

THE

Cross

SECTION

A Monthly Publication of the High Plains Underground Water Conservation District No. 1

Volume 23—No. 1

"THERE IS NO SUBSTITUTE FOR WATER"

January, 1977



District Manager Frank Rayner; J. W. (Buck) Buchanan, Manager of the North Plains Groundwater Conservation District No. 2; and General James Rose, Executive Director of the Texas Water Development Board, listen to a report on the most recent meeting of the High Plains Study Council, given by Dr. Herbert Grubb of the Texas Water Development Board.

Weather Modification Hearings Scheduled In Lubbock

Two hearings on applications for permits to engage in weather modification activities and control operations in the High Plains have been scheduled at 1 p.m. February 16 in the 99th District Court in Lubbock by the Texas Water Development Board.

Both hearings will be conducted simultaneously and will continue as long as necessary so that anyone who wishes to speak may do so, according to Gen. James Rose, TWDB Executive Director.

Plains Weather Improvement Association, Inc., and Atmospherics, Inc., have applied for permits to conduct activities to increase precipitation and decrease hail within two adjacent target areas on the High Plains. The requested area of operations would extend beyond the smaller target areas.

Because of intense opposition to the proposed weather modification activities, representatives from several counties met in Littlefield recently and organized "Citizens for Natural Weather." More than 2,000 area residents are members of the group.

Purpose of the organization was to discuss engaging legal counsel to file an injunction against the adjudicated hearing and to prevent the issuing of weather modification permits.

Contributions are being collected from farmers and businessmen to finance the opposition.

Members of CNW contend the

previous weather modification efforts have caused a reduction in rainfall as well as not causing much decrease in the amount of hail which has fallen. The weather modification firms have denied the charges and won a renewal of their permits in 1974 in a hearing and court battle.

The group supports a "right-to-vote" law which would give individual counties the right to decide by ballot if they wanted weather modification activities conducted in their county.

If the permits are issued, as applied for, they will be effective until the end of 1980, and even if a right-to-vote bill is passed after the permits are issued, the bill would have no effect until the permits expired.

For that reason, members of CNW have asked that the Board withhold a decision until the Legislature has had time to consider the right-to-vote bill, which is now in the drafting stages.

In one application, Plains Weather Improvement is seeking permission for aircraft flights over portions of Hale, Lamb, Castro, Swisher, Briscoe, and Floyd Counties from the authorization date through December 31, 1980.

The other application is from Atmospherics, Inc., for operations over portions of Deaf Smith, Randall, Parmer, Castro, Swisher, Bailey, Lamb, Hale, Cochran, Hoekley, and Lubbock Counties through October, 1980.

HIGH PLAINS STUDY COUNCIL FORMED

Representatives from the six Great Plains states of Colorado, Kansas, Nebraska, New Mexico, Oklahoma and Texas met at the Dallas-Fort Worth Regional Airport on January 7th, and formed the High Plains Study Council (HPSC).

The formation of the HPSC is an effort by the six states to assume primacy for directing the studies of the High Plains, and Ogallala aquifer, portions of the subject states that is provided for in Section 193 of Public Law 94-587, the Federal Water Resources Development Act of 1976 (otherwise known as the omnibus Public Works Bill for Rivers and Harbors).

Federal Law

Section 193 of Public Law 94-587 states:

SEC. 193. In order to assure an adequate supply of food to the Nation and to promote the economic vitality of the High Plains Region, the Secretary of Commerce (hereinafter referred to in this section as the "Secretary"), acting through the Economic Development Administration, in cooperation with the Secretary of the Army, acting through the Chief of Engineers, and appropriate Federal, State, and local agencies, and the private sector, is authorized and directed to study the depletion of the natural resources of those regions of the States of Colorado, Kansas, New Mexico, Oklahoma, Texas, and Nebraska presently utilizing the declining water resources of the Ogallala aquifer, and to develop plans to increase water supplies in the area and report thereon to Congress, together with any recommendations for further congressional action. In formulating these plans, the Secretary is directed to consider all past and ongoing studies, plans, and work on depleted water resources in the region, and to examine the feasibility of various alternatives to provide adequate water supplies in the area including, but not limited to, the transfer of water from adjacent areas, such portion to be conducted by the Chief of Engineers to assure the continued economic growth and vitality of the region. The Secretary shall report on the costs of reasonably available options, the benefits of various options, and the costs of inaction. If water transfer is found to be a part of a reasonable solution, the Secretary, as part of his study, shall include a recommended plan for allocating and distributing water in an equitable fashion, taking into account existing

water rights and the needs for future growth of all affected areas. An interim report, with recommendations, shall be transmitted to the Congress no later than October 1, 1978, and a final report, with recommendations, shall be transmitted to Congress not later than July 1, 1980. A sum of \$6,000,000 is authorized to be appropriated for the purposes of carrying out this section.

In response to the recommendations for a ten-Federal-agency study contained in the draft report, "A Study Design for the High Plains Development Project", by Kenneth Frederick, with Resources for the Future Incorporated (Washington D.C.), Oklahoma's Governor David Boren called a special meeting of representatives from the subject six states in Oklahoma City on November 24, 1976.

The participants at the Oklahoma City meeting adopted two resolutions, one recognizing the depletion of the natural resources in the High Plains Region, the need for sustaining the area's economy and recognizing the states' efforts in this behalf; and a second resolution calling for the formation of the High Plains Study Council to direct the studies provided for by Section 193 of PL 94-587.

Attending the Oklahoma City meeting from Texas were A. L. Black, Chairman of the Texas Water Development Board (from Friona, Parmer County), General James Rose, Executive Director of the Texas Water Development Board (Austin) and Felix Ryals, Manager of the Panhandle Groundwater Conservation District No. 3 (White Deer, Carson County) representing U. S. Congressman Jack Hightower.

Council Formed

At the January 7th meeting, the High Plains Study Council was formed and Texas Governor Dolph Briscoe appointed A. L. Black, General Rose and Representative Billy Wayne Clayton (Springlake, Lamb County), Speaker of the Texas House of Representatives, as the representatives on the HPSC for Texas. The other Council members include three representatives appointed by the respective governors of the other five states, and a single Federal representative, the Assistant Secretary of Commerce for Economic Development.

By-Laws for the HPSC were adopted setting forth voting rights, and Governor Boren, A. L. Black and Ed Buske (Kansas) were elected Chair-

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A MONTHLY PUBLICATION OF THE HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1

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Cordell Mahler, 1979 _____ Wayside
James Bible, 1979 _____ Wayside
Guy Watson, 1981 _____ Wayside
Bill Heister, 1981 _____ Wayside
Leslie Adams, 1981 _____ Wayside

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Doris Wedel, Secretary
H&R Block, 224 W. 2nd, Muleshoe
Marshall Head, 1979 _____ Rt. 3, Muleshoe
Harold Layton, 1979 _____ Rt. 2, Morton
Eugene Shaw, 1981 _____ Rt. 3, Muleshoe
David Stovall, 1981 _____ Rt. 2, Muleshoe
Ernest Hamn, 1981 _____ Rt. 2, Muleshoe

Castro County

Garnett Holland, Secretary
City Hall, 320 Jones St., Dimmitt
Anthony Acker, 1979 _____ Rt. D, Nazareth
Glenn Odum, 1979 _____ Rt. 4, Box 135, Dimmitt
Jackie Clark, 1981 _____ Rt. 1, Box 33, Dimmitt
W. A. Baldrick, 1981 _____ 602 W. Grand, Dimmitt
Frank Wise, 1981 _____ Rt. 4, Dimmitt

Cochran County

W. M. Butler, Jr., Secretary
Western Abstract Co., 108 N. Main Ave., Morton
Jennie Clayton, 1978 _____ 700 S. Main, Morton
Robert Yeary, 1978 _____ Route 2, Morton
Rershel M. Tanner, 1980, Route 2, Box 36, Morton
Danny Key 1980 _____ Star Route 2, Morton
H. H. Rosson, 1980 _____ Star Route 2, Morton

Crosby County

Clifford Thompson, Secretary
2930 Avenue Q, Lubbock
Donald Aycock, 1978 _____ Lorenzo
Alvin Morrison, 1978 _____ Box 6, Lorenzo
Tommy McCattister, 1980 _____ 200 N. Van Buren, Lorenzo
Edward B. Smith, 1980 _____ 103 N. Van Buren, Lorenzo
Pat Younk, 1980 _____ Box 146, Lorenzo

Deaf Smith County

B. F. Cain, Secretary
County Courthouse, 2nd Floor, Hereford
George Ritter, 1979 _____ Rt. 5, Hereford
Bill Cleavinger, 1979 _____ Star Rt., Wildorado
James E. Higgins, 1981 _____ 300 Star St., Hereford
Garland Solomon, 1981 _____ 303 Sunset Dr., Hereford
Tom Robinson, 1981 _____ 211 Cherokee Dr., Hereford

Floyd County

Helen Bertrand, Secretary
Farm Bureau, 101 S. Wall Street, Floydada
Joe Canyus, 1978 _____ Lockney
Gilbert L. Fawver, 1978 _____ Rt. 4, Floydada
C. O. Lyles, 1980 _____ Route 4, Floydada
Connie Borden, 1980 _____ Route 1, Floydada
M. M. Smitherman, 1980 _____ Silverton Star Rt., Floydada



BOUNDARY OF HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1

Hale County

J. B. Mayo, Secretary
Mayo Inn, 1617 Main, Petersburg
Henry Kveton, 1978 _____ Route 2, Petersburg
Gaylord Groce, 1978 _____ HPD, Petersburg
Clint Creech, Jr., 1980 _____ Box 98, Petersburg
Homer Roberson, 1980 _____ Box 250, Petersburg
Henry Scarborough, 1980 _____ Route 2, Petersburg

Hockley County

Jim Montgomery, Secretary
609 Austin Street, Levelland
J. E. Wade, 1978 _____ Route 3, Levelland
Jimmy Price, 1978 _____ Route 3, Levelland
Billy Ray Carter, 1980 _____ Route 5, Levelland
Leon Young, 1980 _____ Route 1, Ropesville
Robert Phillips, 1980 _____ 218 Redwood, Levelland

Lamb County

Robert Richards, Secretary
500 Phelps Avenue, Littlefield
Billy J. Lansford, 1978 _____ Box 381, Olton
Edward Fisher, 1978 _____ Box 87, Sudan
P. A. Washington, 1980 _____ Box 124, Springlake
Jack Stubbelfield, 1980 _____ Box 397, Spade
Larry Lockwood, 1980 _____ Star Rt. 2, Littlefield

Lubbock County

Clifford Thompson, Secretary
2930 Avenue Q, Lubbock
Dan Young, 1978 _____ 4607 W. 14th St., Lubbock
Clifford Hillbers, 1978 _____ HPD, Idalou
Don Bell, 1980 _____ Box 114, Wolfforth
Ronald Schilling, 1980 _____ Route 1, Slaton
Granville Iso, 1980 _____ Route 1, Shallowater

Lynn County

Clifford Thompson, Secretary
2930 Avenue Q, Lubbock
Orville Maeker, 1978 _____ Route 1, Wilson
Freddie Kieth, 1978 _____ New Home
S. B. Rice, 1980 _____ Route 1, Wilson
W. R. Steen, 1980 _____ Route 2, Wilson
Wendell Morrow, 1980 _____ Route 1, Wilson

Parmer County

Ken Horn, Secretary
Horn Insurance Agency, Bovina
Floyd Reeves, 1979 _____ Box 276, Friona
Ralph Romins, 1979 _____ Rt. 2, Box 30, Bovina
Troy Christian, 1981 _____ Rt. 1, Farwell
Dalton Gaffoy, 1981 _____ 15th St., Friona
Ronald Elliott, 1981 _____ Rt. 3, Muleshoe

Potter County

F. O. Colliard, III, 1979 _____ Rt. 1, Box 433, Amarillo
W. J. Hill, 1979 _____ Box 53, Bushland
Jim Lane, 1981 _____ Box 97, Bushland
Albert Nichols, 1981 _____ Rt. 1, Box 491, Amarillo
Weiden Rea, 1981 _____ Bushland

Randall County

Mrs. Louise Tompkins, Secretary
Farm Bureau, 1714 Fifth Ave., Canyon
John F. Robinson, 1979 _____ 1002 7th St., Canyon
Bill Dugan, 1979 _____ Box 53, Hasty
Harry LeGrand, 1981 _____ 4700 S. Bowie, Amarillo
Joe Albrecht, 1981 _____ P.O. Box 81, Bushland
Jack Brandt, 1981 _____ Rt. 1, Box 350, Canyon

HIGH PLAINS . . . continued from page 1

man, Vice Chairman and Secretary of the Council.

The Council adopted the following objectives for the "High Plains Ogallala Aquifer Study" at their January 7th meeting in Dallas.

1. Inventory current ground-water reserves.
2. Make estimates of ground-water reserves which will be available by decade period through the year 2030.
3. Subdivide the aquifer into its based on its ability to yield water to wells to support irrigation both currently and in the future by decade periods. (This subdivision would be made from maps showing the saturated thickness of the aquifer coupled with data related to the specific yield of the aquifer.)
4. Make a current inventory of the food and fiber produced in the area under current water availability conditions and project the decrease in its capacity to produce food and fiber under limited water supply conditions as identified in three above.
5. Make estimates of the economic impact to each area, to each State and the nation by decade periods as a result of the declining agriculture production as identified in four above. The economic impact statement should include estimates of availability of food and fiber as well as increased cost of food in the supermarkets throughout the nation by decade period as a result of reduction of food and fiber production. The reduced purchasing capacity of the residents of the area should be made for household furnishing, automobiles, tractors, fertilizers, fuels, clothes, taxes, etc., and the effects of these reduced purchases on the labor market in other areas of the nation as a result of the declining water supplies and decreased production. Also, the economic impact statement should include estimates of the effect of this decreased production of food and fiber on the U.S. international balance of payments.
6. Based on information developed in three, four, and five above, develop a conceptual plan to stage delivery of surplus water from outside the area to the areas of need at the time of need.
7. Make projections of social and economic effects to each area, to each state and the nation by maintaining agricultural productivity of area by importing water to the areas as described in six above.
8. Describe and measure the social and ECONOMIC costs of adjustment if no new water is brought to the area.

Prime Contractor

A subcommittee of the Council was also appointed, by Governor Boren, to establish procedures for directing the Federal funding of the proposed studies through the Council, and the selection of a prime contractor (consulting firm) to direct the study. The subject Council committee met with Federal agency personnel in Washington, D.C. on January 14, 1977, to

BLACK TO RECEIVE AWARD

A. L. Black of Friona, chairman of the Texas Water Development Board is slated to receive one of four awards for outstanding contribution to conservation of natural resources at the annual meeting of the National Association of Conservation Districts (NACD) in Atlanta, Georgia, February 6-10.

Black will be honored for "years of sustained devotion to the goals of conservation, agricultural progress and resource development."

He has served on five NACD national committees and has been chairman of the Great Plains Committee. Black is a former president of the Association of Texas Soil and Water Conservation Districts.

Others to be honored at the annual meeting are Sen. Herman Talmadge, D-Ga., chairman of the Senate Agricultural Committee; Morris G. Hallock of Sturgis, S.D., president and publisher of the Sturgis Tribune; and the Caterpillar Tractor Co. of Peoria, Ill.

TWCA MEET SET

The 33rd Annual Convention of the Texas Water Conservation Association is slated March 2-4, in the Palacio Del Rio Hotel in San Antonio.

An outstanding program is planned with speakers to include Texas House Speaker Bill Clayton; Gen. John Morris, Chief, Corps of Engineers; R.I. Commission Chairman Mack Wallace; Pat O'Meara, Executive Director of the National Water Resources Association; Dr. Joe Edmiston, environmentalist; Marcus Yancy, Texas Highway Department (Transportation); and Jerry R. Holleman, labor consultant.

Webb Gober of Farwell, Director of High Plains Underground Water Conservation District No. 1, is a member of the Irrigation Panel for TWCA and as a member serves on the TWCA Board of Directors.

Additional information may be obtained from the District office or the TWCA office in Austin.

establish funding procedures; however no definite provisions for primacy of the Councils directing the subject studies was resolved.

Financing

Although Section 193 provides for the appropriation of six million dollars for the High Plains studies, no appropriation has yet been made for same by the U.S. Congress. However the Economic Development Administration has earmarked 1.2 million dollars out of its 1977 appropriations for commencing the subject studies.

A briefing, by Dr. Herbert Grubb of the TWDB, regarding actions which have been taken by the HPSC was presented to several interested and concerned members of the Governor's Task Force on Water Conservation and Development at the conclusion of the Task Force's monthly meeting on January 12th in Austin (see related photograph).

NOTICE: Information regarding times and places of the monthly County Committee meetings can be secured from the respective County Secretaries.

Applications for well permits can be secured at the address shown below the respective County Secretary's name, except for Potter County; in this county contact W. J. Hill.



Mr. and Mrs. Ray Gerk of Hereford and their daughters, Shelley, Shannon, and Shyla.

Board Welcomes New Member

A new member on the Board of Directors for the High Plains Underground Water Conservation District No. 1, is Ray Gerk of Hereford, who represents District Director's Precinct Four, which includes Deaf Smith, Armstrong, Potter and Randall Counties.

Elected January 15, Gerk replaces Gilly Wayne Sisson of Hereford. He was sworn in as a Director in ceremonies January 24, at the Hilton Inn in Lubbock, by Judge Robert Wright of the 137th District Court.

Gerk and his wife, Carol, are the parents of three daughters, Shelley, 14; Shannon, 11; and Shyla, 8. The younger two girls attend St. Anthony's school in Hereford, and Shelley is an eighth grader at La Plata Junior High school in Hereford.

Born in Ovid, Colorado in 1936, Gerk attended schools in Sedgewick, Colorado. He and his brother, Robert, are partners in a 3500-acre irrigated farm near Holyoke, Colorado, on which they grow corn and pinto beans.

Gerk farms about 4,000 acres in Deaf Smith County which he leases or owns, all irrigated. On it he raises corn, wheat and potatoes. He farms an additional 3600 acres in southeastern Colorado, in Baca County, which he is developing for irrigation, and he raises corn, wheat and milo there.

He owns interest in a cattle feeding operation near Hugo, Oklahoma.

A strong believer in the free enterprise system, Gerk firmly believes in private ownership of groundwater, and is particularly encouraging of the methods used in water conservation in Texas. Because he owns property in other states (Colorado and Nebraska), Gerk has had first-hand experience with groundwater situations in other areas.

Because of Gerk's experience with groundwater laws in other states, the District feels that Gerk will be a strong member of its Board of Directors, and is happy to welcome him to the Board.

GOBER ELECTED PRESIDENT OF BOARD

Webb Gober of Farwell was recently re-elected to the Board of Directors of the High Plains Underground Water Conservation District No. 1. He represents District Director's Precinct Three, which includes Bailey, Castro and Parmer Counties. Gober was sworn in as a Director January 24, by Judge Robert Wright of the 137th District Court in Lubbock, and was elected President of the Board by his fellow Board members. He has previously served as Vice-President and Secretary-Treasurer of the District's Board of Directors.

Gober and his wife, the former Irene Sachs, live nine miles northeast of Farwell and farm 480 acres of corn, wheat, grain sorghum and a little milo. All the acreage is under irrigation.

Born in 1918 in Frederick, Oklahoma, Gober moved to the Farwell area in 1925 with his parents. He went through school at the Oklahoma School.

Following his graduation, Gober attended Texas Tech for three years as an agricultural education major, before joining the U.S. Navy, in which he served as a Naval officer for three years during World War II.

He and Mrs. Gober were married in 1942, in Savannah, Georgia, during his Navy tour.

He began farming on his own in 1946, and since then has served on several advisory boards and committees. He was County Committeeman for the District from Parmer County for seven years, before his election, in 1973, to the District's Board of Directors. In March, 1976, he was elected to a three-year term on the Irrigation Panel for the Texas Water Conservation Association (TWCA) and in that capacity, serves as a member of the TWCA Board of Directors.

Gober and his wife are the parents of three sons and a daughter. The eldest, Jerald, received his Master's Degree from Texas Tech, and is employed by an insurance firm in Hartford, Connecticut. Another son, Dale, a Texas Tech agricultural engineering graduate, farms near his parents. The youngest son, Alan, is a Texas Tech

graduate, and currently lives in Lubbock. Kathryn, the Gober's only daughter, is a Texas Tech senior, majoring in elementary education.

As a District Director, Gober particularly enjoys the association with other people in the "water business" and with the residents of the District; but says he dislikes being considered a "policeman" for the District.

He is opposed to state or federal regulation of groundwater, stating, "We know our problems better than people from the outside, and are better qualified to find our own solutions." He praised District employees and other Board members, saying, "We have very competent people working for the District."

Gober believes the aims of the District in the areas of water conservation can be best accomplished through public education, and feels that the high schools are an excellent training ground for water conservation practices.

Although he does not foresee an immediate critical energy situation for farmers in the District, he does feel that eventually energy costs will be part of the solution for area water conservation problems. Costs of pumping will be eventually so great that they may outstrip the advantages of irrigation.

He does foresee additional natural gas curtailments, but says they have been more of a nuisance in the past than anything else. The energy problem in this area will eventually become critical, he adds.

He believes technology can be an effective factor in water conservation, and believes more and more farmers will go to crops with shorter growing seasons which require less water, and crops which simply require less applied irrigation.

The District is pleased to welcome back Gober, and considers that his experience and expertise as Secretary-Treasurer and as Vice-President of the Board of Directors, as well as his wide experience in the fields of water-related activities, will be an invaluable asset to the District and to the Board of Directors.



Charles Whitfield, Consulting Land Appraiser from Lubbock, uses the District's saturated thickness maps in developing the 1976 cost-in-water values used in the cost-in-water depletion income tax allowance program.



Mr. and Mrs. Webb Gober of Farwell.



Judge Robert Wright of the 137th District Court in Lubbock, left, swears in Webb Gober of Farwell, center, and Ray Gerk of Hereford, as members of the District's Board of Directors in ceremonies January 24 in Lubbock. Gober is serving his third term on the Board and Gerk, his first.



New officers elected by the District's Board of Directors are from left, seated, James Mitchell, Vice President; A. W. Gober, President; and from left, standing, Ray Gerk; Selmer Schoenrock, Secretary-Treasurer; and Malvin Jarboe.



Jim Osborne, Chairman of the Agricultural Economics Department at Texas Tech University, talks with District Manager Frank Rayner, and Mrs. Ann Bell, geologist for the Texas Water Development Board, at the winter meeting of the Texas Farm and Ranch Managers and Appraisers meeting in Amarillo recently. All were speakers at the meeting.

COUNTY COMMITTEEMEN ELECTED

Twenty-two County Committeemen, three from each of the seven counties in District Director's Precincts Three and Four were chosen in the election January 15. A fourth County Committeeman was elected in Armstrong County to fill a vacancy created when a former Committeeman moved from the District. They will each serve a four-year term.

Committeemen from Parmer County chosen were Dalton Caffey of Friona, Troy Christian of Farwell, and Ronald Elliott of Muleshoe.

Those from Armstrong County were Guy Watson, Bill Heisler, James Bible, and Leslie Adams, all of Wayside.

Bailey County Committeemen are David Stovall, Ernest Ramm and

Eugene Shaw, all of Muleshoe. Frank Wise, Jackie Clark, and A. Baldrige were chosen from Cass County as Committeemen.

Deaf Smith County Committeemen are Tom Robinson, James Higgins and Garland Solomon, all of Hereford.

Elected from Potter County Committeemen were Jim Line and Weldon Rea, both of Bushland, and Albert Nichols of Amarillo.

Randall County Committeemen selected were Jack Brandt of Canyon, Harry LeGrand of Amarillo, and J. Albracht of Bushland.

The terms of office and the addresses of the five County Committeemen for each of the 15 counties in the District are listed on page 2.

PROGRAM FOR WESTERN IRRIGATION FORUM SCHEDULED FOR DENVER, COLORADO

A Western Irrigation Forum sponsored by Tri-State Generation and Transmission, Inc., has been scheduled for February 9-11 at the Regency Inn in Denver, Colorado.

The program is as follows:

FEBRUARY 9

- 10:00 a.m. Registration
- 1:15 p.m. Welcome—Tri-State General Manager W. E. Mickey
- 1:25 p.m. Keynote address—Ken Hill, Operations Field Representative for REA
- 1:50 p.m. "Water—An Exhaustible Resource"—Frank Rayner
- 2:15 p.m. Water Inventory Panel—Paul Liess, moderator; Leonard Mercer, Vince Dresszen, Anthony Mancini, and Ed Jenkins.
- 4:00 p.m. "Water—Legal Problems"—David Harrison, attorney
- 7:30 p.m. Banquet—Dr. Donal D. Johnson, speaker

FEBRUARY 10

- 8:15 a.m. "REA Irrigation Survey Requirements"—John Spellman, REA
- 9:00 a.m. "Load Management Without Hardware"—Tom Broz and Robert Longenbaugh
- 10:30 a.m. "Load Management Hardware Presentations"—Jerry Seed, moderator

FEBRUARY 11

- 8:15 a.m. "Irrigation Scheduling—Success or Failure"—Laverne Stetson, moderator; John Anschutz, James Underwood, John Evans, and Gene Lieneman
- 10:00 a.m. "Load Management Peaks and Valleys"—Jack Fuller
- 10:45 a.m. Summary—Robert F. Risch
- 11:15 a.m. Adjournment

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EXTENT OF OGALLALA AQUIFER



Wayne Wyatt, former Head of Water Import Division of the Texas Water Development Board, visits with Rep. Bob Close of Perryton, member of the Natural Resources Committee in the Texas House of Representatives, at the TWDB public hearing for the revised Texas Water Plan. Wyatt presented computer projections of the expected depletion rate and decline in well capacities of the Ogallala aquifer in Texas.

Interim Committee Submits Report To Legislature

A recommendation that groundwater conservation districts be given the power to buy, sell, and distribute (or transport) surface and groundwater has been presented to the 65th Texas Legislature's House of Representatives by the Natural Resources Committee, headed by Rep. Tom Craddick of Midland.

Expansion of the powers of groundwater districts in several areas was suggested to the Legislature in the Interim Report of the Sixty-Fifth Legislative Session. The Committee noted that Chapters 51 and 52 of the Texas Water Code contain provisions for the administration and creation, respectively, of groundwater conservation districts. It was recommended by the Committee that Chapter 52 be amended to expand the powers of such districts, and include Administrative and Procedural Provisions specifically for groundwater conservation districts.

The portions of Chapter 51 of the Texas Water Code which now apply to groundwater conservation districts also apply to water control and improvement districts. Amending Chapter 52 as recommended would elimi-

nate the need for any of Chapter 51 to apply to groundwater conservation districts.

High Plains Underground Water Conservation District No. 1 is the largest of the five active groundwater conservation districts in Texas. The others are North Plains Water Conservation District, Panhandle Groundwater Conservation District, Edwards Underground Water District and the Harris-Galveston Coastal Subsidence District. The first three have been created and operate pursuant to laws codified under Chapters 51 and 52 of the Texas Water Code. The other two operate under special statutes.

The Committee praised groundwater districts for their work in conservation, noting that "while current groundwater supplies are conserved by local groundwater districts and conservation practices (such as tailwater pits), maintenance of future production in the High Plains at the present levels is dependent, ultimately, on the importation of water from sources outside the area."

Since present law (Section 52.105)

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Soil Moisture Survey Completed

By O. H. Newton

The 10th Annual Soil Moisture Survey for 14 counties of the South Plains was completed in early February. Each year for the past 10 years, the amount of moisture stored in the top five feet of soil has been evaluated from soil moisture measurements at approximately 90 locations. This information serves two purposes: to provide year-to-year and area-to-area changes, and to indicate the current soil moisture needs for the coming season.

The survey just completed shows a higher level of variability than has been the case in recent years. This was undoubtedly due to the erratic rainfall distribution as well as irrigation and crop deficiencies. The driest soils showed deficiencies as much as six inches, while some of the wetter areas were down by no more than one inch. About 20 percent of the 14 counties was deficient by two inches or less while about 30 percent needed from four to six inches. The remainder was moderately dry and needed two to four inches.

The average for the 90 readings made over the 14 counties was -3.3 inches. This may mean very little to the individual farmer, but when we compare this to the -3.2 inches average for last year and the -6.0 inches average for the 1973-74 survey, it does indicate that the area is not critically short. In fact, the deficiency for this year is only slightly higher than the average for the area's more productive years. It does mean, however, that most sections will need average to above average rainfall if we are to expect a productive agricultural production year.

Soil Moisture Carry-Over

The amount of available soil moisture that can be carried over from one season to the next is dependent on the water holding capacity of the soil. Usually, we consider the top five or six feet for most crops. Sandy soil can hold about seven inches in this layer while heavier clay soils have a capacity of nine inches or more.

This does not mean that a well-saturated soil will supply the moisture needed to produce a crop. Most South Plains crops will extract a minimum of about 12 inches and possibly as much as 20 inches or more. Actually, this pre-season moisture may supply only a portion of the total used by the crops, but more importantly, it forms

the base moisture. This means that any additional moisture added by rain or irrigation can go to crop production rather than to make up any existing deficiency.

Purpose Of Survey

The primary purpose of the Annual Fall and Winter Soil Moisture Survey is to determine the average amount of moisture that is held in the top five feet of South Plains soils. This, in turn, provides a basis for estimating the need for and the amount of pre-plant irrigation required to rewet the soil and give the farmer the best chance for a profitable crop.

During the early years of South Plains irrigation, it was found that better crops could be produced if the soil was wet prior to spring planting. Years of crop production have not produced a substitute method and the need for a well saturated soil profile prior to planting still holds. Until recent years, farmers could only guess at the amount of water needed to wet the soil, but with modern techniques, it has been possible to make a reliable estimate of additional pre-season water needs. Farmers who irrigate in excess of that which is needed probably will lose money and valuable water and those having sandy soils could lose nutrients which may be leached out of the soil.

Review Of 1976-77 Season

Several weather and crop factors influence the amount of moisture that is retained in the soil and carried over from one season to the next. Some of these factors have a subtle effect and are difficult to evaluate while others are more obvious.

Factors that appear to have had the greatest influence on soil moisture during the 1976-77 season were the late summer and early fall rainfall and the early freeze that cut off late season soil moisture extraction by crops. Late summer and early fall rainfall was a significant factor this season but, because distribution and timing were less than favorable, the soil moisture pattern is more erratic than usual. Another factor that influenced the pattern was the non-uniformity of the crops. Some crops produced fairly heavy foliage and the water use was high, while other areas produced less foliage and the water demand was lower.

In almost all areas the dry late fall and winter season combined with the continued on page 3... SOIL MOISTURE

THE Cross SECTION

A MONTHLY PUBLICATION OF THE HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1

2930 Avenue Q, Lubbock, Texas 79405

Telephone 762-0181

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Second Class Postage Paid at Lubbock, Texas
District Office at Lubbock

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- Don Smith Geologist
- Don McReynolds Geologist
- Tony Schertz Draftsman
- Obbie Goolsby Field Representative
- J. Dan Soale Field Representative
- Oscar Biemer Field Representative
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- Kenneth Corver Asst., Permit Section
- Mrs. Norma Pitts Secretary-Dockkeeper
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- Miss Kathy Redeker Receptionist

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Precinct 2

(COCHRAN, HOCKLEY and LAMB COUNTIES)

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Precinct 3

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(ARMSTRONG, DEAF SMITH POTTER and RANDALL COUNTIES)

Rex Oak — Hereford

Precinct 5

(FLOYD and HALE COUNTIES)

Malvin A. Jarboe — Floydada

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Armstrong County

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Wayside, Texas

Gordell Mahler, 1979 — Wayside

James Bible, 1979 — Wayside

Guy Watson, 1981 — Wayside

Bill Weisler, 1981 — Wayside

Leslie Adams, 1981 — Wayside

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Doris Wedel, Secretary

H&R Block, 224 W. 2nd, Muleshoe

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Ernest Ramon, 1981 — Rt. 2, Muleshoe

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City Hall, 120 Jones St., Dimmitt

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Glenn Odum, 1979 — Rt. 4, Box 135, Dimmitt

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W. A. Haldrup, 1981 — 600 W. Grant, Dimmitt

Frank Wine, 1981 — Rt. 4, Box 10, Dimmitt

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Western Abstract Co., 108 N. Main Ave., Morton

Jessie Clayton, 1978 — 796 S. Main, Morton

Robert Yeary, 1978 — Route 2, Morton

Hershel M. Tanner, 1980, Route 2, Box 36, Morton

Danny Key, 1980 — Star Route 2, Morton

H. H. Rossen, 1980 — Star Route 2, Morton

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Clifford Thompson, Secretary

2930 Avenue Q, Lubbock

Donald Aycock, 1978 — Lorenzo

Alvin Morrison, 1978 — Box 6, Lorenzo

Tommy McCallister, 1980 — 309 N. Van Buren, Lorenzo

Edward B. Smith, 1980 — 102 N. Van Buren, Lorenzo

Pat Youkum, 1980 — Box 146, Lorenzo

Deaf Smith County

B. F. Cain, Secretary

County Courthouse, 2nd Floor, Hereford

George Ritter, 1979 — Rt. 5, Hereford

Bill Cleavinger, 1979 — Route 1, Wildorado

James E. Hixson, 1981 — 200 Star St., Hereford

Garland Solomon, 1981 — 303 Sunset Dr., Hereford

Tom Robinson, 1981 — 311 Cherokee Dr., Hereford

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Helen Bertrand, Secretary

Farm Bureau, 101 S. Wall Street, Floydada

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Gilbert L. Frewer, 1978 — Rt. 4, Floydada

C. O. Lyles, 1980 — Route 4, Floydada

Connie Bearden, 1980 — Route 1, Floydada

M. M. Smithman, 1980 — Silverton Star Rt., Floydada



COUNTY	Well Applications Received	New Wells Completed	Replacement Wells Completed	Reportedly Dry Holes
Armstrong	0	0	0	0
Bailey	114	83	6	0
Castro	159	127	5	0
Cochran	15	5	0	0
Crosby	3	2	0	0
Deaf Smith	206	155	7	0
Floyd	94	48	5	0
Hale	26	10	5	1
Hockley	52	37	2	2
Lamb	178	114	20	0
Lubbock	89	38	6	3
Lynn	10	10	0	1
Parmer	173	116	4	1
Potter	1	1	0	0
Randall	35	27	2	2
TOTAL	1155	773	62	10

Water Well Permitting Trends

By Ken Carver

Recently an analysis was made by the District to establish patterns of time and numbers of permits issued. The period studied was the past 10 years (1966-1975). A comparison was then made with the current statistics of 1976.

