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Race Against Subsidence

By Lee Pilgrim, Editor, Texas Water Resources

The yarn about the Arkansas farmer who never thought about patching his leaking roof until it rained appears to have--at first glance--a parallel in the subsidence-plagued upper Gulf Coast region.

When tropical storms inflicted ruinous damage on the region, victims took measures to defend property against future hurricane tides: constructing levees and retaining walls, raising dike-like roads, and stacking bulkheads higher. But these efforts were like the farmer's setting cooking pots under the holes in the roof AFTER the rains set in. He needed a new roof, and the Houston-Galveston coastal region needed to curtail pumping of underground water.

Despite geologists' warnings that pumping ground water faster than it can be replenished naturally causes land to sink, 181 billion gallons a year continued to be pumped from the underlying aquifer.

The folk tale indicates the farmer just kept on shoving pans under the drip. If so, the analogy ends here. The need for positive action to convert to surface water in that area has been recognized and things are happening.

The goal of moving huge quantities of water from lakes, rivers, and reservoirs to users in the 3,000 square mile area entails a mind-boggling project. But that is only part of the problem. There is no law now in effect which curtails the use of underground water and forces conversion to surface water. Convincing the populace of the urgency and setting up the machinery to implement this prodigious undertaking combines human, technological, engineering, legislative, economic and time elements. The range of elements involved explains why a single management system to regulate ground water use and to secure, treat, and distribute the required volume of water to the multitude of users has not been developed.

Progress toward the final goal of reducing the use of ground water is divided into numerous action packages. Since it remains a jig-saw puzzle yet to be fitted together, this report on what's being done about subsidence deals with three major topics: Water Users, Water Sources and Suppliers, and Legislation.

Legislation

Some important subsidence-related bills confront the currently convening legislature. Bill Jenkins of Lt. Gov. William Hobby's staff has written a revision of Chapter 52 of the Texas Water Code. Enactment of this revision has application to the subsidence-affected area in that an underground water conservation district can be formed which includes the entire problem area. Once formed under this revision, the district could regulate ground water removal to the extent necessary to control subsidence.

An underground water conservation district under this act would be governed by a local board of directors elected by precinct method. It would be financed by taxes and bonds.

Another bill proposes to create a Houston-Galveston Coastal Subsidence District under Article XVI, Section 59 of the Texas Constitution. Originally drawn up by the Harris and Galveston County Mayors' and Councilmen's Association's Ad Hoc Committee on Land Subsidence Legislation, the bill now is in the hands of a six-man committee which will hold hearings to obtain input from people in Harris and Galveston Counties who will be affected by the bill. Serving on this committee are Representatives Bill Caraway, Clear Lake City; Ed Watson, Deer Park; Bill Blythe, Houston; Joe Allen, Baytown; Ed Harris and Andrew Baker, Galveston. They will make recommendation for changes and introduce an amended bill to the legislature.

As written the proposal is concerned only with regulation of withdrawal of ground water which materially contributes to coastal subsidence. The bill aims to curb excessive pumping of underground water, increase reliance on surface water, and control well spacing. The district would be limited to Harris and mainland Galveston Counties. It proposes that the district have a governing body appointed by local elected officials with municipalities, industries, and agriculture represented; that ground water production remain as high as possible without causing coastal subsidence; that no one be prevented from using ground water unless surface water is reasonably available; and that the district be financed by state appropriations, local government participation, and well permit fees. Chairman Watson says the committee is concerned with the make-up of the board, financing, and enforcement as the bill is written.

There are possibly other subsidence-related bills being prepared, but only the above-mentioned have come to public attention at this writing. It does appear that a water district will be formed to address itself to the regional land subsidence problem. The size of the district and means of financing it are the major controversial aspects.

Last year Rep. Allen authored a bill which is currently being implemented. It revised Chapter 52 to include land subsidence as one of the purposes of creation of an

underground water conservation district. Attorney General John L. Hill has circulated a petition to create such an underground water conservation district for the "purpose, among other purposes, of controlling subsidence in the Harris County, Texas, area." The Texas Water Rights Commission has set a public hearing in Houston March 5 to receive evidence concerning an underground reservoir in the Harris County area. Delineation of an underground reservoir is necessary before an underground water conservation district can be created under general law. Formulation of this district under existing law will save considerable time in implementing a program to control subsidence.

