego Valley is a desert area located in the northeastern corner of San Diego County. It is immediately east of the Peninsular Range of mountains that separate the more temperate coastal plain from the desert. It is separated from the Salton Sea, thirty miles to the east at the northern end of the Imperial Valley, by eroded land known as the Borrego Badlands. It is separated from the Coachella Valley to the north by the Santa Rosa Mountain chain. See Figure 4, page 33.

In terms of understanding groundwater issues in the Borrego Valley, there are three geographic areas to be considered. First is the valley, or more properly valley floor, which is defined by mountains and canyons on the north, west and south and by the Borrego Badlands to the east. Second is the drainage basin which includes the valley and the surrounding mountains from which runoff from rainfall in the mountains is drained into the valley and aquifer via canyons and other natural features. Coyote Canyon, at the northwest end of the valley, is the most significant drainage feature. Third is the aquifer, which contains the groundwater and underlies a portion of the valley and may extend well beyond it in a southeast direction.

The Borrego Valley runs in a north-south direction for about 11 miles and in an east-west direction for about 6-1/2 miles. It includes an estimated 55,000 acres of privately held land with the remaining area of the valley being within the Anza Borrego Desert State Park. Borrego Valley Road is the approximate dividing line between the western half of the valley and the eastern half. The western half is developed with residential and agricultural uses. The eastern half of the valley is primarily open land including the Borrego Sink, the lowest area of the valley to which all natural drainage is directed. As much as 8,000 acres around the Borrego Sink is the site of a mesquite bosque or woodland, some of which has been designated as a protected feature under County of San Diego land use regulations. This eastern half also includes the airport, some agricultural land north of it, Old Borego, the original settlement area, La Casa del Zorro and the Ram's Hill Country Club. Most of the Ram's Hill project will remain open space as only about 600 acres of the 3,000 acres are designated for development. Therefore, a substantial portion of this eastern half of the valley is and will remain in undeveloped open space. A large portion of the northern end of the valley, within Coyote Canyon, is now state parkland and will, therefore, remain undeveloped.



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SCALE: 1"=5 Miles
JANUARY 2001

Borrego Water District
Groundwater Management Study

GENERAL LOCATION MAP

San Diego County, California
Figure: 4

The valley, or actually valley floor, is part of a much larger drainage basin that extends several miles to the northeast and southwest. In the north it includes all the mountains around Coyote Canyon up to the community of Anza in Riverside County. Likewise, in a southwest direction it extends several miles as it includes the drainage area of San Felipe Creek including The Narrows and Scissors Crossing. In contrast, to the east, the drainage basin does not extend much beyond the area of the valley's private land holdings as the Badlands drains toward the Salton Sea and not into this basin. See Figure 5, page 36.

Rainfall in the drainage basin has augmented the groundwater in the aquifer and provides some recharge. The valley floor receives about six inches of annual rainfall and the mountains about sixteen inches. Intermittent streams enter the valley through canyons. In 1945 the USGS reported that the groundwater basin was being operated under steady-state conditions. By the mid-1950's it was in an overdraft situation due to the introduction of large-scale agriculture in the valley.

The Borrego Valley Basin is filled with up to 2,400 feet of poorly consolidated to unconsolidated sediments resting on the basement granite. The USGS Report 82-855 identified an upper, middle and lower aquifer (material that stores, transmits and yields significant amounts of water to wells and/or springs). The alluvial sediments filling the basin originated by the weathering action of the rocks in the surrounding mountains. Stream flows then carried the resulting gravels, sands, silts and clay particles into the basin, depositing them in an orderly progression with the larger material (gravels and sands) settling out first and the smaller materials (silts and clay particles) being carried farther into the basin before settling out. Climatological conditions at the time of transportation and deposition considerably influenced the spatial extent of such deposits. The technical committee studies did not uncover differences sufficient to alter the USGS model. Appendix "C" of the Technical Report details recent well information.

The USGS analysis of the distribution of the three aquifers indicates that the upper aquifer, which currently supplies most of the groundwater used, is thickest in the northern part of the basin and thins to extinction in the southeastern area. The middle aquifer is thickest toward the central portion of the valley adjacent to the Coyote Creek fault and thins toward the Valley's western edge. The lower aquifer is thinnest in the northwest and thickens and becomes dominant aquifer toward the southeast.

Basically, the amount of water available for use, as well as the ease of recovery decreases from the upper to the lower zones. On the basis of one recent well, the County's analysis suggests that in some locations, an increased volume and yield may be found at a greater depth than expected.

In general, the water quality is good, with a total dissolved solids content of less than 500 parts per million (ppm). There are several pockets of water in the aquifer where nitrates are above 45 ppm, the maximum safe concentration. Several wells in the Borrego Valley have been taken out of service because some of the high nitrate water moved laterally as the

water level dropped. The Borrego Water District ID-4 wells 1 & 4, and the Roadrunner Mobile Home Park well are good examples of this phenomenon.

5.2 ADJACENT GROUNDWATER SOURCES

Three adjacent sources were investigated to see if additional water could be found in close proximity to the Borrego Valley. The first area is Clark Dry Lake, which lies just to the east of the Coyote Creek Fault near the Peg Leg Smith monument on the Borrego-Salton Seaway (County Highway S-22). The second area is San Felipe Creek, which lies to the southeast of the Borrego Sink area and possibly could be part of the Borrego Valley aquifer. The third area is near Ocotillo Wells, designated as the lower Borrego Valley, and continuing east of the Imperial County line. All three of these projects have the potential to supplement the water supply of the Borrego Valley; however, the export of water from these areas will undoubtedly impact the natural resources of their respective regions. See Figure 5, page 36.

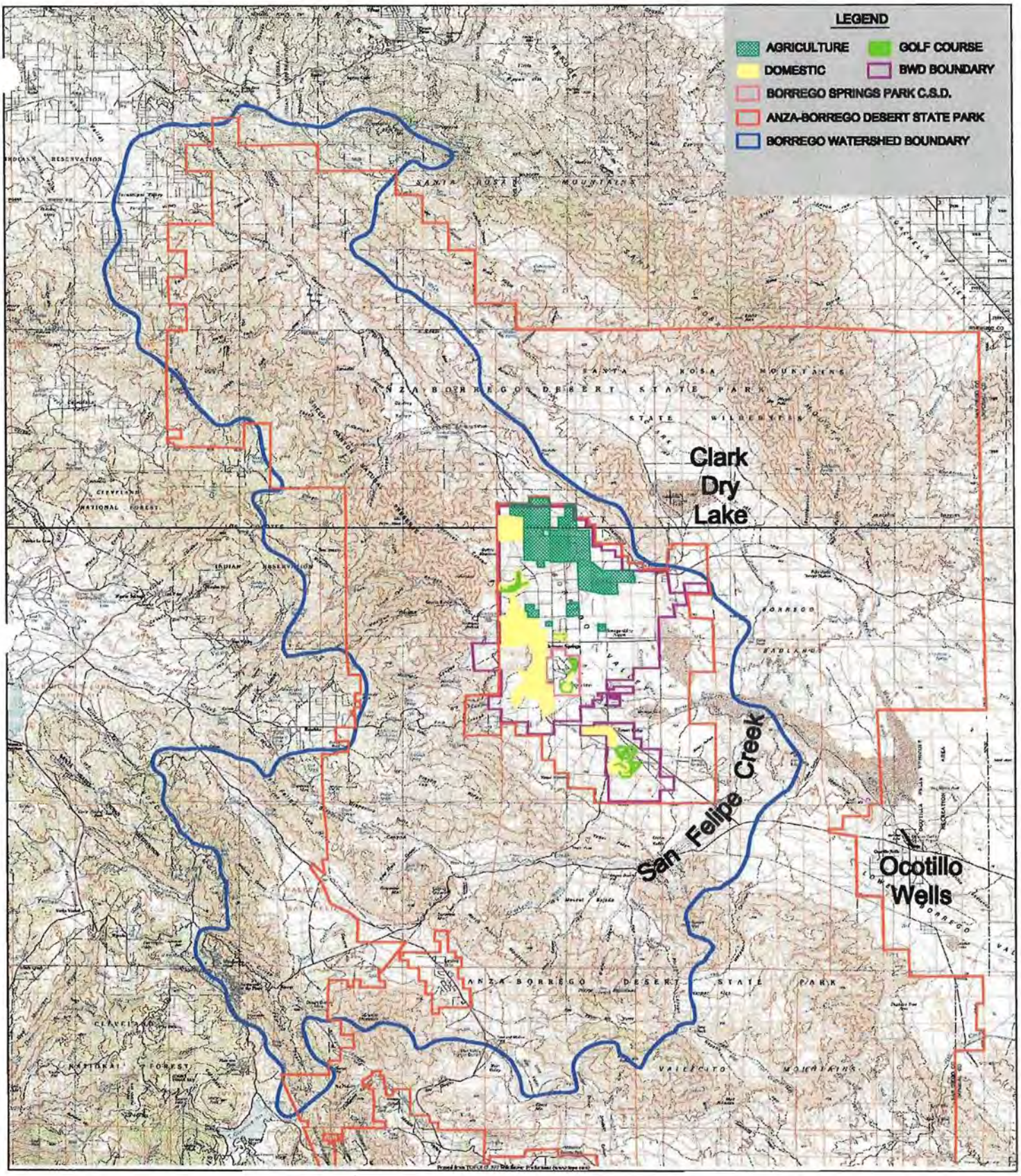
Clark Lake Basin

Clark Dry Lake lies to the northeast of Borrego Springs, separated from the Borrego Valley by the Coyote Creek Fault. The land area comprises approximately 13,000 acres. The area has two small ranches, a historical rock house and an abandoned gravel operation. Once the site of an astronomy telescope, the majority of the area is now under the control of the Anza-Borrego Desert State Park.

This small basin is formed geologically similar (block faulting) to and contains sediments similar to the Borrego Valley basin. Subsurface data below the total depths of wells is sketchy at best, and is open to interpretation. The sediments are thought to be in a wedge shape with the thinnest edge along the western edge of the valley and the thickest edge along the northwest-southeast trending fault at the eastern side of the valley. The basin has produced limited amounts of water for individual landowners of the area. The Borrego Water District drilled an exploration hole, which located some production of saline water.