In order to obtain more concise figures, the District was divided in half; northern and southern counties. The northern counties were Armstrong, Bailey, Castro, Deaf Smith, Lamb, Parmer, Potter and Randall. The southern half consisted of Cochran, Crosby, Floyd, Hale, Hockley, Lubbock and Lynn.

Definite trends began to emerge as the study got under way. Permit activity was noted to be strong during the first six months of each of the 10 years. Total permits issued were 11,272 with 7,162 of these being issued during the first six months—or 63.5 percent.

A further breakdown of these figures showed the northern counties being issued 7,349 permits of the total or 61.1 percent, with 4,491 issued in the first six months or 61.1 percent. The southern counties requested 3,920

permits with 2,671 being issued during the first half of the year or 68 percent.

In 1976, a total of 1,155 permits were issued. For the first half of the year, 716 permits were issued or 61 percent of the total. A breakdown of 1976 permits into counties yielded the following percentages: northern counties had 61.6 percent issued during the first six months while the southern had 63.7 percent issued for the same period.

For the 10-year period 1966-1975, an average of 94 permits were issued per month. An average of 119 permits were issued during the first six months of each year of those 10 years with only an average of 69 permits per month for the last six months of the year.

The above averages compare with an average of 96 permits per month issued during 1976. The first six months-average-per-month was 119 with 73 being the average per month for the last half of the year.

The study of the permits issued the past 10 years, with the comparison of 1976 statistics show the pattern set far back as 1966 is still in effect today.



Attending the hearings of the Texas Water Development Board February 17 for renewal of weather modification permits were former District Board member Chester Mitchell (wearing dark jacket and glasses) and District Manager Frank Rayner. A standing-room-only crowd turned out for the hearings, in the 99th District Court in Lubbock.

NOTICE: Information regarding times and places of the monthly County Committee meetings can be secured from the respective County Secretaries.

Applications for well permits can be secured at the address shown below the respective County Secretary's name, except for Potter County; in this county contact W. J. Hill.

COMMITTEE... continued from page 1

prohibits groundwater conservation districts to buy, sell, or distribute water, and thus prevents a district from providing water for recharge purposes.

The Committee recommended that Section 52.105 be amended to allow groundwater districts to buy, sell, and distribute surface and groundwater. Without such authority, the districts could not serve in a distributor's role for imported or recharge water.

In recommending such power for groundwater districts, the Committee noted that existing districts have more information concerning available water supplies, cover a wide geographical area, and have a history of conservation management. In addition, the underground aquifers which underlie groundwater districts are the logical sites for storage of surface water supplies.

The report stated that effective conservation of groundwater can result through local regulation to prevent waste, but added that perhaps at some time in the future, state regulation might be required to conserve water supplies.

It was recommended also by the Committee that Section 52.103 be amended to permit groundwater districts to levy "reasonable fines for the full violation of the district's rules and regulations." The Committee was of the opinion that this would aid the districts in the enforcement of their rules and regulations.

Certain provisions in Chapter 51 of the water code which were found to be objectionable to groundwater districts by the Committee are the limitation of the Boards of Directors to five members, specified meeting dates, and staggered two-year terms. Groundwater district representatives agreed that for full geographic representation, the limitation of the number of Board members was undesirable. Also, under the current provisions, for staggered two-year terms, the districts are required to conduct increasingly expensive elections annually.

If Chapter 52 were amended to give its own Administrative and Procedural Provisions, provisions could be written specifically for groundwater conservation districts. Thus, the Ad-

ministrative and Procedural Provisions in Chapter 51, which apply to both water control and improvement districts and groundwater conservation districts, and were found to be objectionable to groundwater districts, could be corrected.

The Committee urged (but did not recommend) that future consideration be given to requiring permits for all wells drilled, and eliminating the exemptions for those wells which produce 64.7 gallons per minute or less, as provided for in Section 52.118.

Also not recommended but suggested for future consideration was a requirement that the entire area over a delineated aquifer participate in each groundwater district if the majority of voters approve creation of the district. This would eliminate the provision in the law which permits segregated irrigation areas which vote against creation to be excluded from a district. The Committee believes that otherwise, persons outside the district can defeat the conservation measures of the district.

Legal counsel for the Natural Resources Committee Interim Report was William S. Rose. Assisting Craddick with the Report were Rep. Tony Dramerger of San Antonio as vice-chairman and Rep. Wayne Peveto of Orange as vice-chairman, appropriations. Other committee members are Representatives Bob Close of Perryton, Samuel Hudson of Dallas, Tom Massey of San Angelo, Greg Montoya of Elsa, Bob Simpson of Amarillo, Chester Slay of Nederland, Perry Tanner of Livingston and Ed Watson of Deerpark.

Frank Rayner, manager of HPUWCD No. 1, praised the Committee for its "very thorough and deliberate research into the activities and problems encountered by existing groundwater management districts." He believes if the recommendations are implemented, continued and better local management of groundwater supplies would be perpetuated.

As yet, none of the recommendations of the Committee has been introduced as a bill in either the Texas House of Representatives or Senate.



Ray Gerk, right, member of the District's Board of Directors, visits with Bob Goldenstein, Manager of the Highline Electric Association in Holyoke, Colorado, while attending the Western Irrigation Forum in Denver, Colorado, February 9-11. (See The Cross Section, January, 1977). The Forum, sponsored by Tri-State Generation and Transmission Association, was concerned with groundwater supplies and management, and irrigation energy requirements and (power) load scheduling. District Manager Frank Rayner presented a paper on groundwater management on the Texas High Plains.

SOIL MOISTURE... cont. from page 1

usual land preparation has created a dry top layer of the soil. This will undoubtedly present problems of getting seed germinated and seedlings up to a good stand. In areas subject to irrigation, a moist seedbed can be provided while in dryland areas we must depend on rain.

Chances For Rain

The following chart based on long-term averages shows the probability of getting as much as one to four inches or more during the spring season. This chart is based on the rainfall records

at Lubbock. Chances for this amount of rain are somewhat less in the western and southwestern counties and slightly higher in the eastern and northeastern counties.

1/Compiled and distributed by the National Weather Service Office for Agriculture, Texas Agricultural Experiment Station, and the Texas A&M University Agricultural, Research and Extension Center at Lubbock with partial support by the Plains Cotton Growers, Inc.
2/The author, O. H. Newton, is Advisory Agricultural Meteorologist, National Weather Service for Agriculture, Texas Agricultural Experiment Station at Lubbock.

Rainfall (inches)	PERCENT PROBABILITY FOR RAINFALL (equal to or greater than amount stated)				
	Time Intervals				
	3-21/4-20	3-21/4-30	3-21/5-10	3-21/5-20	3-21/5-31
1.0	39	57	77	90	94
1.5	23	40	61	81	87
2.0	14	28	50	69	80
2.5	9	19	40	59	70
3.0	5	14	31	48	62
3.5	3	9	24	39	54
4.0	2	6	19	32	47

Federal Voting Rights Act Causes Election Costs To Rise

The costs for the election of two members to the Board of Directors of 22 County Committeemen for the High Plains Underground Water Conservation District No. 1 have increased more than nine times since the election conducted in January, 1975, in the seven-county area in the District.

The cost-per-vote in the District's election, held January 15, 1977, was \$8.74. This figure compares with the \$4.16 cost-per-vote in the District's election conducted in January, 1975.

Counties involved in the recent District election were Bailey, Castro, Kinney, Deaf Smith, Armstrong, Potter, and Randall.

The primary reason for the tremendous increase in cost to the District

was the 1975 Voting Rights Act (VRA) passed by the U.S. Congress. The Federal law requires that an area with a certain minority percentage population be required to use the primary language of the minority in the election material. In the case of the District (or Texas) that language is Spanish; therefore, all legal notices had to be printed in both English and Spanish, and all other material pertinent to the election was printed in both English and Spanish (ballots, instructions, signs, etc.).

During the recent election, the District maintained 12 polling places in the seven counties involved in the election.

Since the newspapers charge by the word and since legal notices are re-

quired to be printed in "a newspaper of general circulation" in the District and must be printed three times, one week apart, the new Federal law actually required a doubling of such printing by requiring a Spanish version. Although the District is required to publish in only one newspaper it has been the District's policy to publish in both the Amarillo and Lubbock newspapers in order to get as wide public notice as is possible by publicity in such daily papers.

No person with a Spanish surname voted in the District's 1977 election.

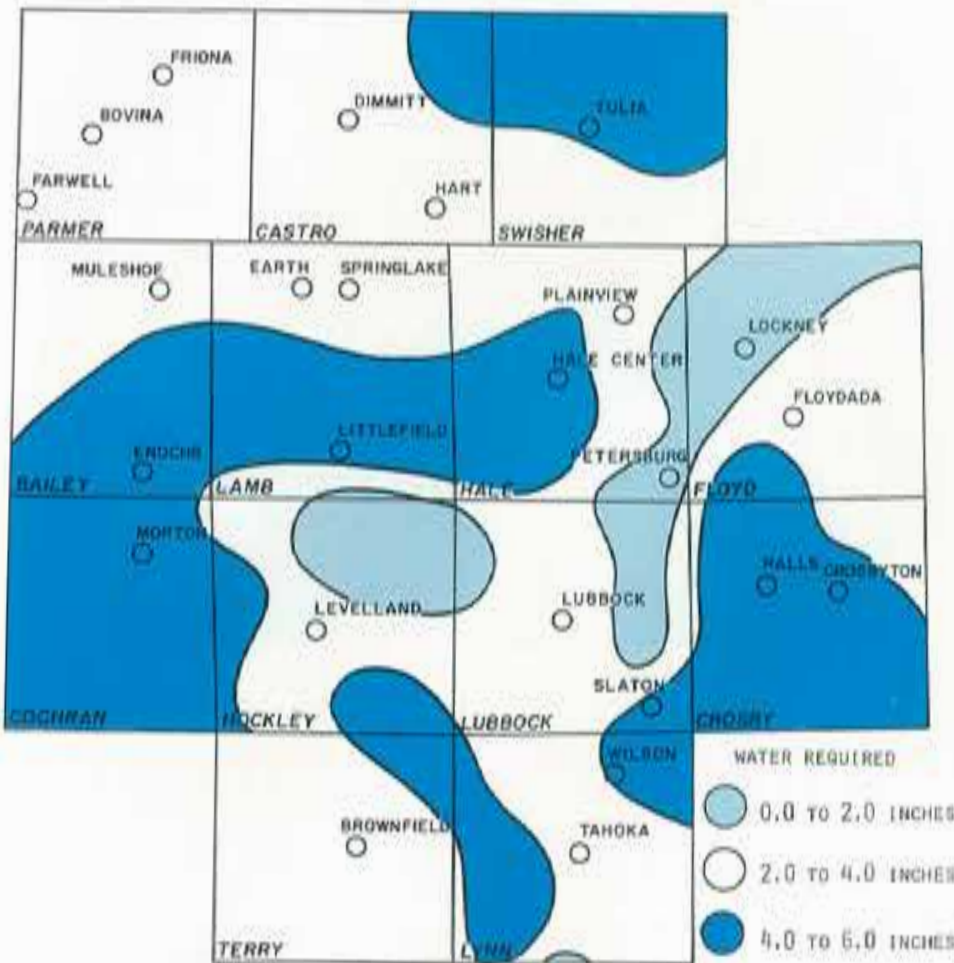
Total election costs for the 1977 election was \$5,926.80. A total of only 153 votes were cast. If every qualified voter in the seven-county area involved in the election had

voted, the total cost would have increased only negligibly, but the cost-per-vote would have decreased considerably. The most expensive vote in the election was cast in Friona, and cost \$90.17 for the single vote in that box. That cost would have been exactly the same, even if no vote had been cast.

Edwards District

The Edwards Underground Water District, based in San Antonio, estimated its 1977 election cost an additional \$27,000, which is 10 percent of that District's annual budget. Their cost-per-vote, according to Assistant Manager Bob Matthews, was only 50 cents per vote, however, because of the large voter turnout.

cont. on page 4... ELECTION COSTS



AMOUNT OF WATER NEEDED TO REWET THE TOP FIVE FEET OF SOIL.

ELECTION COSTS... cont. from page 3

Matthews noted that Mickey Mouse had received one write-in vote in the Edwards District election. Manager Frank Rayner commented that "Mickey Mouse could have won a spot in the District election if he had received one write-in vote."

One County Committeeman in the District election received no votes, but was subsequently appointed to the post by the District's Board of Directors. He was unopposed on the ballot.

Texas Legislative Committee Study

A study of the effects of the 1975 Federal Voting Rights Acts was done by a legislative committee in the Texas House of Representatives. They noted that efforts to comply with the statute had already cost Texas' taxpayers approximately \$200,000 and that more than 35,000 man hours had been logged.

Efforts to comply with the law are going to increase all local election costs dramatically and will, according to the Committee, "take away the

final decision from the local officials and state government, and place it in the hands of the Federal government."

Suggestions to mitigate costs of the requirements of the VRA have not been successful thus far. Establishment of a state office, whose purpose is to assist local governments in preparing VRA submissions (paperwork) to the U.S. Department of Justice to prove compliance, has been one consideration.

Failure to comply with the requirements of the VRA can lead to an investigation by the Justice Department, with the result that an election could be declared null and void. This, however, must be done within 30 days of the election.

Texas Sues

The State of Texas has brought suit against the Justice Department and the U. S. Bureau of Census to change the VRA requirements in regard to Texas. The State challenges figures used by the Federal government in extending coverage of the Voting Rights Act to



Webb Gober, left, president of the District's Board of Directors, talks with U.S. Congressman Jack Hightower and District Manager Frank Rayner at the annual membership meeting of Water, Inc., February 19 at the Hilton Inn in Lubbock where Hightower was the luncheon speaker.

Texas. This case is scheduled to be heard before the U.S. Supreme Court in March.

Although the VRA was an attempt to make the voting process easier and encourage minority voting (or discourage discrimination), it will, in fact, do just the opposite, opined Rayner. The law serves only to complicate the elections to the point that small governmental units, such as the District, will have no choice but to reduce other election conveniences—such as reducing publicity costs and possibly maintaining fewer polling places. Thus, the few votes cast in a District election, could become even fewer.

Future Elections

The District is required, under the Administrative and Procedural Provisions contained in Chapter 51 of the Texas Water Code, to conduct elections annually for Board Members (for staggered two-year terms); and the District's by-laws provide that County Committeemen (five from each of the 15 counties in the District) be elected to four-year terms.

One Board member was elected in 1977 each from Director's Precinct

Three and Director's Precinct Five and three County Committeemen from each of the seven counties. The District election in this area will be in January, 1979, for the two Board Member positions, and for two County Committeemen from each of the seven counties.

However, in January, 1978, the District will conduct an election in the southern portion of the District, in eight counties in Director's Precinct One, Two, and Five. Three Board Members will be elected and County Committeemen each from eight counties in those precincts.

A one-cent-per-word increase in legal notice rate will go into effect in April in the Lubbock newspaper, and the District can undoubtedly anticipate increased costs in staff salaries, legal fees, printed supply costs, election official pay and other expenses.

Election costs have risen substantially each year for the District since 1972, when a vote cost the District only \$2.77.

THE

Cross

SECTION

A Monthly Publication of the High Plains Underground Water Conservation District No. 1

Volume 23—No. 3

"THERE IS NO SUBSTITUTE FOR WATER"

March, 1977

Brown Named Ag Commissioner

Reagan V. Brown, special assistant to Gov. Dolph Briscoe, has been named by the Governor as Texas' new Commissioner of Agriculture, subject to Senate confirmation.

Brown, age 55, was born and reared on a farm and is a 30-year veteran in agricultural work. He has served as County Extension Agent for Hunt, Kaufman, and Caldwell Counties and was widely acclaimed for his innovative community-improvement programs. He instituted the Luling "Watermelon Thump" and helped Luling, Texas, to become the largest shipper of watermelons in the state.



REAGAN V. BROWN

During his employment in Kaufman County, two communities there were named as the most progressive rural communities in Texas. He started the Kaufman County Vetch Festival and helped build vetch seed into a million-dollar-crop in that area.

Brown is on leave from the staff at Texas A & M University as an Extension Sociologist, and holds three degrees from A & M: a B.S. in marketing and finance, an M.S. in rural sociology and an M.A. in education (psychology).

One of Texas' most popular speakers, Brown has spoken in every county in Texas and in 25 states. He was voted "Man of the Year" by Progressive Farmer magazine in 1968.

Brown has vowed to dedicate all his efforts to helping the farmers and ranchers of Texas make a profit. "Texas ranks No. 3 in agriculture now," Brown said, "but we are going to be No. 1 before we get through."

The biggest problem for Texas farmers, in Brown's opinion, is "making a living." After that he listed conservation problems including the recent dust storms, energy problems, and getting more of a share of the world's markets.

The Board of Directors and staff of the High Plains Underground Water Conservation District No. 1 congratulate Brown on his appointment, and wish him success in his position as Commissioner of Agriculture.



Speaker of the Texas House of Representatives Bill Clayton, second from left, shares a moment with three Board Members of the High Plains Underground Water Conservation District No. 1 at the recent annual convention of the Texas Water Conservation Association in San Antonio. Rep. Clayton was a speaker at the convention. The Board Members are, left to right, Mai Jarboe of Floydada, Ray Gerk of Hereford, and Selmer Schoenrock of Levelland.

POLL REVEALS CITY RESIDENTS' OPINION

A question asked recently in a public opinion poll taken by Lubbock television station KCBD, Channel 11, revealed that 32 percent of those surveyed do not believe the High Plains area is running out of water.

According to Jane Prince, news reporter and co-anchor at Channel 11, 343 persons responded in the electronic survey, taken February 17. Of those who answered, 55 percent or 188 persons replied in the affirmative to the question, "Do you believe the High Plains area is running out of water?"

The 32 percent who believe we have sufficient water amounted to 109 persons, and 46 fell into the category of "undecided", which computed to 13 percent. Those surveyed had the option of replying "yes", "no", or "I don't know". An additional 58 persons did not respond at all and are not included in the tabulation, even in the undecided category.

On the following day, the question was asked, "Would you vote for tax money to import water to the High Plains area?"

Of the 310 responses, 61 percent (190 persons) answered "yes"; 28 percent (86 persons) said "no"; and 11 percent (34 persons) said they were undecided.

The survey was taken by means of six tape recorders, with telephone numbers dialed by operators who activated the recorders when the telephone was answered. The person polled is asked a question which has been pre-recorded by Miss Prince. The phone numbers are normally selected from the Lubbock phone book, and are chosen randomly, according to a statistical formula.

It is obvious that a credibility gap exists between the communications media (or perhaps the government) and the people of the High Plains. We

continued on page 2... T.V. POLL

District Manager Named To TWCA Panel

District Manager Frank Rayner was elected to a two-year term on the Groundwater Panel of the Texas Water Conservation Association at the annual convention March 2-4 in San Antonio. In that capacity, he will serve on the TWCA Board of Directors. He replaces Bill Clayton of Springlake, Speaker of the Texas House of Representatives, on the Panel.

Carl Riehn, Executive Director of the North Texas Municipal Water District, was sworn in as president of TWCA, and John Specht, General Manager of the Guadalupe-Blanco River Authority in Seguin, was named President-elect. Frank Moon of Houston, outgoing president of TWCA, was named as Chairman of the Board.

J. W. (Buck) Buchanan of Dumas was re-elected to the Groundwater Panel, as was Jay S. Myers of Carrizo Springs. The 1977 TWCA convention was dedicated to Buchanan, manager of the North Plains Groundwater Conservation District. Buchanan also serves on the TWCA Executive Board as a vice president.

Three members of the Irrigation

Panel were re-elected. They are J. D. Nixon of Beaumont, Walter R. Clark of Devers and John A. Hayes of Pecos. Webb Gober, president of the Board of Directors of High Plains Underground Water Conservation District No. 1, serves on the Irrigation Panel. His term expires in 1978.

Panel members for TWCA are elected for staggered two-year terms, and those who are elected also serve on the TWCA Board of Directors.

The Municipal Panel elected three new members; Bill Ratliff of Houston, John Kubala of Arlington, and E. H. Ingram of Garland. The three replace Alee Cunningham of Corpus Christi, Curtis Johnson of Austin, and T. L. Koederitz of San Angelo.

Robert Lee Johnson of Dallas and Clyde Cole of Silsbee were re-elected to the Industrial Panel, and James Frank of Victoria is a new member, replacing W. V. Osgood of Orange.

Three members re-elected to the River Authorities Panel are Fred Parkey of Wichita Falls, Owen Ivie of Big Spring, and David Brune of Arlington.

continued on page 2... TWCA

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- Don McEynolds _____ Geologist
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- J. Dan Soale _____ Field Representative
- Oscar Blomer _____ Field Representative
- Butch Bates _____ Field Representative
- Clifford Thompson _____ Head, Permit Section
- Kenneth Carver _____ Asst., Permit Section
- Mrs. Norma Fite _____ Secretary-Bookkeeper
- Mrs. Penny Newberry _____ Secretary
- Miss Kathy Redeker _____ Receptionist
- Mrs. Pat Nickell _____ Director of Public Education

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(CROSBY, LUBBOCK and LYNN COUNTIES)

James P. Mitchell, Vice President _____ Wolfforth

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(COCHRAN, HOCKLEY and LAMB COUNTIES)

Selmer H. Schoenrock, Secy./Pres. _____ Levalland

Precinct 3

(BAILEY, CARTRO and FARMER COUNTIES)

A. W. Gober, President _____ Farwell

Precinct 4

(ARMSTRONG, DEAF SMITH, POTTER and RANDALL COUNTIES)

Ray Gerk _____ Hereford

Precinct 5

(FLOYD and HALE COUNTIES)

Malvin A. Jarboe _____ Floydada

COUNTY COMMITTEEMEN

Armstrong County

Carol Rogers, Secretary

Wayside, Texas

- Cordell Mahler, 1979 _____ Wayside
- James Bible, 1979 _____ Wayside
- Guy Watson, 1981 _____ Wayside
- Bill Helsler, 1981 _____ Wayside
- Leslie Adams, 1981 _____ Wayside

Bailey County

Eoria Wedel, Secretary

H&R Block, 224 W. 2nd, Muleshoe

- Marshall Head, 1979 _____ Rt. 1, Muleshoe
- Harold Layton, 1979 _____ Rt. 2, Morton
- Buene Shaw, 1981 _____ Rt. 3, Muleshoe
- David Steval, 1981 _____ Rt. 2, Muleshoe
- Ernest Ramm, 1981 _____ Rt. 2, Muleshoe

Castro County

Garnett Holland, Secretary

City Hall, 120 Jones St., Dimmitt

- Anthony Acker, 1979 _____ Rt. D, Nansreth
- Oleah Odum, 1979 _____ Rt. 4, Box 125, Dimmitt
- Jackie Clark, 1981 _____ Rt. 1, Box 33, Dimmitt
- W. A. Baldrige, 1981 _____ 608 W. Grant, Dimmitt
- Frank Wise, 1981 _____ Rt. 4, Box 10, Dimmitt

Cochran County

W. M. Butler, Jr., Secretary

Western Abstract Co., 105 N. Main Ave., Morton

- Jessie Clayton, 1978 _____ 706 E. Main, Morton
- Robert Yeary, 1978 _____ Route 2, Morton
- Herchel M. Tanner, 1980, Route 2, Box 38, Morton
- Danny Key, 1980 _____ Star Route 2, Morton
- H. H. Rosson, 1980 _____ Star Route 2, Morton

Crosby County

Clifford Thompson, Secretary

2930 Avenue Q, Lubbock

- Donald Aycock, 1978 _____ Lorenzo
- Alvin Morrison, 1978 _____ Box 6, Lorenzo
- Tommy McCallister, 1980 _____ 209 N. Van Buren, Lorenzo
- Edward B. Smith, 1980 _____ 102 N. Van Buren, Lorenzo
- Pat Yeakum, 1980 _____ Box 146, Lorenzo

Deaf Smith County

B. P. Cain, Secretary

County Courthouse, 2nd Floor, Hereford

- George Ritter, 1979 _____ Rt. 5, Hereford
- Bill Cleavinger, 1979 _____ Route 1, Wildorado
- James E. Hissias, 1981 _____ 300 Star St., Hereford
- Garland Solomon, 1981 _____ 303 Sunset Dr., Hereford
- Tom Robinson, 1981 _____ 211 Cherokee Dr., Hereford

Floyd County

Verna Lynn Stewart, Secretary

Floyd Co. Abstract, 215 W. California, Floydada

- Joe Cunyus, 1978 _____ Lockney
- Gilbert L. Fawver, 1978 _____ Rt. 4, Floydada
- O. O. Lyles, 1980 _____ Route 4, Floydada
- Connie Bearden, 1980 _____ Route 1, Floydada
- M. M. Smitherman, 1980 _____ Silverton Star Rt., Floydada



Hale County

J. B. Mayo, Secretary

Mayo Ins., 1617 Main, Petersburg

- Henry Kveton, 1978 _____ Route 2, Petersburg
- Gaylord Groce, 1978 _____ RFD, Petersburg
- Clint Gregory, Jr., 1980 _____ Box 98, Petersburg
- Homer Roberson, 1980 _____ Box 250, Petersburg
- Henry Bearberough, 1980 _____ Route 2, Petersburg

Haskell County

Jim Montgomery, Secretary

609 Austin Street, Levelland

- J. E. Wade, 1978 _____ Route 2, Levelland
- Jimmy Price, 1978 _____ Route 2, Levelland
- Billy Ray Carter, 1980 _____ Route 5, Levelland
- Leon Young, 1980 _____ Route 1, Ropeaville
- Robert Phillips, 1980 _____ 218 Redwood, Levelland

Lamb County

Robert Richards, Secretary

569 Phelps Avenue, Littlefield

- Billy J. Langford, 1978 _____ Box 381, Oton
- Edward Fisher, 1978 _____ Box 47, Sudan
- P. A. Washington, 1980 _____ Box 124, Springlake
- Jack Stubblefield, 1980 _____ Box 397, Spade
- Larry Lockwood, 1980 _____ Star Rt. 2, Littlefield

Lubbock County

Clifford Thompson, Secretary

2930 Avenue Q, Lubbock

- Dan Young, 1978 _____ 4607 W. 14th St., Lubbock
- Clifford Hilbers, 1978 _____ RFD, Idalou
- Don Bell, 1980 _____ Box 114, Wolfforth
- Ronald Schilling, 1980 _____ Route 1, Slaton
- Granville Iso, 1980 _____ Route 1, Shallowater

Lynn County

Clifford Thompson, Secretary

2930 Avenue Q, Lubbock

- Orville Maeker, 1978 _____ Route 1, Wilson
- Freddie Kieth, 1978 _____ New Home
- B. B. Rice, 1980 _____ Route 1, Wilson
- W. R. Steen, 1980 _____ Route 2, Wilson
- Wendell Morrow, 1980 _____ Route 1, Wilson

Farmer County

Ken Horn, Secretary

Horn Insurance Agency, Bovina

- Floyd Reeve, 1979 _____ Box 876, Friona
- Ralph Rowins, 1979 _____ 808 Riddala Dr., Bovina
- Troy Christian, 1981 _____ Rt. 1, Farwell
- Dalton Caffey, 1981 _____ 15th St., Friona
- Ronald Elliott, 1981 _____ Rt. 3, Muleshoe

Potter County

F. O. Colford, III, Secretary

1502 7th St., Canyon

- W. J. Hill, 1979 _____ Box 53, Bushland
- Jim Lins, 1981 _____ Box 87, Bushland
- Albert Nichols, 1981 _____ Rt. 1, Box 491, Amarillo
- Weldon Rea, 1981 _____ Bushland

Randall County

Mrs. Louise Tomukins, Secretary

Farm Bureau, 1714 Fifth Ave., Canyon

- John P. Robinson, 1979 _____ 1602 7th St., Canyon
- Bill Duncan, 1979 _____ Rt. 2, Box 36, Happy
- Harry LeGrand, 1981 _____ 4700 S. Bovin, Amarillo
- Joe Albracht, 1981 _____ P.O. Box 81, Bushland
- Jack Brandt, 1981 _____ Rt. 1, Box 280, Canyon



Mrs. Verna Lynn Stewart, right, is the new Floyd County Secretary for the District. Shown, here with her secretary, Miss Becky Bertrand, Mrs. Stewart owns the Floyd County Abstract Co. at 215 West California St. in Floydada, which will serve as the Floyd County Office for the District, effective April 1.

New Floyd County Secretary Named

As of Friday, April 1, Mrs. Verna Lynn Stewart is the new Floyd County Secretary for the High Plains Underground Water Conservation District No. 1, in Floydada. The District Office in Floyd County has been moved from the Farm Bureau office at 101 South Wall St. to the Floyd

County Abstract Company office, 215 West California Street, a block west of the courthouse.

Employed by the abstract firm in 1956, Mrs. Stewart has owned the business since 1962. Her secretary, Miss Becky Bertrand, 19-year-old daughter of Mrs. Helen Bertrand, former County Secretary for the District.

T.V. POLL... continued from page 1

have been faced with multiple shortages in recent years, such as sugar, gasoline, natural gas, orange juice, paper towels, and coffee, and have continued to buy and use just as much of all these products, although perhaps at higher prices.

Apparently because of their continued availability, we find it difficult to accept the idea that any product mentioned is in short supply.

Thus, as long as the faucet continues to deliver water, perhaps it will be just as difficult to accept a water shortage.

However, the major water user in the High Plains area is agriculture. Farmers use billions of gallons annually to irrigate crops, and the farmers have long since accepted the idea that water is a depleting resource and instigated conservation measures.

The irrigation water used on the High Plains has contributed to making this part of the nation one of the most highly productive agricultural areas in the world, and as a result, we have a booming economy, based on that agriculture.

With the depletion of our water source, the Ogallala aquifer, a gradual but certain return to dryland farming is inevitable, with resultant lowered production levels. What impact this will have on the High Plains economy is yet to be determined, but perhaps an economic impact will be the most definite indicator to High Plains residents that we are indeed depleting our water.

Mrs. Stewart is married to L. Stewart, service manager for Oldsmobile Inc. in Floydada. They are the parents of two daughters and they have two grandchildren.

Gilbert L. Fawver of Floydada replaced Fred Cardinal, who resigned recently as a Floyd County Committeeman. Other members of the County Committee are Joe Cunyus of Lockney, and C. O. Lyles, Connie Beard and M. M. Smitherman, all of Floydada.

The Board of Directors and staff of the District welcome Mrs. Stewart to the roster of County Secretaries.

TWCA... continued from page 1

Robert J. Huston of Austin replaced Josiah Wheat of Woodville on the Environmental Panel. Clark Hubbs of Austin and C. L. Leinweber of Hereford were both re-elected to that Panel.

Guy C. Jackson III of Anahuac and Duane Orr of Corpus Christi were elected to the Navigation Panel and Dow Wynn of Port Arthur was elected to replace Lowell C. Duncan of Irving.

Members of the High Plains Underground Water Conservation District No. 1 Board of Directors who attended the TWCA convention included Mrs. Selmer Schoenrock of Levelland, Mr. and Mrs. Mal Jarboe of Floydada, and Mr. and Mrs. Ray Gerk of Hereford. Mrs. Pat Nickell, Director of Public Education for the District, also attended.

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J. W. (Buck) Buchanan displays the plaque awarded to him in San Antonio denoting that the 33rd Annual Convention of the Texas Water Conservation Association was dedicated to him. Also pictured, from left, are District Board Member Mal Jarboe, District Board President Webb Gober, Mrs. Buchanan, and District Board Member Ray Gerk.



District Board Members and their wives who attended the TWCA conference in San Antonio March 2-4 were, left to right, Irene and Webb Gober of Farwell, Selmer and Maureen Schoenrock of Levelland, Carol and Ray Gerk of Hereford, and FloElla and Mal Jarboe of Floydada. The caretaker of the Water Museum in San Antonio is also pictured.

Pesticide Certification Requires Little Time, Effort

Three hours invested in a training class will result in pesticide application certification for the farmer, who will need the certificate to purchase restricted-use pesticides after October

Training sessions are currently taking place across the state, and will continue into the fall, in an effort to certify between 50,000 and 75,000 Texas farmers before the October deadline. The classes are being conducted by the Texas Agricultural Extension Service. Training classes and materials are free, as is the private applicator's certificate.

A certificate to purchase and use restricted-use pesticides will be required after October 21, according to the amended Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), which was first passed in 1947, amended in 1972, and again in 1975. The act is administered and enforced by the Environmental Protection Agency (EPA).

Under the amended FIFRA law, each state is required to pass legislation and devise its own plan to comply with the federal regulations. Each state plan must further be approved by the EPA.

The Texas Department of Agriculture is the state's lead agency for developing and implementing the State of Texas Plan for certification of pesticide applicators as required by federal law. The Texas plan has been approved by the EPA with "contingencies" but should the program be invalidated by EPA, those already certified will remain so.