Legislation of another nature--but one that speaks of the critical need for efforts to halt subsidence--is a bill authorizing the financing of a $5 million project to preserve the historic San Jacinto Battlegrounds and Monument through the use of levees and a system of pilings.

Legislators also will hear a report by the Gulf Coast Waste Disposal Authority calling for the creation of a new agency with legal and financial power to control subsidence. It further asks appropriations to drill test wells and measure the short-term effect on underground water when industries begin using surface water in 1976.

Water Users

In 1973, 495 million gallons a day (MOD) of ground water was consumed in the Houston-Galveston region; 48 percent by municipalities; 33 percent by industry; and 19 percent by agriculture. These entities, whether individuals or corporations, have viewed conversion to surface water with misgivings. Few were willing to commit themselves to the added expense of surface water, fearing that neighboring municipalities, irrigators, or industries might not follow suit. Possibly another reason they were dilatory was that the entire cost of tying on, treating and distributing the water would come from their pockets; whereas temporary measures such as building levees were subsidized by the federal government.

Nevertheless, many industries and some cities have switched voluntarily--some only partially--to surface water. The City of Houston has been using surface water since 1954. Other pioneer municipalities include Galveston, League City, and Pasadena. Potential surface water users include municipalities now involved in switch-over plans such as Texas City, LaMarque, Nassau Bay, Clear Lake City, as well as those in the discussion stage: Baytown, Deer Park, Pearland, Friendswood, Ellington Field, South Houston, Missouri City, El Lago and Seabrook. Outside Harris-Galveston Counties the willingness to change over is slack. Leaders in Chambers and Brazoria Counties say they do not want to be part of an underground water district, even though Lake Jackson (Brazoria County) will probably establish a surface supply, at least as a supplement, in the next five years.

Industry has a few long-time users of surface water, some recently converted, and many committed to use surface water when it is available. Exxon (Baytown) began converting in 1943. Two years ago it made the last step toward total conversion by installing a water clarification plant. Exxon's consumption of ground water has dropped from 7 to 8 MGD

to 2 MGD, and the goal is to reduce it to less than 1 MGD. Texas City industrial area consumption is now approximately 95 percent surface water. Industries on the Houston Ship Channel in Pasadena area are now consuming 80 to 90 MGD from Lake Houston and will go to 220 MGD when water is available, reducing its sub-surface water use by approximately 80-90 MGD, according to H.R. Norman of the City of Houston Department of Public Works. For the past five years Houston has furnished all industries of Mont Belvieu area, Baychem Industries, and U.S. Steel complex with all their needs from surface water supply. When Coastal Industrial Water Authority (CIWA) begins operation it will serve industries now using Houston water, plus 24 othermajor industries such as Champion International, Shell Oil, Friendswood Development Co., and Atlantic Richfield. Even though contracts commit these industries to use 90 percent surface water, the quantity commitments are not as high as anticipated because they are recycling water.

"The most beneficial thing subsidence has done, as far as industry is concerned," Norman commented, "it has stepped up the recycling of water."

An exact cost of water is difficult to establish. J.A. Willhelm, general manager of Galveston County Water Authority (GCWA) has stated that "ground water costs 6 to 7 cents per 1000 gallons at the pump, and we estimated a cost of 18 cents per 1000 at our proposed treating plant. To both of these costs, you must add maintenance and operation expenses of distribution system, plus the cost of getting from the well/plant to the system."

Cost estimates on surface water from municipal officials surveyed ranged from 22.7 to 37 cents per 1000 gallons. Comparing that to ground water's 6 cents per 1000 (at the pump), municipalities are moving slowly and must find ways of financing the conversion project. Paul R. Jason, member of the Baytown Area Water Authority, says that the city is currently negotiating for surface water and then must reach an acceptable plan for financing the construction of a clarification plant and distribution facilities.

Sources And Suppliers

Three River Authorities in the area are major contributors of surface water: Brazos, San Jacinto, Trinity. The Galveston County Water Authority and Coastal Industrial Water Authority, both mentioned above, are distributing agencies. Currently the City of Houston is a major supplier of surface water to the area. The Houston supply comes from Lake Conroe and Lake Houston on the San Jacinto River Watershed, Livingston and Wallisville Reservoirs on the Trinity River Watershed, and Old River, a tributary of the lower Trinity. Houston furnishes domestic and industrial users, 5,000 acres of rice land, in addition to providing treated water to GCWA. Clear Lake City Water Authority will begin buying 5 MGD from the City of Houston in 1976 to supply the needs of Clear Lake City, Nassau Bay and the Space Center.

