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Edwards Depletion Protection Pollution

By Lou Ellen Ruesink, Editor, Texas Water Resources

The following statements made by Environmental Protection Agency Administrator Russell E. Train emphasize the importance of the Edwards Underground Reservoir as well as its vulnerability.

1. *The Edwards Underground Reservoir is the principal source of high quality water for about 1 million people, including 17 cities and towns, 5 military installations, and a large number of farms and ranches. Current water supply treatment practice is limited to minimal disinfection for drinking purposes and there is no alternative source of drinking water supply which could economically replace the Edwards Reservoir.*

2. *The Reservoir is vulnerable to contamination through its recharge zone, particularly from streams crossing the zone. Since contamination of a groundwater aquifer can be difficult or impossible to reverse, contamination of the Edwards Underground Reservoir would pose a significant hazard to those people dependent on the reservoir for drinking purposes.*

"I'd rather have that good dependable water than a gold mine under my land."–Uvalde County Irrigator

"It would cost 10 times as much to use another source of water."–San Antonio Resident

"The springs make this area one of the most popular tourist attractions in Texas."–San Marcos Businessman

"One of the most prolific artesian aquifers in the world."–United States Geological Survey

All agree: the Edwards Underground Reservoir is one of the most valuable natural resources–perhaps the most valuable– in Southwest Texas. The aquifer supplies municipal and industrial water to more than one million people in a 5-county area, irrigates 75,000 acres of cropland west of San Antonio, and is the source of Texas' largest freshwater springs.

As development and growth take place in the area served by the aquifer, two potential problems exist: withdrawal of more water than can be replaced and pollution of the water in the underground reservoir.

Prolific and Unique

The porous, honeycombed limestone formation stores and moves vast quantities of underground water and extends from 100 miles west of San Antonio to a few miles northeast of San Marcos. It is about 175 miles long, ranges from 5 to 40 miles wide, averages 500 feet in thickness, and lies about 500 feet below the ground. The aquifer is unique in its exceptional capacity for rapid movement and replenishment as well as having upper and lower boundaries of relatively impermeable clay.

The aquifer is artesian which means that the water is under pressure and rises close to the surface when a well is drilled into the limestone.

It is not possible to accurately estimate the capacity of the Edwards reservoir. Even if the total were known, it would not represent the usable capacity for several reasons: (1) it is probably impossible to pump all of the water from the limestone; (2) as water is pumped from the aquifer in greater quantities, saline water may intrude from the south; and (3) depletion of the aquifer would result in lowering and eventual drying up of the springs.

A more meaningful figure for water availability is annual recharge or refilling of the reservoir. From 1934 to 1973 the average yearly recharge was 556,700 acre-feet. The highest annual recharge recorded was 1,700,000 acre-feet in 1958 and the lowest was 43,700 acre-feet in 1956, only two years before. One acre-foot is enough water to cover an acre of land with water one-foot deep.

The primary recharge mechanism in the Edwards is the Balcones fault zone, an area of porous limestone through which surface water enters the underground reservoir. Rivers and streams crossing the fault zone lose a large part of their water to the aquifer. Water literally disappears into the large cracks and crevices in the streambeds. About three-fifths of the water entering the reservoir comes from streams in the western counties of Medina, Uvalde, and Kinney.

Discharge from the Edwards Underground Reservoir is through wells and springs. About 38 percent of the discharge, averaging 400,000 acre-feet a year, is from more than 4,000 wells. Natural discharge from the reservoir occurs in six major springs and numerous smaller ones. The "safe yield" of the aquifer is based on the amount of water which can

be pumped each year without adversely affecting springflow. Flows from the largest springs feed into the San Antonio and Guadalupe rivers.

Increased Demand

From 1934-73 the average annual discharge including springflow almost equaled the average annual recharge. There were 24 years during that period when the total discharge exceeded the recharge. If the demand for irrigation, municipal, and industrial water increases as predicted, the time is coming when the discharge from the reservoir will regularly exceed the available recharge.

Irrigation demand has increased significantly in the past 15 years. For example, the number of irrigated acres in Medina and Uvalde counties has doubled. Present irrigation demands in a three-county area require one-fifth of the average annual recharge. With the addition of more cultivated acres and with more farmers raising two crops per year, the demand in a dry year could reach one-half of the total recharge.

San Antonio is now the third largest city in Texas and is a national military, industrial, and trade center. Growth trends in San Antonio, San Marcos, New Braunfels, and Uvalde, as well as ever-increasing recreational development, point to more frequent years when water will be "mined"–pumped out faster than nature can replenish it.

Alternative Water Sources

Numerous proposals for augmenting the Edwards water resource have been made, but none will become reality until it is decided how new supplies will be financed. Which present users of groundwater will make the change to a new water source?

San Antonio can pump water that requires minimal treatment from the Edwards at a cost of about three cents per thousand gallons. Alternative source estimates run as high as 30 cents, including installation of extensive treatment facilities.