San Felipe Creek

The San Felipe Creek collects surface water (and possibly fracture-flow groundwater) from rainfall and snowpack runoff in the mountains to the west of Borrego Springs. This drainage meanders in a southerly direction through San Felipe Valley. As that valley intersects state highway 78, the creek turns east passing through Tamarisk Grove Campground and The Narrows, then veers north across the Texas Dip to the eastern edge of the Borrego Valley near the original Borrego spring. At this point the drainage collects the overflow from the Borrego Valley then traverses easterly through the desert to Ocotillo Wells, before emptying in to the Salton Sea.



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JANUARY 2001

Borrego Water District
Groundwater Management Study

ADJACENT GROUNDWATER SOURCES

San Diego County, California
Figure: 5

The area near the Texas Dip and southeasterly thereof (westerly portion of Lower Borrego Valley) is of interest because the underlying lower aquifer is relatively deep and is subject to recharge from San Felipe Creek. An 850-foot deep test well drilled in 1995 by the District confirmed the depth of the formation and that it was saturated. The pump test, however, indicated that the formation was typical of the tight lower aquifer and that completed wells would be relatively low capacity (200 –300 gpm) and also that it would require many wells, widely spread in order to extract a significant quantity of water.

Ocotillo Wells and South and East to the Allegretti Farms Area in Imperial County

The small community of Ocotillo Wells lies in the northeastern extremity of San Diego County, adjacent to the Ocotillo Wells State Vehicular Recreation Area. On the southern end of the area is Split Mountain and the U.S. Gypsum quarry. The central portion of the valley is dotted with individual home sites and several small recreation vehicle parks, each with their own domestic water well.

Geologically, this area sometimes is referred to as the Lower Borrego Valley. It is situated between Borrego Mountain (with granitic material exposed) and the granitic Vallecitos Mountains on the south. Sediments found in this narrow trough were largely derived from the alluvial fans along the Vallecitos Mountain front and, according to some knowledgeable geologists, were also deposited from the stream flow of the ancestral San Felipe Creek drainage. It seems unlikely that the underlying thickness of sediments would be very great, maybe in the order of 800 to 1,000 feet. The action of the creek flowing down the trough was probably predominantly erosional, not depositional. In an east-southeast direction from Ocotillo Wells, the thickness of sediments should increase gradually toward the Salton trough to about 20,000 feet. Groundwater in the area is found mainly in shallow (250' deep) wells, which produce sufficient water for individual dwellings.

The area three miles south and seven miles east of Ocotillo Wells owned by the Allegretti Farms has very high capacity wells (2,000 gpm+); the water produced is of low quality (2,000 ppm TDS). This area has a long history of farming alfalfa. The water produced should be suitable for golf courses, landscape irrigation and irrigated agriculture. (For more information see Appendix "I" of the Technical Report)

5.3 ESTIMATES OF THE ANNUAL INFLOW INTO THE BASIN

The 1988 USGS report has stated the basin's annual recharge to be approximately 4,800 acre-feet per year. An additional 300-500 acre feet per year might be expected through catchment basins in exceptionally wet years. The source of this recharge flow comes primarily from three major drainages; Coyote Creek (65%), Borrego Palm Canyon and San Felipe Creek (35% combined). Although all three sources have had flow monitored at one time or another, only Borrego Palm Canyon is presently being gauged through a joint venture of the USGS and the Borrego Water District. It is also believed that the basin could be losing some water down Borrego Sink Wash at the southeasterly corner of the valley into San Felipe Creek. The 1982 USGS report estimated that further upstream the subsurface flow from San Felipe Creek into Borrego Valley was approximately 32 acre-feet per year. The USGS gauging station data is included in the Appendix "D" of the Technical Report.

5.4 ESTIMATES OF THE ANNUAL GROUNDWATER USE AND THE OVERDRAFT

In the twenty-year period from 1978 to the present, during which time the County monitored water levels in local wells, urban water uses have increased 400%, agricultural water uses (which began with a much greater base) 250% and golf course and general landscaping by 220%. During this same twenty-year period the rate of decline in water levels has increased from less than one foot per year to over two feet per year on average and in some locations as much as three feet a year (the original Borrego Springs well in the town center).

Based upon metering and water use, in 1999 the Borrego Water District defined the annual water usage of the valley to be 17,500 acre-feet. The 1982 USGS Report 82-855 concluded that *"between 1945 and 1980 water levels in wells have declined as much as 100 feet locally and water withdrawn from the basin exceeded recharge by 330,000 acre-feet."* The report also established an amount of groundwater storage in the aquifer. The 1988 USGS Report 87-4199 refined and updated earlier figures. In 1993, Dr. David Huntley, professor of geology at San Diego State University and John Peterson, San Diego County Department of Planning and Land Use, established from the USGS data that the amount of water in storage was 1,900,500 acre-feet (upper aquifer – 809,000 acre-feet; middle aquifer – 1,090,600 acre-feet). The annual use varies according to water withdrawn from the aquifer by residential, golf courses, agriculture and natural vegetation (transpiration). When this usage is greater than the amount of recharge, the aquifer is considered in overdraft. Historically, the Borrego Valley aquifer has been in an overdraft situation every year since 1945. See Appendix "E" of the Technical Report for more technical data.

Water Use Calculations

Water use by both the Borrego Water District (including Rams Hill Golf Course) and the Borrego Springs Park Community Service District (including Club Circle Golf Course) are metered and included in the appendix of the Technical Report. Other golf course usage has been estimated by area of irrigated turf. Agricultural usage has been calculated by determining irrigated acreage from infrared aerial photography dated 1996. These acreages, the crop type and a standard water use by crop type were used to calculate water use. It was determined that citrus groves (both lemon and grapefruit) use approximately six acre-feet per acre, nursery and palm groves use approximately four acre-feet per acre and potato fields, which are a winter crop and are rotated every three years use approximately two acre-feet per acre. This calculation is in Appendix "F"of the Technical Report. Private domestic and air ranch usage have minimal irrigation and have been estimated by amount of domestic use.

1999 BORREGO VALLEY WATER USE IN ACRE-FEET

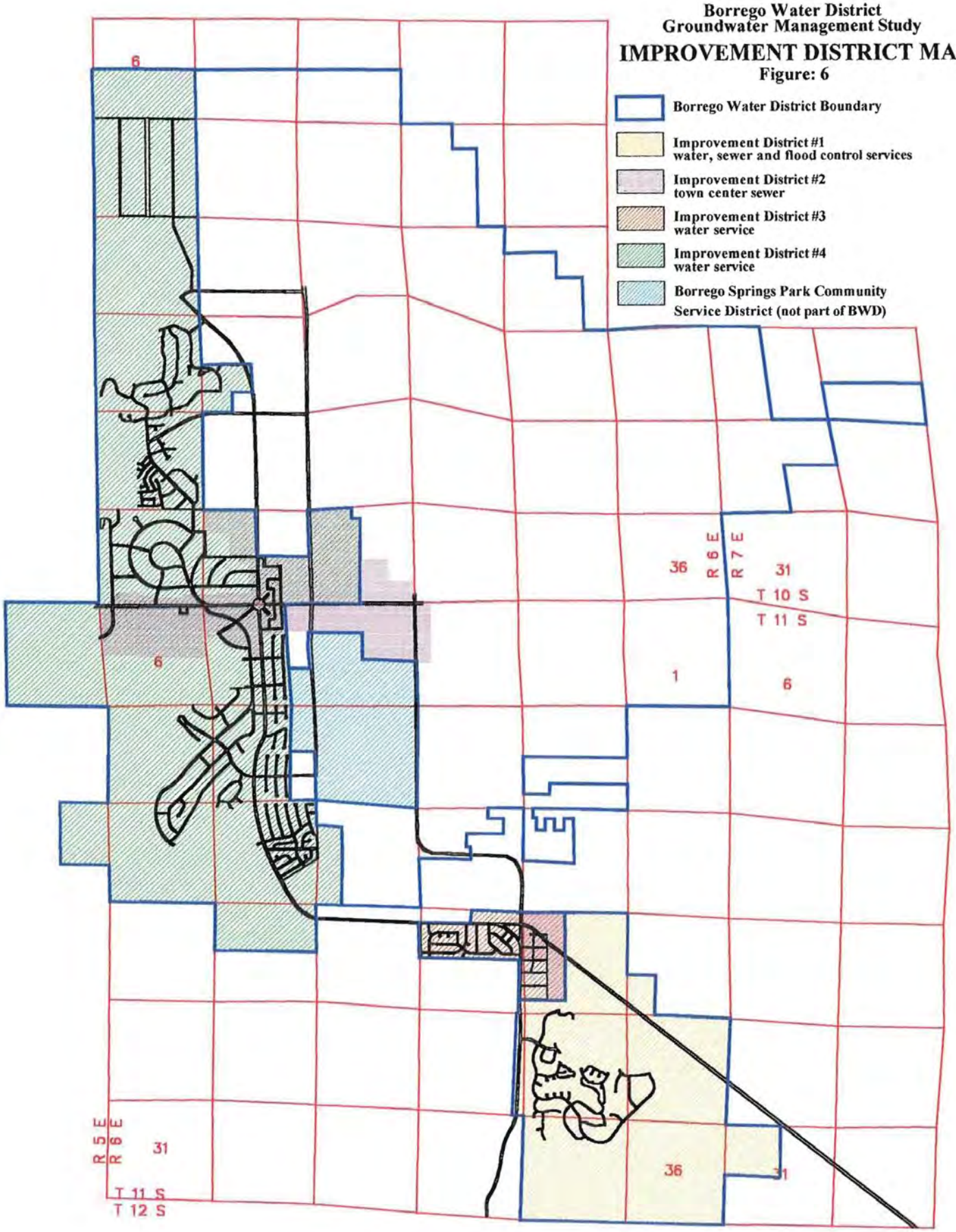
AREA	MUNICIPAL	AGRICULTURE	GOLF COURSE & LANDSCAPE	TOTAL
B.W.D. ID-1&3	420		1,494	1,914
B.W.D. ID-4	1,723		191	1,914
B.S.P.C.S.D.	75		1,000	1,075
Roadrunner Club G.C.			750	750
DeAnza C.C.			1,000	1,000
Agricultural Wells	4	15,590		15,594
Borrego Air Ranch	10			10
Other Private Wells	40			40
TOTAL:	**2,272**	**15,590**	**4,435**	**22,297**

NOTE: "municipal" and "domestic" are terms used to refer to urban uses. Borrego Springs is not an incorporated municipality, but an unincorporated community of San Diego County. "ID" refers to "Improvement District". The Borrego Water District has four improvement districts each representing a new service area added to the district. ID 1 covers Ram's Hill water, sewer and flood control. ID 2 included the sewer line extended from the treatment plant at Ram's Hill to the Palm Canyon Resort and all the properties along it that may connect to it from Palm Canyon Resort to La Casa del Zorro. ID 3 includes water service for Rancho Borrego, La Casa del Zorro and Deep Well Trails. ID 4 includes water service for the area acquired from the Borrego Springs Water Company and is basically the area from Indian Head Ranch south to Ocotillo Heights and west from the Park Headquarters to the Roadrunner Club. This constitutes four-fifths of the service area.