Each pesticide will be labeled by the EPA as either a "general" or a "restricted" use chemical, based on the potential hazard to the applicator, anyone else, or the countryside. A federally restricted-use pesticide may

be used only by or under the direct supervision of a certified applicator.

Becoming a certified private applicator is as easy as taking a test, with no high score required. The test, which is divided into five segments, is kept by the applicant for future reference.

Procedure for qualifying for certification involves viewing a slide presentation, answering the test questions concerning that segment; going to another slide presentation, answering more questions, and so on, until the test is completed.

Should an applicant answer a test question incorrectly, he has merely to correct his answer when the County Extension agent, who acts as the instructor, goes over the test. At the end of the three-hour session, the County agent collects signed forms from the applicants, who are told that certificates will be mailed to them by the Texas Department of Agriculture.

If a person does not wish to attend a training class, he may answer the test questions after reading the Private Applicator Manual entitled "Using Pesticides." This booklet, which is given to all applicants, contains the same information as the slide presentation.

He then mails his answered test questions to the Texas Department of Agriculture, along with his signed form, which is a request for private applicator certification. The corrected test, along with his certification, will be mailed back to him.

The EPA suggests the best time to apply pesticides is in 95-degree weather. They further suggest that the pesticide applicator wear coveralls or a long-sleeved garment, an apron or a slicker, a hard hat with a face shield or goggles, a respirator, long unlined rubber gloves and tall rubber boots.

Then the EPA warns that early symptoms of pesticide poisoning are excessive sweating, blurred vision, and difficulty in breathing.

A privately certified applicator in Texas cannot accept monetary recompense for his services (in the area of pesticide application). He can, however, trade services, with a busy farmer who does not have certification and wishes to apply a restricted-use chemical under the direct supervision of a certified pesticide applicator.

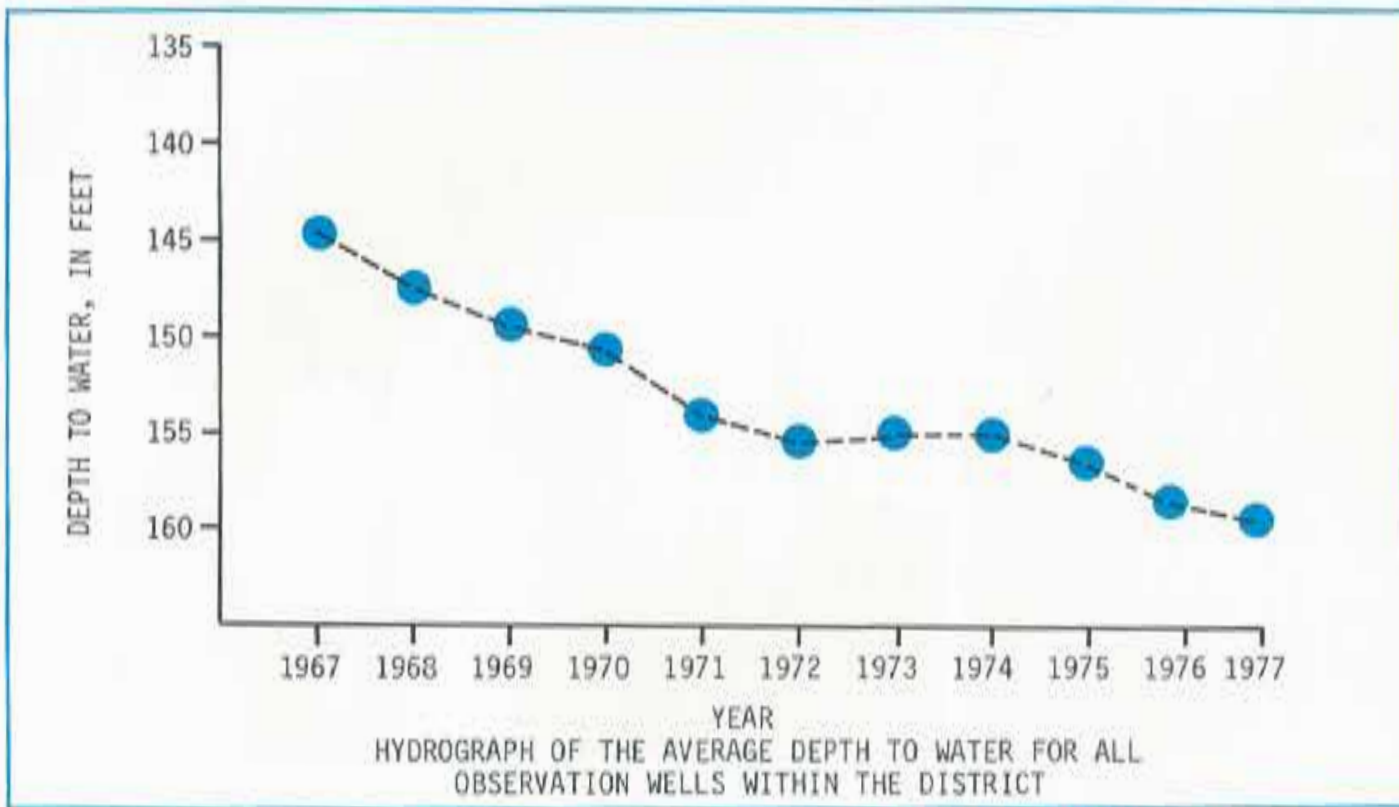
Penalties for violating the FIFRA requirements, subsequent to receiving a written warning from the EPA or following a citation for a prior viola-

tion, may be a civil penalty up to \$1000. Knowingly violating the requirements of FIFRA is a misdemeanor. Upon conviction, a private applicator is subject to a fine of no more than \$1000 or imprisonment for no more than 30 days, or both.

So far, the training sessions have not been particularly well attended. However, so far, no one knows just what restricted-use pesticides will be, because the EPA has not yet released a list of them. The list is, however, anticipated before the October deadline on certification.



Dr. Bill Lyle, second from right, visits with District staff members at the annual High Plains Irrigation Conference in Hereford March 10. Staff members are, left to right, Johnny Lee, District engineer; Kenneth Carver, assistant in Permits Section; and Don McReynolds, geologist. Dr. Lyle was a speaker at the Conference.



DEPTH-TO-WATER MEASURED IN DISTRICT OBSERVATION WELLS

by Don Smith

A preliminary evaluation of the data obtained from January 1977 measurements of the depth-to-water values in the 800-plus water level observation wells within the District has been completed. The overall direction of change continues to be a decline or drop in the water table; this trend became apparent soon after the introduction of groundwater pumpage to the area and has continued without reversal to date.

The rate of decline (feet per year or percent of reduction to the aquifer) has a direct relationship to the amount or volume of water removed from the aquifer through pumpage. Year-to-year and area-to-area pumpage extractions have normally been highly variable and closely aligned to such factors as the thickness of the aquifer, soil type of the land surfaces, intensity of well development, crop type patterns, distribution of precipitation and other criteria of varying importance. For these reasons, the validity of observed data becomes more meaningful when viewed in perspective to established long term trends with the annual changes serving as a comparison to overall averages.

The table "Average Decline of

Water Table"—serves to depict the changes within each county, or that portion of the county contained within the District's boundaries.

County	Avg. Decline in ft. 1976-1977	Avg. Annual Decline in ft. 1968-1977
Armstrong	1.40	1.19
Bailey	3.09	1.44
Castro	3.86	2.96
Cochran	1.44	0.16
Crosby	2.68	1.73
Deaf Smith	3.49	2.58
Floyd	3.42	2.27
Hale	2.45	1.15
Hockley	1.43	0.31
Lamb	3.18	1.96
Lubbock	0.89	0.57
Lynn	-0.35	-0.39
Parmer	4.01	3.08
Potter	1.62	0.98
Randall	0.89	1.50

Comparison of the one-year change to the ten year average annual change clearly illustrates the areas where an extremely dry Spring and early Summer necessitated extensive pumpage. By contrast, Lynn County data reflects the more than adequate rainfall received during the growing season.

The Table "Summary of Water-Level Measurements", presents data for the District on the number of wells measured, the minimum, maximum

and average depths to water for each county in January 1968 and January, 1977.

While numerical statistics may lend themselves to a variety of interpretations, it would appear that the calculated values for the average-to-water within the District have not experienced as large an incremental change from year-to-year as was noted in the past. In retrospect, a marked change in the yearly overall increase in average depth became noticeable in 1972 and subsequent years' data have helped to validate this change in the

SUMMARY OF WATER-LEVEL MEASUREMENTS

County	No. of Wells Measured	1968			1977			
		Min.	Max.	Avg.	Min.	Max.	Avg.	
Armstrong	8	106.62	146.37	126.41	9	111.74	156.80	135.00
Bailey	53	21.02	139.88	79.19	58	25.00	161.59	92.00
Castro	62	72.63	260.48	169.03	63	107.05	279.84	188.00
Cochran	50	86.78	199.96	141.34	49	76.52	197.62	142.00
Crosby	12	129.59	201.80	177.61	19	133.58	223.68	194.00
Deaf Smith	71	68.25	296.15	165.87	72	58.55	330.87	188.00
Floyd	84	53.04	311.24	187.28	94	61.59	301.21	204.00
Hale	17	81.45	186.74	135.43	17	79.77	201.59	139.00
Hockley	74	41.30	190.00	124.73	74	42.78	196.04	125.00
Lamb	68	32.70	179.40	111.77	71	37.41	214.16	126.00
Lubbock	105	6.05	214.67	125.33	116	13.47	219.14	129.00
Lynn	29	38.90	159.31	91.61	31	23.82	151.80	89.00
Parmer	61	145.25	318.25	229.64	57	170.60	355.28	252.00
Potter	3	204.15	217.04	211.86	3	195.79	220.47	210.00
Randall	31	96.67	226.00	161.55	31	105.01	245.01	174.00
District	728	6.05	318.25	145.79	764	13.47	355.28	158.00

TROY CHRISTIAN HONOR

Parmer County Committeeman Troy Christian of Bovina has been named "Conservation Farmer of the Year" by the Parmer County Soil and Water Conservation District. Christian served as a County Committeeman for the HPUWC District since January 1973, and was elected to a second four-year term in January.

annual trend—a reduction in the annual increase of depth-to-water from more than two feet per year during the period of 1962-1972 to an estimate of approximately 1.5 feet per year during the period 1972-1977.

Causal factors are probably due to both aquifer limitations and economic considerations. In the first instance, the continued thinning of the aquifer with a corresponding change in yields in many areas of the District has undoubtedly reduced the volume of net pumpage. Economic considerations such as increasing energy costs, better conservation practices, and cropping pattern changes necessitated by the available water supply have also contributed to the reduction.

The figure "Hydrograph of Average Depth to Water for all Observation Wells Within the District" pictorially displays the plotted curve for the average depth-to-water within the District. The importance of the curve is not so much in the statistical values contained, but rather in the play of change occurring through time. Averages of the numerical values derived from annual water level measurements should not be interpreted to imply that all of the diversity contained in the aquifer is fully covered by proper ratio of observation wells to each resources situation.

THE

Cross

SECTION

A Monthly Publication of the High Plains Underground Water Conservation District No. 1

Volume 23—No. 4

"THERE IS NO SUBSTITUTE FOR WATER"

April, 1977



Texas Department of Health Resources officials were in Lubbock April 15 to conduct a public hearing on the proposed TDHR drinking water regulations. Committee members included, left to right, C. K. Foster, Director of the Division of Water Hygiene; Dan Le Fleur, chief legal counsel for TDHR; Floyd Williams, Chief of the Domestic Water Supply Branch; and Ron Catchings, Engineer.



Frank Rayner, District Manager, testifies before a committee from the Texas Department of Health Resources at a public hearing conducted in Lubbock April 15. Turnout at the hearing was sparse, and Rayner was the only person testifying.

Drinking Water Regulations Will Result In Higher Consumer Costs

The financial burden long anticipated with the implementation of the Safe Drinking Water Act will soon be faced by Texas High Plains "public water supply systems", in accordance with the provisions of Public Law 93-523, the so-called "safe-drinking water act", passed by the United States Congress in 1974.

The U.S. Environmental Protection Agency (EPA) has established maximum levels for several elements in public drinking water supplies. The proposed EPA interim standards for drinking water were published in the Federal Register, December 24, 1975, to become effective June 24, 1977.

Public Law 93-523 provides that a state agency, if acceptable to the EPA, can be designated as the enforcement agency for the provisions of this Federal law. The Texas Department of Health Resources (TDHR) has been designated by Governor Dolph Briscoe as the State agency responsible for the drinking water portion of PL 93-523. However, the primacy of the TDHR for enforcing Federal drinking water standards has not yet been certified by the EPA.

Pending the certification by the EPA, in an attempt to meet the deadline for state certification as set forth in the Federal laws, the TDHR has published a 28-page report of proposed

regulations governing drinking water supplies and reporting requirements for public water supply systems.

The TDHR conducted public hearings throughout Texas during April, to receive testimony regarding the TDHR proposed standards. They requested that written comments on the proposed drinking water standards be made to the regional or national offices of the EPA prior to April 29. The address of the regional EPA office is: John C. White, Regional Administrator, Environmental Protection Agency, Region 6, First International Bank Building, 1201 Elm Street, Dallas, Texas. The national EPA office address is: Environmental Protection Agency, Office of Water Supplies, Criteria and Standards Division, 401 M Street, SW, Washington, D.C. 20460.

NOTICE TO PUBLIC WATER SUPPLY MANAGERS, HIGH PLAINS OF TEXAS

If the fluoride and/or nitrate content of your water supply exceeds 1.6 or 45 milligrams per liter of fluoride or nitrate respectively, the story on this page will be of particular interest to you.

Fluorides and Nitrates

Two constituents in the proposed regulations, fluoride and nitrate, will prevent compliance with the Federal law for many water systems within the High Plains of Texas.

As far as anyone can tell, water containing relatively high fluoride levels is not dangerous to health and the only adverse effect is thought to be the brown mottling in the teeth of young children. However, in the early 1950s, it became quite popular for water systems to add fluoride to water, because it was proved to be an aid in building strong teeth. It is still widely used in the manufacture of tooth paste, and is inevitably mentioned as a selling point for the product.

Obviously, fluoride was not added

to High Plains water systems since the majority of them already had plenty of fluorides. Too much, it now appears.

At least 81 water systems within the High Plains of Texas exceed the EPA maximum allowable levels for fluorides, while four are above the maximum levels set for nitrates. Of the 81 water systems above the allowable levels for fluorides, 31 are in Lubbock County, and consist mostly of small systems for trailer parks and gin yards. The number does, however, include a few small city water systems.

High concentrations of nitrates have been blamed for "blue babies", a deficiency in an infant's ability to absorb oxygen into the blood. No "blue baby" cases have been linked to water systems in the High Plains area.

The maximum allowable level for nitrate content is 45 milligrams per liter, or 10 milligrams per liter of nitrate nitrogen. In the state of Texas, there are 66 water systems above the permissible levels in nitrates, and 538 water systems in Texas are above the maximum acceptable limits for fluorides.

The proposed TDHR standards vary only slightly from the EPA-published interim standards. The most notable variation is in the definition of a pub-

MAXIMUM ALLOWABLE FLUORIDE LEVELS

When the annual average of the maximum daily air temperatures for the location in which the water system is situated is the following, the maximum allowable levels for fluoride are:

Temperature (Degrees Fahrenheit)	Fluoride Milligrams per liter
63.9 - 70.6	1.8
70.7 - 79.2	1.6
79.3 - 90.5	1.4

cont. on page 2... DRINKING WATER

THE Cross SECTION

A MONTHLY PUBLICATION OF THE HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1

2930 Avenue Q, Lubbock, Texas 79408

Telephone 762-0181
PAT NICKELL, Editor

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District Office at Lubbock

Frank Rayner, P.E.	Manager
Don Smith	Geologist
Don McKeaynolds	Geologist
Tony Scherts	Draftsman
Obbie Goolsby	Field Representative
J. Dan Seale	Field Representative
Oscar Blomar	Field Representative
Butch Bates	Field Representative
Clifford Thompson	Head, Permit Section
Kenneth Carver	Asst., Permit Section
Mrs. Norma Pite	Secretary-Bookkeeper
Mrs. Penny Newberry	Secretary
Miss Kathy Redeker	Receptionist
Mrs. Pat Nickell	Director of Public Education

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Selmer H. Schoenrock, Secy.-Treas. — Levelland

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(ARMSTRONG, DEAF SMITH, POTTER and RANDALL COUNTIES)
Ray Gerk — Hereford

Precinct 5

(FLOYD and HALE COUNTIES)
Malvin A. Jarboe — Floydada

COUNTY COMMITTEEMEN

Armstrong County

Carroll Rogers, Secretary	Wayside, Texas
Gordell Mahler, 1979	Wayside
James Bible, 1979	Wayside
Guy Watson, 1981	Wayside
Bill Heisler, 1981	Wayside
Leslie Adams, 1981	Wayside

Bailey County

Doris Wedel, Secretary	H&R Bldg., 224 W. 2nd, Muleshoe
Marshall Head, 1979	Rt. 3, Muleshoe
Harold Layton, 1979	Rt. 2, Morton
Eugene Shaw, 1981	Rt. 2, Muleshoe
David Stovall, 1981	Rt. 2, Muleshoe
Ernest Ramm, 1981	Rt. 2, Muleshoe

Castro County

Garnett Holland, Secretary	City Hall, 130 Jones St., Dimmitt
Anthony Acker, 1979	Rt. D, Nazareth
Glenn Odum, 1979	Rt. 4, Box 135, Dimmitt
Jackie Clark, 1981	Rt. 1, Box 33, Dimmitt
W. A. Haldridge, 1981	803 W. Grant, Dimmitt
Frank Wise, 1981	Rt. 4, Box 10, Dimmitt

Cochran County

W. M. Butler, Jr., Secretary	Western Abstract Co., 103 N. Main Ave., Morton
Jessie Clayton, 1979	705 B. Main, Morton
Robert Yeary, 1979	Route 2, Morton
Hershel M. Tanner, 1980	Route 3, Box 36, Morton
Danny Key, 1980	Star Route 2, Morton
H. H. Rossen, 1980	Star Route 2, Morton

Crosby County

Clifford Thompson, Secretary	2930 Avenue Q, Lubbock
Donald Aycock, 1978	Lorenzo
Alvin Morrison, 1978	Box 8, Lorenzo
Tommy McCullater, 1980	309 N. Van Buren, Lorenzo
Edward B. Smith, 1980	103 N. Van Buren, Lorenzo
Pat Yeakum, 1980	Box 146, Lorenzo

Deaf Smith County

B. F. Cain, Secretary	County Courthouse, 2nd Floor, Hereford
George Ritter, 1979	Rt. 5, Hereford
Bill Chavinger, 1979	Route 1, Wildorado
James E. Higgins, 1981	808 Star St., Hereford
Garland Solomon, 1981	303 Sunset Dr., Hereford
Tom Robinson, 1981	311 Cherokee Dr., Hereford

Floyd County

Verna Lynn Stewart, Secretary	Floyd Co. Abstract, 315 W. California, Floydada
Joe Cunnys, 1978	Lockney
Gilbert L. Fawver, 1978	Rt. 4, Floydada
C. O. Lyles, 1980	Route 4, Floydada
Connie Beardon, 1980	Route 1, Floydada
M. M. Smitherman, 1980	Silverton Star Rt., Floydada

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Hale County

J. B. Mayo, Secretary	Mayo Ins., 1817 Main, Petersburg
Henry Kveton, 1978	Route 2, Petersburg
Gaylord Groce, 1978	RFD, Petersburg
Clint Gregory, Jr., 1980	Box 98, Petersburg
Homer Roberson, 1980	Box 250, Petersburg
Henry Scarborough, 1980	Route 2, Petersburg

Hockley County

Jim Montgomery, Secretary	609 Austin Street, Levelland
J. E. Wade, 1978	Route 2, Levelland
Jimmy Price, 1978	Route 2, Levelland
Billy Ray Carter, 1980	Route 5, Levelland
Leon Young, 1980	Route 1, Ropesville
Robert Phillips, 1980	218 Redwood, Levelland

Lamb County

Robert Richards, Secretary	500 Phelps Avenue, Littlefield
Billy J. Langford, 1978	Box 281, Otton
Edward Fisher, 1978	Box 67, Sudan
P. A. Washington, 1980	Box 124, Springlake
Jack Stubbelfield, 1980	Box 397, Spade
Larry Lockwood, 1980	Star Rt. 2, Littlefield

Lubbock County

Clifford Thompson, Secretary	2930 Avenue Q, Lubbock
Dan Young, 1978	4697 W. 14th St., Lubbock
Clifford Hilbers, 1978	RFD, Idalou
Don Bell, 1980	Box 114, Wolfforth
Ronald Behilling, 1980	Route 1, Slaton
Granville Igo, 1980	Route 1, Shallowater

Lynn County

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Orville Maeker, 1978	Route 1, Wilson
Freddie Kiech, 1978	New Home
S. B. Rice, 1980	Route 1, Wilson
W. R. Breen, 1980	Route 2, Wilson
Wendell Morrow, 1980	Route 1, Wilson

Pharmer County

Ken Horn, Secretary	Horn Insurance Agency, Bovina
Floyd Reeve, 1979	Box 276, Friona
Ralph Romins, 1979	809 Hidalgo Dr., Bovina
Froy Christian, 1981	Rt. 1, Farwell
Dalton Caffey, 1981	15th St., Friona
Ronald Elliott, 1981	Rt. 3, Muleshoe

Potter County

F. G. Collard, III, 1979	Rt. 1, Box 423, Amarillo
W. J. Hill, 1979	Box 53, Bushland
Jim Lins, 1981	Box 87, Bushland
Albert Nichols, 1981	Rt. 1, Box 491, Amarillo
Weldon Rea, 1981	Bushland

Randall County

Mrs. Louise Tompkins, Secretary	Farm Bureau, 1714 Fifth Ave., Canyon
John P. Robinson, 1979	1002 7th St., Canyon
Bill Dusan, 1979	Rt. 2, Box 30, Happy
Harry LeGrand, 1981	4700 S. Howie, Amarillo
Joe Albracht, 1981	P.O. Box 81, Bushland
Jack Brandt, 1981	Rt. 1, Box 280, Canyon

DRINKING WATER . . . cont. from page 1

lic water system. Under the EPA interim standards, a public system is defined to have at least 15 connections, and serve 25 persons at least 60 days annually.

A public water system is defined by the TDHR as a system for delivery of water for human consumption, if such a system has four or more service connections and regularly serves at least 25 individuals for at least 60 days out of the year. A "community water system" is defined by the TDHR as any system which serves at least four or more connections and regularly serves 25 permanent-type residents for at least 180 days each year.

Another variation in the Federal and State requirements is the EPA limit on total dissolved solids (secondary standards) is 500 milligrams per liter, while the proposed TDHR limit is 1,000 milligrams per liter.

The public hearing for the High Plains area was conducted in Lubbock April 15, and the only person testifying was Frank Rayner, P.E., manager of the High Plains Undergruound Water Conservation District No. 1.

He stated that the fluoride content in the water in the High Plains does not constitute a threat to public health, and said that mottling of teeth is now rare and does not occur except in isolated cases. He opined that individual tolerances to fluoride vary considerably and noted that most youngsters today no longer ingest sufficient quantities of water to cause the brown mottling.

He also noted that the requirements that any new water system (any system developed after the adoption of the EPA standards) meet both the primary and secondary standards would virtually eliminate the development of any new public water supply systems to be supplied by the area's groundwater.

Compliance with Federal and State standards for drinking water are going to cause a severe financial hardship for

many water systems within the District he said, and pledged the District support and assistance to those water systems managements who intend attempt to comply with the regulation or those who will find it necessary seek a variance or exemption from standards.

Rayner also commented on the advisability of adopting the EPA requirements as to the methods (public broadcasting and newspaper notices for continually and repeatedly informing the public that their water system is operating under a variance or exemption. He noted that such reporting requirements would only cause public hysteria and would not benefit the public's understanding of the quality of their drinking water. He was of the opinion that water system managers would be subjected to repeated critique from some of the customers who could become unduly concerned from the public warning and that such managers—in a preservation effort—would tend to recommend compliance (not request exceptions or variances) irrespective of the cost to the consumer, in order to protect their jobs.

Variance and Exemption

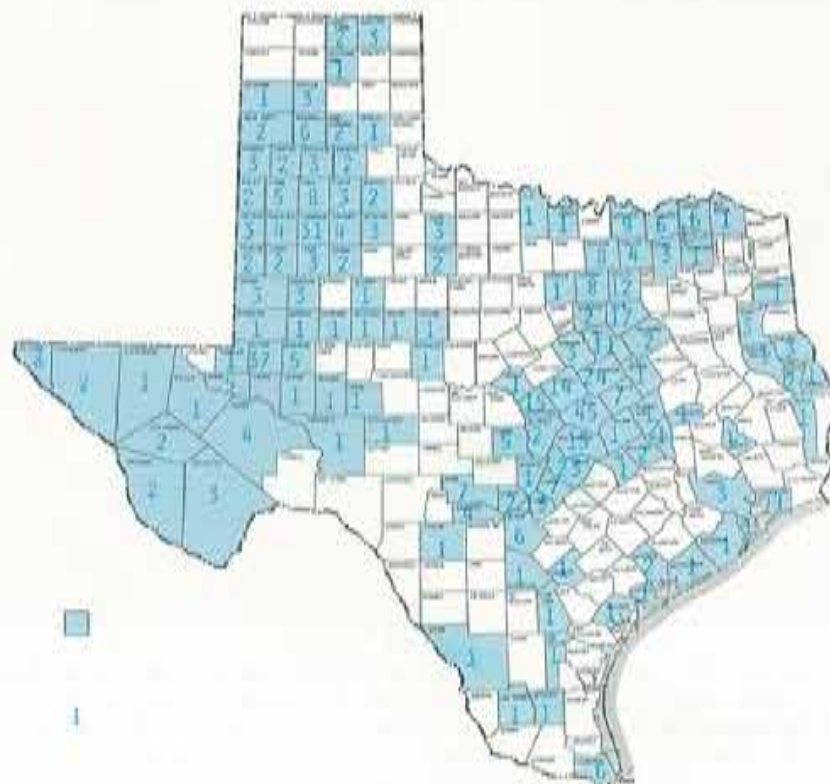
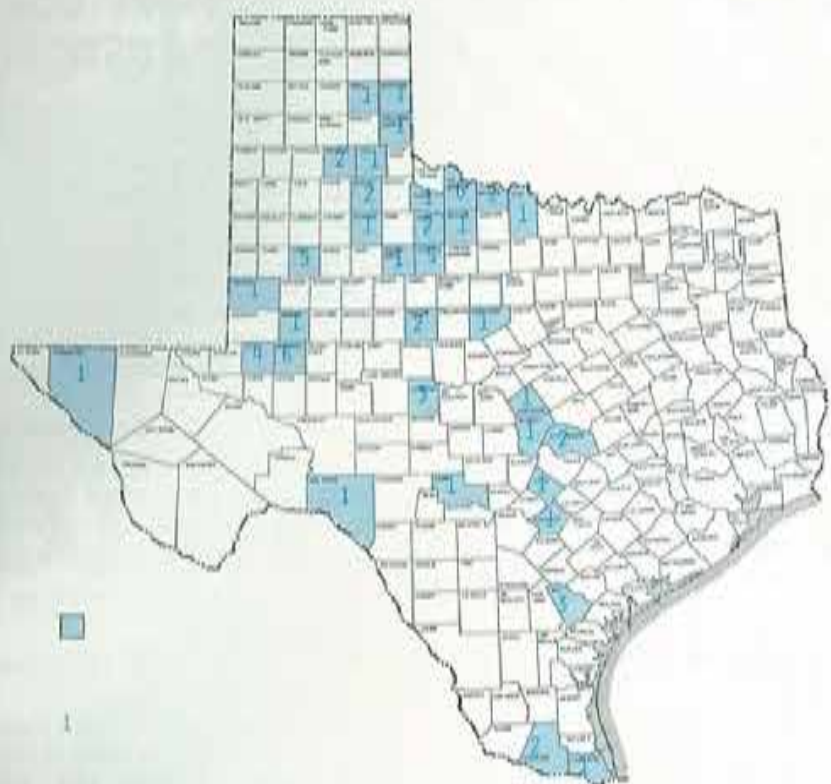
A variance means an exception one or more of the maximum allowable dissolved solids, and will be necessary if the condition of the water is such as to exceed the maximum allowable level despite the application of the best available treatment techniques (taking cost into consideration) and if: 1) the water system requesting the variance was operating when the standards became effective and 2) granting the variance will result in an unreasonable risk to public health.

An exemption means an exception to a provision of the standards which because of compelling factors, which may include economics, the system cannot comply with a specified allowable level. An exemption may be

cont. on page 3 . . . DRINKING WATER



Carl Riehn, new president of the Texas Water Conservation Association, is congratulated by Webb Gohar, president of the Board of Directors of the High Plains Undergruound Water Conservation District, No. 1, and Ray Gerk, new Board Member. Riehn, Executive Director of the North Texas Municipal Water District, was installed in ceremonies at the annual TWCA convention recently in San Antonio.



PUBLIC WATER SUPPLY SYSTEMS WHICH EXCEED THE MAXIMUM PERMISSIBLE NITRATE CONTENT (from the Texas Department of Health Resources)

□ County wherein public water supply system is located
 1 Number of systems exceeding the permissible nitrate level

PUBLIC WATER SUPPLY SYSTEMS WHICH EXCEED THE MAXIMUM PERMISSIBLE FLUORIDE CONTENT (from the Texas Department of Health Resources)

□ County wherein public water supply system is located
 2 Number of public water supply systems exceeding the permissible fluoride level

DRINKING WATER . . . cont. from page 2

granted only if: 1) the public water system requesting the exemption was operational before the standards became effective, 2) no unreasonable risk to public health is involved, and 3) a schedule is established to bring the system into compliance by January 1, 1981, if additional treatment is to be provided, or by January 1, 1983, if regional facilities are to be used.

An application for an exemption or a variance must include: 1) a statement of which standard is not met, 2) an estimate of the risk involved to public health, with supporting evidence from physicians in the area, 3) a long-range plan for correction of the problem, and 4) a detailed economic evaluation of the current and future conditions of the water supply system.

To obtain a variance or an exemption, officials of a water system must have a hearing before the TDHR. If a complaint about a certain water system has been received by the TDHR, the public hearing must be conducted in the area where the public water system is located.

The proposed standards of the TDHR require fluoride levels to be no higher than 1.4 to 1.9 milligrams per liter. Floyd Williams, division chief for the TDHR, speculated that water systems with up to four milligrams per liter of fluoride may be eligible for exemptions, which will be granted at the discretion of the Department. Of the 81 water systems over the allowable fluoride levels in the High Plains area, 55 are under four milligrams per liter, but 26 water systems are above even that level.

Williams pointed out that the main problem area, with high levels of fluorides and nitrates, is very small water systems, and the TDHR hopes to encourage small systems to switch over to larger regional systems.

According to Don Smith, geologist for the High Plains Underground Water Conservation District No. 1, advanced water treatment technology has reached the level where virtually any chemical configuration may be changed or removed at some cost—by reverse osmosis, ion exchange, and electro dialysis. He anticipates new or

innovative systems will be developed by industry to accomplish the task in a manner economically compatible to the users.

For example, he said, if a low cost activated alumina process for removal of fluorides could be commercially developed, meeting the maximum contaminant levels of the Safe Drinking Water Act would not impose financial hardship on the water systems of the High Plains.

Water Sampling Required

The TDHR and the EPA regulations require that water samples be collected and analyzed monthly. The number of samples required ranges from a low of two for a system serving up to 1,000 people, to 130 samples for cities as large as Lubbock.

It was announced by the TDHR at the Lubbock hearing that costs for the water samples and quality tests will be borne by the TDHR, through funds expected from a Federal grant. In any event, or from any source of funding, compliance with the EPA-TDHR drinking-water water sampling and reporting requirements is expected to

involve millions of dollars.

Williams noted that if a small water system cannot finance water quality improvements necessary to meet the drinking water regulations, they may apply for financial assistance from the Farmers Home Administration. A small water system is one which serves less than 10,000 persons, however, priority will be given to those systems which serve less than 5,000.

Costs High

The TDHR has estimated that it will require an additional minimum investment of more than 15 million dollars in new treatment facilities for the 604 public water systems supply in Texas which do not meet the proposed fluoride and nitrate standards. These costs do not include operation and maintenance costs, or the costs that will be incurred by water supply systems which do not meet one or more of the other numerous water quality criteria.

Information Available

The 28-page TDHR report defines water systems, laboratory tests, reporting requirements, surveys and other terms and requirements; and sets standards for arsenic, barium, cadmium, lead, chromium, mercury, nitrate selenium, silver, fluoride and other organic chemicals, bacteria, man-made and natural radiological and radionuclide contaminants, chlorine residuals, turbidity, alkalinity, and potential of hydrogen.

The complexity of the proposed TDHR public drinking water standards are such as to prevent a detailed analysis of them in The Cross Section, therefore operators, owners and elected public officials are encouraged to contact the TDHR, or this District, immediately, to obtain a copy of the proposed TDHR drinking water standards.

