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Meeting Urban Water Demands in Nevada, the Las Vegas Proposal

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Groundwater Law, Hydrology and Policy in the 1990s

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Meeting Urban Water Demands in Nevada, the Las Vegas Proposal

Population influxes to southern Nevada from other parts of the country have increased the population of Clark county considerably. Growth rates, starting in 1980 for example, were between two and four percent per year until 1987. The growth rate that year was 18 percent followed by 14 percent the next year. The first two years of this decade have seen increases of only two percent. This has resulted in a current (1991) population in Clark County of about 834,900 (Jeff Hardcastle, Clark County Comprehensive Planning, Oral Commun., 1992) with the Las Vegas Valley accounting for approximately 95 percent of the total.

The Las Vegas area currently (1991) uses a mix of 85 percent Colorado River water and the remainder comes from the local ground-water system. The ground-water system is fully appropriated and Nevada's portion of the Colorado River will be fully utilized shortly after the turn of the century. Conservation efforts, which were started in 1989, are expected to extend the out-of-water date until about the year 2006. At that time without an additional water supply the community will become extremely vulnerable to conservation effectiveness, drought severity, and the potential for contamination of water supplies.

In an early engineering water supply study by the Las Vegas Valley Land and Water Company, the forerunner of the Las Vegas Valley Water District (District), it was determined that ultimately the area would develop beyond the available water supply from the Colorado River and from the ground-water system in Las Vegas Valley. Water Planning studies by the State Division of Water Planning and the State Engineers Office (1971 and 1982) evaluated optional water supplies and recommended that ground water be developed in adjacent ground-water basins and imported into the Las Vegas area.

The District has reviewed all of the water resource options available and set off on a multiple course to prepare for the future. The first project was artificial recharge and that is described by Katzer and Brothers (1989) and Brothers and Katzer (1990). Conservation efforts (Morris, et al, in preparation) began in 1989 and are becoming more effective with time. Reuse is primarily an economic factor because the Colorado River water is returned to the river via the advanced wastewater treatment plant and credit is given for this water. There appears to be little possibility that additional water can be purchased from any other Colorado River Basin state, however the District is pursuing the possibility of leasing water knowing full well that

ultimately the lease will expire and another alternate source must be at hand. Desalinization is also being investigated with the thought that someday this process will not be so energy intensive and desalted ocean water will be delivered to the Los Angeles Basin in exchange for Colorado River water or piped directly to Las Vegas Valley.

The final option that is being studied is the vast supply of unappropriated ground water, and to a lesser extent surface water, in eastern and southern Nevada. In order to do that the District first had to file on all the available water. This was done to protect the interest of southern Nevada. If the District had indicated publicly that it was interested in this area then numerous individuals and companies would have filed first and then tried to market the water at an inflated price to the District. So in October, 1989 the District filed for 145 points of diversion from the ground water and one surface water diversion on the Virgin River. The total amount of water the District believes it may be able to develop is about 185,000 acre feet of ground water and at least 70,000 acre feet from the Virgin River (60,000 surface water and 10,000 ground water) for a grand total of 255,000 acre feet. The total area encompassed by the project, termed the Cooperative Water Project (CWP), is about 20,000 square miles and includes parts of four counties, Clark, Lincoln, Nye, and White Pine. The District is currently (1992) preparing the technical arguments to present before the State Engineer in support of the water right filings.

The need for the CWP was established by a series of studies conducted jointly by the major water purveyors and all levels of government agencies in southern Nevada. Initially, the UNLV Center for Business Economics was asked to develop socioeconomic projections to the year 2030, using their econometric model which determines the effects of projected changes in the national economy on the southern Nevada economy. The Center for Business and Economic Research projected an average annual population growth rate of two percent for southern Nevada from 1990 to 2030, resulting in a population of 1.8 million with employment of 1.0 million by the year 2030, if sufficient water resources were available. These projections were reviewed and accepted by all of the water purveyors and agencies involved.