Borrego Water District
Groundwater Management Study

IMPROVEMENT DISTRICT MAP

Figure: 6



HISTORICAL BORREGO VALLEY WATER USE IN ACRE-FEET

YEAR	MUNICIPAL	AGRICULTURAL	GOLF COURSE & LANDSCAPE	TOTAL
1950*	170	11,435	190	11,795
1958*	225	22,455	790	23,470
1962*	265	13,455	1,725	15,820
1968*	475	7,260	1,720	9,455
1972*	530	5,320	2,270	8,120
1978*	600	5,705	2,050	8,355
1980**	430	10,600	2,100	13,130
1999***	2,272	15,590	4,435	22,297

* Applies water use from PRC Toups Engineering

** Applies water use from USFS, US Census and DWR population, land use and water use data

*** Applies water use data complied by Borrego Water District using records of metered water use for municipal purposes, inspection of irrigated acreage and reports from golf course operators.

5.5 THE IMPACT OF DECLINING GROUNDWATER LEVELS ON THE VALLEY'S WELLS

The 1982 USGS Report 82-855 states that in 1946, Taylor and Taylor Engineering produced a map depicting 36 wells in the Valley. In 1953, the USGS visited 133 wells, indicating an increase of about 100 wells over the course of seven years. Today, the agricultural area (predominantly north of Henderson Canyon Road) operates approximately 50 wells. Golf courses operate approximately eight wells for irrigation. Domestic water supplies for the Borrego Springs Park Community Service District and the Borrego Water District are pumped from 14 wells. Individual domestic wells total in the neighborhood of 50. The area between Henderson Canyon Road and Palm Canyon Drive contains a number of old irrigation wells currently not in production.

The Groundwater Technical Committee recognized the serious nature of the problem of groundwater overdraft. The Committee agreed that if there is no groundwater management or controls on water use, the water levels would continue to drop. More wells will fail due

to the intrusion of high nitrate concentrations and there will be progressive failures due to the water level dropping below the bottom of existing wells.
High nitrate (NO_3) levels in the groundwater have been showing up in valley wells for some time now. There are basically three sources of the contamination; agricultural fertilizer, domestic septic tanks and naturally occurring due to decomposing vegetation. As pumping levels drop, the radius of influence expands – drawing groundwater from closer to the surface into the pumping zone. Historically, this problem has been solved by drilling a new well in the same area, and by lowering the perforation zone to a lower point in the aquifer.

By far, the largest impact on production wells from the declining water table is the increased well operating expense. For every 10 feet drop in the pumping level, well operators can count on an additional 3% in operating costs. As energy costs continue to climb, this percent will also climb proportionally. In addition, older wells in the Valley were constructed based on a much higher pumping level than currently exists. These wells are generally less deep and the perforation zones tend to get left "high and dry" as the water level drops below the area of the well, which allows water to enter the casing.

The current forecast is that the upper and middle aquifer will continue to drop at a rate of approximately 2.5 feet per year. By 2034, the upper and middle aquifer will be 50% depleted and the pump lift will be increased by (34 x 2.5 ft/yr) 85 feet. The increased lift will add over 25% to the present costs for pumping. An additional drop of 85 feet in the water level will cause a number of wells to fail because the water level will be too low to enter the existing perforations. Each new replacement well would cost approximately $100,000 based on today's construction costs.

5.6 THE IMPACT OF DECLINING GROUNDWATER LEVELS ON THE VALLEY'S NATURAL ENVIRONMENT

Plant and animal life can adapt to change when it occurs gradually. But what happens when this change is not so gradual? As the valley's pumping wells continue to draw down the water level, the de-watered portion of the aquifer readily accepts more water to infiltrate into the ground. Water, which historically has pooled on the surface is now limited or in some cases, disappeared completely, forcing wildlife to higher elevations away from their native habitat.

Plants like the native mesquite extend their taproots into the water table (reported up to 150 feet). The area known as the Borrego Sink was once abundant with mesquite, but every year there is more evidence that these adaptable trees are dying of thirst. The water level is simply dropping quicker than their growing rate can accommodate. In addition, plant life serves an important purpose as ground cover. As the surface plant life diminishes, more soil is left uncovered and is free to blow with the wind, creating dust storms. This aspect is covered in more detail in a report by Mark Jorgensen, a local ecologist, in Appendix "G" of the Technical Report.

5.7 ESTIMATES OF THE BASIN'S HOLDING CAPACITY AND REMAINING GROUNDWATER

The Borrego Valley basin has three levels of strata and three aquifers. The upper and middle aquifers consist of porous materials such as sands and gravel from which groundwater is easily extracted.

Based on USGS Report 87-4199 and subsequent studies by Dr. David Huntley and John Peterson, the quantity of water in the Borrego Valley upper and middle aquifer was approximately 2,131,000 in 1945 before there was any significant development or water extraction. By 1979, it was determined that the accumulated overdraft had reduced the water in storage to 1,900,500 acre-feet. These calculations were carried forward to 1999 at which time the water remaining was calculated to be approximately 1,685,000 acre-feet. Using the present rate of overdraft of 17,500 acre-feet per year the upper and middle aquifers will be one-half depleted in the year 2034 and fully depleted by the year 2095 if the present rate of use remains unchanged. The remaining water in the lower aquifer would be difficult and costly to extract because of its very low (3%) specific yield and very low specific capacity (5 gpm/ft. of drawdown or less). This time frame is based upon existing water use. Changes in land use would change these calculations. See Appendix "E" of the Technical Report for the full calculations.

Geophysical studies were conducted by Agbabian Associates in late 1995 and early 1996. Their stated purpose was *"to generate a model of depth to groundwater and basement."* The area surveyed is located in the extreme northwest corner of the Borrego Valley basin and extends only a limited distance (Henderson Canyon Road) toward the south. The electromagnetic soundings and seismic refraction surveys were conducted primarily to map depth to groundwater, while the gravity survey mapped the depth to crystalline basement/bedrock. The combined electromagnetic and refraction work along with the known groundwater elevations from "main station," "oasis" and a well located 1.2 km southeast of "main well" were used to generate several maps. All of these wells have been monitored by the county. Figure 2 of their report is a contour map of groundwater elevations and figure 3 is a contour map of depth to groundwater. Figures from this report are featured in Appendix "H" of the Technical Report.

The gravity data was used to generate a model of depth to granitic basement. The resulting basement contour map shows two distinct basins in the surveyed area. These are separated by a bedrock ridge, which trends southeast-northwest. Along the north side of the surveyed area, the two basins merge into a singular trough, which parallels the Coyote Creek fault and has an apex extending up into Coyote canyon.

Appendix "H" of the Technical Report also contains an illustrated cross section of the above gravity survey, which has been superimposed on a cross section of the area taken

from the USGS report 82-855. As noted, the depth to the basement ridge located by the gravity survey is not significantly different than that profiled in the USGS report. Significant difference is noted in the depth to basement of the two areas paralleling the ridge. Our limited data suggests an increased thickness of sediments in the two troughs of some 600-800 feet. There are no wells that penetrate into these two deep basins; hence, we do not know the compositions of the sediments or the quantity or quality of water in those formations. A more thorough idea of the existence of the two basins and the basement ridge can most easily be gained by extending gravity surveys to the south of the currently mapped area. A second alternative would be to program any well to be drilled in the trough area to a total depth sufficient to check the existence of the trough. Such a well, properly monitored, could provide sediment data as well as quality and quantity of water for that location.

5.8 THE AGE OF THE WATER BEING PUMPED FROM DISTRICT WELLS

During one of the Technical Committee meetings in late 2000, Mr. Peter Martin, a scientist with the United States Geological Survey, suggested that it would be interesting to know the age of the water being pumped from District wells. Such information would give some indication if the water in storage was of recent percolation or if it was thousands of years old. The District staff selected Zymax Forensics after making several contacts. Zymax recommended that we test three of the ID 4 wells near where the deeper wells were located and that they use carbon-14 dating of bicarbonate, acceleration mass spectrophotometry as a way to obtain the results for the least cost. We then sampled Wells 3, 11 and 18 and delivered the samples to the laboratory in mid-July 2001 with the understanding that it would be several months before the results would be known. On December 28, 2001, Zymax Forensics reported that the water from Well 3 was so low in carbohydrates that the results were unreliable. The water from Well 11 was determined to be 873 ± 42 years old and the water from Well 18 was 1,982 ± 54 years old.

Well 3 is located in the northwest area of the valley adjacent to the de Anza Country Club. Well 11 is in the central-west area adjacent to the high school and Well 18 is next to the agricultural area and Indian Head Ranch.

5.9 ISSUES OF GROUNDWATER QUALITY

The groundwater throughout the Borrego Valley is generally good to excellent in quality. The Borrego Water District wells average less than 500 parts per million (ppm) total dissolved solids. To put that in perspective, Colorado River water is in the 700-ppm (TDS) range. Any water source above 1,000 ppm is considered non-potable. See Appendix "I" of the Technical Report for water quality data. The data indicates that there has been no serious degradation to the water quality. All wells that service domestic customers are constructed to minimize surface water contamination.

The Valley has no serious contamination problems at this time. Area gasoline stations are the only real industrial contamination risk in the community. The Regional Water Quality Control Board has inspected the two abandoned stations and the three existing stations are centrally located in the town center, away from any production wells. Water quality samples have not detected MTBE (Methyl Tertiary – Butyl Ether), the gasoline additive intended to clean up the air that has contaminated groundwater basins in many urban areas.