ESTIMATED COSTS FOR FLUORIDE, NITRATE REMOVAL

FLUORIDE REMOVAL

NITRATE REMOVAL

NITRATE REMOVAL

Estimated Capital Investment Cost (does not include operation and maintenance costs) for Fluoride Removal by Activated Alumina (from the Texas Department of Health Resources)

Estimated Capital Investment Cost (does not include operation and maintenance costs) for Nitrate Removal by reverse Osmosis (from the Texas Department of Health Resources)

Estimated Capital Investment Cost (does not include operation and maintenance costs) for Nitrate Removal by Ion Exchange (from the Texas Department of Health Resources)

Population Served	Cost Per System (Dollars)	Min. Cost Per Person (Dollars)
25-99	2,600	26
100-499	6,100	12
500-999	12,000	12
1,000-2,499	22,000	9
2,500-4,999	37,000	7
5,000-9,999	60,000	6
10,000-99,999	130,000	1
Average	38,528	10

Population Served	Cost Per System (Dollars)	Min. Cost Per Person (Dollars)
25-99	30,000	303
100-499	52,500	105
500-999	99,650	100
1,000-2,499	195,800	78
2,500-4,999	381,500	76
5,000-9,999	726,000	73
10,000-99,999	1,228,500	12
Average	290,507	107

Population Served	Cost Per System (Dollars)	Min. Cost Per Person (Dollars)
25-99	41,000	414
100-499	68,000	136
500-999	100,000	100
1,000-2,499	140,000	56
2,500-4,999	470,000	94
5,000-9,999	810,000	81
10,000-99,999	2,000,000	20
Average	518,428	129



Dr. Don Reddell, right, former employee of the High Plains Underground Water Conservation District No. 1 and Professor of Agricultural Engineering at Texas A & M University, talks with District Manager Frank Rayner at the Southwest Regional meeting of the American Society of Agricultural Engineers in Lubbock April 6-8. Dr. Reddell was named Engineer of the Year by the group.

CROP, LIVESTOCK QUESTIONNAIRE DUE TO COMPILE AGRICULTURE STATISTICS

During late May and June, many Texas farmers and ranchers will receive a crop or livestock questionnaire from the Texas Crop and Livestock Reporting Service or will be personally interviewed by the Service's field staff. This is part of the continuous effort of keeping track of Texas' biggest business—agriculture.

The information gathered through the questionnaires and interviews provides the basis for determining the acreage devoted to the various crops and midyear livestock numbers for the State of Texas and for each county.

Reliable information on what is produced, how much, and where is important to farmers, ranchers, and others in making production and marketing decisions and in providing an unbiased picture of Texas agriculture.

Cooperation by producers is the key to all crop and livestock estimates. Farmers and ranchers have recognized

the need for accurate and timely statistics by participation in the program since its start over a century ago. Individual farm and ranch information is kept confidential, and only State and county summaries become part of the final published estimate.

This is a cooperative effort of the USDA's Statistical Reporting Service and the Texas Department of Agriculture.

Lee, Engineer-in-training for the High Plains Underground Water Conservation District No. 1, for owners of center pivot sprinkler systems include:

- 1) Do not attempt to work on an operating system.
- 2) Be absolutely certain the system is properly grounded.
- 3) Be sure that all electrical power to the unit has been turned off before attempting to make any wiring changes or repairs.
- 4) Eliminate the possibility of someone else turning the power on while another individual is working on the system.
- 5) Consider having all wiring changes or repairs done by a competent electrician.
- 6) Inspect the system before beginning irrigation in the spring. Check for bare wires in the control boxes at each tower box, and damaged conduit along the system. Each motor should also be checked to ascertain that it is functioning properly (not improperly grounded or otherwise shorted).
- 7) Use common sense. For example, don't place a hand in the main control box or a tower box while electrical power is on.
- 8) Work on the center pivot system should be avoided during high winds and during periods of electrical storm (thunderstorm) activity.

Lee noted the favorable safety record of properly installed and maintained sprinkler systems.

The District also wishes to remind sprinkler system operators that it is a violation of the District's waste prohibition rules and a hazard to public safety, to sprinkle roads.

CAUTION ADVISED FOR SAFE CENTER PIVOT SYSTEMS

With increasing numbers of center pivot sprinkler systems being installed by irrigators in the District annually, most of them electrically-powered, a warning of the potential hazards associated therewith is timely. Electrical shock and other accidents are becoming increasingly frequent and are often fatal.

The danger with electrically-powered center pivots is the unusually high voltage that the main power circuit requires (480 volts), as it delivers power to the tower motors. The water usually found in the vicinity of such a system provides an additional conductor for the electrical power. When a system is not properly grounded, a

short can develop and if someone were to touch the system while standing on the ground, he would receive the full and fatal voltage.

Because of the high voltage in the control box and every tower box, anyone who examines those items is reminded to be extremely cautious.

Precautions advised by Johnny R.

PROJECTED COSTS¹ OF DRINKING WATER TREATMENT PROCESSES

(From the Texas Department of Health Resources)

Process	100 People ²			5,000 People ³			100,000 People ⁴		
	\$/1,000 Gal	\$/Cap	\$/Hshld	\$/1,000 Gal	\$/Cap	\$/Hshld	\$/1,000 Gal	\$/Cap	\$/Hshld
Chlorination	0.05	2.16	6.72	0.03	1.76	5.52	0.03	1.79	5.72
Clarification	1.32	52.51	163.31	0.30	16.87	52.46	0.20	12.62	39.25
Ion Exchange	2.27	90.19	280.49	0.55	30.80	95.80	0.20	13.00	40.43
Activated Alumina	0.19	7.79	24.23	0.08	4.58	14.24	0.05	3.18	9.89
Activated Carbon	1.18	46.90	145.86	0.19	10.97	34.10	0.04	2.44	7.59
pH Control	0.02	0.61	1.87	0.006	0.35	1.08	0.003	0.02	0.07
TOTAL	5.03	200.16	622.48	1.156	65.35	203.20	.523	33.05	101.75

¹ Assumes 7 percent interest on capital costs amortized over 15 years plus operation and maintenance costs

² Assumes 109 gallons (0.412 m³) produced per person per day

³ Assumes 154 gallons (0.582 m³) produced per person per day

⁴ Assumes 174 gallons (0.658 m³) produced per person per day

THE

Cross

SECTION

A Monthly Publication of the High Plains Underground Water Conservation District No. 1

Volume 23—No. 5

"THERE IS NO SUBSTITUTE FOR WATER"

May, 1977

DISTRICT CUTS TAXES



Webb Gober, left, president of the Board of Directors of High Plains Underground Water Conservation District No. 1, stands with Robert Millwee, president of Stephens Consulting Services of Little Rock, Arkansas, in front of a map which has illustrated with a dark line the proposed route of a canal which would deliver water from four river systems in Arkansas to the Wright-Patman Reservoir near Texarkana.

Arkansas Water Transport Concept Discussed

Severe economic consequences to the state and nation are predicted if Texas cannot transport water to the High Plains, according to a study made for the Texas Water Development Board by Stephens Consultant Services of Little Rock, Arkansas.

Entitled "An Assessment of Surface Water Supplies of Arkansas, With Computations of Surplus Supplies and a Conceptual Plan for Import to Texas", the study declares the role of the High Plains of Texas in agricultural production to be critical to help balance future world food shortages and offset the trade deficits resulting from the United States depleting its energy resources and being forced to rely on foreign energy supplies.

Purpose of the study was to evaluate the surface water resources of the State of Arkansas to determine if there is sufficient surplus water to satisfy the needs of water short areas of Texas. Time period for the study was 44 years, estimating water surpluses in Arkansas until the year 2020.

One water short area of Texas is the High Plains, the study noted, and

estimated that "six million acre feet of water annually would be adequate to maintain current irrigation levels."

Conclusion of the study was that Arkansas could indeed yield the needed water for transport, from the "excess and surplus" flows of the White, Ouachita, Arkansas, and Little River systems. Annual loss from these river systems of six million acre feet would be less than ten percent of the water which leaves the state from these rivers. This does not include any of the water from the Mississippi River, either in water for transport or computations of loss.

Robert Millwee, president of Stephens Consulting Services, was a guest speaker recently for a meeting of the Board of Directors for Water, Inc. in Lubbock. He told the group he considered the Arkansas conceptual plan of water exportation more feasible economically than the concept of importing Mississippi River water to Texas because of the shorter distance involved in delivering the water to the Texas state line.

Con't. on page 2... WATER TRANSPORT

During their meeting of May 3, 1977, the Board of Directors of the High Plains Underground Water Conservation District No. 1 authorized a 40 percent reduction in the District's 1977 tax rate. As the result of the Board's action, the 1977 tax assessing and collecting contract sent to the county tax assessor-collectors in each of the fifteen counties within the District specifies that the District's tax rate was set at three cents for each \$100 assessed valuation for all real and personal property within the District for the 1977 tax year.

Tax Assessor-Collectors

The District does not assess or collect any of its taxes. All of the District taxes are assessed and collected by the individually-elected county tax assessor-collectors. The District has no control over the rate of assessment or collection of its taxes. All such assessing and collecting is accomplished in accordance with the practices adhered to by each county's tax assessor-collector.

As provided by Texas Law, each county tax assessor-collector is paid a fee of two percent for assessing, two percent for collecting and five percent for collecting delinquent taxes. Therefore, for every \$100 assessed, the tax assessor-collector is paid \$2. If all of the \$100 assessed is collected, the assessor-collector is paid an additional \$2 for a total of \$4 for each \$100 collected. The collection of \$100 of delinquent taxes, if collected in accordance with the law, would mean a fee of \$7 to the tax assessor-collector—\$2 for assessing and \$5 for collecting.

Tax Rate Unchanged

After its creation in 1951, the District's tax rate for 1952, the first year taxes were collected, was set at three cents per \$100 valuation. In 1953 the tax rate was raised to five cents per \$100 valuation. The five cent rate remained unchanged from 1953 through 1976.

Continued on page 3... TAX CUT

NEW CROSS SECTION EDITOR NAMED

Mrs. Pat Nickell, Director of Public Education for High Plains Underground Water Conservation District No. 1, has been named editor of The Cross Section, by Frank Rayner, District Manager.

Employed by the District since September, Mrs. Nickell is a 1971 graduate of Texas Tech University, with a B.A. degree, having majored in journalism and minored in English. While a student, she was named Campus Editor of the University Daily newspaper, and was a member of Sigma Delta Chi, professional journalism society; Theta Sigma Phi, profession journalism society for women; and Kappa Tau Alpha, the only honorary organization in the field of journalism.

After graduation, she was employed by The Lubbock Avalanche-Journal as a reporter. She has also served as public relations chairman for a number of local organizations.

Mrs. Nickell is the author of a weekly humor column, "Nickell's Worth," which appears in the Lubbock newspaper, "The West Texas Times", and will soon appear in the Wolfforth-Ropesville weekly newspaper, "The Plainsman."

Since her employment by the District, Mrs. Nickell has assisted in the photography, writing, editing, and lay-

out of The Cross Section. She has attended many meetings and seminars during the past months, and considers efficient use of energy as the area of conservation which needs the most immediate attention. She also believes that public education in the field of water conservation should be about agricultural needs for water, and should be aimed at the general public.

Mrs. Nickell is married to Melvin R. Nickell, a Lubbock contractor, and has two children, Kelly, age 14, and Karren, age 11.



PAT NICKELL

THE Cross SECTION

A MONTHLY PUBLICATION OF THE HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1

2930 Avenue Q, Lubbock, Texas 79405

Telephone 782-0181

PAT NICKELL, Editor

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District Office at Lubbock

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Don McReynolds _____ Geologist
Tony Scherts _____ Draftsman
Obbie Goolsby _____ Field Representative
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Oscar Riemer _____ Field Representative
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- Carol Rogers, Secretary _____ Wayside, Texas
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Guy Watson, 1981 _____ Wayside
Bill Heisler, 1981 _____ Wayside
Leslie Adams, 1981 _____ Wayside

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- Doris Wedel, Secretary _____
H&H Block, 224 W. 2nd, Muleshoe
Marshall Head, 1979 _____ Rt. 3, Muleshoe
Harold Layton, 1979 _____ Rt. 2, Morton
Eugene Shaw, 1981 _____ Rt. 2, Muleshoe
David Stovall, 1981 _____ Rt. 2, Muleshoe
Ernest Ramm, 1981 _____ Rt. 2, Muleshoe

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- Garnett Holland, Secretary _____
City Hall, 120 Jones St., Dimmitt
Anthony Acker, 1979 _____ Rt. D, Nazareth
Glenn Odum, 1979 _____ Rt. 4, Box 135, Dimmitt
Jackie Clark, 1981 _____ Rt. 1, Box 33, Dimmitt
W. A. Beidridge, 1981 _____ 608 W. Grant, Dimmitt
Frank Wise, 1981 _____ Rt. 4, Box 10, Dimmitt

Cochran County

- W. M. Butler, Jr., Secretary _____
Western Abstract Co., 100 N. Main Ave., Morton
Jessie Clayton, 1978 _____ 708 S. Main, Morton
Robert Yearly, 1978 _____ Route 2, Morton
Herchel M. Tanner, 1980, Route 2, Box 36, Morton
Danny Key, 1980 _____ Star Route 2, Morton
H. H. Rosson, 1980 _____ Star Route 2, Morton

Crosby County

- Clifford Thompson, Secretary _____
2930 Avenue Q, Lubbock
Donald Azeock, 1978 _____ Lorenzo
Alvin Morrison, 1978 _____ Box 6, Lorenzo
Tommy McCallister, 1980 _____ 309 N. Van Buren, Lorenzo
Edward S. Smith, 1980 _____ 102 N. Van Buren, Lorenzo
Pat Yeakum, 1980 _____ Box 148, Lorenzo

Deaf Smith County

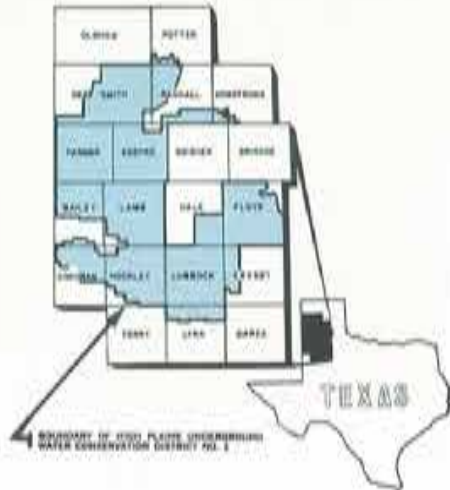
- B. P. Cain, Secretary _____
County Courthouse, 2nd Floor, Hereford
George Ritter, 1979 _____ Rt. 5, Hereford
Bill Cleavinger, 1979 _____ Route 1, Wildorado
James E. Higgins, 1981 _____ 200 Star St., Hereford
Garland Solomon, 1981 _____ 303 Sunset Dr., Hereford
Tom Robinson, 1981 _____ 211 Cherokee Dr., Hereford

Floyd County

- Verna Lynne Stewart, Secretary _____
Floyd Co. Abstract, 215 W. California, Floydada
Joe Cunyus, 1978 _____ Lockney
Gilbert L. Pawver, 1978 _____ Rt. 4, Floydada
C. O. Lyles, 1980 _____ Route 4, Floydada
Connie Beardon, 1980 _____ Route 1, Floydada
M. M. Smitherman, 1980 _____ Silverton Star St., Floydada

NOTICE: Information regarding times and places of the monthly County Committee meeting can be secured from the respective County Secretaries.

Applications for well permits can be secured at the address shown below the respective County Secretary's name, except for Potter County; in this county contact W. J. Hill.



Hale County

- J. B. Mayo, Secretary _____
Mayo Ins., 1817 Main, Petersburg
Henry Kveton, 1978 _____ Route 2, Petersburg
Gaylord Gross, 1978 _____ RFD, Petersburg
Clint Gregory, Jr., 1980 _____ Box 98, Petersburg
Homer Robertson, 1980 _____ Box 250, Petersburg
Henry Scarborough, 1980 _____ Route 2, Petersburg

Hockley County

- Jim Montgomery, Secretary _____
609 Austin Street, Levelland
J. E. Wade, 1978 _____ Route 2, Levelland
Jimmy Price, 1978 _____ Route 3, Levelland
Billy Ray Carter, 1980 _____ Route 5, Levelland
Leon Young, 1980 _____ Route 1, Roseville
Robert Phillips, 1980 _____ 318 Redwood, Levelland

Lamb County

- Robert Richards, Secretary _____
509 Phelps Avenue, Littlefield
Billy J. Langford, 1978 _____ Box 381, Citon
Edward Fisher, 1978 _____ Box 67, Sudan
P. A. Washington, 1980 _____ Box 124, Springlake
Jack Stubbiefield, 1980 _____ Box 397, Spade
Larry Lockwood, 1980 _____ Star Rt. 2, Littlefield

Lubbock County

- Clifford Thompson, Secretary _____
2930 Avenue Q, Lubbock
Dan Young, 1978 _____ 4607 W. 14th St., Lubbock
Clifford Hibers, 1978 _____ RFD, Idalou
Don Bell, 1980 _____ Box 114, Wolforth
Ronald Schilling, 1980 _____ Route 1, Slaton
Granville Leo, 1980 _____ Route 1, Shallowater

Lynn County

- Clifford Thompson, Secretary _____
2930 Avenue Q, Lubbock
Orville Maeker, 1978 _____ Route 1, Wilson
Freddie Kieth, 1978 _____ New Home
S. B. Rice, 1980 _____ Route 1, Wilson
W. R. Steen, 1980 _____ Route 2, Wilson
Wendell Morrow, 1980 _____ Route 1, Wilson

Farmer County

- Ken Horn, Secretary _____
Horn Insurance Agency, Bovina
Floyd Reeve, 1979 _____ Box 576, Friona
Ralph Roming, 1979 _____ Rt. 2, Box 26, Bovina
Troy Christian, 1981 _____ Rt. 1, Farwell
Dalton Coffey, 1981 _____ 15th St., Friona
Ronald Elliott, 1981 _____ Rt. 3, Muleshoe

Potter County

- F. G. Colvard, III, 1979 _____ Rt. 1, Box 433, Amarillo
W. J. Hill, 1979 _____ 5503 Emil, Amarillo
Jim Line, 1981 _____ Box 87, Bushland
Albert Nichols, 1981 _____ Rt. 1, Box 491, Amarillo
Weldon Rea, 1981 _____ Bushland

Randall County

- Mrs. Louise Tompkins, Secretary _____
Farm Bureau, 1714 Fifth Ave., Canyon
John F. Robinson, 1979 _____ 1002 7th St., Canyon
Bill Dusan, 1979 _____ Rt. 2, Box 26, Happy
Harry LeGrand, 1981 _____ 4700 S. Bovina, Amarillo
Joe Albracht, 1981 _____ P.O. Box 81, Bushland
Jack Brandt, 1981 _____ Rt. 1, Box 280, Canyon

WATER TRANSPORT... con't. from pg. 1

Although "excess and surplus" water has not yet been legally defined, estimates of the excess water from the White, Arkansas, Ouachita and Little Rivers range from a conservative estimate of 43 million acre feet to 71 million acre feet annually. An acre foot of water is the amount necessary to cover an acre of land one foot deep in water, approximately 325,900 gallons.

While the study did not attempt to answer all the technical, economic and political considerations involved in the interbasin and interstate transfer of water, it made clear that "water transport would occur only during periods when higher priority items had already been met." Those priorities for surface water included municipal use, industrial use, agricultural use, and the minimum flows to support navigation and maintain water quality for all the areas involved both at the point of origin and downstream.

The report noted that "money obtained from the sale of the water to Texas could be used to help reduce taxes, or at least maintain the low tax level now enjoyed by Arkansas residents."

Previous extensive studies made of the diversion of water from the southern Louisiana Gulf Coast to east Texas for transport to west Texas have shown that it is not economically feasible.

The new report has suggested a route to transport water from the Arkansas, White, and Ouachita Rivers and the Millwood Reservoir southwestward across Arkansas to deliver it to the Wright-Patman Reservoir in Texarkana.

A canal to deliver water to the Wright-Patman Reservoir near Texarkana would not require maximum capacity for the entire length, simply because the plan calls for the system to pick up water from various sources as it moves westward.

However, it was suggested that the most economical route for transporting water to the High Plains of Texas might be through the Oklahoma system, as set forth in the Oklahoma

Water Plan. This calls for the use "compacted Arkansas waters which originate in Arkansas, such as Ouachita and White Rivers, which could be diverted to Oklahoma for delivery to the High Plains of Texas, the western portion of Oklahoma."

The High Plains of Texas has about 5.5 million acres under irrigation which could irrigate more than 13 million acres, if water were available, the report noted. The area under discussion, 56 contiguous counties in the High Plains and West Texas, comprises 10 percent of the total land area in Texas.

"Production potential on the High Plains is practically unlimited," the study emphasized, but added that irrigation is expected to peak by 1990 unless supplemental water supplies have reached the area.

Unless water is transported to the area, the study concludes, "the economy will decline as water supplies and the impact to the entire nation will be severe. The construction of a water transportation system would lower the agricultural economy of West Texas to continue, and hopefully grow thereby forestalling the displacement of people."

Completion of a canal to deliver water to the Texas state line would require several years, once the canal is approved by Texas voters and Arkansas officials. Delivery and distribution of the imported water to residents and irrigators on the High Plains of Texas will require additional time and expense.

"Although the ultimate solution to the water shortage on the High Plains of Texas is water importation," emphasized Frank Rayner, manager of the High Plains Undergruond Water Conservation District No. 1, "the present solution is the institution of all economically feasible conservation programs for that water which we already have. Within the foreseeable future, we will have to look to existing water supplies to maintain the economy of this area."

Copies of the report may be obtained from the Texas Water Development Board, P.O. Box 13087, Austin, Texas 78711.



Robert Millwee, second from right, president of Stephens Consulting Services discusses the Arkansas water transport feasibility study made by his firm for the Texas Water Development Board, at a meeting of the Board of Directors of Water Inc., recently in Lubbock, with Duncan Ellison, right, Executive Director of Water Inc., Jim Osborn, Chairman of the Agricultural Economics Department at Texas Tech, second from left; and Felix Ryals, left, Manager of the Panhandle Ground water Conservation District in White Deer.

CUT... continued from page 1

Tax Income Increases

In 1952 the District's tax income was \$42,189.31 from the three-cent rate. Through inflation, improvements in property value reassessment by the county tax assessor-collectors, the District's tax base of \$8,777,646 earned \$395,000 (after payment of assessing and collecting fees and accounting for uncollected taxes) in income in 1976—at the old five-cent rate. Assuming the same (1976) tax base for 1977, the new three-cent rate could be expected to provide an income to the District of \$234,000 in 1977; after accounting for all fees and uncollected taxes.

A Decade Of Inflation

In 1966 the District tax income was \$1,098.31. Compared to the 1976 income, there has been a 96 percent increase in the ensuing ten years. During this same decade, the District's net worth (the market value of all of the District's real and depreciable property) increased from \$61,851.95 in 1966 to \$985,960.94, a 1,494 percent increase. Most of the gain (approximately \$335,000) in the District's net worth is represented by the purchase of land and the building of an office building during 1974 and 1975.

According to the United States Department of Labor, the purchasing power of the dollar has been reduced through inflation from an assumed 100 cents in 1967 to 56 cents in 1976, a 44 percent reduction. During the last ten years, the District's operating expenses increased from \$239,933.93 in 1966 to \$346,690 in 1976; a total of 44 percent increase, or four percent per year.

Most of the increase in annual operating costs is represented by the increase of staff's salaries (an average increase of 127 percent per employee during the 10 years), the hiring of additional personnel, and in increased employee benefits.

Financing District's Operations

The majority, 89 percent, of the District's annual income is provided through taxation.

However, approximately \$43,000 in additional income was received by the District during 1976—approximately 18 percent of its total 1976 income. Part of this miscellaneous income, approximately \$790 (.2 percent of the District's total income), was derived from an application for water well permit deposit forfeitures. The application for water well deposit of \$10 for each application is forfeited to the District whenever the applicant fails to cancel the application or fails to submit a well completion report to the District within the four-month time period (or as extended through application for time extension). Otherwise, the well application deposit is returned to the applicant in full.

The bulk of the miscellaneous income, approximately \$21,000, in excess of five percent the District's total income, was derived from fees charged for supplying some of the cost-water depletion, income-tax-allowance services to the (relatively) limited number of landowners making such federal income tax allowance claims.

Interest on time deposits—at approximately six percent—provided an



Reagan V. Brown, right, Texas' Commissioner of Agriculture, chats with District Manager Frank Rayner at a press conference during the Occupational Safety and Health Adm. hearings in Lubbock May 10 regarding the proposed cotton dust standards. The Commissioner was one of the multitude of witnesses who appeared in Lubbock protesting the standards as too strict. The District submitted a written report, in quadruplicate, to OSHA officials, to protest the standards because of the potential problem of polluting the area's groundwater supply.

income of nearly \$14,000 in 1976 (approximately four percent of the District's income).

Recovery of the actual cost to the District for validating water wells amounted to nearly \$7,000 (nearly 2 percent of the total District income) in 1976.

The well validation program consists of bringing into compliance with the District's Rules, water wells (primarily irrigation wells) that are usually not in "technical" compliance with some of the District's Rules, particularly the permitting and registration of well programs.

The actual personnel and equipment and supply costs for validating wells is borne by the well owner. When establishing the well validation program in 1971, the District's Board of Directors reasoned that well owners and other taxpayers should not have to bear the costs of validating wells for those persons who accidentally or purposely fail to follow the District's well rules.

In 1976, the minor income of \$378.40 was derived through recovery of data reproduction, and other special services provided to people requesting same.

Tax Breaks

During the last 10 years the District doubled the fees paid to the county tax assessor-collectors—from one percent for assessing and one percent for collecting to two percent for each operation.

In 1973 the District granted the special (additional) \$3,000 homestead exemption for people 65 years of age and older, as provided by Texas law.

The special tax exemption for disabled veterans and their survivors, is also honored by the District.

Although the District must grant the special tax exemptions, as provided through laws passed by the Texas Legislature, it is not eligible to receive "Federal Revenue Sharing" funds as do State, county and city governments.

Time Of Tax Reduction

The accelerating inflationary increase in Social Security fees paid to

the Federal Government, increasing energy costs, increasing equipment and services costs, increasing insurance costs, and attorney fees may require the District to increase its taxes above the present three cent rate in some future years; however, under no circumstances can the District increase its tax rate above the five cent value, as it existed from 1953 through 1976. Therefore, the taxpayers are assured that the 40 percent tax reduction established for the District's 1977 taxes can never be recovered by the District by its adopting a tax rate in excess of the five cent limit.

The District's Manager, Frank Rayner, in recommending the 40 percent tax cut for 1977, assured the District's Board of Directors that the District could operate well within the funds available to it through November, 1978, without any reduction in its existing services to the District's residents, initiate some new services and programs, all without the need to borrow money or to sell bonds. The Man-



District Manager Frank Rayner was a guest lecturer for Dr. Jack Muetersbough's Environmental Conservation Class at West Texas State University April 29. Rayner, left, distributed District publications to the students and to Dr. Muetersbough, to illustrate District activities to the students.

Solar Plant Opened In New Mexico

ALBUQUERQUE, N.M.—Several hundred farmers, scientists, engineers and government officials are expected to attend a national solar irrigation workshop at the Albuquerque Convention Center July 7. The two-day program will be highlighted by a demonstration the following day of a recently developed experimental solar-powered irrigation system in use at Willard, New Mexico, about 65 miles southeast of Albuquerque.

Persons interested in solar irrigation are invited to attend the two-day program. The workshop and working demonstration are co-sponsored by the U.S. Energy Research and Development Administration (ERDA), U.S. Department of Agriculture, the State of New Mexico, New Mexico State University (NMSU) and ERDA's Sandia Laboratories.

Persons interested in attending the workshop and solar irrigation demonstration should notify Lyle Wetherholt, conference chairman, by telephone (505-264-2130), or by mail (Organization 5710, Sandia Laboratories, Albuquerque, New Mexico 87115) before June 24.

Former Water Leader Dies

Former Brownfield civic leader John J. Kendrick, 57, died May 5 in a Dallas hospital following a lengthy illness. Kendrick served as President of Water, Inc. and the South Plains Underground Water Conservation District, both of which he helped organize.

At the time of his death, Kendrick was chairman of Capital Bank in Dallas.

Rayner further noted, in a brief budgetary report submitted to the Directors, that other than the normal, and very nominal outstanding monthly operating (expenses) accounts, the District has no outstanding indebtedness (all of its land, building, vehicles, and other equipment are fully paid for) in the form of borrowed funds or bonds.

Engine Efficiency Conservation Aim

For the past 24 years, most of the conservation measures espoused and presented by the District have been primarily water conserving techniques. The savings in fuel consumption was obvious simply because the total irrigation water needs were decreased (pumping time shortened) by any water conservation measure. However, the point and emphasis was commonly placed on dollar savings made possible by the implementation of the various routines.

Suddenly, we (the fuel consumer) are confronted with a multitude of fuel shortages, priority ratings, allocations and (predictably) rationing. The concept of conservation is rapidly changing from a voluntary measure equated with good stewardship to a mandatory imposition regulated by fuel availability.

With these thoughts in mind, the District would like to reiterate its advocacy (*The Cross Section* March 1974, Feb. 1975) of the importance of maintaining peak efficiency of pumping plants. Evaluation of the performance efficiency of a pumping plant may be approached in two steps—the power unit and the pump.

While electric motors serve as the power unit for a substantial portion of the irrigation wells in some areas, the internal combustion engine normally affords the most opportunity for improvement of the fuel consumption-power output ratio. The benefits to be accrued by maintaining a properly tuned engine are fairly well understood by most operators because they are very similar to the miles-per-gallon fuel consumption of our automobiles.

The pumping unit may easily be compared with the manufacturers performance guides to determine its efficiency. Pumps properly matched to the well and in good mechanical condition should operate in the 75 percent efficient range.

In summary the necessity to have pumping plants efficiently designed, installed and maintained with records kept of accurate operating cost and periodic tests to assure acceptable performance would seem a minimum demand upon the fuel consumer. The net effect would be dollar savings to the water well operator and a measure for conservation of the energy source utilized to power the well.

WHAT IS RAINFALL WORTH?

AREA (Acres)	RAINFALL AMOUNT (Inches)	EQUIVALENT PUMPAGE BY WELL					FUEL COST IN DOLLARS	
		Time in Days					Electricity ¹	Natural Gas ²
		200 gpm	400 gpm	600 gpm	800 gpm	1000 gpm		
80	1	7.5	3.8	2.5	1.9	1.5	\$ 72.	\$ 4.
	2	15.1	7.5	5.0	3.8	3.0	144.	8.
	3	22.6	11.3	7.5	5.7	4.5	216.	12.
160	1	15.1	7.5	5.0	3.8	3.0	144.	8.
	2	30.2	15.1	10.0	7.5	6.0	288.	16.
	3	45.2	22.6	15.1	11.3	9.0	432.	24.
640	1	60.4	30.2	20.0	15.1	12.1	576.	32.
	2	120.6	60.4	40.2	30.2	24.1	1152.	65.
	3	181.0	91.0	60.4	45.2	36.2	1728.	97.

¹Electricity \$.035 KWH, overall efficiency 66.0 percent, Total Dynamic Head 200 ft.

²Natural gas \$1.50 MCF, overall efficiency 17.0 percent, Total Dynamic Head 200 ft.

PANHANDLE DISTRICT ADOPTS MINIMUM ACREAGE RULES

An amendment to limit the number of irrigation wells which may be drilled on a segment of land has been adopted by the Board of Directors of the Panhandle Groundwater Conservation District No. 3, with offices in White Deer. Felix Ryals, Manager of the Pan-

handle District, said, "The District has consistently made an effort to protect, conserve, and prevent excessive draw-down on the underground freshwater formation, and we have added amendments from time to time to our original rules and regulations as we ran into

problems that we had not originally anticipated."

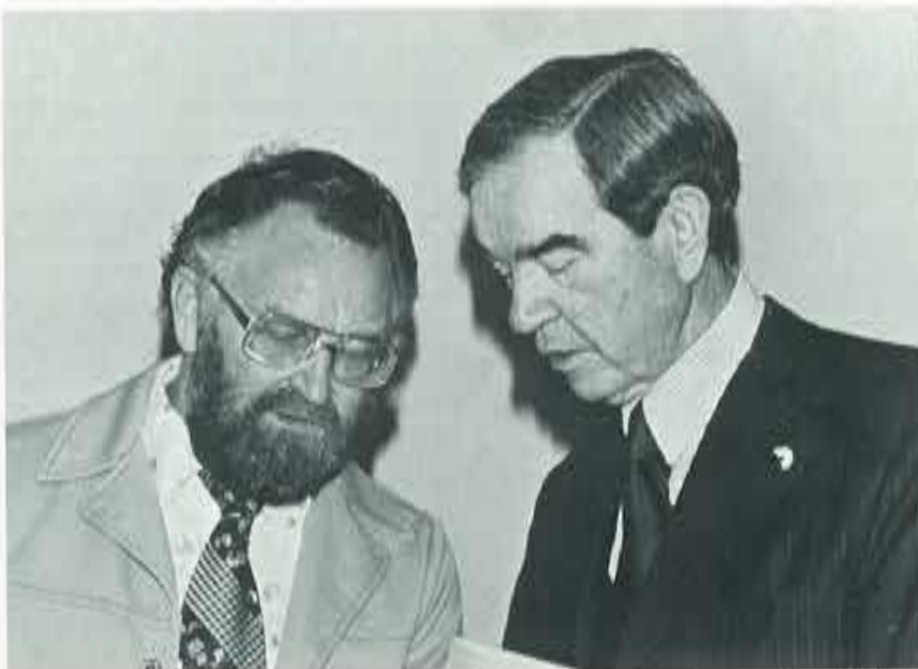
He emphasized that the District received a very favorable response to the amendment from local landowners and nearby cities. Panhandle District covers parts of Potter, Carson, Gray, and Armstrong Counties.

The new amendment, which goes into effect May 26, 1977, limits the numbers and capacities of wells which may be drilled on a section, quarter-section and quarter-quarter-section, and smaller plots.