Next, the projections of housing units and employment in a wide range of industries were used to determine corresponding water demands, using a customized version of the Corps of Engineers' water use forecasting system. The water demands were then used in a network

optimization model to study various future demand and supply scenarios, and to determine for each scenario the year in which Nevada's consumptive use allocation from the Colorado River would be fully utilized. The analyses concluded:

1. If moderate conservation is practiced and there are shortages on the Colorado River, Nevada's consumptive use allocation would be fully utilized by 2006.
2. If severe conservation is imposed and the sharing by Nevada of possible future Colorado River shortages was taken into account (as seemed reasonable for a scenario involving severe conservation), Nevada's consumptive use allocation would still be fully utilized by 2006.

Clearly much depends on the flows of the Colorado River and the critical time of full allocation use could come earlier, but probably not much later. Thus the major water purveyors and all levels of government in southern Nevada agreed that a new source of supply would need to be available by at least 2007 for southern Nevada to continue its natural growth process.

There are, in essence, five separate flow systems that encompass the entire area of the CWP. Water rights were originally filed for by the District in 28 ground-water basins in eastern and southern Nevada. After preliminary evaluations were made of the available supply and the State Engineer's office was canvassed to determine existing water right permits, the District informed the State Engineer in writing that it was no longer pursuing the applications in several of the valleys. Some of the valleys appear to be over appropriated, some were beyond a benefit cost ratio and a couple have a relative large rural population, and are environmentally sensitive; in these areas there is unappropriated water, but it was decided that the local entities would be in a better position to use that water. The District offered these water right applications to the rural counties and certain Federal agencies with no conditions, but the offer was not accepted and the water under those applications has returned to the public domain.

PROJECT DESCRIPTION

The CWP will consist of three major pipelines which will connect the five flow systems and be constructed in five major phases. The plan view of the facilities to be constructed is shown in Figure 1.