There have been serious local problems in the past due to elevated concentrations of Total Dissolved Solids (TDS) and nitrate (NO_3). Pockets of low quality water have moved toward active wells and the water becomes unsuitable for use in the domestic water system. This is not a reversible situation. The following examples of this situation have been documented:

Roadrunner Club Well, 1010 Palm Canyon Drive
(W ½ of section 33, T10S, R6E):

Approximately 20 years ago, the Roadrunner Club provided its own irrigation water, as well as its own domestic water to its residents. Over a period of a few months, the concentration of NO_3 increased rapidly and exceeded the 45-ppm concentration level allowed for drinking water. The solution was to extend the Borrego Springs Water Company system to the Roadrunner Club from the public water system (Now the Borrego Water District) and have the Roadrunner Club distribute it to the residents of the park. The golf course and landscaping are served from privately operated wells, which have high NO_3 concentrations.

Borrego Springs Water Company Well #1, 2475 Stirrup Road
(W ½ of SE ¼ section 32 T10S, R6E):

In the late 1960's the original Borrego Springs Water Company well became contaminated and the water was unsuitable for domestic water service because of high nitrates. It was taken out of service and thereafter used only for construction water. Today the well serves as a monitor well.

Di Giorgio Wells 11, 14 and 15 Borrego Valley Road, north of Henderson Canyon Road
(Sw ¼ of section 15 and NE ¼ of section 22 T10S, R6E):

These three wells all pumped high quality water in the 1960's. By 1985 when the wells were being used for the Roadrunner Tree Nursery, the water quality had deteriorated as follows:

WELL NUMBER	TDS (ppm)	NO_3 (ppm)
Well 11	1,770	180
Well 14	1,650	195
Well 15	1,820	120

The water produced from wells in this area is of such very low quality that it is not suitable for use as drinking water.

PART 6: FUTURE DEMANDS ON THE GROUNDWATER SUPPLY

6.1 REVIEW OF CURRENT SITUATION

The current demands (1999 water usage) on groundwater as identified earlier are as follows:

15,590 acre-feet per year for Agriculture
4,435 acre-feet per year for Golf Courses and landscape irrigation
2,272 acre-feet per year for Urban Uses (residential, commercial, resort)

This water demand is generated by approximately 4,000 acres of agriculture, some of it such as the potato fields, only uses water periodically. The urban water use comes from the existing commercial development and approximately 1,500 residences, again probably less than half are occupied year around.

6.2 FACTORS EFFECTING POTENTIAL WATER USES

Future Urban Development

The Borrego Valley consists of approximately 55,000 acres of privately held land. Less than 25 percent of this area has been subdivided into potential residential lots of five acres or less or have a specific plan approved for future development (Rams Hill, The Borrego Country Club and Roadrunner Mobile Home Park). The staff of the Technical Committee did attempt to count all the existing or approved subdivided lots under five acres and approved mobile home parks assuming that those could constitute potential residential lots. There are also existing mobile home parks and RV parks that have long-term residents. We then separated the lots with residential uses on them from the lots not yet utilized. We concluded that there are approximately 6,659 lots or mobilehome sites, existing or approved under specific plans, that could be built upon of which only about 2,000 are currently built upon or used for mobile homes. This means that about 30 percent of the available home sites are currently being used. In addition there are 1,000 RV spaces that exist or have been approved for development, which would add an additional 2,000 population in the winter season. If there were total buildout of these home sites, the total population using the current generation factor of 2.3 residents per household would be around 19,000 even if no more new developments were approved. The County of San Diego Department of Planning and Land Use projects that even the new lower density designation being proposed in the GPA 2020 program would allow a valley population of approximately 25,000 if there were total buildout. Total buildout is unlikely, but a realistic future valley population could reach 15,000 or more.

The next question in regard to urban growth is how fast will it take place. Over the last 20 years, the water agencies in the valley have experienced an overall average of 40 additional connections a year – residential and commercial. Some of these involved large building spurts such as Rams Hill. When Rams Hill was under construction, it was projected that the financial break-even point for a large-scale project required the sale of 100 units or lots per year. Similar projects in the Palm Desert area were averaging 300 units per year. The factors that limit growth in the Borrego Valley are access, lack of commercial development and the fact that most homes involve custom construction. As commercial and health care facilities generally require a minimum population of approximately 15,000, the primary factors limiting growth will most likely remain in effect until the valley has a much larger population. That would suggest a continuation of relatively slow urban growth. Conversely, the factors that cause growth in this relatively isolated, retirement and resort community are economic prosperity and the lack of a similar life-style in other locales. With California projecting to have a 30 percent increase in population over the next 25 years, there could be an increased demand for homes in this area, as it becomes more desirable. Second or weekend homebuyers do not necessarily require or demand all the urban services of primary home locations.

There is little commercial development at the present time, but a population of 15,000 would attract chain stores and restaurants and their existence would attract a greater population and more of a year-round population. It can be concluded that with such growth the valley would probably use four or five times more water for urban uses even without approving any additional major subdivisions except those within the approved specific planning areas of Rams Hill, Borrego Springs Country Club and Roadrunner Mobile Home Park.

Future Golf Courses

The valley currently has three regulation 18-hole courses and two small 9-hole courses (Club Circle and Roadrunner). Both Rams Hill and the Borrego Springs Country Club have specific plan approval for an additional 18-hole course and Roadrunner has approval for an additional nine-hole course. If these new courses were added with improved irrigation systems and the existing golf course improved their systems and reduced the size of the their fairways, the additional courses could probably be accommodated with less than 25 percent increase in water use for all golf courses. In order to maintain turf in the desert, it takes 7 feet of water per year. In Arizona and some other locations water use has been restricted to 4.5 acre-feet per year. The typical action taken is to reduce the area irrigated. If a traditional 18-hole golf course had 95-100 acres of irrigated turf, the irrigated area is being reduced to 75-85 acres of turf. It is estimated that currently there are 130 acres of irrigated turf at the De Anza Country Club and that there are 150 acres of irrigated turf at Ram's Hill.

Future Agriculture

Agriculture, like manufacturing, requires an ability to produce a product that is economically competitive. Agriculture in Borrego is to a great extent dependent upon the price of pumping water. Pump drives can either be electric or diesel. The costs of those two sources of power have a major influence on the economic viability of farming in Borrego. The issue being, can the water be pumped at a price competitive with that from subsidized water projects. Farming anywhere is also dependent upon foreign competition. In the past Borrego had flower farms. Expansion of this activity in Columbia, South America, and shipping by air eliminated that product. In the 1980s when the environmental impact report was written for Rams Hill it was projected that agriculture would die out due to its competitive disadvantage. It has survived and there has even been the introduction of new products such as row crops and potatoes.

Due to climatic conditions, and now economic factors, citrus probably has limited potential for expansion. However, an agricultural nursery in Thermal purchased over 1,000 acres last year so there may be a new product opening up. If agriculture uses seven acre-feet of water for every acre planted, then every 340 additional acres added to agriculture will use as much water as all urban uses do at the present time. In effect, every 340 acres of agriculture is a new Borrego Springs. The Borrego Valley has a great deal of vacant land. If there is no urban growth to occupy it, then it must either go into agriculture or remain a tax burden for the owner. Agriculture also has the potential of further limiting the amount of usable water by impacting the quality of the water due to the introduction of fertilizers. This is particularly prevalent in desert areas where it is necessary to flush out salt build-up by using additional water.

The Anza Borrego Foundation, whose purpose is to acquire land for the State Park, has purchased potential agricultural land adjacent to Henderson Canyon Road to preserve wildflower areas. This purchase of land in the Valley floor is done, however, only when the price of the land is very low or is contributed as a tax writeoff.

Due to the slow rate of urbanization and the ability to limit golf courses through County action, the expansion or contraction of agricultural land will be the basic factor in determining the impact on the groundwater supply.

6.3 GROWTH AND ITS IMPACT ON THE AQUIFER

If estimates of the usable water in the aquifer are accurate and the current level of water use continues, the overdraft will substantially deplete all water supplies in about 95 years. Build out of 75 percent of the allowed residential lots and the addition of 1,000 more acres of agriculture, an increase of 25 percent, would reduce that to approximately 52 years depending upon the rate of the growth. (See Appendix "E" in the Technical Report) The expansion of urban water

use and golf courses can be controlled under current land use regulations. The County of San Diego, which is the local land use regulating agency for the Borrego Valley, currently has no regulations regarding expansion of agricultural uses.

PART 7: ALTERNATIVE PROGRAMS TO ASSURE A LONG-TERM WATER SUPPLY

The following alternative projects were presented in the Technical Report and evaluated by the Policy Committee and the Board of Directors of the BWD in developing a groundwater management plan:

7.1 PROGRAMS TO INCREASE WATER SUPPLY

Obtaining Imported Water From California Water Projects

In 1984 the California Department of Water Resources issued a report entitled "Borrego Valley Water Management Plan." Part of this report detailed three options for importing water into the valley. The cost analysis reflected only the construction of the conveyance system and did not include any figures on the cost or availability of the water supply. One source originated from the Metropolitan Water District of Southern California via San Diego County (Escondido-Borrego). The second source originated from the Coachella Valley Water District via the northern edge of the Salton Sea in Riverside County (Oasis-Borrego). And the third source originated from the Imperial Irrigation District via southern edge of the Salton Sea in Imperial County (Westside-Borrego). As part of our 2000 Groundwater Management Program, Mr. Carl Hauge of the State Department of Water Resources updated the costs associated with conveying water from these sources. The costs for these conveyance systems are as follows:

Escondido-Borrego -	$7,675 per acre-foot (untreated water)
Oasis-Borrego -	$3,039 per acre-foot (untreated water)
Westside-Borrego -	$3,228 per acre-foot (untreated water)

For comparison the current water rate for treated water delivered by the Borrego Water District is $439 per acre-foot.

The costs associated with actually purchasing the water are not included and the water is not likely to be available due to existing over-allocations of the State's water supplies. Appendix "J" in the Technical Report details these costs. In addition, all imported water must be treated to meet drinking water standards. A plant to accommodate this volume will add approximately$20 million to the startup costs.