For plots of land smaller than a quarter section, 6.5 gallons per minute represented may be reduced if spacing requirements are met. For example, a 60 acre plot may produce 390 g.p.m.

The ordinary or usual pumping rates are to be regarded as follows:

Acre	No. of Wells	Maximum G.P.M. Per Well
640	3	(10-inch well) 1400
		(8-inch well) 1000
640	4	1000
320	2	1000
160	1	1000
640	8	(6-inch well) 560
		(5-inch well) 560
		(4-inch well) 560
640	10	390
320	5	390
160	3	390
640	15	(4-inch well) 265
		(3-inch well) 265
		(2-inch well) 265



Frank Rayner, Manager of High Plains Underground Water Conservation District No. 1, talks with U.S. Representative George Mahon at the cotton dust standards hearing conducted by the Occupational Safety and Health Adm. (OSHA) officials at the Southpark Inn in Lubbock on May 10. A written statement protesting the stringent cotton dust standards was submitted to OSHA by the Manager and Board of Directors of the District. Congressman Mahon was one of the several hundred witnesses who testified during the hearings, which lasted several days. Rayner noted that present technology for air cleaning involves the use of water as a scrubber, creating a pollutant and an unnecessary use of the area's precious water supply.

THE

Cross

SECTION

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Deaf Smith Electric Cooperative Considers Load Management

Load management of electrical power is one conceivable answer to fulfilling increased demands for electrical power, and the concept has been used successfully in the states of Kansas and Nebraska for several years.

Load management of electrical power is a program which attempts to have electric usage during the peak demands of any given summer 24-hour period (11 a.m. to 7 p.m.) and shift this usage to other periods of the day.

Until now, no electric supplier in Texas has initiated a power scheduling program, but the Deaf Smith Electric Cooperative is seriously considering load management.

Wholesale electric power is sold to co-ops based on two charges. One charge is for actual energy (kilowatt hours or kWh) used by the supplier and the other is a demand charge for maximum power (kilowatts or kW) for a short time period during the year (usually 15 minutes to a hour, based on maximum load). The demand charge is designed to cover fixed costs incurred because all fixed costs for the transmission and generation facilities continue all year, even though the full capacity is not required during most

months. In the case of Deaf Smith, they are charged by the month of peak power. The entire idea of power management is to add load without increasing peak demand.

The basic problem is the seasonal nature of the irrigation load, which produces a high summertime power demand in rural areas. The power district must build transmission lines and substations which can handle the increasing peak demands. This capacity will, however, be in excess of the power company's needs for the eight to ten months annually when irrigation pumps are not running. Neither power districts nor their wholesale suppliers can economically justify very high capacity systems which operate at only a small fraction of that capacity most of the time.

Some power districts must pay a penalty to the wholesale supplier when the winter load falls below a specified percentage of the summer peak. The greater the difference between summer and winter loads, the greater the penalty. Adding more summer irrigation increases the summer peak and the penalty. Thus power districts are

continued on page 2 . . . LOAD MGMT.



Klaas Vink, left, Associate Professor at the Agricultural University of Wageningen in Wageningen, the Netherlands, visits with Webb Gober, President of the Board of Directors of the High Plains Underground Water Conservation District No. 1 at a cattle auction lot. Vink is in the U.S. to study groundwater irrigation methods and management techniques. He noted that his country's concentrated agriculture is expanding into irrigation using groundwater.



Sara Lee Tiede interviews Ray Gerk, member of the Board of Directors of the High Plains Underground Water Conservation District No. 1, recently regarding the status of the High Plains irrigated economy as it is being affected by increasing energy and equipment costs and declining commodity prices. Gerk was harvesting wheat on one of his fields north of Donna in Deaf Smith County. Mrs. Tiede, a reporter for the Dallas Times-Herald, assigned to the Austin bureau, was gathering information for a story on the irrigated economy of the High Plains. She spent several days in the Lubbock area, talking with representatives of the District, officials of Water, Inc., Lubbock County farmer Frank Gray, staff members at Texas Tech University, and Representative Pete Laney of Hale Center.

"Right-To-Vote Bill" Signed For Weather Modification Actions

Highlighting one of the most bitterly contested issues in recent years, Texas Governor Dolph Briscoe signed into law Senate Bill 632 on June 10, a bill which will provide for elections before a permit can be issued for weather modification activities.

Just a few days prior to the signing, and following months of consideration, the Texas Water Development Board issued weather modification permits to Plains Weather Improvement Association and Atmospherics, Inc., in what has been termed a "compromise" decision.

Both the weather modification firms had asked for four year permits, and the TWDB issued permits good only through October 31, 1977.

Proponents of SB 632, "the right to vote" bill, worked diligently to see the legislation passed during the session, fearful that if the bill were not signed

by the Governor prior to issuance of the permits, opponents could do nothing to fight weather modification activities for the next four years.

Senate Bill 632

Under the provisions of the bill, areas affected by weather modification activities will be divided into two categories, 'target' and 'operational'. All voting precincts in the target area will vote as one unit, while voters in the operational area (this will include territory up to eight miles outside the target area) will vote in separate precincts.

The target area is that area specifically described in the permit application, while the operational area would be the surrounding land, which might be affected by the activities, with an eight-mile limit.

continued on page 4 . . . WEATHER MOD.



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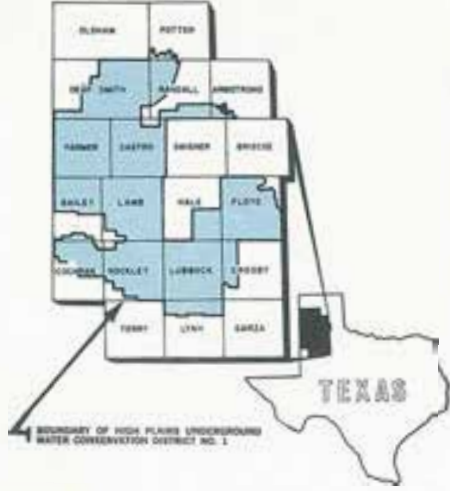
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Connie Bearden, 1980 Route 1, Floydada
M. M. Smitherman, 1980 Silverton Star Rt., Floydada

NOTICE: Information regarding times and places of the monthly County Committee meeting can be secured from the respective County Secretaries.

Applications for well permits can be secured at the address shown below the respective County Secretary's name, except for Potter County; in this county contact W. J. Hill.



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Gaylord Groce, 1978 RFD, Petersburg
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Homer Roberson, 1980 Box 250, Petersburg
Henry Scarborough, 1980 Route 2, Petersburg

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J. E. Wade, 1978 Route 2, Levelland
Jimmy Price, 1978 Route 3, Levelland
Billy Ray Carter, 1980 Route 5, Levelland
Leon Young, 1980 Route 1, Ropesville
Robert Phillips, 1980 218 Redwood, Levelland

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Edward Fisher, 1978 Box 67, Sudan
P. A. Washington, 1980 Box 124, Springlake
Jack Stubblefield, 1980 Box 397, Spade
Larry Lockwood, 1980 Star Rt. 2, Littlefield

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Dan Young, 1978 4607 W. 14th St., Lubbock
Clifford Hilbers, 1978 RFD, Idalou
Don Bell, 1980 Box 114, Wolforth
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Granville Igo, 1980 Route 1, Shallowater

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W. R. Steen, 1980 Route 2, Wilson
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Floyd Reeve, 1979 Box 816, Friona
Ralph Roming, 1979 809 Ridgela Dr., Bovina
Troy Christian, 1981 Rt. 1, Farwell
Dalton Caffey, 1981 15th St., Friona
Ronald Elliott, 1981 Rt. 3, Muleshoe

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W. J. Hill, 1979 5503 Emil, Amarillo
Jim Line, 1981 Box 87, Bushland
Albert Nichols, 1981 Rt. 1, Box 491, Amarillo
Weldon Rea, 1981 Bushland

Randall County

Mrs. Louise Tompkins, Secretary
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John F. Robinson, 1979 1002 7th St., Canyon
Bill Dugan, 1979 Rt. 2, Box 30, Happy
Harry LeGrand, 1981 4700 S. Bowie, Amarillo
Joe Albracht, 1981 P.O. Box 81, Bushland
Jack Brandt, 1981 Rt. 1, Box 280, Canyon

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sometimes willing to add new irrigation customers each year only in proportion to their winter load increase.

Deaf Smith Electric Co-op

Manager James Hull and several of his staff members from the Deaf Smith Electric Cooperative recently visited power management districts in Nebraska and studied the situation. While they noted several differences in both general farming and irrigation practices, they were impressed with the success of the power management venture.

In recent years, service extensions to members of the Deaf Smith Electric Co-op have had to be curtailed, because of the rapid growth of the co-op. Their power supplier permits them to grow at an annual pace of 6.5 percent, and their average annual growth rate in the past few years has been about 14 percent. In 1976, it was 19 percent. At this time, Hull noted, the co-op turns down at least one customer daily for service, and he feels there would be more service refusals if the word had not spread about the difficulty in acquiring service connections. The co-op does accept customers for new service connections, but refuses those which have another power source.

If a program of power management were to be initiated, Hull said, the co-op can continue to grow and fulfill increased power demands, without increasing its peak loads more than the allowed 6.5 percent yearly.

If the Board of Directors of the Deaf Smith Electric Cooperative votes to begin a load management program, it will more than likely begin on a fairly small basis, with the intention of enlisting established customers as it grows. Those older customers will hopefully be attracted by the cheaper rates for controlled power. New customers may conceivably be required to join the management program in order to obtain service.

Savings Possible

Nebraska farmers have been able to save up to 25 percent on their power bills by joining a load management program, and Hull estimated that Deaf Smith area farmers could save 15 to 20 percent. The reason for the reduced savings is that Texas already has relatively low power rates, Hull said.

The advantage to the co-op of a power management program is that it could grow by adding more load at off-peak hours.

For the customer, joining the power management program may assure him of a power source, delay certain retail rate increases (which are inevitable with an energy crisis) and very likely result in lower overall costs for power.

Hull and David Pruitt, Area Development Manager for Deaf Smith Electric Cooperative, opined that farmers would become accustomed to a power management program, after they learned to reorganize time and change a few old habits.

They noted, however, that one disadvantage to the power control program is a potential negative reaction to the whole idea. Other disadvantages are the large initial capital outlay for equipment, and the unlikely but possible reduced crop yield, if stress occurs.

Methods of Control

Voluntary power control can be accomplished through an "honor system", where irrigators agree to their systems off and on at prescribed hours or on prescribed days.

Hull said the Deaf Smith Co-op not considering a voluntary system because when power control was needed, the "honor system" situation would not work.

If the Board of Directors of Deaf Smith Co-op initiate a program of load management, Hull said, it will use a non-voluntary method such as ripple or radio control. Although the program itself will be a non-voluntary type, joining the power management program will be on a voluntary basis.

The ripple control method, which would probably cost more at the point of origin, is a signal injected into power lines, which travels through the power system. Receivers on electrical equipment such as irrigation motors will receive the signals to either turn on or off. Since the signal will be present in all power lines, a receiver at the farmstead would tell the irrigator when his pump has been shut off or when power has been restored.

The radio control system, which would cost less initially, but which probably be more expensive in the long run, involves the use of a network with a two-toned signal transmitted to decoders. A special set of tones would turn the irrigation system off and another set would restore power, so the system could be stationary. Tone combinations can be transmitted by the radio signal transmitter and be determined by the radio signal receiver unit selected. The receiver units would be more costly for this type of control than for the ripple control receiver.

Hull said the co-op did not know the cost figures on the two types of equipment, but estimates that a power management program will cost from \$200,000 to \$500,000, depending upon the number of wells involved in the program. The cost for the system could be borne by the co-op, Hull said, because they could sell more kilowatt hours.

Program Tried

A small volunteer program of power management was tried last summer (1976) by Deaf Smith Electric Cooperative and included eight farmers. It turned off irrigation motors for one other day for eight hours, during peak hours of 11 a.m. to 7 p.m. One of the eight farmers reported that the curtailment had resulted in no damage to his crop. A 750 horsepower reduction resulted from the controlled power, with a returned savings benefit.

A full-scale management program would not involve that much time and power shut-offs, Hull said. No more than two days weekly, or 60 hours each month would be lost and would only include two months of the year. The cut-off time would, however, be during the peak hours of a.m. to 7 p.m.

Co-ops To Grow

The efficiency of irrigation wells has declined due to declining water levels, Hull said, and those farmers who would be content with less-than-efficient

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The Lewis Cox and Son well, 1974. Note (blue arrow) the Douglas Cox well 149 yards west.



Pump and motor removed from the Lewis Cox and Son well, April 1977.



Lewis Cox and Son well, with pump and motor removed, April 1977. Note the Douglas Cox well (blue arrow).



Former site of the now destroyed Lewis Cox and Son well. Note Douglas Cox well (blue arrow).

Lewis Cox & Son Irrigation Well Permanently Closed

The final chapter in a long legal tangle over the closing of an irrigation well on the Lewis Cox and Son farm in Floyd County has ended with the well destroyed.

The Cox well was drilled in 1968, but, as a result of a well location survey, was discovered to be in spacing violation of the Douglas Cox well, located only 149 yards west, in 1974. After a series of public meetings before the Floyd County Committee, and the District's Board of Directors, the Lewis Cox well was ordered closed in 1974.

Lewis Cox then filed suit against the District seeking to enjoin the enforcement of their order. Culminating in numerous trials and appeals through the District, Appeals, and Texas Supreme Courts, the Texas Supreme Court affirmed the District Court's order denying Cox's plea for injunction against the District and finding in favor of the District's suit seeking summary judgment against Cox.

In disregard of the Court's findings, the Cox well was again placed into operation in April, 1977, and the District filed contempt of court charges against Lewis Cox on April 20, 1977. Before the contempt trial could be heard, on June 9, 1977, Lewis Cox destroyed the subject well (see photos). Mr. Cox testified at the June 9th

trial that he had placed a six-foot cement plug in the well, several feet below land surface.

In response to the District's suit for contempt, Judge John T. Boyd found, that since Lewis Cox had destroyed his well and was now in compliance with his order of November 3, 1976, he would not find Cox in contempt but would provide for recovery of attorney fees by the District, if precedent for such award could be shown by the District's attorneys.

Lewis Cox has recently completed a new well located 161 yards due east of his destroyed well, and 410 yards east of the Douglas Cox well.

Legal Process Slow

Several persons have expressed concern that the legal processes, and cost associated therewith, available to the District for enforcement of its rules and regulations are much too slow and costly and are subject to such lengthy delay as to effect, at least, a partial circumvention of the District's aims and powers.

Texas Law provides that "the District may enforce its rules by injunction, mandatory injunction, or other appropriate remedy in a court of competent jurisdiction (Chapter 53.102)".

Although the District sometimes encounters gross "legal delays" in its rules enforcement, it continues to pur-

sue its purposes and ultimately sees its rules enforcement to their legal conclusion.

It has been suggested that the District adopt procedures for seeking fines for violation of its rules; as is provided for the enforcement of the rules of several Federal and State water agencies. However, the District's Manager has noted that if the District could recover its attorney fees—and if such recourse to recovery of attorney fees was made well known to the rules violators—the resultant "fine" would be an effective deterrent to abating stalling tactics through "legal maneuvering".

In any event, he further noted, both parties are subject to the high cost of attorney fees for any protracted legal process; a fact that has guided the District to first seek and pursue all other means to enforcement of its rules before seeking solution through the courts.

Legal Contingency Fund

Although the District infrequently encounters legal expenses in pursuing its rules application, a special "legal contingency fund" is maintained for this purpose. This fund, now containing several thousands of dollars, is maintained with a minimum reserve of \$20,000 in order to guarantee the District's ability to pursue the enforce-

ment of its rules in those cases where high legal costs are encountered. However, the District Manager noted, the pursuit of the Cox case did not require the use of any funds from the legal contingency account.

NOTE: A detailed review of the Cox case, through appeals to the Supreme Court, was presented in an article headlined, "Texas Supreme Court" in the November, 1976, issue of "The Cross Section".

LOAD MGMT. . . . continued from page 2

irrigation engines will no longer accept power losses through inefficiency. Electric motors are more efficient than natural-gas-powered engines, and with the future natural gas supplies uncertain, more and more farmers will switch to electricity. Electric co-ops will have to grow, Hull believes, to accommodate the demand for electric service.

In addition to the power management equipment, the Deaf Smith Co-op will, if the Board of Directors decides to initiate the program, install a load monitoring system. This equipment will determine peak power demands accurately, and can determine when power curtailments are needed. With monitoring, power will not be shut off needlessly.

WEATHER MOD. . . cont'd. from page 1

The bill prohibits the TWDB from issuing a permit within 30 days following publication of the first notice of the weather modification firm. The measure is designed to give voters time to draw up a petition calling for an election.

After a written request from 25 qualified voters has been received by the County Clerk, he must circulate petitions calling for signatures of 10 percent of the qualified voters in a precinct (within the target or operational area) requesting an election. These petitions must be filed with the County Clerk within 30 days of the first published notice of the weather modification intention, and the election must be conducted by the Commissioners' Court within 21 days.

The Texas Water Development Board must be notified of the date of the election. If the target area as a whole favors issuance of the permit, then the TWDB can issue such. However, if the operational area precinct voting is against issuance, then that part of the area is excluded from the permit. If the Board finds that a weather modification and control program is still feasible, a permit may be issued covering areas in which no election was requested.

If the permit is denied under this section of the bill, no application for a permit covering all or part of the same target or operational area may be considered, and no permit under that application may be issued by the TWDB for at least two years following the date of the election.

If a permit which includes authorization for hail suppression is to cover only part of a county, those qualified voters within an election precinct(s) of the county included in the target or operational area are eligible to sign a petition and vote in an election under this section, and in computing the vote, only a majority of the whole shall be necessary to carry the proposition in that county.

No permit shall be issued which provides for or allows the seeding of clouds for hail suppression outside the target area. This shall not prohibit the observance of clouds or cloud formations.

The TWDB shall monitor any program under such conditions as the board deems advisable and the provisions of this section do not apply to any permits in effect at the time the

section became law (June 10).

If the Board finds that a permittee, through carelessness or gross carelessness, performed all or any part of a weather modification or control operation outside the boundaries of the permit area, they may issue a warning and suspend the permit up to two years, or suspend the permit without a warning if they feel it is warranted.

If the Board decides that the application will not significantly dissipate clouds and prevent their natural course of developing rain in the area where the activity is to take place, to the material detriment of persons or property in the area, and after an election in which the activity is approved, they may issue a permit to the applicant who:

- 1) holds a valid weather modification license
- 2) pays the permit fee
- 3) publishes a notice of intention and submits proof of publication as required
- 4) and furnishes proof of financial responsibility.

Activities Contested

Cloud seeding has been a bitterly contested activity on the High Plains for the past several years. During 1977, representatives from 13 South Plains and Panhandle Counties banded together to form a group known as "Citizens for Natural Weather," whose purpose was to fight issuance of permits to weather modification groups by the Texas Water Development Board.

Representatives of the group turned out in large numbers at a hearing for the weather modification permits in Lubbock February 16, conducted by the TWDB, with TWDB legal counsel Bruce Bigelow as presiding examiner.

Bigelow subsequently recommended to the TWDB that approval for the permits be granted, at the TWDB May 6 meeting in Houston, provided the operators adhere to TWDB regulations. He concluded that a longer-lasting, more widespread rain was more beneficial to the area than a "gully washer", especially when one recognizes the increased production of rain from the thundercloud due to increasing the humidifying effects caused by increasing the area of rainfall.

The attorney for the Citizens for Natural Weather group maintained that a hard, fast rain was better for crops than the slow rain, Bigelow noted, and further indicated that there was considerable disagreement over



Members of the Law Enforcement Lions Club met recently in the Village Restaurant to hear Frank Rayner, Manager of the High Plains Underground Water Conservation District No. 1 present a slide program on the District. Lions pictured are, left to right, Ted Atwood, member of the LC Board of Directors; Lion Bob Duane Howell; First vice-president Don Bridgers who will take over as Lion Board in July; Rayner; Ed Taylor, LC news editor; and Troy Coon, member of the Lions Club Board of Directors.

the effects of cloud-seeding operations. Evidence that rainfall has decreased since the inception of the weather modification programs is not proof that the program has caused rainfall to decrease, he said, particularly since the overall region was affected with a drought.

He maintained that while a farmer or rancher who had lived in the area for a number of years could predict rain reasonably accurately, an understanding of cloud physics and meteorology was required to competently judge the effects of cloud seeding.

Area farmers have contended that the program stops rain, and blamed weather modification activities for severe drought.

TWDB To Monitor

An announcement was made recently that the TWDB would begin to monitor cloud seeding operations in 10 counties, after complaints had been received that the flights had been straying off target.

General James Rose, Executive Director of the TWDB, said the Board was unaware of any violations of the permit agreement with the weather modification firms, but in view of the complaints, felt that monitoring was in order.

Opponents Still Argue

One member of the Citizens for Natural Weather group noted that while weather modification activity had been halted (during May), rainfall had increased. However, May is traditionally a heavy rainfall month in the High Plains, if any month can be considered "heavy rainfall". More tornadoes and tornadoes were also spawned in May than in previous months. Citizens for Natural Weather in Briscoe County recently met and formulated plans for a "boycott Plainview" campaign, with a petition signed by individuals who opposed the views of Plainview councilmen, County Commissioners, and Plainview merchants who publicly supported weather modification efforts.

While the right-to-vote bill was passed, and citizens can now vote on whether attempts should be made to modify their weather, the dust has not yet settled over the issue of cloud seeding, nor will it soon.

Opponents to weather modification will blame the cloud seeders for drought or hail.

Proponents, meanwhile, will take credit for any rain which falls. Evidence presented at public hearings seems to indicate that neither side has a solid basis for his claim.

THE Cross SECTION

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July, 1977



CHESTER MITCHELL

Chester Mitchell Dies

Chester W. Mitchell, former member and president of the Board of Directors of High Plains Underground Water Conservation District No. 1, died July 11, near Lockney of an apparent heart attack.

Services were conducted in First Baptist Church of Lockney with the Rev. L. G. Moseley of Melvin officiating. Burial was in Plainview Memorial Park.

Mitchell was elected to the District's Board of Directors in January, 1964, and served six consecutive two-year terms before leaving the Board in January, 1976. He served on the District Board of Directors longer than any other man in the District's 26-year history.

Prior to his election to the Board of Directors, Mitchell served as a County Committeeman from Floyd County for the District. He was awarded a plaque in November, 1976, by the District for his 16 years of service to the District.

Mitchell was a native of Winters, Texas, and moved to Floyd County with his family in 1919. He was graduated from Oklahoma State University in 1937 with a B.S. degree in Agronomy. He was married to Alice Miller.

After serving seven years as County Agent in Logan County, Oklahoma, Mitchell and his wife moved to the Lockney area in 1946 to begin farming.

In addition to his work with the water district, Mitchell was a 32nd degree Mason, a member of Lockney First Baptist Church, the Old Time Fiddlers Association, the Lions Club, and the Open Heart Club.

He is survived by his widow; a daughter, Mrs. David (Shirley) Anderson of Seagraves; two sons, Warren Mitchell of Lockney and Neil Mitchell of Lubbock; a brother, R. C. Mitchell of Lockney; and six grandchildren.

Solar Energy Used For Irrigation Pumping

One of the Southwest's most abundant natural resources, sunshine, is beginning to be tapped as an energy supply for use in driving irrigation equipment.

An experimental solar-powered irrigation system, located on the Torrance County Land and Livestock Company farm near Willard, N.M., was formally dedicated in ceremonies at the site July 8. The system engineering was under the direction of Sandia Laboratories of Albuquerque.

The Willard experiment is one of the first large-scale systems to use solar energy to pump water from a well for irrigation purposes. Another large-scale solar irrigation project has recently been placed into operation near Gila Bend, Arizona. That installation pumps water from an irrigation supply canal.

Tracking parabolic solar collectors focus sunlight onto receiver tubes located along the axes of the collectors, heating a fluid flowing through the collector field. This hot fluid is pumped to a thermal storage tank and then to a heat exchanger where its thermal energy is used to vaporize a low boiling point fluid, which drives a heat engine or turbine connected to the water pump. The fluid which flows through the collectors is an oil-like substance, known as Caloria HT 43, which heats to a temperature of 420 degrees F. The turbine is powered by Freon R113, with a working temperature of 325 degrees F. Both fluids are contained within a closed loop system.

The 5500-gallon-capacity insulated tank provides enough thermal storage to operate the pump for about 23 hours daily. The thermal storage is necessary for a high performance system which will operate after darkness or on overcast days. The oil-like fluid can also flow into an underground, 6500-gallon-capacity mixing tank where the fluid can be held at 240 degrees F, before returning to the collector field.

Mitchell was well-known for his public service in the interests of groundwater conservation and the efforts being made to secure an imported water supply for the Texas High Plains.

The voters of Floyd and Hale Counties continued to support his re-election to the District's Board of Directors through six elections, and the irrigators in his Precinct repeatedly sought his counsel and advice regarding matters associated with the District's services.

The system was designed to demonstrate the possibilities of using solar energy to help solve the problems of rising irrigation costs created by a decreasing supply of natural gas.

It has been estimated that more than 160,000 natural-gas-powered irrigation pumps are in use in the western states alone. Annual irrigation pumping costs have been estimated to exceed \$700 million in the 17 western states. Energy costs from conventional fuels are projected to increase dramatically over the next decade due to greater demand, increasing lift requirements, shortages of natural gas, and rising prices of fossil fuels and electricity.

However, costs for the solar equipment to irrigate 100 acres of farmland were roughly estimated at \$800,000. The equipment used, all commercially available, included 112 Acurex parabolic tracking reflector troughs which provided a total of 6,720 square feet of surface area; an organic Rankine cycle turbine which included a boiler/heat exchanger, regenerator and condenser system; a 5500-gallon-capacity insulated tank which provides thermal storage; working fluids (Caloria HT 43 and Freon R113); and a lined storage pond which will hold up to four and a half acre feet of water. A conventional back-up system to power the pump in case of overcast skies is also included in the cost. A 20-year lifetime is the design goal for the system.

The fluid ordinarily used in a heating tube in a solar collector is water, but water requires anti-freeze in the

winter, and tends to be corrosive, so scientists at the Willard site turned to the oil-like substance, Caloria HT 43, which has proved to be very stable at a high temperature.

The solar energy at the Willard farm powers a Rankine cycle turbine. The shaft delivers 25 horsepower to pump approximately 640 gallons of water per minute from a 110-foot well. The water is placed into a storage pond and then pumped from the pond by conventional means.

In an effort to offset the high cost of solar equipment, "high value" crops were planted for irrigation of 100 acres during a 100-day irrigation season. Methods used are trickle, subsurface, sprinkling, and conventional flood irrigation.

The crops planted were 40 acres of wheat, 30 acres of potatoes and 30 acres of corn.

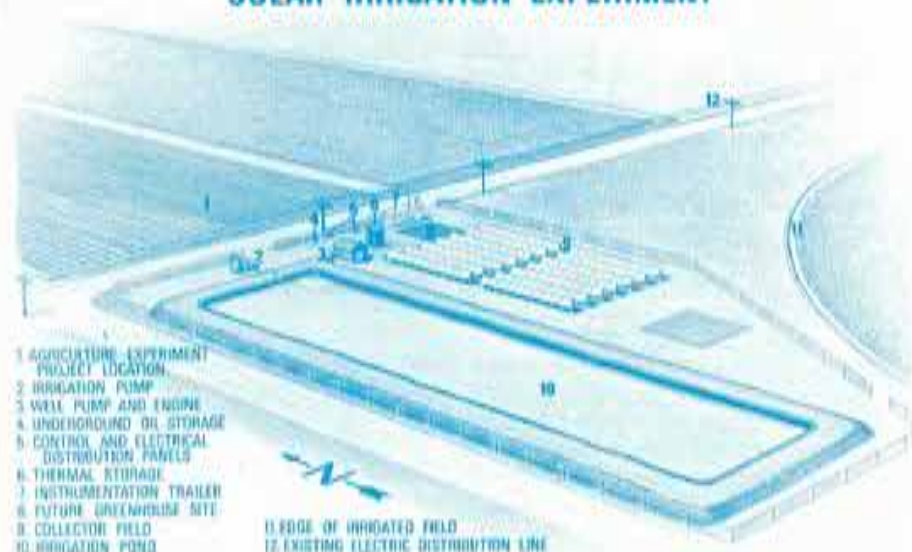
Funding for the project was provided by the Energy Research and Development Administration (\$1,000,000), State of New Mexico (\$150,000), and Four Corners Regional Development Commission (\$50,000).

One of the objectives of the Willard experiment was to design, fabricate, and demonstrate a solar-powered irrigation system on a working farm. Although the farm is 3,000 acres, only 100 acres is being irrigated using solar energy.

The experiment was also an attempt to demonstrate the feasibility of using solar energy as an alternative to natural gas for powering irrigation sys-

continued on page 3... SOLAR

ERDA/NEW MEXICO SOLAR IRRIGATION EXPERIMENT





The Manager Comments

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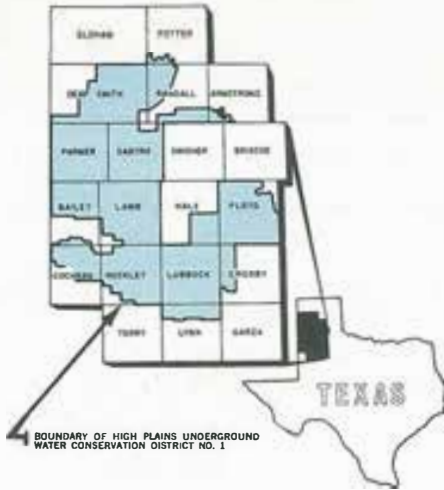
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The reader of this month's Cross Section may be given to wonder about the importance of so much emphasis on energy to the purposes of the District—water conservation. The pertinence is that only with energy can there be groundwater conservation—conservation being the development, efficient and beneficial use of such groundwater; hence, the Cross Section's interest in any new energy sources that may find use in the irrigated agriculture business.

With the ever continuing monthly increases in the cost of natural gas and electricity, irrigators are beginning to develop a logic that there must be some energy-cost relief made available to them, or they will be energy-priced out of business. In this mood there is a tendency to accept the increasing publicity regarding "free" solar and wind energy as the answer to our need for a new less costly energy source. But, a critical analysis of the efforts to harness wind and solar energy to date are somewhat less than encouraging, particularly in regard to the cost of such "free" energy.

Solar and wind energy are both abundant and free in the Texas High Plains—but free only as long as we do not wish to capture and convert them to powering our machines—then the free part becomes more costly than the much-less-than-free natural gas and electricity.

Paul D. Maycock, a Washington D.C. representative of the Solar Division of the Energy Research and Development Administration (ERDA) noted recently, at the Solar Irrigation Workshop conducted by Sandia Laboratories in Albuquerque, New Mexico, July 7-8, that based upon the cost of the Willard solar powered irrigation well (see related story), and assuming a continued rise of 10 percent per year in the cost of natural gas, the use of such costly natural gas would still be less than the cost of the solar source for the next 10-15 years.

Such long-term economic predictions, however, have a history of being inaccurate. The apparent major fallacies of these predictions are the use of experimental costs (as opposed to the more realistic expected commercial production costs) and the assumption that natural gas will even be available for irrigation power for the next 10-15 years.

Free Energy Inconvenient

The near-perfect convenience of petroleum, natural gas and groundwater—all are stored in the subsurface in "free" reservoir space preserved in perpetuity, making no demands upon the reservation of the land surface, and subject to call on demand by man—has spoiled our appreciation for the use of surface water or energy sources wherein it is necessary to use such resources only whenever they become available, which may well be at times when we have little or no need of them.

What the development of the free solar and wind energy really hinges upon is the development of the means for economically storing such energy

for use at time more convenient man's needs. The lack of reliable economic energy-storing devices processes is what really makes the version of solar and wind energy man's uses uneconomic.

The most immediately apparent method of storing solar and wind energy appears to be their conversion to electricity and the power then generated to be used to raise water to a higher elevation (most often referred to as pumpback) and to then recapture such kinetic energy through hydroelectric generation by allowing the water to again flow to the lower elevation. This reversal of the flow of water to store energy is a major provision in the California water project, and to a large extent here in Texas where, at off-peak power demand periods, water is pumped from the Central Texas, Colorado River, Inks Lake back upstream to be stored in Lake Buchanan. However, in California, Texas, and other areas where the pumpback process is now employed, the pumpback energy is not free; it usually comes from the thermo-electric generating—at a large demand on fossil fuels. The use of solar and wind energy for such pumpback operations could conserve the fossil fuels.

Overshadowing all of the other numerous obstacles to energy storage through pumpback is the absence of surface water and lakesites, and high surface-water evaporation rates in the High Plains area. However, there may be one area wherein solar and wind derived energy could be stored in the High Plains by the conversion of the area's depleting oil and gas reservoirs, and other subsurface storage space, to the storage of air, compressed by the harnessing of solar and wind energy, thereby providing the energy storage mechanism that would have the economic utilization of solar and wind energy in this area. (The compressed air could then be produced by drive turbines to generate electricity needed.)

In any event, it appears that the present complexity and inefficiency of the machines and processes for converting solar and wind energy to a useful and more convenient form of energy is overshadowed by the lack of a means for storing such energy. Therefore, it appears that the immediate prospects for the development of solar and wind energy is not the answer for abating the rising costs of fossil energy sources. The conservation intended to connote preservation of both energy and groundwater appears to be the only immediate means to reducing energy costs and to prolonging energy-groundwater dependent agricultural economy.