GCWA receives raw river water from the Brazos River Authority. It is a non-profit wholesaler of water, charging only the cost of operating and maintenance. It has 114 MGD of raw river water and 8 MGD of treated water under contracts which will be in

effect until 2004. The treated water contract provides for periodic increases up to 30 MGD. GWCA supplies about 55 MGD of raw water to Texas City industries and 7 MGD of treated water to Galveston and League City. Plans are underway to supply surface water to LaMarque and Texas City and to the Marathon Oil Company. Serving Monsanto and Texas City Refining as well as Hitchcock and Alta Loma is a future goal. Now under construction is a potable water line on the west end of Galveston Island where GCWA will supply the new Galveston State Park and other developments.

Still under construction, CIWA, an arm of the City of Houston, will begin supplying water to industries in 1976. The maximum amount of raw water available will be 840 MGD. Specific users will be U.S: Steel, South Channel industries, and Bayport industries. Areas such as LaPorte will probably use CIWA water. CIWA will secure raw water from the Trinity River and expects to be able to sell all the water it is capable of conveying by the year 2008.

At its inception, CIWA was developed to provide water for industrial expansion, according to George P. Munson, Jr., executive director. "In a few years we'll be talking about working to get more water."

Outlook

"Some real progessive steps are being made now," R.K. Gabrysch of U.S. Geological Survey feels. "For a while, things were just dragging on."

The U.S. Geological Survey has recently made an analog model study, based on the commitments of the 24 major industries, plus Galveston, League City, Nassau Bay, NASA and Clear Lake City Water Authority. As a result of cutback in ground water pumpage anticipated, the problem solution indicated artesian pressure recovery of as much as 100 feet in the Houston Ship Channel area to as much as 40 feet in the NASA area. This should result in a significant decrease in the rate of land surface subsidence, according to Gabrysch.

"Another important thing this solution told us," he pointed out, "is that unless future growth in water needs is met by a remote ground water source or a surface water source, additional pressure head declines would begin in a very few years."

"I'm very encouraged by what this shows," Gabrysch said, "but I also fear that people will begin to think the problem is solved. It's not. All this shows is that these surface water projects will give us a breather.

Subsidence Costly: Exhibit A

While the Texas legislature is considering legal measures to control use of underground water, federal lawmakers are considering a bill to evacuate and relocate approximately 1,500 persons who are direct victims of overpumping of underground water in the Houston-Galveston coastal region.

Senator Lloyd Bentsen and Congressman Bob Eckhardt have introduced a bill which will enable the U.S. Corps of Engineers to evacuate and relocate between four and five hundred homes in the Brownwood addition of Baytown. The Legislators' action followed a study by the Corps of Engineers, which recommended this plan over eight others, including levees, flood walls, flood proofing, and combinations of partial evacuation and structural protection.

"Brownwood is a tragic example of people trapped by an unexpected situation that they have no control over, and they are to be complimented on the action that they have taken already on their own behalf. I am very hopeful that the federal government will step in and do its part expeditiously," Bentsen commented.

A draft of the Corps of Engineers' study estimates the cost of the plan will be $ 15,875,000-$12,700,000 to be paid by the federal government and $3,175,000 by the City of Baytown. A cheap way out considering it takes $72,600,000 to build a dike.

The draft environmental statement of that area points out that "vulnerability to flooding continues to increase as subsidence of land surface continues . . . results from extensive withdrawals of groundwater in the Houston metropolitan area."

Brownwood residential sector was developed in 1939 and became a showcase of gracious living, with no hint of subsidence--and its devastating effects--until about 1967. Building cost of homes ranged then from $25,000 to $75,000, according to Mrs. Jean Shepherd, president of the Brownwood Civic Association, who estimates replacements today would cost from $75,000 to $100,000.

The draft summary indicates the most important impacts of the proposed plan will be "relief from constant anxiety associated with flood hazards, depressed property values, public health hazards, inconveniences of repetitive temporary evacuations, frustrations of recurring cleanups and damages to real property and personal possessions . . . " It proposes conversion of the approximately 750 acres of land to park land deeded to Baytown.

If the measure passes, the long-suffering Brownwood residents will have a new home, the birds will have a new sanctuary, and the tax-payers will have a new bill to pay.