Obtaining Water from Adjacent Sources

The Borrego Water District began exploring for additional water sources outside of the main basin in the mid-1990's. The first exploratory well was drilled east of San Felipe Creek near the intersection of Borrego Springs Road and state highway 78. Pump tests performed on this well indicated that the formation was too tight to provide much flow. The second test well was drilled on the District's 240-acre property near Clark Dry Lake, east of the Coyote Creek Fault on the Borrego-Salton Seaway. This test well indicated good yield, but the water was saline and not suitable for drinking water. With the aid of U.S. Filter (one of world's largest water service companies), costs were researched to desalt and convey 2,800 acre-feet per year to the District's distribution system. The cost associated with this project reached $1,220 per acre-foot. It also required a large brine basin that would eventually need to be "cleaned up". As the exploration effort continued, it was discovered that large volumes of water were being pumped for the alfalfa fields of Allegretti Farms, located east of Ocotillo Wells, some four miles east of San Diego County near the Imperial County boundary line. Although not suitable for drinking water, this source could yield 6,000 acre-feet per year for irrigated agriculture only, at an estimated cost of $668 per acre-foot plus the costs of acquiring the right to the water. The reports for these studies can be found in Appendix "K."

Programs to Enhance Recharge in the Valley

By letter dated July 24, 2000, Robert Zinser (a Board member of the Borrego Springs Park Community Service District and member of the Policy Committee) urged the Borrego Water District to give consideration to the repair and maintenance of existing infiltration ponds in the Valley's stream channels and to attempt to obtain funding from the County of San Diego for this function. The eleven existing sites were visited and studied. This report can be viewed in Appendix "L" of the Technical Report. The evaluation of the existing structures indicated that they were generally sound and required some maintenance. In particular, the bottom surface of the ponds should be scarified to improve infiltration rates for better efficiency.

The infiltration ponds and their operation were discussed briefly during a subcommittee meeting in September. Some Committee members were concerned with the development of hardpan or caliche in the stream channels with intermittent flow, which results in low infiltration rates. Mr. Carl Hauge's comment was that he is of the opinion that water will not move through unsaturated zones (approximately 150 feet) to saturated zones unless there is a continuous supply of water that keeps it moving.

The consensus seems to be that if you judge the observed total amount of time that water is running in the stream channels past the existing ponds and the rate of that flow, it would be very infrequent to have a year where more that one or two thousand acre feet of additional water could be infiltrated. Wet years occur very infrequently; hence it would be difficult to accurately estimate the benefits that would result by improving the infiltration ponds. Our

judgement is that the average increase would be limited to between 300 and 500-acre feet per year.

The prudent path to follow seems to be to attempt to have the County of San Diego maintain these structures. If that request fails and the community wants the Borrego Water District to undertake the responsibility it requires further study to ascertain the following:

1. Actual cost of maintenance
2. Who will pay
3. What are the right-of-way problems working on private property
4. What is the potential liability if the District is maintaining the dams and a flood breaches the dam which floods downstream property

7.2 PROGRAMS TO REDUCE GROUNDWATER USAGE

Use of Reclaimed Water for Irrigation Purposes

Water Available for Reuse

Currently, most of the domestic water used in Borrego homes is processed through septic tanks, which discharge the effluent underground. A small portion of the existing homes and businesses are served by sewers (Rams Hill, Borrego Springs Country Club, Club Circle and limited portions of the town center.) If planning policies are changed and the existing lots and developments such as the Roadrunner Mobile Home Park are added to the sewer system, it may be possible to develop a significant quantity of reclaimed water. If a population of 18,000 persons is provided with sewer service, the quantity of reclaimed water that will be produced and the costs should be determined.

Quantity of Reclaimed Water That Can be Made Available for Reuse

The Borrego Water District's records indicate that there are approximately 500 Equivalent Dwelling Units (EDU's) of sewer service connected to its Ram's Hill Reclamation Plant. Average summer and fall flows are in the 15,000 to 20,000 gallons per day (gpd) range; winter and spring flows are in the 30,000 to 40,000-gpd range. Approximately 30 acre-feet of sewage flow reach the treatment plant each year. A population of 18,000 would increase the EDU's to approximately 7,200, or about 14.4 times the current flows. Accordingly, the summer and fall flows should be in the 200,000 to 300,000-gpd range and the winter and spring flows will be in the 400,000 to 600,000-gpd range. In order to process this quantity of sewage flow it will be necessary to triple the size of the treatment plant and also activate the unused filters and disinfection equipment, which are not now in service.

The quantity of reclaimed water produced in acre-feet will average .77 ac.ft./day in the summer and fall and 1.53 ac.ft./day in the winter and spring. Water demands on the Ram's

Hill Golf Course reach 5 ac.ft./day in the summer and fall and averages about 2 ac.ft./day in the winter. Therefore, the reclaimed water produced by an expanded plant will supply about 75% of the golf course demand in the winter and about 16% of the golf course demand in the summer. The total acre-feet delivered from an expanded treatment plant would be about 425 acre-feet per year.

Cost of Facilities Required to Provide 425 acre feet per year

The estimated cost to extend the trunk and lateral sewers together with the Capital and Operating Costs are listed below:

Capital Cost:	
a. 36,000 feet of 8" and 10" laterals @ $30/ft.	$1,080,000
b. 30,000 feet of 12" trunk sewers @ $50/ft.	$1,500,000
c. 1 pump station	$80,000
d. Increase Treatment Plant capacity (.25 mgd to .75 mgd)	$4,750,000
Total Estimated Capital Cost:	$7,410,000
Annual Operating Cost:	
a. Operation labor and material	$300,000
b. Electrical, cost of pumping	$45,000
c. Debt service (20-year bond $8,200,000 @ 6.5% int.)	$745,000
Total Operating Cost:	$1,090,000
Annual Cost per EDU: $1,090,000/6,000 units served	$182/year/EDU

Cost per acre-foot = $1,090,000 / 425 = $2,656.00/ac.ft.

NOTE: This reclamation project would also offset the need for about 5,000 new septic tanks that would be required for individual homeowners and small businesses. The 5,000 new septic tanks may cost as much as $2,500 each for a total cost of $12,500,000; hence, the overall installation of sewers and treatment plant expansion seems to be cost effective if indeed 5,000 homes will be constructed on existing or new lots.

7.3 VOLUNTARY WATER CONSERVATION MEASURES

Water Conservation Options

Many water agencies in the State of California have found that voluntary conservation can be helpful in reducing water demand. Certainly the Borrego Water District can offer programs that will educate local residents to conserve water by limiting use of water to wash off sidewalks and pavement, by limiting the time in showers, by repairing dripping

faucets and leaks in pipelines, etc. Lastly, water conservation measures in agricultural irrigation could help if there is currently overuse of water in crop production.

As urban water use in this valley constitutes 10% of the water use, voluntary conservation measures may be most important in bringing about better awareness of the importance of the overdraft issue. During several recent drought periods in California, it was common practice for restaurants to bring water to customers only on request and in many hotels they still have notices that daily change of bed linen requires extra water use and will be done only upon request. Voluntary conservation measures such as these and the educational programs that go with them would seem to be in order even if in total they only contribute a minor addition to solving the problem. Raising consciousness of the need may be all that is accomplished.

Programs for Local Residents

As identified at the beginning of this section, voluntary programs for local citizens may not have a major role in overall reduction of water use, but they can have a very significant role in bringing the issue before the public. The Borrego Water District already distributes informational items. The District also provides material for school programs. Additional items that may be considered include the following:

1. New style, three-tier billing on water bills with more information. For example, tip of the month (to reduce consumption) such as "did you know that by letting the water run while brushing your teeth, shaving or washing, you can waste 3-5 gallons a minute," or "If you are going to purchase a new washing machine, a side loader will save you water and money!"

2. Resorts, Inns and Motels
    a. Bathroom signs, reminders: "This is a desert. Water is precious!"
    b. Develop water saving linens and laundry programs.
    c. Use low-flush toilet conversions and install low-flow faucets and showerheads. (These are free in some water districts.)

3. Schools:
    a. Volunteer speakers, clown presentations, poster contests.
    b. Teacher guides and special help for possibilities in the science curriculum
    c. Water Day, special events.
    d. Bathroom signage and reminders.

4. Newspaper ads every month in the Borrego "Sun" showing % of water used compared to last year at the same time, rain and recharge, tip of the month.

5. Xeriscape: (low water use landscaping)
    a. Demo garden with drought tolerant plants.

b. Garden tours of local homes featuring a xeriscape plan.
c. Helpful information sheets on irrigation systems, time of day to water and additional resources

6. Large Community Sign (thermometer or water bottle or Borrego basin placed on new District office grounds depicting aquifer use and indicating conservation progress. Sort of a "how are we doing" reminder that we are all in this together.

7. Agriculture: Appropriate crops, appropriate technology (irrigation techniques evaluated to minimize evaporation like mulching, drip irrigation as opposed to sprinklers, etc.)

8. Resource library and an information rack at the new District office with pamphlets and hints on demonstrations and devices in English and Spanish.

Use of Heavy Mulch in Agriculture

One form of water conservation that is beyond simple reduction in water use is that of applying heavy mulch in orchards. The desert heat causes high rates of evaporation that some recent experiments suggest may be reduced significantly by mulching.

In order to evaluate this possible modification to orchard management, it will be necessary to determine the optimum depth of mulch, the cost of application, and any adverse impacts such as reducing fruit size or changing taste. As farmers are businessmen it will also be necessary to evaluate the quantity of water saved as compared with the cost and willingness of farmers to use mulching technology.

Changes in Agricultural Products

One option that may be most effective in limiting agricultural water use, but most difficult to implement is changing the type of agricultural products grown in the Borrego Valley. Farmers, however, respond to the market. At one time alfalfa was a major crop in the valley. Flowers were also an early crop until that market was taken over by growers in South America. Now there is a changing international market in terms of citrus crops. Low water use crops could be promoted through an informational program, but changing from one crop to another is really dependent upon economic factors with the cost of pumping water being one of those factors. As the water levels drop, the cost of pumping will increase and it may be necessary to change crops to compete. Whether the new crops will be less intense water users is still an open issue. A report by Steve Smiley of the Technical Committee can be found in Appendix "M" of the Technical Report.

7.4 REDUCTION IN WATER USE THROUGH GOVERNMENTAL REGULATION AND PROGRAMS

Use of County Land Use Authority to Limit the Expansion of Agriculture

Historically, conversion of land to agriculture has been allowed by right on all land in California, but that is not the practice in desert states such as Nevada and Arizona. The County of San Diego, which serves as the local government for all the unincorporated areas such as Borrego Springs, is currently undertaking a major multi-year planning program to develop a new general plan and new community plans for the unincorporated area of the county and its 24 community or sub-regional planning areas. Borrego Springs is a part of this effort called General Plan Amendment 2020. It is meant to be a land use plan for the next 25 years although as can be told by the date 2020 it is somewhat delayed in completion.