However, most of the scientific engaged in solar and wind energy research appear to be quite optimistic of the prospects of economic conversion of such free energy to commercial use, but that (optimism) is what scientists are, thankfully, made of. It is apparent that the banking community, by being

continued on page 3... COMMENTS

NOTICE: Information regarding times and places of the monthly County Committee meeting can be secured from the respective County Secretaries.

Applications for well permits can be secured at the address shown below the respective County Secretary's name, except for Potter County; in this county contact W. J. Hill.

SOLAR... continued from page 1

ems and for other agricultural applications.

Solar Collectors

A variety of solar collectors is available for use in such an experiment. Besides the parabolic tracking reflector rough type, there are flat plate collectors, which are black to absorb heat but do not follow the sun; a parabolic dish with a mirrored inner surface which focuses the solar rays into a single point; and central receivers of flat mirrors which reflect solar rays to a point on a tower.

At low temperatures (about 140 degrees F.) when the temperature difference between the fluid and the ambient air is small, flat plate collectors are more efficient and cost-effective. At higher temperatures, flat plate collectors lose energy to the atmosphere from both radiation and convection because of their large exposed surface area.

The situation, however, is reversed with concentrating collectors such as the parabolic trough. The concentrator collects only direct sunlight and cannot focus the diffuse light from the rest of the sky. At higher temperature differences, radiation and convection can be controlled better from the concentrator receiver tube, however, because it collects energy on a surface area which is only a small fraction of the size of an equivalent flat plate collector.

The parabolic collectors at Willard are 6 by 10 feet rectangles, and the collector field, storage tank, engine house and storage pond occupy about four acres.

Infant Industry

Although the solar energy industry will surely grow into a giant, it is still in its infancy, and the disadvantages of using solar energy are numerous. Because of the low density of solar rays, a relatively large collector field must be provided, with additional solar collectors used for additional solar power. Consequently, solar use for irrigation may be considered impractical simply because it takes up so much space.

Solar energy cannot be conveniently stored; it more or less must be used as received rather than demanded regularly. Thus, a back-up energy source is necessary for heavily overcast days. Scientists at the Willard site have noted that a cloudy sky usually means rain, at which time the solar energy would not be needed for irrigation anyway.

A heavily overcast sky means rain, but it can easily mean rain elsewhere. The thermal storage tank at the Willard site will maintain heat up to 23 hours (with the system operating), and thus manage to maintain almost around-the-clock irrigating, but it must then be recharged. If not used, the heat can be stored in the thermal tank or up to three days with only about five percent loss of heat.

Solar equipment, in addition to requiring maintenance to keep the panels dust-free and in peak condition, must be so constructed as to withstand damage from high winds or hail.

The parabolic troughs at the Willard site have a built-in sensing device which will theoretically turn them upside down at the first raindrop. The sensing device would be an additional expense to the construction of a solar collection field.

Although experiments have been underway for some time, off-season uses for solar energy have not been perfected. Alternate uses which have been studied and appear promising include space heating for green houses, farm houses, poultry houses, feedlots, and grain drying.

Solar Heat

Although solar energy has been in use for centuries for such mundane purposes as drying wet clothing, growing crops, and even frying eggs on the sidewalk; it has in the past few years enjoyed a tremendous surge of interest. United States President Jimmy Carter has indicated that individuals who attempt to harness solar energy for domestic use will be given a tax advantage.

Dr. E. W. Kiesling, chairman of the Civil Engineering Department at Texas Tech University, headed a project recently to design and build a solar-energy heated residence in Lubbock, with the solar collecting equipment adding about \$9,000 to the price tag of the house. Local banks, according to Dr. Kiesling, will not lend money on the total value of the solar equipment, thus raising the down payment for the house.

Solar energy, Dr. Kiesling believes, will be used first where it is most economical, and that area will be in direct application. At the moment, heating water directly with solar energy is feasible and can be done economically both in domestic and industrial use, he says. He suggested a commercial laundry might do well to investigate solar energy to heat water. Solar heated water has been successfully used by the Campbell Soup Company.

Space heating, Dr. Kiesling believes, will be the next step for solar energy use, followed by space cooling. Both space heating and cooling are non-uniform energy demands. The main advantage of solar heated water is that it is a constant and non-seasonal demand load.

Cooling will require more of an expenditure for a shorter seasonal demand than space heating, because of the disadvantage of having to convert heat to cool, thus losing much of the energy in the transfer process.

Solar energy, so far, is best suited to a low grade energy demand situation, and thus far is not really feasible for irrigation pumping use.

A study of the feasibility of using solar energy to drive irrigation pumps was done at the University of Arizona by Dennis L. Larson, C. D. Sands II, Charles Towle Jr., and D. D. Fangmier. The conclusion was that while solar energy can be used to drive irrigation pumps, the development of concentrating collectors and efficient small fluid expanders will be required before it can become cost competitive.

Solar energy for irrigation will become common only if natural gas or electricity prices go completely out of sight, crop prices go up, solar collection equipment prices go down, off-season use of energy can be readily accomplished, and no other energy source can be found. Solar energy is free, but the means to collect it is still rather expensive. Solar energy is simple—we are, however, limited in our knowledge of how to harness and use it.



Representatives from the High Plains Underground Water Conservation District No. 1 who attended the Solar Irrigation Workshop sponsored by Sandia Laboratories to demonstrate the solar irrigation installation at Willard, New Mexico, were, left to right, Webb Gober, President of the Board of Directors of the District; Mrs. Irene Gober; Oscar Riemer, Field Representative; Pat Nickell, Director of Public Education; and Don McReynolds, District Geologist. The solar collectors are behind them.

Food and Fiber Announces Convention

The 1977 annual Food and Fiber convention is slated September 13-14 in Lubbock Memorial Civic Center, and will emphasize cotton, beef cattle, grain sorghum, and the consumer, utilizing a series of general sessions.

"Cotton and Your Budget" will be the subject for one panel discussion. Panel members include Mrs. W. B. (Joe Ellen) Criswell, representing the consumer; Gary Ivey of Ralls, a producer; and Dr. Calvin Britts, president of Texas Cotton Marketing Corporation.

"Grain Sorghum and the World's Grocery Basket" will be the subject of a panel discussion also, with Elbert Harp, Executive Director of Grain Sorghum Producers Association as panel moderator. Panel members will be Dr. Lloyd Rooney, cereal chemist at Texas A & M University; R. M. (Bob) Carter, past president of Texas Cattle Feeders Association; Ralph Mabry, Director of U. S. Feed Grain Council; and Ben Baisdon, Director of Marketing for the Texas Department of Agriculture.

"Beef, Your Health, and Your Pocketbook" is another topic to be covered. Moderator will be David Stroud, Director of the Livestock and Meat Board. Other speakers will be Dr. Arnold Schaefer, Swanson Institute of Nutrition; Dorothee Polson, Food Editor of the Arizona Republic; O. J. Barron, Jr., Chairman of the Beef Development Task Force; and Dr. Willard F. Williams, Horn (distinguished) professor of Agricultural Economics at Texas Tech University.

The final topic will be "The Nation's Energy and Your Food Supply." Speakers will be Larry Meyers, of the Office of Congressional Affairs of United States Department of Agriculture; Dr. Rooney; and Dr. Schaefer.

Also planned is a banquet and a luncheon. Reagan V. Brown, Texas Commissioner of Agriculture, is tentatively scheduled as luncheon speaker. Secretary of Agriculture Bob Bergland

has been asked to be the keynote speaker at the banquet.

Food and Fiber is a Lubbock-based non-profit organization which emphasizes the importance of the farmer and rancher in providing the basis for the world's most abundant standard of living.

It is feared that the high standard of living on the High Plains may disappear if predicted shortages of food and fiber materialize as have the energy and water shortages.

Food and Fiber believes that public awareness is the key to avoiding this crisis, and that public understanding of the problem or processes will bring about solutions which can be self imposed.

The concept behind Food and Fiber is to research and communicate the changes of the development of the production and processing of natural food and fiber produced from or dependent upon the soil. This involves tracing the line of development of each product throughout the history of the United States.

Because food and fiber are necessary to the existence of every human being, to our standard of living and to world stability, the Food and Fiber National Institute of Achievement has accepted the role of public educator.

COMMENTS... continued from page 2

cautious about loans for solar energy development (see solar energy story) does not share the scientist's optimism. Yet there may be hope, since the same financing interests are quite willing to make 30-year loans on home-heating units, dishwashers, hot water heaters and a myriad of other built-in energy using appliances (none of which can be expected to last more than half the loan life on same); perhaps they will come to recognize the benefits of a new cost-saving apparatus, and solar and/or wind energy installations will be accorded the same loan status of their energy-using counterparts.

"Maria" May Prove Energy Source of Future

Away out here they have a name
For rain and wind and fire.
The rain is Jobe; the fire is Tess,
And the wind, they may call energy.

Wind is Energy

Now considered troublesome, and often very damaging in the spring of the year, the West Texas winds could — with considerable technical and economic "break-through" — be welcomed to the category of rain, a prayed-for commodity.

Spurred by ever-increasing cost of fossil fuels, the "free" energy of the wind is becoming popular research for scientists, and of interest to some commercial wind energy machine developers.

Early Wind Energy Uses

Perhaps the most notable historical development of the wind's energy was for transportation. The majestic beauty and romantic aura of sailing vessels from the tiny, single-masted, triangular-sailed dinghys, to the great multi-masted and multi-sailed clipper ships is a memorable part of our heritage — which still lives on in the hands of a few sailing enthusiasts; and we who would like to be affluent, bold, and carefree enough to be a yacht owner on a globe-circling adventure. However, commercial use of the winds for oceanic travel has long succumbed to the "cheaper" energy of fossil fuels.

Early ranchers and settlers to the Great Plains often claimed that the one machine which made the semi-arid climate habitable was the water-pumping windmill, and such windmills soon became the symbol of our early pioneer culture. But here again, the wind lost the battle to the convenience of man's development of the "cheaper" fossil fuel energy resources.

Scientists Optimistic

Scientists such as Emil Kadlec of the Albuquerque, New Mexico Sandia Laboratories are optimistic that research into new and more efficient wind machines will develop the "break-through" which will result in the commercial development of wind energy machines.

Kadlec is presently experimenting with an "upright windmill" (see photo).

The new breed of windmill uses the proven concept of the more efficient



A wind turbine at the Sandia Laboratories in Albuquerque bears little resemblance to the eclipse windmill which dotted the High Plains of Texas in years past. The new-style windmill is being studied as an alternative source of energy and can produce 60 kilowatts of electricity in a 30-mile-an-hour wind. The windmill is a research project funded by the Energy Research and Development Administration (ERDA).



EMIL KADLEC

air-flow (lift) of the aircraft airfoil (wing) as blades, as opposed to the limited efficiency of the flat blade (resistance) of the old windmills.

Sandia Laboratories experimental machine is presently the largest such upright windmill in the world, the windmill part (excluding other tower structures) being 17 meters in height, for an overall tower height of 75 feet. The service area—or the area necessary to contain the machine and its guy wires—covers approximately one-half acre.

Kadlec noted that the Sandia machine can generate 60 kilowatts of electricity (enough electricity to power a 75 horsepower motor) in a 30 mile-per-hour wind—the average wind velocity on the Texas High Plains is 15 miles-per-hour—while harnessing only 35 percent of the energy in such a wind. As Kadlec pointed out, the Sandia windmill's efficiency of 35 percent is actually nearly 100 percent of the energy available from the wind; because of the peculiarity of wind energy, if one tried to harness 100 percent of the wind, he would destroy the source. Some wind must continue to flow through the machine in order for there to be an energy to develop.

Costs

Although the many individual components of Sandia's experimental machine were fabricated on a lowest-bid basis, Kadlec believes the cost, approximately \$800,000, to develop the machine could probably be reduced to \$280,000 today, and a similar mass-produced machine may cost only \$40,000 or \$50,000.

Good Source Area

Researchers are consistently citing the High Plains of Texas as a large area blessed (?) with sufficient, and dependable, wind to utilize wind machines, should they ever become commercially practical.

Arland Schneider, agricultural engineer, United States Department of Agriculture, Bushland Experimental Station (Potter County) is presently experimenting with the prospects of developing wind energy for irrigation, utilizing an upright wind machine (the principle of the Sandia machine) developed by the Sigma Engineering Company, Inc. of Lubbock.

Free Energy No Panacea

Harnessing the wind or the sun (related story) currently requires use of "conventional" materials and processes, all costly, relatively inefficient, somewhat complex and requiring operation and maintenance experience not readily possessed by the layman.

However, these same obstacles confronted the developers of the radio, automobile, airplane, telephone, television, etc., but such machines and appliances are now used by and used to all of the general public. They will not become so, however, overnight—perhaps several decades—before the old energy sources (sun and wind) become new "free" energy sources for irrigated agriculture.

ANNUAL TAES FIELD DAY SET

A variety of crop research programs on the High Plains will be highlighted during the 68th annual Texas Agricultural Experiment Station (TAES) Field Day for Lubbock and Halfway, set for September 13.

Lubbock TAES will be host for field day this year, according to Bill Ott, Director of the Lubbock and Halfway centers, and Dr. Bill L. Field Day Chairman.

The Lubbock station is part of Texas A & M University Agricultural Research and Extension Center complex, located three miles north of Lubbock Regional Airport, off Highway 87.

A field tour of research plots and facilities is slated, with five stops scheduled. Machinery displays presented by area implement dealers, grape vineyard tours, and a garden information booth will also be featured.

The five stops will include research plots for weed control, cotton varieties and cotton disease control, soil fertility, nematode control, and water-use efficiency of a row-diking system.

Staff members of the experimental station, Texas Agricultural Research Service, and the National Weather Service Agricultural Meteorology office will be on hand, according to TAES officials.

THE

Cross

SECTION

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August, 1977



FRANK RAYNER

FRANK RAYNER RESIGNS

Frank Rayner, General Manager of High Plains Underground Water Conservation District No. 1 since 1969, submitted his resignation to the District's Board of Directors on August 24, 1977, to be effective September 1, 1977.

In accepting Rayner's resignation, A. W. (Webb) Gober, President of the District Board of Directors, said, "Frank, I want to thank you for many years of service here at the District. I think you have worked hard and I hope you do well later on."

At their August 24th meeting, the Directors also executed a contract with Rayner, retaining his services as a "... special consultant to the District for a period of one year...", commencing September 1.

The District's contract with Rayner specifies that he is engaged only as an independent contractor in a consulting position, and that he is free to accept other employment.

Rayner has stated that he intends to begin an immediate search for other employment, but that he was considering remaining in Lubbock to establish a practice as an engineering consultant, specializing in groundwater consultation involving research, design, development, management, quality enhancement and protection, and other endeavors involving groundwater supplies. He also noted that many of the smaller communities, and some industries, particularly in the High Plains area, and in other areas of Texas and surrounding states, are, or soon will be, facing major water supply and water quality problems. He further noted that such communities can, through proper planning, avoid such water supply problems, and obtain outside financing for such purposes.

Rayner first joined the District's staff as Chief Engineer August 1, 1966. On August 7, 1969, he was appointed Acting Manager, and appointed General Manager in October of that same year, while continuing to serve as the District's Chief Engineer.

He also served as editor and author of *The Cross Section* for the year 1970, and from September 1971, through May 1972, and again from August, 1976, through February, 1977.

Prior to his employment by the District, Rayner was the Assistant Director of the Groundwater Division, in charge of quality of water programs, of the Texas Water Development Board.

A registered Professional Engineer

and Geologist, Rayner received his Bachelor of Science degree in Geological Engineering from Texas A & M University in May, 1958. He has also completed several graduate level courses in groundwater geology and hydrology, and hydraulics, at Texas A & M and at Texas Tech University.

The author of approximately 100 papers, reports, brochures, bulletins, pamphlets, and books, Rayner is a member of the National and Texas Societies of Professional Engineers, and a member of the Water Committee of the Texas Society; a member of the Board of Directors of the Texas Water Conservation Association; a member and past president of the Groundwater Management District's Association—which he helped to organize in 1975; a past member of the Board of Directors of the West Texas Water Institute; a member of Governor Dolph Briscoe's Task Force on Water Conservation and Development; and a member of several national water associations.

After accepting Rayner's resignation, the Board of Directors appointed Clifford Thompson, Head of the Well Permit Section, as temporary manager of the District's office, until a replacement for Rayner is chosen.

DAN WELLS DIES

Dan Moody Wells, Director of Water Resources Center at Texas Tech University, died of an apparent heart attack August 12.

Wells had served as director of the Water Resources Center since 1966, when he moved to Lubbock from Austin. The 50-year-old Horn professor of civil engineering had also served as the agricultural consultant on the National Commission on Water Quality staff in Washington. He received the Spencer A. Wells award for his achievements in research and publication in environmental engineering.

He had been engaged in a broad range of engineering, management, and research problems in his years of professional experience. His teaching and research experiences have included specialization in the areas of water quality control and water resources management. He was experienced and proficient both in the management of major research projects and in performance of research in the fields of ground and surface water quality control.

DAN WELLS... continued on page 4

Texas Water Agencies Merge

Commencing August 29, 1977, the three major water agencies, the Texas Water Development Board, the Texas Water Quality Board, and the Texas Water Rights Commission, were combined to form the Texas Department of Water Resources (TDWR).

The voluminous Senate Bill 1139, sponsored by Texas Senator Grant Jones of Abilene, passed the 65th Texas Legislature in 1977 and signed by Texas Governor Dolph Briscoe, provides that the six member Board of Directors of the present Texas Water Development Board will become the Board of Directors of the new TDWR. The present Board of Directors of the Texas Water Quality Board will be abolished.

The three water rights commissioners—the Texas Water Rights Commission—will be retained as a somewhat autonomous Commission within the TDWR; its actions not governed by the Board of Directors of the TDWR.

However, most of the present staff of the Texas Water Quality Board and the Texas Water Rights Commission will be merged with the staff of the present Texas Water Development Board and the three agencies will become one—the TDWR—managed by one executive director.

The three Water Rights Commissioners, as provided by SB 1139, must be appointed by Governor Briscoe by September 1. At this writing, it appears that Governor Briscoe will reappoint the three present Commissioners, Joe Carter, Dorsey Hardeman, and Joe Carroll.

The TDWR Board Members, A. L. Black of Friona, George McCleskey of Lubbock, Milton Potts of Livingston, Glen Roney of McAllen, and Robert Gilmore of Dallas, will continue to receive only per diem and expenses when they meet monthly, or attend other functions of the TDWR, while the Water Rights Commissioners will be full time paid employees of the state.

The 65th Legislature's appropriation to the new TDWR (for the State's fiscal year, beginning September 1, 1977) is nearly two million dollars less than the total 1976-77 appropriation to the three separate agencies. The claim that the combination of the three separate agencies would eliminate duplicate services and reduce state spending was the major emphasis for the support in the Legislature that made possible the passage of SB 1139. Some proponents for the establishment of the TDWR also claimed that it would reduce the confusion and lessen and expedite the work load of other governmental units and individuals that needed the services of two or more of the formerly individual agencies.

However, the resultant reduction in appropriation to the TDWR—at a time when all other larger units of government are requesting and receiving increased appropriation—has caused considerable consternation within some segments of the staffs of the three agencies. In order to help meet the dictates for reduced cost and elimina-

WATER AGENCIES... con't. on page 4



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NEMIR NAMED ACTING EXECUTIVE DIRECTOR

Charles Nemir of Austin has been named Acting Executive Director of the new Texas Department of Water Resources, effective September 1, by the Texas Water Development Board.

James M. Rose of Austin, former Executive Director of the Texas Water Development Board, submitted his resignation to the Board at its regular meeting August 16. The resignation was to be effective August 31.

Although Rose was reportedly offered a post in the new water agency by the Board at an annual salary of \$40,000, he turned it down in favor of going into business for himself. Rose plans to form his own consulting firm in the natural resources area.

After going into closed session, the Board reopened the meeting, with Chairman A. L. Black of Friona presiding. After Nemir agreed to accept the position, George McCleskey of Lubbock moved to name Nemir as acting head of the new agency. Glen Roney of McAllen seconded the motion, and it was unanimously approved.

Nemir has served as Assistant Executive Director of the Texas Water Development Board since June, 1972. He was previously a staff engineer, employed since 1967 by TWDB. He served as Acting Executive Director for TWDB for two months in 1976.

Nemir recommended to the Board that Dick Whittington, Deputy Director of the Texas Water Quality Board, be named Acting Deputy Director of the new Texas Department of Water Resources, effective September 1. The Board unanimously approved the recommendation.

They also, at Nemir's recommendation, appointed W. L. Ivey to serve as Acting Development Fund Manager, effective September 1.

A native of Austin, Nemir was educated in Austin public schools, graduating from Austin High School and the University of Texas at Austin. He received the B.S. degree in 1954 and an M.S. degree in 1960, both in petroleum engineering.

He received the B.S. degree in 1954 and an M.S. degree in 1960, both in petroleum engineering.

Nemir, age 45, served a tour of duty with the U.S. Navy after his graduation from U.T., and completed a course in meteorology at the U.S. Naval Post Graduate School in Monterey, California. He was later assigned as officer in charge of the weather office at the U.S. Naval Air Station Brunswick, Maine.

Nemir joined Texaco, Inc. and served in various petroleum engineering assignments from 1958 to 1972. Whittington was born in 1928 in Liberty County, Texas and received a B.S. in civil engineering from the University of Texas at Austin in 1950. He received an M.S. in environmental health engineering from U.T. in 1952. He is a registered Professional Engineer in Texas.

From 1959 to 1961, he served as Director of Public Works for the City of Liberty. He was associated with Millwee and Associates, Consulting Engineers, from 1956 to 1962. From 1962 to 1967, he worked as an engineer for the Texas State Department of Health. In 1967, he joined the Texas Water Quality Board as Chairman, Field Operations, and later served as the Director of Field Operations for the Agency. He has been Deputy Director of the Texas Water Quality Board since 1972.

FOOD AND FIBER

Representative Jamie L. Whitten, Congressman from Mississippi, Chairman of the Agricultural Appropriations Subcommittee, and Commissioner Reagan V. Brown, Texas Department of Agriculture, will deliver the keynote addresses during the second annual meeting of the Food and Fiber National Institute of Achievement in Lubbock September 13 and 14.



Staff members of High Plains Underground Water Conservation District No. 1 are working on a District booth planned at the High Plains Agribusiness Exposition September 8, 9, and 10 in Lubbock Memorial Civic Center. Staff members are left to right, Oscar Riemer, Field Representative; Kenneth Carver, assistant head of the permit section; Johnny Lee, Engineer-in-Training; and Don McReynolds, geologist. Anyone who has questions regarding the rules, programs, services or practices of the District or any matters involving water wells, groundwater availability or quality, conservation and development are invited to stop by the booth and talk with District staff members who will be on duty.

NOTICE: Information regarding times and places of the monthly County Committee meeting can be secured from the respective County Secretaries.

Applications for well permits can be secured at the address shown below the respective County Secretary's name, except for Potter County; in this county contact W. J. Hill.

Board President Presents Policy Statement To Council

Webb Gober, President of the District's Board of Directors, presented a 24-page statement for the District before the Water Resource Council, Water Resources Policy Study Committee in Dallas on August 1.

The Water Resources Policy Study Committee was created by President Jimmy Carter to formulate a National Water Policy. Analysis and comments on the committee's statements of problems and opinions, as published in the Federal Register of July 15, 1977, were solicited; hence, the statement presented by Gober.

Excerpts from Gober's statement follow:

"We would be less than candid, or, more specifically, less than honest, if it was not first stated that these hearings—ostensibly to afford public input to a supposedly forthcoming National water policy—appear to be little more than a formality."

"The President's action, immediately after taking office, to sever Federal funding of early twenty ongoing (some more than 50 percent completed) water development projects is a direct indication that some type of a water policy had already been decided upon by the Administration."

"The concluding evidence of an already existing Carter Administration (National) water policy is pointedly illustrated by the obvious bias of the Water Resources Policy Study—Issue and Opinion Paper as printed in the Federal Register of July 15, 1977."

"However, since there is destined to be expended thousands, if not millions of dollars of public and private funds in the conduct of these 'policy hearings', it is the District's responsibility to participate in these proceedings with a constructive determination commensurate with the best interests of our local taxpayers, and in what we believe to be the collective best interests of Texas and the Nation."

"We would first question the ability and advisability of the Administration's current attempts to rectify water resource development procedures that have been established over several past decades within the 'hasty' time frame of six months, (to be completed November 23, 1977), as set forth in the Federal Register of July 6, 1977. Although the President directed, on May 23rd, that subject National water policy would be developed by the Federal bureaucracy... In consultation with the Congress and with the public... it must be noted that public participation was even further limited to the period of July 28 to August 20th—a mere 14 days; a time frame wholly inadequate to guarantee meaningful public participation in proceedings that may adversely affect the entire Nation's well being."

"The profound bias, against the present status of water development, pricing, conservation and management practices, of the Federal Register's (of July 15, 1977) PROBLEMS' statements is much more pronounced than are the suggested 'OPINIONS' statements one is forced to assume that the 'PROBLEM' is as stated in the Federal Register. While in truth, in most cases the problem is completely stated out of an obvious bias and in some cases so distorted as to actually border on being a fabrication. Even more than the 'OPINIONS', as stated in the Federal Register, the 'PROBLEMS' statements prejudice the present water-fraternity, and are direct evidence of the already existing (Administration) water policy."

"Therefore, our first opinion (of the Federal Register) is that the bias of the problem statements in the Federal Register is not conducive to generating honest and unbiased public participation in these proceedings. However, as it was previously noted, the people the District serves expect some effort to be made in their behalf to try to foster beneficial water policies and programs, and therefore, it behooves us to make such an effort in spite of the problem of the Federal Register's PROBLEM bias."

"The emphasis of the Federal Register's proposals to require the water project initi-

ators or 'benefactors' to pay the lion's share, or all, of the costs associated with water projects is inconsistent with the Federal Register's emphasis on 'social equality' and primary benefits to be afforded the 'low-income groups'. If project benefits are to be primarily received by the low-income groups, then the Federal Register's proposals that the primary benefactors pay the costs of water projects is paradoxical—or, perhaps, calculated to prevent water project construction."

"The proposal to give veto power to non-water agencies over water agency proposals is asinine. This situation already exists in some present Federal laws and it has proven to be totally unworkable, except to guarantee to stall water projects and, thereby, add grossly to their cost."

"Further, if it is logical, and in the National interest, to give veto power to non-water agencies over water agency proposals then reason would be that the National interests would also be served to give water agencies veto power over non-water agency proposals—as equally asinine as is OPINIONS a through b, page 36789, column 1 (The Federal Register)."

"The Federal Register's critique of the present cost-benefit evaluation procedures is correct, but not in the same connotation as the OPINIONS make apparent the bias of the PROBLEMS statement intended."

"This is to say, it is apparent that the PROBLEM statement is critical of the present methods of calculating the cost-benefit ratios for water projects because such calculations usually show that there is a very clear benefit to the funding of such projects."

"The reason we believe the cost-benefit ratio should be challenged is for entirely the opposite reasons as those set forth in the Federal Register. We believe the requirement that a cost-benefit ratio be calculated only for water projects involving Federal participation is blatantly discriminatory to only water projects. Although we have no objection to the retention of the cost-benefit analysis to water projects; it is reasonable to assume that such a cost-benefit analysis is equally adaptable to all other Federally financed programs, except national defense, and would therefore recommend that such analysis be attached to all such governmental spending. To single out water development is discriminatory."

"We would further suggest that the social, aesthetic, and environmental (man environment) secondary and tertiary monetary benefits of water projects, be made a part of the cost-benefit analysis. The practice of using only the assumed 'natural environmental' disadvantages (negative benefits) to evaluate water projects is discriminatory to a fair judgment of the myriad of water project benefits."

"After emphatically and repeatedly condemning water project funding as subsidies to the project benefactors, the Federal Register reverses its stand and recommends that 'social and environmental' objectives be subsidized in order to pay their share of project costs (p. 36793, col. 1)."

"Recommendations that water be sold to the highest bidder would so disrupt the guarantee of receiving project water by the initial project sponsors that it would be impossible to secure cost sharing sponsors since they would be unwilling to guarantee repayment of money borrowed (bonds) or funds otherwise contributed to construct the project. The inability to guarantee water delivery at a predetermined price would make project financing impossible to secure."

"The insecurity of governmental financing, as exemplified by the Administration's attempt to terminate several water projects already under construction, can be expected to have drastic repercussions on future efforts to secure non-Federal cost-sharing financing, particularly to the state and local governmental unit's attempts to sell bonds to finance their part of a project wherein there is some Federal financing."

"The Opinion that the Federal government could reallocate water rights... to the most socially desirable or economically productive use... and that such rights could be obtained through... eminent domain procedures... (p. 36794, col. 4, the Federal Register) is less than conducive to

fostering the faith of the financial community in purchasing water development bonds."

"Only slightly less prevalent in the Federal Register than the repeated recommendation for more Federal and state regulation of water resources, is the theme that the cost of water to the consumer or user should be increased. The overall mood of the Federal Register is that water must be made more expensive and that higher water pricing is the answer to all of our needs for more water."

"If the proponents for pricing water out of business would take time to review what happened when petroleum product prices recently doubled and even tripled in cost, they will note that there was only a momentary slowdown in energy demands, until all other related price structures could be adjusted upward to account for the energy price increase (inflation), because we, as a Nation, are using more petroleum products now than we were before the all-too-recent Arab oil embargo."

"The free (or quasi free) enterprise system in the United States has been built to supply abundant goods and services, and, thereby, through volume sales the cost of each unit of commodity has been kept within reason—the old large volume low price principle of economy. This is particularly true of the water supply business. Since the availability of abundant supplies of water at peak demand periods is absolutely essential to most municipal, industrial and agricultural endeavor, water development projects have been designed and constructed to meet these needs, on the principle of high volume, low price per unit of water. In spite of the Federal Register's contentions, there is nothing illegal, illogical or immoral with this principle of water pricing."

"The Federal Register's repeated critique of the low cost of water is actually a hidden compliment to the present water development fraternity. The abundance and low cost of certain commodities, such as water and (formerly) energy, are the major contributors to this Nation's 'comfortable' way of life. Should the water fraternity be condemned for supplying abundant low cost water? Why should water be priced out of reach of the masses, if it is not necessary to do so? Abundant, low cost, high quality water should be the goal of all governments, not a point of contention to change to high cost, and, thereby, limited quantities."

"The insistence that the Water Policy Study is not... intended to suggest a new or larger Federal role...—more Federal involvement in surface and groundwater regulation—is not consistent with the repeated OPINIONS of the Federal Register which suggest much greater Federal water management activity, but much less Federal funding and construction of water development projects. The entire Federal Register is replete with projecting the dominance of the Federal bureaucracy over both surface and ground water rights and regulation, while at the same time stating an obvious bias against continued Federal participation in the funding and construction of water development projects."

"It is not surprising that the Federal bureaucracy was quick to recognize that groundwater would have to bear the brunt of the Nation's need for more water, since it is the apparent intention of the Federal government (the Administration) to withdraw from, or seriously curtail, financial participation in surface water development; and in recognition of the 'environmentalists' success at preventing water projects construction using liberal court interpretation of Congressional acts."

"Without the continued development of surface water supplies, the water needs of this Nation will have to be supplied by groundwater."

"There can be very little argument against the principle that surface and groundwater supplies can be managed conjunctively. However well sounding is the theory of conjunctive management, the history of the majority of attempts to do so have been disastrous to the groundwater interests, and detrimental to efficient surface water management."

"We are given to suspect that the Federal



A. W. (Webb) Gober, President of the Board of Directors of High Plains Underground Water Conservation District No. 1, made a brief speech and then presented a 24-page statement to the Water Policy Study Committee in Dallas August 1. The committee held public hearings in several cities across the nation in an attempt to receive public input to help develop a national water policy. Excerpts from the District's statement are reproduced in The Cross Section.

Government's (Administration) real intent for forcing conjunctive management is to force those needing a water supply and having a surface water source to use—by surface water reservoir construction—to forego dam construction and appropriate any available groundwater, thereby satisfying the so-called environmentalists' demand for no more dam construction."

"If the Administration decides to continue to press for conjunctive management of surface and ground waters, the District would suggest that the unique characteristics and advantages of groundwater supplies, particularly its much greater volume and widespread occurrence, dictates that it be considered as the basic water supply source and that surface water development and management should be complementary to groundwater; and under no circumstances should the groundwater supplies be abused, mismanaged, or regulated only to serve surface water dictates."

"Further the author's contention that groundwater supplies are 'poorly regulated' is forgivable ignorance, but no doubt, still painfully unappreciated by the many residents of the District (and the residents within numerous other groundwater management entities throughout the United States) who have, for over 26 years, been abiding with, and even paying for, the enforcement of groundwater development and use restrictions administered by this District."

"Before swallowing the Federal Register's contentions regarding groundwater's 'poor' management, those interested should first survey the state of the art, particularly the readily available examples of the magnitude and specialty systems of groundwater management practiced by the members of the Groundwater Management District's Association."

"The District appreciates this opportunity to submit these comments regarding a National Water Policy, and although some comments may appear critical, it is hoped that they will be accepted in the constructive context in which they are submitted."

Respectfully submitted,
A. W. "Webb" Gober, President
Board of Directors,
High Plains Underground Water
Conservation District No. 1.

FIELD DAY SET

Topics to be covered in the annual field day at the Texas Agricultural Experiment Station will include soil-plant-water relationships; cotton—varieties, breeding, and culture; weed control; sorghum research; fertilizers; and water conservation.

The field day is slated to begin at 1 p.m. September 13 at the Lubbock-Halfway Center. Other agencies participating in the field day are the ARS-USDA, National Weather Service, Agricultural Extension Service, and the High Plains Research Foundation.