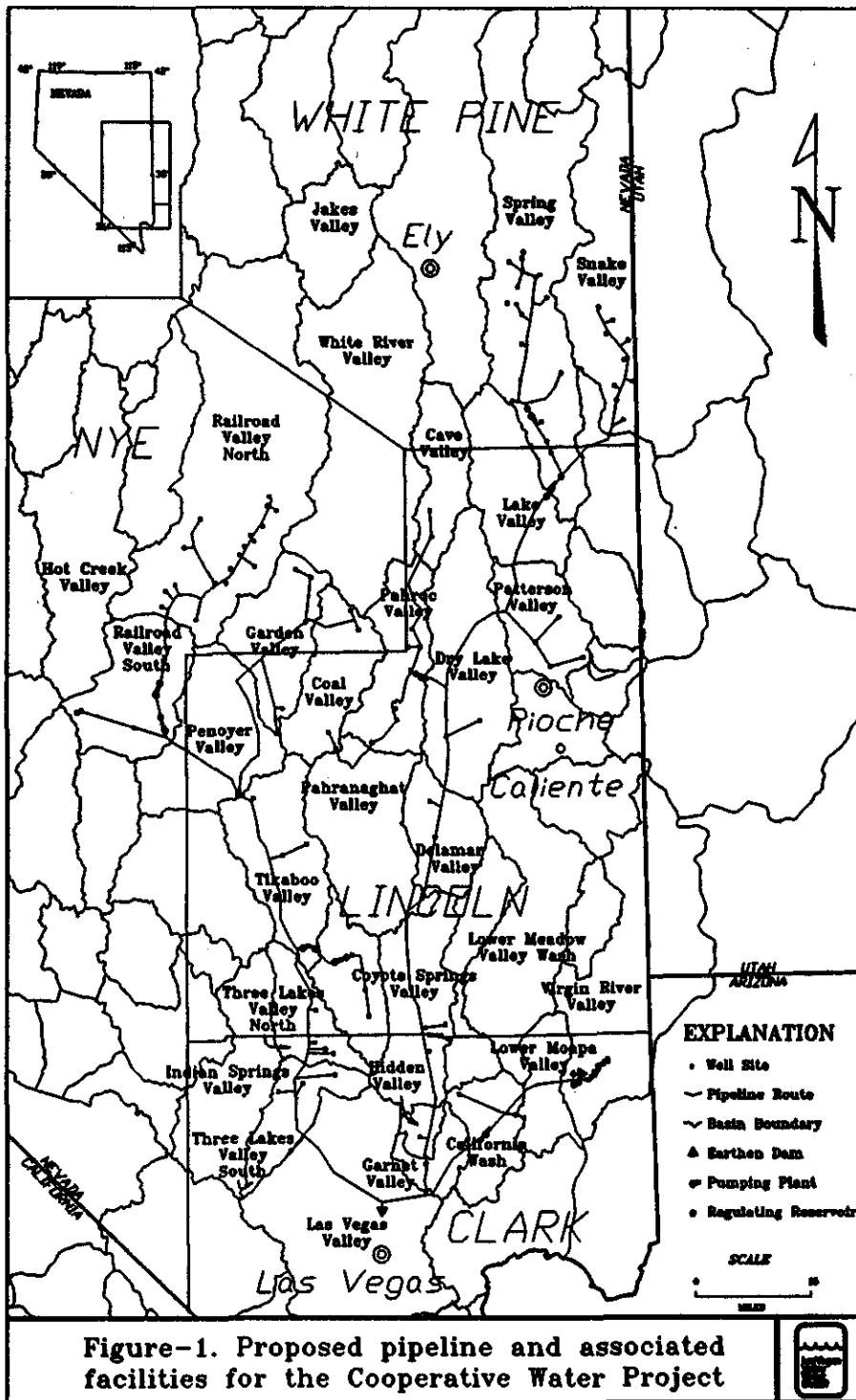


Figure-1. Proposed pipeline and associated facilities for the Cooperative Water Project

Phased Construction

The first phase is the construction of facilities to divert, store and transmit about 60,000 acre feet of Virgin River water along with about 10,000 acre feet of ground water pumped from the flood-plain aquifer immediately adjacent to the river. The District has entered into an agreement with the U.S. Bureau of Reclamation to do a feasibility study to develop and desalt the Virgin River, including an Environmental Impact Statement.

Other phases are strictly ground water and can be characterized by perhaps 1,000 miles of pipeline, numerous pumping stations, probably 200 or more ground-water wells, and needed electrical facilities. Pipeline size will vary from small feeder lines of 6 to 8 inches to main transmission lines up to 60 inches. All lines will be buried and canals will not be used. Potentially, because the northern valleys are all higher than Las Vegas Valley so there is a large head differential, pumping plants will be at a minimum and in line electrical generation equipment may be used to reduce the head and generate electricity for some of the ground-water wells and pumping plants.

ISSUES

There are three main issues that must be resolved prior to a single drop of water being exported to Las Vegas Valley and this trilogy is composed of technical, legal, and political.

Technical

In comparison to the other issues this one is by far the easiest. In general much is known about the available water resources. Locating and constructing ground-water wells and the associated distribution system, while certainly challenging, has a logic to the process that appears to be missing in the other two issues.

There is always the question of impacts to the existing hydrologic system. It is the District's position that existing uses will be protected, as will the endangered, threatened, and sensitive fauna and flora. To ensure that these uses are protected one part of the project that is extremely important is the monitoring of project as well as non project impacts to the environment. This most important element will be carried out utilizing a wide variety of direct and indirect techniques.

The District expects that the State Engineer will include extensive monitoring requirements as part of any water right permit and is currently developing a monitoring

proposal. The monitoring plan is the most important tool to negotiate settlement of potential impact issues. Techniques to predict and simulate potential impacts can vary as can the results; however, agreement on "where to look" for impacts as well as agreed responses on what to do if monitoring indicates changes benefits all parties. Therefore the monitoring and assessment of data becomes the common ground and one of the most important parts of the project.

Legal

In addition the actual water-right hearings that are required by the Nevada State Engineer, and which may easily last over a year, there is always the possibility of other legal processes that could add years to the start-up time of the project.