It has been suggested by Borrego residents concerned with groundwater overdrafting that it is time that the County planning department began to recognize that the desert, and other areas outside of the service area of imported water, have special needs. Undeveloped land in these areas cannot simply be designated for conversion to agricultural uses by right as though there are no negative impacts to such change.

Historically the concern of all planning agencies in San Diego County, including the County Department of Planning and Land Use has been solely on how to regulate or accommodate urban growth. That remains the primary concern of the current planning studies.

Those who emphasize the need for County consideration of "Back County" needs stress that overdrafting of groundwater resources is an additional major concern that must be addressed in these areas. In the late 1970s the County did adopt a special land use designation for the Borrego Valley that prohibited the conversion of land to large-scale developments until there were adequate studies of the groundwater issues. That triggered the original studies of the valley in the early 1980 when the Di Giorgio Corporation, developers of Rams Hill, helped fund the USGS study and private studies of the valley aquifer and groundwater supply. Those private studies identified that agriculture, not urban development was the major user of water, but incorrectly projected that economic factors would cause its demise thereby saving the aquifer from any adverse impacts.

The Borrego Springs Sponsor Group, the County's officially designated planning advisory group for the valley, has considered proposals from members to recommend to the County planning department that it develop special designations for the unused land of the valley that would prohibit the conversion of such land to agriculture as a right. This concept would allow the expansion of agricultural development only by major use permit. The issuance of a major use permit is done by the Planning Commission in a public hearing. The major use permit would require an environmental review as part of the process. A proposal presented to the Sponsor Group recommended that such environmental review

include proof that the conversion of raw land to agriculture would not have adverse impacts on groundwater supplies, groundwater quality and air quality from blowing dust associated with the operation or the land after agriculture is abandoned. The Sponsor Group has asked the Board of Supervisors to adopt such a measure until a groundwater management program is in effect.

Another proposal has been that in place of designating land in Borrego for agricultural land, the planning department designates all undeveloped land outside of the Country Town boundary (the area proposed for future urban uses) as a category such as Desert Estate.

The designation of Desert Estate would allow the division of the land into large estates such as 10 or 20 acres, but would be accompanied with a design control applied at the time of subdividing the land that would only allow non-native plants on a limited portion of each lot, adjacent to the residence. The existing agricultural areas could continue as a non-conforming use, but raw land could not be converted to agriculture. The intent is to give undeveloped land in the valley a future economic use that does not involve high water use such as for agriculture. It is based upon the premises that it is likely that in the next 25 years there will be a market for such estate lots in the valley. Members of the Sponsor Group have been concerned that if widespread development took place under this designation it could lead to the destruction of the open space appearance of the valley. Some have referred to it as promoting a look of Temecula in the Borrego Valley.

A third proposal that was approved by the Sponsor Group and sent to the County, but rejected by County staff, was to designate the existing agricultural area north of Henderson Canyon as the only area in the Valley to be considered for conversion to a future golf course community. The idea was that the demand for an additional golf course community would probably be a reality in the next 25 years. If such a development were located in areas presently designated and used for agriculture, it would greatly reduce the use of water as well as give the farmers some economic reason to sell their land. Staff felt that designating such a large area, almost as large as Rams Hill's 3000 acres, for a future development even at the Rams Hill overall density of one unit per two acres, would require that all roads in the central and northern areas of valley be sized to this potential future use. That would require that the existing road system be designated for expansion, something the County wants to avoid.

It has also been suggested that the County should be requested to adopt an ordinance to prohibit any additional wells without a use permit. This concept of using land use authority to limit wells has been promoted at water agency conferences by one noted land use attorney who is concerned about the weakness of enforcement provisions in AB 3030 planning efforts.

Require Future Developments to Grant all Water Rights to the BWD as a Condition Before Receiving Urban Water Services

Historically in this valley, it has been the practice of large-scale developments to obtain their domestic water service from one of the water agencies and maintain private wells for landscaping and golf courses. For example, the de Anza estates are all on public water, but the golf course has its own wells. Roadrunner Park has the same provision and will continue it with its expansion, although the County has limited the amount of private water they can use on their new golf course. If the water needs exceed that limit, they must buy the water from the BWD. That is an effort to create an economic incentive to limit water use on the new golf course. Rams Hill has no significant water under it, but has a provision with the BWD to allow it to use the BWD pipelines to transmit water from a well it constructed in the valley for purposes of watering the golf course. For this use, they are required to buy 20 percent of the monthly water use on the golf course from the BWD. They currently buy nearly 40 percent annually.

Any development must supply their own water or obtain a permit from the serving water agency. In most of the valley this is the Borrego Water District. The District could obtain additional control over water rights and the use of water by requiring that any future subdivision sign over its water rights in order to obtain water service from the district. Water rights underlying the original subdivision in Borrego Springs were retained by the developer and assigned to the Borrego Springs Water Company. Those rights were acquired by the Borrego Water District when it purchased the assets of the BSWC. So the precedent has been established in the valley, but has not followed with later subdivisions or large-scale projects such as Roadrunner, De Anza and Rams Hill.

BWD Adopts A Water Pricing Structure to Penalize Heavy Water Users

A step beyond voluntary, but still in that area would be to adopt revised price structures to promote voluntary reduction in water use. This has been done in other districts in California. Reduction in water use is promoted by having an ascending scale. For example, the first 500 cu. ft. could be priced at $1.00 per 100 cubic feet (the current rate in Borrego) and all water in excess of 500 cu. ft. at $1.25 per 100 cubic feet or there could be other increases. To make such an ascending water rate acceptable, it is recommended that any money raised by this means should be used for groundwater management studies or the acquisition of land that has a high water use, such as agricultural lands.

However, when residential and commercial uses only account for ten percent of the water use as they do in the Borrego valley, a reduction by such users has limited affect on the overall overdraft. An additional step in terms of pricing is to apply a rate structure on all pumped well water, either in a water use tax or assessment based upon the quantity of water pumped. This will contribute to reducing golf course and agricultural uses, but unless the money raised is used to assist the heavy users in changing from such heavy use, it may be

seen as simply punitive. For example, to avoid the punitive aspect, it could be used to acquire water rights or purchase land with heavy water use.

Pay Farmers to Not Farm

Farm publications have presented the concept that perhaps the major product that farmers have to sell is not the items grown on their land, but the water under it. If this concept were used in the Borrego Valley, the BWD would not buy water, but rather pay farmers not to use the water under their land so that the aquifer is not depleted. It would be less expensive to initiate than buying the land or water rights, but would have to have some end time period or it would become very costly over time.

Acquisition of Agricultural Land For Fallowing

Ultimately for a groundwater management program to have a significant impact there must be a reduction in the major water use, which is water used for agricultural purposes. Those agricultural users have the right to the underlying groundwater with certain limitations. One way to reduce that use would be to apply a water use fee, or as it is sometimes called an extraction tax, and use the revenue it generates to acquire farmland and fallow it.

Currently those who pump water from the Borrego Valley aquifer incur costs in the range of $100.00 per foot. The BWD consultants have prepared various studies to show how this could be applied. The following examples illustrate how such a plan could be implemented:

Assumptions:

1. All water users in the basin would pay the same unit price for water pumped (water use fee).

2. The water use fee will be used to buy acreage currently using water for irrigation of crops.

3. Land acquisition would start with purchases of land, which are lowest in cost or that used the most water. Land costs would average approximately $8,000/acre.

Water Sales and Land Purchases and Resulting Water Use:

Alternative No. 1 (Pay as you go plan: purchase land for fallowing from increased water charges):

Year 1: Water Pumped

	Acre-Feet
Domestic Use:	2,300
Agriculture:	16,000 Used on 4,300 acres; average = 3.72 ac.ft./ac.
Golf Courses:	4,400
Total:	22,700 ac.ft. x water use fee $100/ac.ft. = $2,270,000

Year 2: Purchase 375 acres for $2,270,000 ($6,050/ac.)
This will reduce water use by 1,395 acre-feet.

Domestic Use:	2,300
Agriculture:	14,605
Golf Courses:	4,400
Total:	21,305 ac.ft. x water use fee $110/ac.ft. = $2,343,550

Year 3: Purchase 375 acres for $2,343,550 ($6,249/ac.)
This will reduce water use by 1,395 acre-feet.

Domestic Use:	2,300
Agriculture:	13,210
Golf Courses:	4,400
Total:	19,910 ac.ft. x water use fee: $120/ac.ft. = $2,389,200

Year 4: Purchase 375 acres $2,389,200 ($6,371/ac.)
This will reduce water use by 1,395 acre-feet.

Domestic Use:	2,300
Agriculture:	10,420
Golf Courses:	4,400
Total:	18,515 ac.ft. x water use fee: $130/ac.ft. = $2,406,950

Year 5: Purchase 375 acres for $2,406,950 ($6,419/ac.)
This will reduce water use by 1,395 acre-feet

Domestic Use:	2,300
Agriculture:	10,420
Golf Courses:	4,400
Total:	17,120 ac.ft. x water use fee: $150/ac.ft. = $2,568,000

Year 6: Purchase 375 acres for $2,568,000 ($6,848/ac.)
This will reduce water use by 1,395 acre-feet.

Domestic Use:	2,300
Agriculture:	9,125
Golf Courses:	4,400
Total:	15,825 ac.ft. x water use fee: $175/ac.ft. = $2,769,375

Year 7: Purchase 350 acres for $2,769,375 ($7,912/ac.)
This will reduce water use by 1,303 acre-feet.

Domestic Use:	2,300
Agriculture:	7,823
Golf Courses:	4,400
Total:	14,523 ac.ft. x water use fee: $200/ac.ft. = $2,904,600

Year 8: Purchase 320 acres for $2,904,600 ($9,077/ac.)
This will reduce water use by 1,190 acre-feet. Also assume that the higher pump tax has caused a 10% reduction in water use by domestic and golf courses.

Domestic Use:	2,070
Agriculture:	6,633
Golf Courses:	3,560
Total:	12,263 ac.ft. x water use fee: $220/ac.ft. = $2,697,860

Year 9: Purchase 320 acres for $2,697,860 ($8,431/ac.)
This will reduce water use by 1,190 acre-feet.