Specialists will be available for discussions of specific problems and displays and exhibits will be featured for public viewing.

Osborn Leaves TTU

Dr. James E. Osborn, agricultural economics department head and an assistant dean at Texas Tech University, will become chairman of the department of agricultural economics at Oklahoma State University in Stillwater September 1.

A native of Tuttle, Oklahoma, Osborn is well known for his studies of declining groundwater supplies on the High Plains. He has conducted feasibility studies on the development of groundwater for irrigation and the integration of ranches, feedlots, and farming activities into combined operations.

Osborn was project leader of input-output study for a 56 county West Texas area to determine economic effects of declining water supplies and greater battle numbers on the High Plains economy.

Osborn has been at Texas Tech since 1966. He was named assistant dean of the College of Agricultural Sciences at Texas Tech in 1973 and head of the agricultural economics department in 1974.

He is a 1959 graduate of OSU with a Ph.D. degree earned in 1964. He has taught at Auburn University in Auburn, Alabama.

He has been a member of the Board of Directors of the West Texas Water Institute and he is a past president of the Lubbock Economics Council.

Memberships in professional organizations include the American Agricultural Economics Association, the Western Agricultural Economics Association, and the Southern Agricultural Economics Association.

WATER AGENCIES . . . con't. from page 1

tion of duplicate services, the Texas Water Development Board chairman, A. L. Black of Friona, has ordered the retirement of all employees in the three agencies over 65 years of age and eligible for state retirement.

Since all the three agencies are already housed in the new Stephen F. Austin State Office Building, moving expenses and relocation of staff will be minimal, an argument for amalgamation by the proponents of SB 1139. Likewise the desirability for facilitating the working relationship of the public with the three agencies was the major argument for authorizing the construction of the Stephen F. Austin Building several years ago.

Opponents to the merging of the three agencies into the TDWR claimed the executive director of the new agency would have czar-like powers, and democratize state government administration would suffer. As an example, the opponents cited the abnormal powers wielded by several large Federal agencies such as the Environmental Protection Agency, Federal Power Commission, the Occupational Safety and Health Administration, the Department of Health, Education and Welfare, etc.

Perhaps the hidden concern for the powers that the executive director of the TDWR would have over the water community was exemplified by the failure of the members of the Governor's Task Force on Water Resource Development—composed of employees (mostly managers) of water districts, river authorities, city water departments, etc.—to collectively recommend, support, or oppose the creation of the TDWR.

The Governor's Task Force, as did many of the agencies and organizations, remained uninvolved, keeping a hands-off attitude of watchful interest as SB 1139 was written and debated by the Legislature.

In the early 1960s, the then one state water agency, the Texas Water Commission, was dissolved into two major agencies: The Texas Water Development Board and the Texas Water Rights Commission.

This splitting of the Texas Water Commission into two state agencies—both of which proceeded to individually grow larger than the parent agency—was justified on the Texas Research League's recommendation that the water rights decisions should be independent of the agency responsible for

the planning and funding of water development projects.

Since that time the Texas Water Quality Board has been created (primarily out of the Texas State Department of Health—now the Texas Department of Health Resources—and in direct response for a state agency to satisfy the dictates of the Federal Law, PL 92-500, which created the Federal Environmental Protection Agency). Now all three agencies with extensive adjudicative, planning, development, control, and financing powers, have been combined into one agency—a direct reversal of the 1960's reasoning of the Texas Research League.

However, the Texas action to create the TDWR is following a trend common in many other states where there is being created one multipurpose state water agency to perform the services of several former individual agencies—the California Department of Water Resources being a classic example, even to the exactness of name as that of the new Texas Department of Water Resources. Consolidation of governmental services (and consequently governmental powers) appears to be in favor with present public sentiment.

One section of SB 1139 which will be of particular interest to groundwater owners is:

The Department shall make and enforce rules and regulations for conserving, protecting, preserving, and distributing underground, subterranean, and percolating water located in this state, and shall do all other things necessary for these purposes.

This is not new law. It was enacted by the Texas Legislature in 1931 and had formerly been in the prerogatives of the State Board of Water Engineers, then the Texas Water Commission, and more recently, the Texas Water Rights Commission. Now, however, with the ever-increased emphasis for more groundwater regulation at the State and National levels (see story "Board President Presents Policy Statement") the reappearance of the old law as a privilege of the TDWR is notable.

The complexity of the wording of SB 1139, to meet constraints on creating the TDWR posed by the Texas Constitution, and the many problems of state agency amalgamation of this magnitude has several observers noting that several years may be required before the powers, duties, and structure of the TDWR are tested and perfected.



DAN MOODY WELLS

DAN WELLS . . . continued from page 1

Wells participated in the design and construction of numerous practical engineering projects. He served as principal investigator on several multidisciplinary research projects in the environmental quality field, some of which included the Galveston Bay Work Plan, Concentrations of Pesticides in Agricultural Runoff, Cattle Feedlots as Sources of Water Pollution, Urban Runoff Quality Study, The Development of a Generalized Mathematical Model for Groundwater Management, and Recreational Reuse of Municipal Wastewater.

A 1951 graduate of Texas Tech with a B. S. degree in civil engineering, Wells earned his Masters degree in 1954 in civil engineering from the University of Missouri, and was awarded his Ph.D. from the University of Texas at Austin in 1966.

He was a member of the American Society of Civil Engineers, Texas Society of Professional Engineers (past president of the South Plains Chapter), American Water Works Association, Water Pollution Control Association, American Association for the Advancement of Science, American Association of Environmental Engineers and Professors, National Reclamation Association, American Water Resources Association, Sigma Xi, Texas Water Conservation Association (past member of its Board of Directors), and registered Professional Engineer in Texas.

In the past five years, he authored 20 publications and 18 technical reports.

THE Cross SECTION

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Dedication ceremonies outside the Goodman Gin building at the Museum of Texas Tech University, (2) Horizontal drive pulley, called a bull wheel, was operated by teams of mules,



(3) Ground-level view of the wooden screw press which was powered by two mules, (4) Second floor view of the screw press.

Century-Old Cotton Gin Restored

In ceremonies on Friday, September 16, the Museum of Texas Tech received a restoration of a century-old cotton gin which was built in 1875 near Tyler, Texas. The Goodman Gin was dedicated as a memorial to Ennis E. Moss, inventor of the Moss-Gordin Lint Cleaner and a man whose invention helped change the cotton industry to its modern pace.

Mr. W. C. Thompson of Shallowater presented the gin to the museum on behalf of the Plains Ginners Association and the Texas Cotton Ginners Association. Dr. Cecil Mackey, President of Texas Tech University, accepted the gin. Also on hand for the dedication of the restored gin was Texas Commissioner of Agriculture Reagan Brown, who noted that the gin was a reminder of our past while denoting future responsibility to be builders like Goodman and Moss.

The Goodman gin which was built by Mr. Samuel A. Goodman combined antebellum plantation gin practices

with coming commercial ways. The lint press used in the gin was unique even among wood screw presses common to that time. Most screw presses operated by means of two mules attached to levers which turned the wooden screw. However, the Goodman press was operated by two mules turning the entire press box around the wooden screw, forcing it up or down. The machinery for the gin was all mule powered and could gin six bales of hand picked cotton per day. The two story building made of oak beams, yellow pine studs and cypress siding, stands 64 by 34 feet. The gin was preserved as a historical resource for almost half a century by Mrs. Sallie Goodman Calaway, daughter of Samuel Goodman. Her heirs eventually gave it to the museum.

Friday's dedication to Ennis Moss was said to be the latest tribute to a man who "made money for everybody" in the cotton business.

ECONOMICS OF 'EFFICIENCY'

Continuing escalation of unit energy cost, particularly as they relate to a power supply for irrigation pumpage, has created widespread interest in efficient conversion of the energy to actual work. To state that a pump is only operating at 50 percent efficiency when optimum expectation is 75 percent, conveys the correct impression that such an improvement would save money and conserve energy. However, it leaves unanswered the often asked question "But, what would it cost?". Since there can not be any stock answer except the obvious "Well, that depends —", it would seem advisable to attempt the answer in terms of actual examples.

Irrigation Pumps and Power, Inc., of Muleshoe recently completed an efficiency test on the Sparks-Wilson-Kassahn farm southwest of Lazbuddie operated by Max Steinbock. The well involved was a new well drilled in March 1977, and equipped with an on-hand pump. In mid-summer Mr. Don McElroy, pump engineer with the above firm was commissioned to make tests on the pumping plant in the well and formulate a recommendation for change if necessary.

continued on page 4... EFFICIENCY

BOARD HIRES CONSULTANT

At the Board of Directors meeting on September 2nd, the Board hired A. Wayne Wyatt as a special consultant to study the operation and responsibilities of the District. Wyatt received a charge from the Directors to evaluate the District's role in complying with legal responsibilities, public education concerning water conservation and long range goals and direction.

Wyatt is head of a groundwater consulting firm in Austin, Texas. He was employed by the Texas Water Development Board in Austin from 1968-1977 and is also a former long time District staff member where he served as director of field activities.

In performance of his contracted duties, Wyatt and the Board of Directors have both emphasized their desire to encourage input and comments from all persons interested in the District and its activities. All suggestions are welcomed and may be directed to Wyatt at the District office or to any Board member.



A. WAYNE WYATT

Water Conserved Today
Is
Water For Tomorrow



URBAN WATER CONSERVATION POTENTIAL

As most area residents are aware, a diminishing water supply is the single most critical problem facing the region. The conservation and beneficial utilization of water remain subjective choices, to which a larger segment of the population has not yet made a commitment through personal adoption. Water-saving opportunities exist throughout the populace. Even in use areas where water conservation measures will not save large quantities of water, they may result in a saving of energy and/or provide opportunities for environmental improvement. For convenience, water use may be broken into three categories: Urban Residential, Commercial-Industrial and Agricultural.

eliminating ad valorem taxes for water and collecting the revenue through the rate structure, and similarly handling sewage treatment charges would further contribute to the user's awareness of the quantity-cost relationship.

Any attempt to control water use through pricing must be mindful of the impact on low income segments of the population. The so-called life-line rate concept recently implemented by some gas and electric utilities, where-by discount rates on the first units delivered are made available to certain needy, could be included in the pricing system.

Commercial and Industrial Water Conservation

Most of the methods for reducing residential waste are also applicable to water users in the commercial and industrial sector. Inter-governmental programs should be instituted so that these agencies would set an example by implementing water saving practices at their facilities wherever possible.

In the industrial sector, recent water pollution laws have, and will to a larger extent in the future, provide incentives to reduce water use. Conservation measures include not only increased in-plant reuse and reduction of use, but also the use of treated sewage and industrial waste water. In considering the location of new industries, particular attention should be given to areas where treated effluent can be made available.

Current water pricing systems have commonly favored large users through a rate structure which includes reductions in unit price. Such pricing policies have been utilized to encourage economic development. Communities continue to be concerned with a healthy, viable economy. Therefore, the inequity of reducing rates in water pricing to industry should be addressed in terms of the financial impact considering the cost of water compared with other manufacturing costs. Some reasonable balance should be achievable by equating supply available and community economic considerations.

Agricultural Water Conservation

The efficient use of irrigation water has been the subject of exhaustive research for more than 25 years in the High Plains area. On-the-farm implementation of study recommendations is widespread and significant in its impact upon consumptive water use. Virtually every farm on the High Plains utilizes one or more water conservation practices, and the complexity of total water management integration on some farms is awesome.

A list of agricultural practices which offer an opportunity to conserve water should include: the method of application, sprinkler, drip, etc.; irrigation scheduling; good drainage and re-use systems; optimum rainfall utilization; weed control; use of flow line and seepage control; suppression of evaporation and transpiration; choice of crops grown; system automation-soil moisture sensing, etc.; cultivation practices; and land use capability and compatibility.

continued on page 3 . . . URBAN WATER

A MONTHLY PUBLICATION OF THE HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1

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Telephone 762-0181

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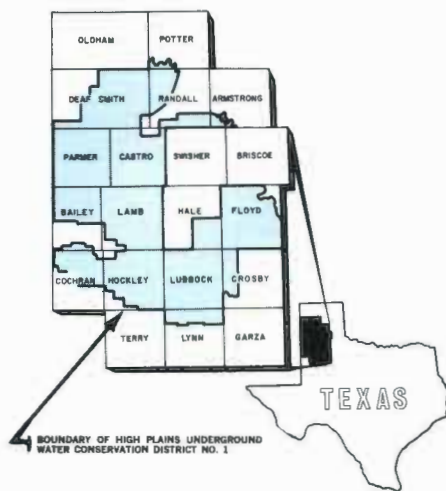
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NOTICE: Information regarding times and places of the monthly County Committee meeting can be secured from the respective County Secretaries.

Applications for well permits can be secured at the address shown below the respective County Secretary's name, except for Potter County; in this county contact W. J. Hill.

TDWR PUBLISHES DEAF SMITH STUDY

(TDWR News Release)

A study of how much is in the Ogallala Aquifer and projections for future years in Deaf Smith County has been completed by the Texas Department of Water Resources.

Report 213, "Analytical Study of the Ogallala Aquifer in Deaf Smith County" charts the impact and future course of underground water depletion through the next 44 years and its effect on irrigation water production. The study and report were made by A. Wayne Wyatt, Ann E. Bell, and Shelly Morrison. Copies of the report are available without charge from the Texas Department of Water Resources, P. O. Box 13087, Austin, Texas 78711.

Most High Plains residents are well informed on the continuing decline of the region's groundwater, and know that this is the lifeblood of the area's agriculture where some 70 percent of the State's irrigated food and fiber is grown.

Guidelines provided in the report were obtained by the use of electronic computers that simulate the aquifer's behavior and should provide the groundwater user in the county with reasonably good estimates by which future management decisions can be made.

Deaf Smith County had about 9.9 million acre-feet of groundwater in 1974. The study shows that 47 percent, or 4.7 million acre-feet, will be left by the year 2000 if past water-use patterns and aquifer behavior are continued in the future. Only 2.5 million acre-feet or 25 percent will remain in storage by 2020.

Pumping lifts in wells now range from 50 to 400 feet. Lifts of 400 feet occurred only in local areas in 1974 but will become more widespread by the year 2000 and will approach 450 feet in some local areas by 2020.

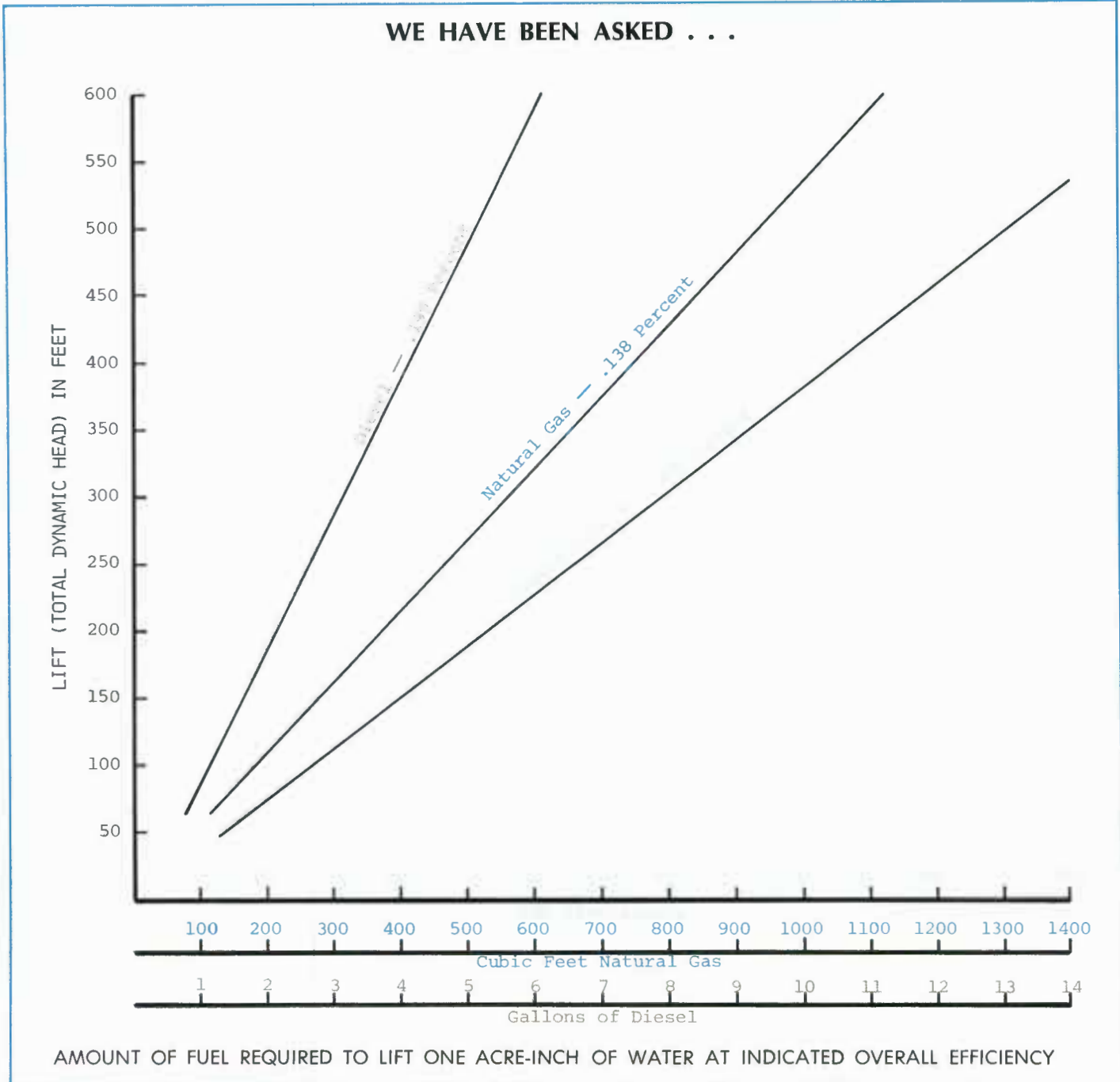
Compared to the 322,000 acre-feet of water produced in 1974, the amount expected to be produced in the years 2000 and 2020 is about 202,000 and 119,000 acre-feet, respectively, an overall decline of 63 percent.

Nowhere in the county is the water expected to be exhausted, but yields of wells will decrease and expense of irrigation pumpage will climb. The increased lifts will require more energy and thus greater cost in bringing the water to the surface.

During the past three decades, the withdrawal of groundwater has greatly exceeded the natural recharge of the aquifer. If this overdraft continues, the aquifer ultimately will be depleted to the point that it may not be economically feasible to produce water for irrigation, the authors state.

These findings, the authors emphasize, are based on the continuation of past trends. Future events can be very different if these trends change, the authors say. The most determinative factor may be the decisions of the water users themselves.

The report contains maps, charts, and tabulations which reflect estimates of the volume of water in storage in the Ogallala Aquifer and the projected depletion of this water supply by decade periods through the year 2020. The report also contains estimates of



pumpage, pumping lifts, and other data related to current and future water use in the counties.

The maps in the report are intended for use as general guidelines only and are not recommended for use in determining water availability when buying and selling specific tracts of land. It is recommended that a qualified groundwater hydrologist be consulted to make appraisals of groundwater conditions when such transactions are contemplated.

EDITOR'S NOTE

This report is ninth in the continuing series of county groundwater studies of the Texas High Plains by the Texas Water Development Board (now Texas Department of Water Resources). The completed reports cover the below listed counties in their order of publication: Report 200, Hale; Report 204, Lamb; Report 205, Parmer; Report 206, Castro; Report 207, Bailey; Report 209, Crosby; Report 211, Floyd; Report 212, Briscoe; Report 213, Deaf Smith. A limited number of these publications are available from the High Plains Underground Water Conservation District No. 1 office, 2930 Avenue Q, Lubbock, Texas 79405.



The Texas Agriculture Experiment Station at Lubbock observed its 68th Annual Field Day on September 13th. Pictured is the basin tillage tool designed to form small mounds of soil at intervals along the furrow and in effect build small dams to prevent rainfall runoff.

URBAN WATER continued from page 2

Obviously, a number of other measures have applicability under certain circumstances. Escalation of energy prices is providing additional incentives for innovative water management, and the penalty for non-adaptability may well be economic failure for area irrigation farms.

Each sector of the water-using populace must become involved in water conservation practices whenever the opportunity is available. Through dedication and perseverance, the water problems of the area can be met with constructive action aimed at alleviating, or pushing further into the future, the impact which water shortages will bring.

NEW WELL IN YOUR FUTURE?

All of those individuals who are thinking about drilling a new well have the opportunity to design efficiency into the construction procedures. In recent months, at conferences and in the printed media, considerable space has been allocated to the subject of pumping plant efficiencies as they relate to the individual irrigator on the High Plains. While existing wells generally offer some measure of improvement in the conversion of energy to water production, most of these opportunities are restricted to the pump and power unit. In a limited number of instances, the cased borehole itself might be responsive to some renovation and maintenance procedures. Little or no attention has been focused on the tremendous opportunity presented to all those individuals who are constructing new wells.

Proper design and construction of a new well, with criteria based upon the lithology and hydrology unique to each individual borehole, will commonly afford substantial opportunity to obtain a water well that is efficient and produces an adequate yield. Proper design of a well also maximizes the features which help assure a long and trouble-free well life. Additionally, any added investment for a properly designed well will usually produce maximum economy.

A partial list of variable features included in the proper design of a well include: *well diameter, well depth, well screen length, well screen slot openings, well screen diameter, screen transmitting capacity, screen material, screen strength, gravel pack design, thickness of gravel and method of emplacement.* Procedures for effective development and a final testing of the aquifer characteristics to provide the values necessary to assure proper selection of efficient pumping plant equipment are also essential.

The minimum expectation from such engineered construction should be a trouble-free well pumping an adequate yield (within aquifer limitations) of sand free water with minimal draw-down and optimum conversion of energy to water horsepower.

EFFICIENCY . . . continued from page 1

At the conclusion of his testing, McElroy reported that the existing pump was capable of producing 637 gallons per minute (gpm) at 262 feet of total dynamic head (TDH) and had a requirement of 94 horsepower. The Chrysler 413 engine coupled to a 4:3 gearhead was fully loaded at 1610 rpm pump speed. The calculated pump efficiency was 44.8 percent.

Acting upon McElroy's advice, the pump was pulled and a selected set of new bowls was installed. Using the same power plant and gearhead, the well was again tested. McElroy found the pump at 1725 rpm was producing 890 gpm with 299 feet TDH and had a requirement of 90 horsepower. The new calculated efficiency was 74.6 percent.

Total cost to the well owners for achieving the improvement in efficiency amounted to \$3,064. The accompanying chart illustrates the variable values with cost comparisons on an acre-inch basis. The hourly cost comparison was also calculated assuming the same yield (637 gpm) from the new pump as was being produced from the original unit and, with the reduction in required horsepower and improved efficiency, it was possible to reduce hourly fuel cost from \$1.79 to \$1.09.

ACRE INCH COMPARISON

Pump Efficiency	GPM	TDH	Required BHP	Fuel cost/ acre inch	4200 Acre inch Fuel cost	Savings	Cost to Attain	Return on Invest.
44.8	637	262	94	\$1.27	\$5,334.00	\$1,663.20	\$3,064.00	54%
74.6	890	299	90	.874	3,670.80			

Assumptions: Natural gas cost \$1.50 MCF and contains 1,000 BTU/cu ft, thermal efficiency of engine averages 20 percent.

Required Pesticide Applicators Certification After Oct. 21, '77

As reported in the March, 1977, edition of "The Cross Section" the federal program governing the application of restricted use pesticides will take effect on October 21. The new program will particularly affect farmers and other private applicators of pesticides. According to the program only certified applicators or persons under their direct supervision will legally be able to apply those pesticides classified as restricted use. Also, it is reported that only those persons so certified will be able to purchase these restricted use substances.

In review, the program involves the amended Federal Insecticide, Fungicide, and Rodenticide Act which requires the Environmental Protection Agency (EPA) to classify certain pesti-

The Water District's exhibit in the Agriculture Building at the Panhandle South Plains Fair in Lubbock.

The well owners opted to increase the well yield so as to adequately water the acreage required and avoid any potential crop stressing situations. As indicated on the chart, the fuel savings alone on one season of 4200 acre inches of pumpage amounts to \$1,663.20. This savings calculates out to an annual return of 54 percent on the invested cost of improving the efficiency.

Pollution Controls Costly

According to recent surveys by economic researchers, the cost for the control of water and air pollution will continue to rise in future years. L. J. Pearl of National Economic Research Associates, Inc., Washington, D. C., in the paper entitled "Evaluating Environmental Legislation" estimates that over the next ten years, the cost of pollution control will take from 1.5 to 4.0 percent of our Gross National Product (GNP). The magnitude of these figures becomes clear when you compare the percentages attributed to other expenditures such as law enforcement, which now accounts for only 1 percent of the GNP. Also by comparison, the money spent for defense now accounts for only 6 percent and health care amounts to 8 percent.

It is estimated that between the years of 1975-1983, water pollution control will reach a high of 18 percent of new capital expenditures. Schedules depicting the benefit-cost ratios for implementation of the 1972 Federal Water Pollution Control Act Amendments show only 0.14 to 1. estimates.

Implementation of Federal clean air legislation will reportedly cost Texans an average of 2.5 times the national average or approximately \$1800 per household between 1975 and 1990. If these figures are an example of the things to come, one would wonder if the human health effects are worse from air and water pollution or from impoverishing our citizens to pay for their control.



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DR. ROBERT M. SWEAZY

Sweazy Named Director Of WRC

Texas Tech University News Release

The appointment of Dr. Robert M. Sweazy as Director of the Water Resources Center at Texas Tech University was announced Tuesday by Dean John R. Bradford of the College of Engineering.

Sweazy succeeds Dr. Dan M. Wells who died August 12.

Since 1970 Sweazy had been Assistant Director of the center and served as Acting Director for nine months in 1975 when Wells was on leave of absence. Sweazy also is an associate professor of civil engineering at Texas Tech.

Dean Bradford termed the appointment a "logical choice."

"Under the very capable leadership of Dan Wells," he said, "the Water Resources Center at Texas Tech University has achieved national prominence and has provided leadership throughout the state."

Committee Hears Testimony On Energy Costs

by Ken Carver

On October 11, 1977, the House Energy Resources Committee headed by Representative Joe Hanna of Breckenridge met at Plainview, Texas.

This one-day hearing was attended by area farmers and businessmen voicing their opinions concerning the high cost of energy.

The lead-off witnesses were Michael Meredith for the North Plains Energy Consumers Association followed by Bruce Rigler representing the Plains Irrigation Gas Users Association. Both expressed great concern over the rising energy cost, and fears of many farmers having to resort to partial watering or going totally to dryland farming. They further stated that along with concern over the price of fuel, there was considerable uneasiness over its availability. During the day,

"Dr. Sweazy's appointment to this position will provide the necessary continuity of leadership and the initiative for continued development of the center's work."

"Dr. Sweazy was the logical choice for this position, with his varied background of experience in water quality, reuse and conservation," Dr. Bradford said.

A native of Chanute, Kansas, Sweazy grew up in Ulysses. He received the bachelor's and master's degrees in biology and chemistry at Wichita State University. His doctoral degree in civil engineering, with a specialization in environmental engineering, was earned at the University of Oklahoma.

continued on page 4... SWEAZY

numerous individual farmers speaking for themselves, expressed much the same anxieties as the representative groups.

Max Lennon, representing the Texas Tech University College of Agriculture, explained the importance of irrigation to the area economy. He stated that irrigation has exerted a stabilizing effect on the economy and that a return to dryland farming would result in an erratic economy. He further stated that under dryland farming, the production of wheat would be reduced by 40 percent; cotton and sorghum reduced by 50 percent; and corn reduced by 80 percent.

Dr. Robert M. Sweazy, Acting Director of the Water Resources Center at Texas Tech, followed with testimony about various research projects now being conducted. Some projects mentioned were playa lake studies, re-

charge wells, and engineered wells.

Dr. L. Davis Clements, Assistant Professor of Chemical Engineering at Texas Tech, explained some of the research being conducted to provide alternate energy sources such as solar, wind power, and synthesis gas. However, he stated that while these sources may show promise, for now we must rely on our present fuel sources.

In the afternoon session Don Marble, representing Marble Brothers and High Plains Research Foundation, stated that he too was concerned with high fuel prices and the availability of fuels. He said one way to off-set rising energy costs is through better well efficiency. For example, at the High Plains Research Foundation an engineered well was developed which shows greater specific yield potential

continued on page 4... COMMITTEE

Texas Soil, Water Conservation Districts Meet

Lubbock's Memorial Civic Center was the scene for the 37th Annual State Meeting of the Texas Soil and Water Conservation Districts on October 12 and 13th. The meeting theme was "Changing Challenges" and it was capably upheld by a panel of speakers including former Congressman Dan Kuykendall, Dean of Agriculture at Texas Tech Anson Bertrand, and State Representative Joe Hubenak of Rosenberg.

At the banquet on Wednesday night, Texas Commissioner of Agriculture Reagan Brown delivered a humorous and inspirational address to approximately 600 attendees.

The post meeting tour of Vice Chairman Frank Gray's farm east of Lubbock proved to be a highlight for many. The farm has been continuously irrigated with treated sewage effluent from the City of Lubbock since 1937 and presently receives approximately 14 million gallons per day.



Texas Soil and Water Conservation Districts attendees on a post meeting tour of the Frank Gray Farm.

COURT RULES AGAINST PUBLIC EASEMENT

In a judgment handed down by the 64th Judicial District Court Judge John Boyd on October 11th, 1977, the County Commissioners of Hale County were notified that an easement which they had granted an area farmer was legally invalid.

The easement in question was granted by Hale County Commissioners in February 1976, to an area farmer for the purpose of burying a water flow line in the bar ditch of a county road so the farmer could transport water from one farm to another more than one-half mile away. In granting judgment to the Plaintiff, Judge Boyd ruled the purported easement was a nullity; the pipeline in

question was a purpresture (wrongful appropriation of land subject to the rights of others), being an unauthorized appropriation for private or individual purposes of a public right-of-way.

In ruling for the Plaintiff, Judge Boyd adjudged the Defendants be mandatorily required to remove the pipeline(s) in question and to restore the road for public travel. Judge Boyd also permanently enjoined and restrained the Defendants and Hale County from using the County road to install, construct, and maintain pipelines for private and individual purposes.



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Sprinkler Irrigation-Distribution Cost Comparisons

Considerable interest has developed in recent years concerning methods of application of irrigation water. These same years have seen a tremendous increase in sprinkler irrigation systems as they have become an integral part of irrigated agriculture.

In September 1976, the High Plains Underground Water Conservation District No. 1 in cooperation with the Agricultural Economics Department of Texas Tech University prepared a report for the Governor's Energy Advisory Council in Austin, detailing the "Cost of Pumping Irrigation Water In The Texas High Plains". In this study a section was reserved for a discussion of the cost associated with sprinkler irrigation.

Sprinkler irrigation systems consist of an apparatus designed to move water through a network of tubing or pipes and discharge same from sprinkler heads or nozzles attached to spray this water upon the land surface. The basic premise of common sprinkler systems is a requirement that the water to be applied must be pressurized. Of these type systems, there are a substantial number of wheel move, side roll and drag line type sprinklers in use throughout the High Plains area. However, it is the center pivot system which is drawing the most attention and investment over most of this area.

An important factor to be considered with a center pivot system is a

pressure requirement which might range to 70 pounds per square inch (psi). A pressure of 70 psi is the equivalent of an additional lift of 161.6 feet. As an example of the effect on pumping cost a sprinkler system could have, a good pumping plant yielding 800 gallons per minute at a 300 foot lift and a fuel requirement of 987 cubic feet of natural gas per hour, would see the fuel requirements increase to 1,519 cubic feet of natural gas per hour when the same volume of water was delivered at 70 psi.

The calculated cost for distribution of water through a center pivot system would amount to \$1.38 per acre-inch applied. Whereas, the cost associated with distribution by surface application would be \$0.60 per acre-inch. These figures relate only to the distribution costs as shown in the accompanying tables.

While the purchase of an automated sprinkler system may not be totally justifiable from an economic analysis of return on investment, lower labor requirements plus the capability of covering all of the planted acreage quickly are plus factors which are difficult to place a dollar worth upon. Obviously, the physical characteristics of the soil type(s) and water requirements of specific crops are also an important part of any economic appraisal.

DISTRIBUTION COSTS FOR PIVOT SYSTEM PER WELL

Cost Item	Per Year	Per Acre ¹
Replacement Cost (\$30,000.)		
Depreciation ²	\$2,425.00	\$ 9.19
Interest ³	1,390.00	5.26
Insurance and taxes	600.00	2.27
Total Overhead	4,415.00	16.72
Operating Cost		
Distribution labor ⁴	\$ 396.00	\$ 1.50
Repairs and maintenance ⁵	647.00	2.45
Total operating cost	1,043.00	3.95
Total cost	5,458.00	20.67
Total cost per acre-inch applied ⁶		\$ 1.38

- ¹ 132 acres irrigated by system rotated between summer and winter crops.
- ² Depreciated over 12 years useful life with 3 percent salvage value.
- ³ Nine percent interest on average investment.
- ⁴ Thirty minutes per acre irrigated at \$3.00 per hour.
- ⁵ Adapted from TAES Report 71-1 with inflation factor of 58 percent added. It is assumed that 20 irrigations are applied per year for both summer and winter crops at a cost per acre per irrigation of \$0.24.
- ⁶ Assuming an application rate of 1.5 acre inches per application for a total of 3,960 acre inches per year.