Nevada law, since 1866, has adhered to the doctrine of "prior appropriation" which is similar to the laws of other western states. This doctrine has often been criticized as the "use it or lose it" law. Nevertheless it has worked well in Nevada for nearly a century and a half. When an appropriator seeks water, whether it be ground or surface water, the person must first file an application with the State Engineer. This is precisely what the District did in October, 1989, and submitted applications for 145 points of diversion from ground water and one application for a surface-water diversion.

The State Engineer, after the applications have been published in local newspapers and the protest period has expired, may or may not conduct an administrative hearing. Generally, if a protest is filed, a hearing is held. The State Engineer has advised the District, together with the protestants, who number an unprecedented 3,610, that administrative hearings will be held, probably starting in late 1992.

The State Engineer must evaluate the following factors prior to granting or denying the applications:

1. Is there unappropriated water in the proposed source of supply?;
2. Is there an adverse impact on existing rights if the application is approved?; and
3. Are the applications in the public interest?

Accordingly, the District and the protestants will utilize the above factors according to Nevada water law, (NRS 533.370(3)) to present their respective interests during the water right hearings. The District has not offered to purchase water rights from individual in any of the

basins of interest, however certificated water rights are considered private property and numerous individual have indicated an interest in selling their water rights to the District.

Political

This issue, above all else, will determine the fate of the CWP. When the District first filed the applications county officials in the rural counties were notified. At the same time a meeting was arranged with the county officials to explain the project and seek their cooperation. At the end of a long day there was virtual unanimous agreement that we could work together and that there was something in the project for everybody. Benefits to the rural counties that were mentioned included a percentage of the developed water, an annual tax on each acre-foot exported, economic benefits based on construction and operation, and the development of certain recreational benefits where they would enhance the project. Within a very short time this all went under the bridge, so to speak. There was such a hue and cry raised about the project that the emotional issue of "don't take our water" drowned out reason and rationality. Predictably, the rural politicians also took up the same banner and according to the press the water war was on. In reality there is no war and rural counties are somewhat divided in their opinion about the project for which their is some support.

The Federal establishment must also be one of the partners to the project for a variety of reasons. First, most of the water right applications are on public land and therefore temporary and permanent easements for project facilities will be required. Thus one of the main tasks to complete, after the water right hearings are over and the District knows where it can appropriate water, is an EIS, which also must be completed prior to receiving the needed easements. Actually base work on this task is well underway and much of it will be accomplished using remote sensing techniques. The second reason the Federal Government is heavily involved is in the protection of the environment. Scattered throughout eastern and southern Nevada are numerous wildlife preserves, a national park, recreational area, and monuments. Thus their interests and the District's interest are parallel. They do not want us to impact those areas and we do not intend to do so. In that regard we have suggested to Federal establishment that it is in their best interest to assist the District with the project thus ensuring an orderly and responsible development of a valuable resource.

SUMMARY

As the earth's population continues to grow, the urban cities of the arid southwest are being faced with providing one of the most basic elements of any city's infrastructure, a sufficient supply of potable water. Man's environmental consciousness has also grown with the population, and in doing so has increased requirements and therefore time required before new water resources can be developed. Las Vegas, Nevada, is one of these southwestern cities now facing and planning for the upcoming day when existing water resources will be fully utilized and new water resources will have to be available to sustain the city's growth and economy.

Prior to the environmental movement, developing new water resources provided challenges to our engineers. These challenges were answered as we along the Colorado River can attest as we utilize water from a series of large lakes ponded behind massive concrete dams such as Hoover and Glen Canyon. Today the engineering required to develop new water resources seems to be one of the less difficult tasks to accomplish when compared to the time and effort required to address the numerous environmental concerns.

Developing new water resources has now become a challenge for those in the earth science disciplines. Meeting the challenges imposed by developing about 190,000 acre-feet of ground water and 60,000 acre-feet of surface water from over 20,000 square miles for future southern Nevada will require all of science's technological advancements as well as all of our environmental understanding; plus a fantastic legal staff and lots of luck on the political scene

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