Domestic Use:	2,070
Agriculture:	5,443
Golf Courses:	11,073 ac.ft. x water use fee: $240/ac.ft. = $2,657,520

Year 10: Purchase 320 acres for $2,657,520 ($8,305/ac.)
This will reduce water use by 1,190 acre-feet.

Domestic Use:	2,070
Agriculture:	4,253
Golf Courses:	3,560
Total:	9,883 ac.ft. x water use fee: $250/ac.ft. = $2,470,750

Year 11: Purchase 300 acres for $2,470,750 ($8,236/ac.)
This will reduce water use by 1,116 acre-feet.

Domestic Use:	2,070
Agriculture:	3,137
Golf Courses:	3,560
	8,767 ac.ft. x water use fee: $275/ac.ft. = $2,410,925

After 11 years the water use will have decreased by over 60%, at a cost of $36,000,000. The process could be carried on to its planned conclusion, until land purchases would no longer be required.

Analysis of the Effects of Alternative No. 1 on User's Costs

1. Individual homeowner on one-third acre lot using one-half of an acre-foot of water per year in ID-4.

   a. Current Cost:

¾" Meter Service Charge	$199.00
Water Rate: one-half ac.ft. = 218 Ccf x $.905/Ccf	$196.00
Annual Cost	$396.00

   b. Cost with Water Use Tax of $100/ac.ft.

Service Charge	$199.00
Current Water Rate:	$196.00
Water Use fee on one-half ac.ft. (0.5 x $100)	$ 50.00
Annual Cost:	$445.00

2. Citrus Grower with a private well irrigating 20 acres using 5 ac.ft./acre/year = 100 ac.ft/year

   a. Current Cost:

No Service Charge	$ 0
Pumping Cost: ($100/ac.ft.)	$10,000
Annual Cost:	$10,000

   b. Cost with Water Use Fee of $100/ac.ft.

No Service Charge	$ 0
Pumping Cost: ($100/ac.ft.)	$10,000
Water Use Fee: 100 ac.ft. @ $100/ac.ft.	$10,000
Annual Cost:	$20,000

   An increase of $10,000 per year or a 100 % increase

3. Rams Hill Golf Course using 1,300 ac.ft./year

   a. Current Cost:

Service Charge:	$ 2,400
Well 12 water: 650 ac.ft. x $100	$ 65,000

BWD water: 650 ac.ft. x $349	$226,850
Annual Cost:	$294,250

b. Cost with Water Use Fee of $100/ac.ft./year

Service Charge:	$ 2,400
Well 12 water: 650 ac.ft. x $100	$ 65,000
BWD water: 650 ac.ft x $349	$226,850
Water Use Fee: 1,300 x $100	$130,000
Annual Cost:	$424,250

An increase of $130,000/year or a 44% increase.

7.5 ANALYSIS OF THE PROGRAMS

THE COSTS AND BENEFITS OF PROGRAMS THAT IMPORT WATER

Note: For comparison current cost for BWD water delivered to a user is approximately $450 an acre foot.

Importing Water from the San Diego County Water Authority

Costs: $7,675 per acre-foot to build the pipeline, plus necessity of paying back taxes to both the San Diego County Water Authority and the Metropolitan Water District.

Who would benefit: All Borrego Valley Water Users.

Who would pay: All Users.

Problems: Water supply already over-allocated and project is too expensive to be realistic.

Importing Water from Coachella Valley Irrigation District

Costs: $3,039 per acre-foot to build the pipeline. This water would have to be treated; hence, the cost of building and operating a treatment plant must be added to these figures.

Who would benefit: All Borrego Valley Users.

Who would pay: All Users.

Problems: Water supply at source is over-allocated and project is too expensive to be realistic.

Importing Water from Imperial Irrigation District

Costs: $3,228 per acre-foot to build the pipeline. This water would have to be treated; hence, the cost of building and operating a water treatment plant must be added to these costs.

Who would benefit: All Borrego Users.

Who would pay: All Users.

Problems: Water supply at source is over-allocated and project is too expensive to be realistic for Borrego Springs.

Importing Water from Clark Dry Lake

Costs: $1,220 per acre-foot to build the pipeline, construct production wells and desalinate for irrigation purposes.

Who would benefit: All Borrego Valley Users.

Who would pay: All users.

Problems: The rejected brine must be disposed of or evaporated. The evaporation ponds, approximately 150 acres, must be lined, which is a costly process. The open ponds will be costly to maintain, blowing salt may cause air quality problems. The resource may not be able to sustain pumping at 4,000 acre-feet per year indefinitely.

Importing Water from Ocotillo Wells and South and East to Allegretti Farms.

Costs: $668 per acre-foot to build the pipeline and construct production wells. Existing landowners would have to be mitigated for the decline of their water levels.

Who would benefit: Agriculture and golf courses.

Who would pay: Users.

Problems: Water quality will not be suitable for drinking water; it will be delivered to golf courses and agricultural irrigators and is too expensive for their use. The Regional Water Quality Control Board may be concerned with the long-term effect of importing lower quality water into the Borrego Valley than that which currently exists.

EVALUATING THE COSTS OF VARIOUS ALTERNATIVE COMBINATIONS

The Borrego Water District and all landowners in the Borrego Valley have numerous options in developing a groundwater management plan. The Technical Study reviewed several projects, which could increase the available water supply; however, each project is costly and none of the options fully solve the groundwater overdraft. The scarcity of water in this region is such that any successful plan must include ways to reduce current water use, including fallowing of irrigated agricultural lands as part of the solution.

The Technical Committee report described eleven projects which were considered that would either bring in more water to the Borrego Valley, reduce existing water use by conservation methods, reclaim sewage, enhance infiltration in existing stream channels, or fallow irrigated agricultural lands. This discussion of options was an attempt to compare selected combinations from the eleven projects or methods of solving the problem. Each option was structured to solve the 17,000 acre-foot annual overdraft.

I. Consideration of projects which involve importation of Colorado River Water. All of these projects result in water costs in excess of $3,000 per ac.ft. with capital costs in excess of $170,000,000. These are projects that cover only the facilities required to deliver untreated water. The DWR reports that there is no indication that there is a willing seller available that would sell the water even if Borrego could afford to construct the facilities. If a Colorado River water transportation facility is constructed, the required treatment plant necessary to filter and disinfect the water to make it potable would cost an additional $20,000,000.

II. Consider a combination of the following projects:

		Water Produced Acre Feet	Capital Cost	Annual Operating Cost
a.	Clark Lake Wells & Desalting Facility:	2,800	$25,000,000	$3,416,210
b.	Water Development S & E of Ocotillo Wells:	6,000	$31,500,000	$4,010,500
c.	Reduction of Irrigation/Mulching:	2,000	Unk.	Unk.
d.	Reduction of Use by Golf Course to 3000 AF/yr:		Unk.	Unk.
e.	Enhanced Infiltration:	500	Unk.	Unk.
f.	Fallowing: using bond financing:	5,290	$11,376,000	$1,073,894
	Total Costs:		$67,876,000	$8,500,604

Resulting Aquifer Inflow:

Natural Inflow (average):	=	4,800 ac.ft.
Enhanced Infiltration	=	500 ac.ft.
Plus Project Water:		
Clark Lake Wells:	=	2,800 ac.ft.
Ocotillo Wells:	=	6,000 ac.ft.
Total Water Available/yr:	=	14,100 ac.ft.

Resulting Water Use/yr:

Municipal:	=	2,800 ac.ft.

Golf courses/landscaping	=	3,000 ac.ft.

Current Agriculture:	=	15,590 ac.ft.
Less mulch savings	=	-2,000 ac.ft.
Less fallowing	=	-5,290 ac.ft.

Remaining agricultural use	=	8,300 ac.ft.
TOTAL USE	=	14,100 ac.ft.

The water use would be in balance with available water under this scenario.

Estimated Cost to Construct this Combination of Projects:

Assumptions:

- The cost to purchase irrigated acreage with permanent plantings would average = $8,000/acre
- Average Water use per acre: = 3.72 ac.ft.
- Lands to be purchased to save 5,290 ac.ft. ÷ 3.72 = 1,422 acres
- Cost of land for fallowing: assume sale of bonds to finance property for fallowing: Annual debt service for bond issue @ 7% for 20 years = $1,073,894/yr.

Total Annual Cost:

Pumped water cost (4,800 + 500) = 5,300 ac.ft. x 100 ac.ft.	=	$ 530,000

Project Operational Cost including debt service:

Clark Lake Wells and Desalting Facility:	=	$3,416,210
Water Dev/Ocotillo Wells Project:	=	$4,010,500
Annual Cost to purchase land to fallow:	=	$1,073,894
Average Cost of Water: $8,500,605 ÷ 14,100 ac.ft.	=	$602.87/ac.ft. *

*Plus whatever costs are incurred to achieve savings in water use on existing crops plus the cost of maintaining the infiltration ponds to enhance the rate of infiltration.

III. Consider a combination of the following projects:

	Water Produced Acre-Feet	Capital Cost	Annual Operating Cost
a. Water Development S & E of Ocotillo Wells:	6,000	$31,500,000	$4,010,500
b. Reduction of Irrigation by Mulching:	2,000	Unk.	Unk.
c. Reduction of Use by golf courses to 3,000 AF/yr:		Unk.	Unk.
d. Enhanced Infiltration:	500	Unk.	Unk.
e. Fallowing:	8,090	$17,400,000	$1,648,000
		$48,900,000	

Resulting Aquifer Inflow/yr:

Natural Inflow:	=	4,800
Enhanced infiltration	=	500
Plus project water dev.		
S & E of Ocotillo Wells	=	6,000
Total Water Available	=	11,300 ac.ft.

Resulting Water Use/yr:

Municipal	=	2,800 ac.ft.
Golf course/landscaping	=	3,000 ac.ft.

Current Agriculture	=	15,590
Less mulching:		-2,000
Less fallowing:		-8,090
Remaining Agricultural Use	=	5,500 ac.ft.
TOTAL USE	=	11,300 ac.ft.

The water use would be in balance with available water under this plan.

Estimated Cost to Implement this Combination of Projects:

Assumptions: Cost of purchasing irrigate acreage	=	$8,000/acre
Average Water Use per acre	=	3.72 ac.ft.
Lands to be Purchased to save 8,090 ac.ft. annually	=	8,090 ÷ 3.72 = 2,175 acres
Cost of land for fallowing:	=	$17,400,000

Annual Debt Service to support bond issue of $17,400,000 @ 7% interest for 20 years = $1,648,000

Total Annual Cost:

Pumped Water (5,300 x 100)	=	$ 530,000
Operational & Debt:		
Service – Ocotillo Wells Project:	=	$4,010,500
Fallowing Project: Debt Service:	=	$1,648,000
TOTAL	=	$6,188,500

Average Cost of Water $6,188,500 ÷ 11,300 ac.ft. = $547.65/ac.ft.