Should San Antonio incur the cost so that additional water will be available to other aquifer users? Should all users bear the cost of an alternative source so that aquifer water will be available for San Antonio and the springs? These specific questions reflect the complexity of the decisions facing water policy makers in the region of the Edwards aquifer.

Whose Responsibility?

The **Edwards Underground Water District (EUWD)** was created by the state legislature for the purpose of "protecting, conserving, and recharging" the Edwards and "for the prevention of waste and pollution of such underground water." It has served as principal coordinating agency for groundwater development and water quality monitoring in the Edwards area since 1959.

The EUWD has the authority to acquire recharge facilities, develop comprehensive plans for the use of the water and prevention of pollution, levy an annual tax up to $.25 on each $100 assessed value, and bring suit to carry out these powers. Presently a $.02 tax per $100 property valuation provides the funds for operation of the district.

According to **M. D. Weinert,** general manager of the district, operations now consist primarily of studying the recharge potential of the aquifer and monitoring the water quantity and quality. Weinert points out that "average annual recharge has steadily increased and is now estimated to be 30,000 acre-feet greater than it was 15 years ago."

The EUWD board of directors has requested that the present legislature grant the district authority (1) to issue and enforce rules for proper construction of water wells in order to insure against surface pollution and (2) to buy and transport surface water when requested to do so by water surveyors within the district.

Two significant steps to specifically improve the water pollution protection program for the Edwards have been taken in the past two years:

- An order adopted by the **Texas Water Quality Board (TWQB)** delineates the recharge zone and sets criteria that must be met before any new developments can be built on the recharge zone.

- A determination by the **Environmental Protection Agency (EPA)** designates the aquifer as a sole source of drinking water and should be protected by the Safe Drinking Water Act.

The Texas Water Quality Board has the principal pollution control authority for both groundwater and surface water in the state. This includes the Edwards Underground Reservoir, its recharge area, and drainage basins. The Aquifer Protection Order, adopted by the TWQB in 1975, strengthened two previous board orders. This order was amended in March, 1977, to separate orders for each of the seven counties, but the basic protective measures have remained unchanged.

The orders prohibit feedlots and sanitary landfills on the recharge zone. In addition, each order contains specific requirements for municipal, industrial, and private sewage disposal systems. County governments have the responsibility of licensing, inspection, and enforcement provisions of the orders relating to private sewage systems. Licensing of large sewage systems is the responsibility of the Texas Water Quality Board.

First in U.S.

A major aquifer protection mechanism was passed by Congress in 1974 as an amendment to the Safe Drinking Water Act. The Gonzales Amendment, named for its author**, Henry B. Gonzales,** congressman from San Antonio, authorizes the Environmental Protection Agency to designate an aquifer as the sole source of drinking water for an area. After

such a designation, the EPA has the authority to halt any federally-funded project which might create a significant hazard to the aquifer.

On December 16, 1975, the Administrator of the EPA published his determination that contamination of the Edwards Underground Reservoir would create a significant hazard to public health. The Edwards was the first aquifer in the U.S. to receive this designation.

Potential Pollution

The TWQB Edwards Order deals primarily with industrial, agricultural, and municipal sewage facilities while the EPA determination applies only to federal projects. Many San Antonio area residents feel that until the potential pollution problems of urban runoff are specifically addressed, the protection of the Edwards is in doubt. With present legal controls, very little can be done to control and direct development in the Edwards area so that the development itself will not be a source of pollution.

According to a citizens group in San Antonio called the **Aquifer Protection Association (APA),** much more could and should be done to protect the aquifer's future quality.

This group, headed by **Fay Sinkin,** has urged the San Antonio city council to halt development north of the city until the sensitive areas of recharge can be designated and protected against urban runoff. Mrs. Sinkin is concerned with the chemicals from urban runoff. She feels that if pollutants such as oil and pesticides reach the underground water, it could become too costly to treat the water for human consumption.

In the largest turnout for a special election in San Antonio's history, voters came out 4 to 1 against the development of a large shopping mall in the recharge area. Before the voters had had this chance to voice their disapproval of development on the recharge zone, the San Antonio city council had already approved development of three major sites: a federally-funded "new town," the University of Texas at San Antonio campus, and a housing development for 21,000 residents.

Four months later at the insistence of the APA, the city council hired a consulting firm to determine possible effects urbanization in the San Antonio area might have on the aquifer. The firm is to study information already available on the aquifer, gather necessary new information, and finalize zoning options for the city council to consider. Impact statements for each option will be included in the final report of the two-year study.

Statewide Implications

Because of its fast recharge and movement, the Edwards is much more vulnerable to contamination than other Texas aquifers. Recharge for most aquifers is limited to water slowly moving through the layers of earth. This process, called "percolation," also filters and purifies the water as it makes its way down.

However, potential depletion and pollution are not limited to the Edwards Underground Reservoir. Although Texas aquifers vary greatly in size and rate of recharge, none are inexhaustible and many are in danger of contamination by development and industrial or agricultural wastes.

Since 72 percent of all freshwater used in Texas comes from underground sources, the protection policies adopted for the Edwards have implications far beyond the boundaries of the district.