IV. Consider a Plan which depends almost exclusively on land fallowing:

		Water Produced	Capital Cost	Operation Cost
a. Reduction of Use by Golf Courses to 2,500 ac.ft.			Unk.	Unk.
b. Enhanced Infiltration:	=	500 AF	Unk.	Unk.
c. Fallowing:	=	15,590	$33,600,000	

Resulting Aquifer Inflow/year:

Natural Inflow:	=	4,800
Enhanced Infiltration	=	500
Water Available	=	5,300 ac.ft.

Resulting Water Use:

Municipal	=	2,800
Golf courses/landscaping	=	2,500
Total Water Use	=	5,300 ac.ft.

The water use would be in balance with available water under this scenario; however, there would be no agricultural irrigation. The cost of acquiring all of the irrigated agriculture plus any other potential farmland, which could claim a right to use their water rights, is not known. If the cost for all of the existing irrigated land averaged $8,000/acre and the acreage involved was 4,200 acres the cost would be $33,600,000.

The annual debt service on a $33,600,000 bond issue @ 7% interest for 20 years would be $3,171,800.

Total annual cost:

Pumped water 5,300 ac.ft. x 100	=	$ 530,000
Fallowing project debt service	=	$3,171,800
TOTAL COST	=	$3,701,800

Average cost of water $3,701,800 ÷ 5,300 = $698.45/ac.ft.

PART 8. ADOPTED GOALS AND OBJECTIVES

THE FOLLOWING GOALS AND OBJECTIVES
WERE APPROVED BY THE BWD BOARD OF DIRECTORS
ON FEBRUARY 7, 2002, AS A BASIS FOR PREPARING THE DRAFT
GROUNDWATER MANAGEMENT PLAN
(Goal Three was revised at April Board Meeting)

NOTE: The draft objectives prepared by staff for consideration by the Board had more quantifiable measures in them. In the public review and adoption of the goals and objectives, it was determined by the Board of the BWD that as this agency does not have the authority to implement many of the measures needed for groundwater management in the valley, those standards should be less time or quantity specific until we are able to get more specific commitments from the County and State agencies that can implement them. The goals and objectives will be reviewed annually.

Goal One:

Develop programs that assist in stabilizing the over-draft of the aquifer at the current level and work to assure a permanent long-term supply of high quality water to the valley.

(Note: This goal is a general statement that does not suggest a specific approach. It just states that we should try to have an assured long-term supply of water by various means. Also, it does not identify long-term, as that is more of an objective)

Objective:

Adopt programs and approaches to groundwater management that will incrementally reduce the annual decline in water levels of monitored wells.

Goal Two:

Seek programs to provide a long-term supply of water for the valley that will not adversely impact the water resources of adjacent land in the state park.

Objective:

Evaluate all programs adopted for groundwater management to assess their impact on the long-term water resources of the adjacent land in the state park.

Goal Three:

Continue to expand the District's knowledge of the water resources of the aquifer and its water resources.

Objectives:

Implement programs to improve the measurement of all water uses in the valley.

Develop additional programs to measure the water resources of the aquifer.

Goal Four:

Develop and implement conservation programs for all classifications of water users in the valley – urban, recreational and agricultural.

Objective:

Establish standards for reduction of water use for all categories of land use and develop programs to meet those standards.

Goal Five:

Work with state and county agencies to try to minimize any adverse impact that new land uses will have on groundwater resources and groundwater quality.

Objectives:

Maintain water quality throughout the valley at the current standard.

Assure that the appropriate agencies, particularly the BWD, evaluate any new land use in terms of its projected impact upon the valley's groundwater resources.

Goal Six:

Develop the ability within the agency to obtain funding for acquisition of agricultural land.

Objective:

Work with public and private entities to acquire agricultural land from willing sellers.

Goal Seven:

Evaluate the feasibility of acquiring land in adjacent basins and exploring for water to be transported to the Borrego Valley.

Objective:

Determine the maximum amount of water that can be obtained from adjacent basins and evaluate programs to acquire land and construct the necessary facilities to make maximum use of these resources.

PART 9: PROGRAMS TO IMPLEMENT A PLAN

9. 1 PROGRAMS:

(IN ORDER OF PRIORITY ADOPTED BY THE BWD BOARD APRIL 25, 2002)

FIRST: PROGRAMS THAT TRY TO REDUCE AGRICULTURAL AND GOLF COURSE WATER USE WITHOUT PURCHASING WATER RIGHTS

(Financing studies of how to reduce water in agriculture or change crops, financing conversion of irrigation system for golf courses and agriculture to those that use less water, pay to remove tamarisk trees, paying farmers to not farm)

SECOND: PROGRAMS THAT PUBLICIZE WATER CONSERVATION

(Booklets on low water use gardens, resource library, demonstration garden, school programs, paid BWD columns in newspaper)

THIRD: PROGRAMS TO GET MONEY TO PURCHASE WATER RIGHTS IN VALLEY

(This could involve having staff attend meetings of agencies that have funding available, hiring an agency to apply for grants, hiring a part-time person to apply for grants. Work with county staff and local groups on current community planning program, work with county staff on continuing programs)

FIFTH: HAVE STAFF WORK WITH STATE AND REGIONAL WATER QUALITY CONTROL BOARD STAFFS REGARDING WATER QUALITY ISSUES

(Staff attends meetings of Board and makes them aware of valley issues)

SIXTH: PROGRAMS THAT PROVIDE MORE INFORMATION ABOUT THE AQUIFER

(Obtain drillers' logs, Meter golf course & agric wells, Drill more test holes to identify depth of aquifer and types of strata, Purchase SDSU students' studies, Undertake more modeling to show impact of increased or decreased water use on water resources, Undertake water quality studies throughout valley)

SEVENTH: PROGRAMS THAT CREATE ECONOMIC INCENTIVES TO REDUCE DOMESTIC WATER USE

(Tiered water rates)

EIGHTH: PROGRAMS THAT EVALUATE THE FEASIBILITY OF OBTAINING WATER FROM OTHER BASINS
(Age date water, determine water quality, evaluate cost of purchasing land)

NINTH: LAWSUIT TO ADJUDICATE THE WATER BASIN

9.2. PROJECTS AND SOURCES OF FUNDING

Specific Projects to carry out the adopted programs:

(Five board members voting – H = high, M = Medium, L = Low) (Letter in Parenthesis Identifies Staff's Recommendation of How to Identify in Draft Plan) (Underlining Shows Higher Priority Projects)

FUNDING SOURCES

A. Staff Time
B. GWM Implementation Fund
C. Grants from Gov't and Organizations
D. Donations by Individuals or Local Interest Groups (Agribusiness)
E. Long-term Financing based upon District-wide Tax Assessment
F. Long-term Financing (Bonds) repaid by District Rate Payers
G. Long-term Financing repaid on Basis of Benefit (Tax Rate Based)

Project	Priority	Funding Sources
Obtain Drillers' Logs	HMLLL **(M)**	A, B
Meter Agric & GC Wells	MLLLL **(M-L)**	B,C,D
Drill Additional Test Holes	HLLLL **(L)**	B,C,D
Perform A More Detailed Geophysical Study	MLLLL **(L)**	B,C,D
Purchase New Study of Aquifer Prepared by Students	MLLLL **(L)**	B,C,D
Do Modeling Based Upon Students Study to Show Impact of Various Future Land Uses on Ground Water Resources	MMLLL **(M-L)**	B,C,D
Undertake Water Quality Studies	MLLLL **(L)**	B,C,D
Conservation Campaigns in Newspaper	HHMML **(H-M)**	A,C

Produce & Distribute Conservation Literature	HHMML	**(H-M)**	B,C
Resource Library	HHLLLL	**(M)**	B,C,D
Demonstration Garden	MMMML	**(M)**	B,C,D
Have a Regular Informational Column in "Borrego Sun"	HHHMM	**(H-M)**	B,C
Finance Agricultural Studies That May Reduce Water Use	MMMMM	**(M)**	B,C
Tiered Water Rates for Domestic Water Use	HMMLL	**(M)**	A
Pay to remove tamarisk trees	HHLLL	**(M)**	C,D,E,F
Financing conversion of GC Irrigation Systems	MLLLL	**(L)**	C,D,E
Paying Farmer to not irrigate	____	_____	
Law Suit to Adjudicate Water Rights	LLLLL	**(L)**	C,E
Staff works with local groups and County Staff on Community Plan	HHMMM	**(H-M)**	A,B
Staff works with other County Staff on Implementation Issues	HHHMM	**(H-M)**	A,B
Staff works with State Agencies such as DWR on Implementation	HHHMM	**(H-M)**	A
Budget a part-time Grant Person or Employ a Service	HMMMM	**(H-M)**	B,C
Acquire Water Rights in Valley & Fallow Farm Land	MLLLL	**(M-L)**	C,E,G
Evaluate the Feasibility of Obtaining Water From other Basins	MMMLL	**(M-L)**	C,D
Work with Anza Borrego Foundation to Obtain Farm Land with a Percentage Going to Park	MMLLL	**(M-L)**	A

PART 10: IMPLEMENTATION

Implementation of this plan will depend upon a number of factors. First, and most importantly, is the interest of the local residence and voters in this effort. Second, is the availability of funding within the District. Third, is the availability of funding from sources outside of the valley – both government and private sources. Fourth, is the action of state and county government in supporting an effective program for the valley.

This plan is presented in a loose-leaf notebook so that it may be reviewed and sections revised on a periodic basis. Funding by the BWD for groundwater programs will take place at least once a year as part of the annual budget process. At the January or February meeting of the BWD board a report will be made on the status of implementing the Groundwater Management Plan, suggested changes to the plan and recommended programs and funding for the next fiscal year. This will take place at the start of the annual budget process of the District so that funding for any programs can be included in the budget considered in the spring. The review of programs that use that funding will take place on a monthly basis at each Board meeting and as opportunities for obtaining funding arise. Initially funding for the Fiscal Year 2002/2003 was approved in June 2002 at $100,000.