DISTRIBUTION COSTS PER WELL FOR SURFACE APPLICATION

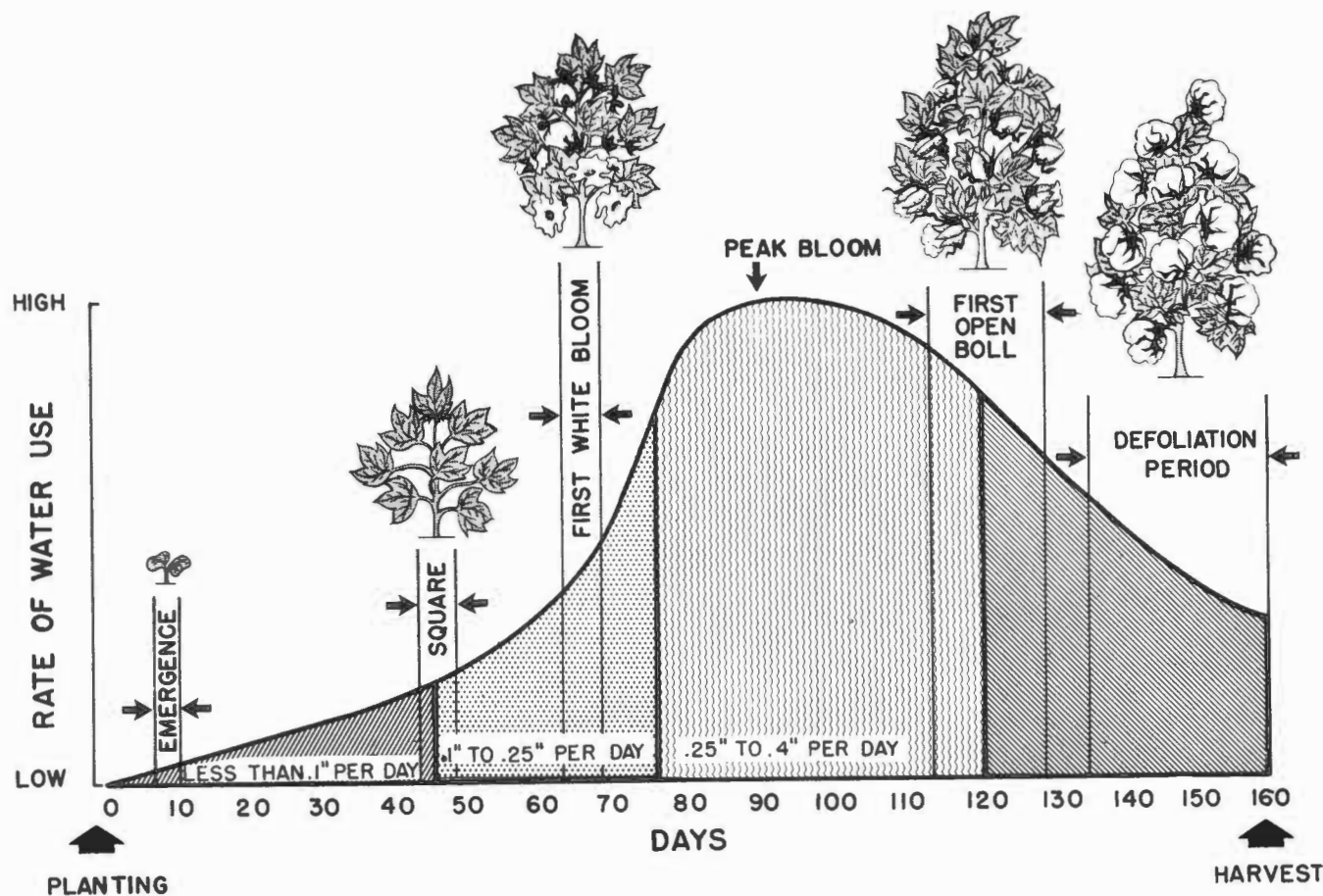
Cost Item	Underground pipe (A)	Gated pipe and shutoff valves (B)	Total system
Replacement cost ¹	\$3,827.50	\$534.00	\$4,361.50
Ownership cost/hr. ²	0.181	0.065	0.246
Repair cost/hr. ³	0.029	0.015	0.044
Labor cost/hr. ⁴			0.50
Total cost/hr.			0.79
Total cost/acre-inch ⁵			\$ 0.60

- ¹ Based on 1,531 feet of underground pipe (A) at \$2.50 per foot and 12 joints of gated pipe (B) at \$44.50 per joint.
- ² Based on a useful life of 20 years for A and 5 years for B with no salvage value, nine percent interest on investment and 2,000 hours operating time per year.
- ³ Based on accumulated repair cost over useful life of 39 percent of new cost for A and 20 percent of new cost for B. (Agricultural Engineer's Year Book.)
- ⁴ Based on one hour labor requirement for applying water for every six hours of pumping time at \$3.00 per hour.
- ⁵ Based on a well yield of 600 gpm and a pumping rate of 2,000 hours per year. Cost may be changed proportionately for different well yields.

NOTICE: Information regarding times and places of the monthly County Committee meeting can be secured from the respective County Secretaries.

Applications for well permits can be secured at the address shown below the respective County Secretary's name, except for Potter County; in this county contact W. J. Hill.

Rate of Water Use in Relation to Plant Development

SOILS AND IRRIGATION
WATER MANAGEMENT

by Robert E. Arhelger*

No one is more aware of the escalating cost of energy than the irrigation farmer. In the past few years, he has become familiar with such terms as "pump efficiency", "tailwater recovery", and "total dynamic head".

Irrigation farmers have been aware of the diminishing water supply for several years. With the increasing cost of pumping water, he is looking for methods of irrigation water management. Failure to properly use every acre inch could mean serious economic loss.

Even if the farmer has the most efficient pumps in the county, he may still miss the mark. The water pumped must be properly managed. Conservation practices that conserve water may and should be used, but it should all be tied back to the farmer's basic resource—SOIL.

The type of soil on a farm should be the basis for the most essential decisions. Should the farmer use a surface irrigation system or a sprinkler system? How long should his rows be? How much water should be applied at what rate? When should the water be applied? Without a knowledge of his soil, the farmer cannot be sure of his answers to these questions.

The Soil Conservation Service is the source for soils information on individual farms. The Soil Conservation Service is responsible for all soil survey activities for the Department of Agriculture. All soil survey work is done in cooperation with state agricultural experiment stations and other state, Federal or local agencies. Soils information is available at local Soil Conservation Service offices for the asking. Assistance is also available for planning irrigation water management.

A farmer may find that the soils in a field have such a low intake curve that a sprinkler system is not practical. Water applied with a sprinkler may run off before it enters the soil. He may find that the intake curve is so high that a sprinkler system is the only efficient method of watering. Soils interpretations are the key.

Many surface irrigation systems are not designed for the soil involved. One soil may call for rows 1200 feet long; another may call for rows only 600 feet long. "Pushing" water a few hundred feet more is like stretching a sack of seed over a few more acres. It doesn't pay.

The available moisture-holding capacity varies with each soil. Applying 3 inches of water to an acre of land when only 2 inches is needed is costly. The extra inch applied amounts to 27,154 gallons of water per acre that is taken from the aquifer. The cost of pumping this extra water bites into the profits too.

The farmer must consider the crop grown on a particular soil. Different types of crops vary in their daily use of water. A good water management plan is based on this in conjunction with the soil type. The peak consumptive use rate of cotton in inches per day is .25 inches. This means that cotton will use an inch of water in 4 days during its peak growth period. If

New Conservation Tool—Irrigation Scheduling

by Kathy Redeker

With increasing cost of energy for irrigation pumpage making water conservation practices more and more important, the irrigation farmer is realizing that his success may largely depend upon his judgment of when to irrigate and how much water to apply. While the irrigator has always been concerned about the effectiveness with which he applies water to his crops, economic figures are increasing the importance of such effective application.

Recent technological developments are helping the farmer better understand methods for the most effective use of the water resources available to him. One such technique which is aiding the irrigator in the efficient use of irrigation water is scheduling of irrigation.

Irrigation scheduling is a method by which the irrigator determines the precise time and amount of irrigation water to apply, based upon knowledge of the quantity of water which the crop requires for optimum yields. The basic idea behind scheduling practices is an understanding of the water holding capacities of the various soil types and the water usage requirements of plants during stages of their life cycle. Also taken into account when calculating scheduling requirements will be the weather conditions and anticipated rainfall. These specifics will help to determine the correct minimum reserve of soil moisture for best plant growth. Therefore, at no time will crops go into stressing situations and a zone will be maintained to accept infiltration of precipitation to avoid run-off.

In recent years several test projects involving irrigation scheduling have

shown that there is great potential and practical use for such scheduling programs. In 1975, a group of Nebraska Groundwater Conservation Districts instigated a test program called "The Benedict Project". One of the goals set out for this project was to reduce the average pumpage of groundwater from 20 inches per year to 15 inches while maintaining crop yields. According to the investigators, this goal was achieved with surprising ease, with those farmers participating in the project averaging 13.2 inches. Through this illustration it is easy to see the advantages irrigation scheduling can offer.

Obviously, to achieve such goals most irrigators will require professional advice and assistance. This assistance in York County, Nebraska, was provided through a number of organizations including the local bank, the ASCS office, the local groundwater conservation district and private consultants. Although the concept of scheduling is relatively new to the High Plains area, there is such technical assistance available through A & L Agricultural Laboratories in Lubbock.

Dr. Weldon McFarland of A & L Agricultural Laboratories explained that their scheduling program is based on a weekly analysis of information concerning crop maturity, root depth and moisture applied previously by either irrigation or precipitation. In order to obtain a basis for calculation of these weekly analyses, the farmer is asked to collect a composite soil sample. This sample is then analysed to determine specific soil characteristics such as water holding capacities and permeability. A thorough understanding of the specific crop characteristics is also essential.

After consideration of these factors, a weekly analysis is calculated using information regarding the previous week's moisture and plant stage changes. In order to calculate the necessary steps which need to be taken it is also helpful to know the moisture status of the soil itself. A method by which the measurement can be attained is through the use of soil moisture blocks. These moisture blocks indicate if the desired effects are being achieved, or if the system needs to be slowed down or speeded up. These soil moisture blocks are placed at 6 inches, and 1, 2 and 3-foot depths, and can be used to evaluate the moisture depletion levels of the field with the use of a meter which passes a current through the block and gives the reading.

With the weekly analyses, the irrigator can determine if irrigation is needed or if there remains enough moisture in the soil to allow desirable plant production without such irrigation. Through these determinations the farmer may avoid unnecessary irrigation and therefore save the water and energy which could have been expended. This point is emphasized by the facts from 1976 field tests in Nebraska using scheduling which showed it was possible to decrease irrigation water used by up to 10 inches per year and also save \$6.00 to \$10.00 per acre by using less energy.

Although irrigation scheduling is relatively new to the High Plains area, it must be realized that the water table is declining rapidly and energy costs are going to continue to rise; therefore, any investigation of methods which have the potential to save some of these valuable resources is of great

continued on page 4 . . . SCHEDULING

continued on page 4 . . . WATER

SWEAZY . . . continued from page 1

In addition to teaching he has been a research associate at the University of Missouri, a water chemist for the city of Wichita, Kansas, and a consultant for the Northern Natural Gas Company.

In his professional and academic work he has served as a member of the Executive Board of the Universities Council on Water Resources; vice chairman of the Water Resources Board for the city of Lubbock; vice chairman of the South Plains Association of Governments Water Sewage and Drainage Committee; and chairman of the Civil Engineering Departmental Committee on Continuing Education.

Sweazy was presented the Texas Tech College of Engineering first annual Award for Excellence in Teaching through Research in 1975.

He also holds a Certificate of Achievement from the Livestock Environmental Sciences Committee for outstanding research, awarded in 1974.

He is author or co-author of approximately 50 scholarly presentations and published papers.

DISTRICT ELECTION TO BE HELD IN JANUARY

The High Plains Underground Water Conservation District No. 1 will conduct its annual election on Saturday, January 21, 1978. Elections will be held in those counties located in Director's Precinct 1 (Crosby, Lubbock and Lynn), Precinct 2 (Hockley, Lamb and Cochran) and Precinct 5 (Floyd and Hale).

The elections will be conducted to elect three members of the District's Board of Directors and at least six new County Committeemen. Under the District's by-laws Directors are elected for two-year terms with no limit on the number of terms served, while Committeemen are elected for four-year terms with a limit of two terms. Since a number of the County Committeemen within these counties have served two consecutive terms, it will be necessary to propose new officials to fill the elective offices.

Inquiries regarding dates and procedures for placing names on the ballots may be made at the Lubbock office.

CROP AND LIVESTOCK REPORTS FROM FARMERS AND RANCHERS NEEDED

From mid-November to early January, thousands of Texas farmers and ranchers will receive a crop or livestock questionnaire from the Texas Crop and Livestock Reporting Service or will be personally interviewed by the Service's field staff. The information gathered through the questionnaires and interviews provides the basis for determining the final acreage, yield and production of crops and end-of-the-year livestock and poultry numbers for the state of Texas and for each county.

Reliable information on what is produced, how much, and where is important to farmers, ranchers, and others in making production and marketing decisions and in providing an unbiased picture of Texas Agriculture. It is also the basis for determining allotment and payment levels to producers by USDA under the various commodity programs.

Cooperation by producers is the key to all crop and livestock estimates. Farmers and ranchers have recognized the need for accurate and timely statistics by participation in the program since its start over a century ago. All individual farm and ranch information is kept confidential, and only state and county summaries become part of the final published estimate.

County statistics for 1976 and January 1, 1977, are available on Livestock, Poultry, Dairy, Field Crops, Small Grains, Cotton, Vegetables, Fruits and Pecans, and Cash Receipts from the Sale of Texas Farm Commodities. Bulletins can be obtained from the Texas Crop and Livestock Reporting Service, P. O. Box 70, Austin, Texas 78767, or by writing Reagan V. Brown, Commissioner of Agriculture, P. O. Box 12847, Capitol Station, Austin, Texas 78711.

SCHEDULING . . . continued from page 3
importance. With an agricultural based economy, it is understood that if we run out of water we are in trouble. Irrigation scheduling is not the entire answer to a declining water table, but its initiation may be of assistance in stretching the available supply through time to blunt the economic impact of a diminishing agricultural productivity.

MATCHING YOUR HORSEPOWER REQUIREMENT

Total Lift	Horsepower Required to Pump Water*						
	100 GPM	300 GPM	500 GPM	750 GPM	1000 GPM	1250 GPM	1500 GPM
100 ft.	4	10	17	26	34	42	51
150 ft.	5	16	26	38	51	64	76
200 ft.	7	21	34	51	68	85	101
250 ft.	9	26	43	64	85	106	127
300 ft.	11	31	51	76	101	127	152
350 ft.	12	36	59	89	118	148	177
400 ft.	14	41	68	101	135	169	202
450 ft.	16	46	76	114	152	190	228
500 ft.	17	51	85	127	169	211	253
550 ft.	19	56	96	139	186	232	278
600 ft.	21	61	101	152	202	253	303

*Using pump efficiency of 75 percent.

This chart illustrates the amount of horsepower your irrigation power source must supply to the pump in order to lift and deliver specified flow rates. It is important to note that these values apply only to a pump operating with a high (75 percent) efficiency. A lower efficiency range for the pump would require additional horsepower to deliver the same volume. For example, the chart indicates that delivery of 1000 gpm with a total lift of 300 feet requires 101 horsepower at 75 percent pump efficiency. Lowering the pump efficiency to 50 percent would demand an increase to 151 horsepower.

COMMITTEE HEARS . . . continued from page 1

than a regular constructed well (see August 1976, issue of The Cross Section).

Pioneer Natural Gas Corporation and Southwestern Public Service Company also had representatives to give testimony on their behalf. Both stated they were trying to keep prices as low as possible. However, they did expect prices to continue to rise.

The panel's questions centered mainly around efforts necessary to help off-set rising fuel prices. The legislative panel will publish a report on energy cost of land irrigation in 1978.

WATER MANAGEMENT . . . continued from page 3

4 inches of water is applied to the cotton, it will have used up the water applied in 16 days and will begin to go into stress if the farmer does not start application of water again. An irrigation system, surface or sprinkler, should be designed with this in mind. Water is a resource of the High Plains that should be used. It serves no purpose left in the ground, but it should be used wisely. Irrigation without irrigation water management could lead to economic failure.

*District Conservationist, USDA-SCS, Lubbock, Texas.



THE Cross SECTION

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Board Authorizes Filing Of Amicus Curiae Brief

The Board of Directors of the High Plains Underground Water Conservation District No. 1, in session on November 8th, authorized the filing of an *amicus curiae* (friend of the Court) brief in the case of Smith-Southwest Industries et al vs. Friendswood Development Company et al.

This is the case where Houston area landowners with subsidence problems have sued neighboring landowners who pumped underground water and allegedly, thereby, caused the subsidence. The trial court held that there was no cause for action because under the Texas Rule of Private Ownership of Groundwater, the landowner is entitled to construct wells and withdraw any water available for capture so long as the water is applied for beneficial purposes.

Upon appeal, the Court of Civil Appeals' written opinion appears to question the Texas Rule of Private Ownership of Groundwater. It cites the Restatement of the Law of Torts, as proposed on April 26, 1971, for adoption by the American Law Institute. Apparently endorsing the philosophy expressed in that Restatement, the Court proceeded to rule:

(1) *Because of a landowner's absolute right to take all of the water which he can produce from his land, the fact that this taking causes the land of others to subside will not, standing alone, give rise to a cause of action.*

(2) *However, if the landowner is negligent in the manner by which he produces the water and the negligence is a proximate cause of the subsidence of another's land, the fact that he owns the water produced will not insulate him from the consequences of his negligent conduct.*

Other language in the opinion indicates that there may be a cause of action by a landowner whose water has been drained from beneath his land by an adjoining landowner, if the pumping constituted negligence or nuisance in fact.

In the applications for writ of error, it is pointed out that the Texas Rule follows the English Rule of absolute ownership of groundwater with no restrictions upon withdrawal other than that it shall not be withdrawn for the specific purpose of waste or willful damage to the neighbor. The Texas Rule has traditionally rejected the Correlative Right Theory and the Reasonable Use Doctrine as a basis for action.

The original defendants point out that any negligence case involves the breach of a legal duty and the violation of a legal right, neither of which is present in the Friendswood case. Additionally, they point out that the Doctrine of Nuisance, where that Doctrine has been applied, is based upon the idea that one must use his own property so as to not unreasonably

injure the right or property of others.

The plaintiffs, on the other hand, stress that their case is not a water rights case, but rather a property rights case wherein the plaintiffs are attempting to prevent the use of adjoining property in a manner which will result in damage to the property of the plaintiffs. They have characterized their case as one wherein their neighbors may be engaged in a lawful activity which has become a nuisance by reason of the circumstances and surrounding facts.

The plaintiffs contend they have a basic right to the peaceful use and enjoyment of their own property and that such right must be viewed in context with the rights of the surrounding landowners. The plaintiffs charge the groundwater withdrawals constitute negligence by concentration of wells, by rate of water withdrawals and by well siting patterns. In their reply to the applications for writ of error, the plaintiffs submit a strong argument to the effect that the groundwater pumpers have done so in a negligent fashion and under facts and circumstances which create a nuisance and therefore the defendants should be held liable.

continued on page 4 . . . BRIEF

Guide To Tailwater Recovery Published

The District is pleased to announce publication of a 78-page handbook "Guide to Irrigation Tailwater Recovery".

Although loss of tailwater should not be a necessary part of irrigation farming, some irrigators in the Texas High Plains still have a tailwater problem. This is especially true in those areas which still have large capacity wells combined with irrigating "hardland" soils. Tailwater leaving an irrigator's farm is considered wasted under Texas Law and subjects the landowner to legal action. The High Plains Underground Water Conservation District No. 1 has chosen in the past to follow an "educational" approach in abating irrigation tailwater waste rather than resort to court action. The vast majority of irrigators currently operating in the District are controlling their irrigation tailwater. It is hoped that those who are not currently in compliance with the waste rules of the District will come into compliance at an early date; thereby, not forcing the District to resort to legal action to bring them into



HARVEY D. DAVIS

Davis Named Executive Director Of TDWR

The Chairman of the Texas Water Development Board, Mr. A. L. Black of Friona, recently announced that Mr. Harvey D. Davis of Temple, had been named Executive Director of the Texas Department of Water Resources. This appointment became effective as of November 1.

The six-member Board of Directors met in Austin in a special session and unanimously selected Davis to head the agency. On September 1, legislation consolidated the staffs of the Texas Water Development Board, the Texas Water Quality Board and the Texas Water Rights Commission into the single agency.

Charles E. Nemir, former Assistant Executive Director of the Water Development Board, has served as Acting Executive Director of the new agency since September 1.

Davis, 50, has been Executive Director of the Texas Soil and Water Conservation Board for the past 16 years and has been with the agency for 23 years.

He is a native of Thrall and attended public school in Taylor. He holds bachelor's and master's degrees in business administration from the University of Houston. Prior to his state service, Davis taught business administration for five years at Blinn Junior College.

compliance.

An irrigation tailwater return system not only has the advantage of controlling tailwater, but also conserves the underground water supply and saves money in pumping and operating

continued on page 4 . . . TAILWATER

AGRICULTURAL PRODUCTIVITY REPORT RELEASED FOR 1976

The Texas Crop and Livestock Reporting Service recently released a report detailing agricultural productivity in the State of Texas for 1976.

It is gratifying and important to note that the Southern High Plains counties again dominate Texas statistics with seven counties ranked in the top ten farm counties of the State.

The accompanying chart shows receipts from crops, livestock and government payments as provided by the 1973 Farm Act disaster provisions.

1976 CASH RECEIPTS FROM FARM PRODUCTION
(\$1,000 Dollars)

County	Crops	Livestock	Payments
Deaf Smith	\$ 66,554	\$102,317	\$2,303
Parmer	99,462	54,868	862
Castro	78,635	66,310	1,023
Hale	103,434	28,752	1,000
Lubbock	78,613	26,233	2,706
Lamb	78,090	20,962	2,521
Floyd	64,037	11,058	1,173
Lynn	67,099	2,528	1,903
Crosby	55,325	3,841	338
Hockley	39,573	5,672	3,950
Bailey	27,946	10,664	2,974

THE Cross SECTION

A MONTHLY PUBLICATION OF THE HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1

2930 Avenue Q, Lubbock, Texas 79405

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- Joe Albracht, 1981 P.O. Box 81, Bushland
- Jack Brandt, 1981 Rt. 1, Box 280, Canyon

"Weather Modification Today"

by Kathy Redeker

Much discussion along with great concern and controversy has developed in recent years over the subject of seeding clouds for rainfall augmentation and/or hail suppression. These topics along with other related data were the theme of a conference held in Austin, Texas, on November 8th, entitled "Weather Modification Today".

The conference was sponsored by the Texas Water Conservation Association in cooperation with Texas A & M University and the Texas Department of Water Resources. The basic purpose of the conference presentations was to update knowledge on the technology, operations, research, socioeconomic, and legal aspects of weather modification. These topics of discussion were ably presented by a number of highly qualified speakers as exemplified by Dr. Pierre St. Amand of the Naval Weapons Center, China Lake, California, in his key note address.

In his address, Dr. St. Amand discussed some of the climatic changes taking place today. He introduced the opinion that due to society's use of our natural resources, man must learn to modify the conditions around him if he is to last. Dr. St. Amand pointed out that in California by the year 2000 their populace will be using two times their annual runoff and as a consequence, in his opinion some type of modification needs to be considered. Dr. St. Amand also submitted that with greater understanding and careful study of field operations, the techniques of successfully modifying the weather conditions to the benefit of mankind will succeed. Dr. St. Amand is readily willing to admit that weather modification has undergone its share of criticism and obstacles and will no doubt continue to receive less than universal acclaim. He also submits that if public relations problems can be overcome and people could be informed more exactly what is going on, then they will be capable of making intelligent decisions.

Research Advancements

For the past 30 years a great deal of research has been directed toward weather modification. This research and consequent field operations have, on the whole, dealt with rather small and specific clouds. There is a general feeling in the academic and professional weather modification community that research needs to be expanded to

deal with larger cloud systems. T. E. Smith of Meteorology Research, Inc., noted that while a considerable amount of evidence tends to support the production of rain from individual cumulus clouds, it is now realized that most rain comes as a result of "merged" or organized cloud systems. However, much more thorough research must be given to the possible cause and effect relationship in dealing with larger more complex cloud systems.

Such detailed observation has been enhanced in recent years by the growing use of computer analyses. In using such analyses the scientific community can "create" a simulation of a particular cloud pattern by feeding data into the computer and then begin to determine a type of "if-then" relationship to seedability. "If" we seed this particular cloud system, "then" we will get what results? With this technological advance one can readily see the potential advantages or disadvantages of knowing possible outcomes of seeding before such actual operations take place.

Such computer data may also be aided in future years by the use of satellite photos. These photos can be used to pinpoint the most intense and coldest portions of a particular storm cell and thereby show the most advantageous seeding locations.

All of these technological advances take a great deal of time to develop. Therefore, the populace as a whole must realize that each operational modification project is still essentially an extension of research.

Research Projects in Texas

In the state of Texas there have been several modification projects conducted. The project of major emphasis at the conference was the HIPLEX project which centers around the Big Spring area. This project is being conducted in cooperation with the Colorado River Municipal Water District (CRMWD), Texas A & M University, Texas Tech University and many others. The program was initiated as a rain stimulation project in 1971 by the CRMWD. The primary purpose of this program was to supplement surface water runoff and, additionally, improve crop production and pasture lands.

In the actual operations of this project a large amount of work was first done to determine the natural characteristics of storm cells of the

continued on page 3... WEATHER



At the conclusion of the "Weather Modification Today" meeting held in Austin, a panel discussion was held. Participating were (pictured above from left to right) Lloyd Stuebinger, Bureau of Reclamation; Howard Taubenfeld, Southern Methodist University; Dr. Pierre St. Amand, Naval Weapons Center; and Bruce Bigelow and John Carr, Texas Department of Water Resources.

NOTICE: Information regarding times and places of the monthly County Committee meeting can be secured from the respective County Secretaries.

Applications for well permits can be secured at the address shown below the respective County Secretary's name, except for Potter County; in this county contact W. J. Hill.

Conservation Bench Terraces vs. Graded Terraces

Conservation bench terraces are more profitable to dryland farmers in the Southern Great Plains than graded terraces. O. R. Jones, USDA Soil Scientist from Bushland presented this information at the American Society of Agronomy Meeting in Los Angeles. He reported on a study that has been conducted at the USDA Research Center at Bushland since 1959. Conservation bench terraces were designed by Austin Zingg, a former Agricultural Research Service soil scientist. His terraces conserved water that ran off from a field with graded terraces. Instead of leaving the field, runoff was contained in a level bench next to the terrace ridge. The watershed on the upper part of the terrace interval was twice as big as the level bench area next to the lower terrace ridge. The terrace interval was twice as great as with graded terraces.

In his study, Jones cropped the watershed area of the terrace in a wheat-sorghum-fallow cropping sequence. Two crops were produced in three years with an 11-month fallow period between each crop. The bench-leveled area below the watershed was planted to annual crops of sorghum from 1959 to 1970. From 1971 to 1976, both wheat and sorghum were planted on the leveled area. Crop production on the watershed and bench-leveled area was compared to a bench-terrace system where all rain was captured, but no runoff received. The soil conservation bench terraces at Bushland were constructed on Pullman clay loam soil with a 1.5 percent slope.

The level bench on the conservation bench terrace received an average of 1.3 inches runoff annually from 1959 to 1970; sorghum yield was 1,990 pounds per acre. Sorghum on bench terrace that received no runoff produced 1,590 pounds per acre. Sorghum growing on the sloping or watershed part of the conservation bench terrace produced 1,890 pounds per acre with an 11-month fallow period in the wheat-sorghum-fallow cropping system.

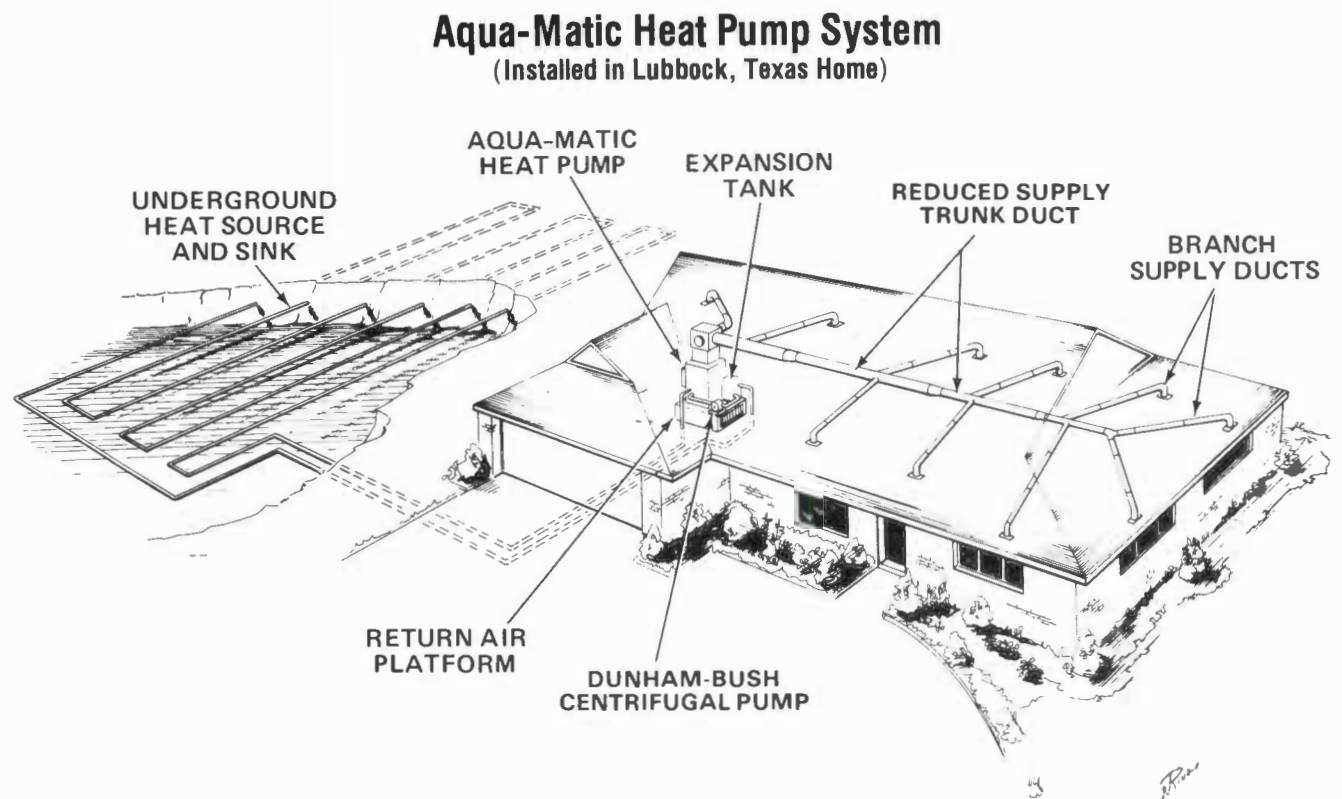
In the second phase of the study, runoff from the slope into the leveled bench area of the conservation bench terrace was 1.6 inches annually. Sorghum yield in the bench was 1,940 pounds per acre. At the same time, only 1,090 pounds per acre or 18.8 bushels of wheat were produced. On an adjacent bench terrace that did not receive runoff, wheat yielded 13.3 bushels per acre and sorghum produced 1,650 pounds per acre.

Jones said, "These studies show that a water conservation terrace system on a clay loam soil greatly increased yields by utilizing runoff". Sorghum yield on sloping areas was about 1,890 pounds per acre in a wheat-sorghum-fallow sequence where two crops grow in three years. Counting fallow time, it took 1.5 years to produce sorghum. This reduces annual yield to 1,260 pounds per acre. Comparing this to 1,990 pounds per acre from the bench area that received runoff or 1,600 pounds per acre on the leveled area that did not receive runoff leaves little doubt that conserving runoff water will pay, the scientist pointed out.

"Determining which was the best

System schematic shows Aqua-Matic heat pump system connected to underground grid consisting of PVC pipe. Ground surrounding the grid, 3½ ft. below the surface,

supplies heat to the house during the heating season, and acts as a heat sink (absorber of heat) during cooling.



USE OF SOIL FOR ENERGY CONSERVATION

by Ken Carver

Today, energy has become a household word and everyone is looking for ways to reduce their cost. Therefore, using heat from the ground presented an interesting alternative to conventional residential air conditioning and heating systems.

In December 1975, Bruce Thornton Air Conditioning and Heating Company installed the first Aqua-Matic system utilizing the ground grid in his own home. A Dunham-Bush Aqua-Matic water-to-air heat pump was used tying the heat pump into a "ground grid" to be used as a heat source and heat sink. The grid was buried about 3½ feet below the surface and consists

type of terrace system was the hard job," Jones continued. He cooperated with Dr. John Shipley, Texas Agricultural Experiment Station Economist, to get this job done. The two scientists concluded that conservation bench terraces were more profitable than conventional bench terraces. It costs more to construct bench terraces since all of the area is leveled. Construction cost for bench terraces on a two percent slope would be \$118.00 per acre, when earth moving costs 40 cents per cubic yard. On the other hand, leveling only one-third of the land for conservation bench terraces would cost only \$55.00 per acre. Total yield is highest from bench terraces but not enough to pay for construction costs.

Terrace systems have been evaluated at Bushland for 20 years. "We are convinced that constructing conservation bench terraces on fine-textured soil on the Southern High Plains will conserve runoff water and be profitable for dryland farmers," Jones concluded.

For additional information on the use of bench terraces, contact Mr. O. R. Jones, Soil Scientist, USDA Southwestern Great Plains Research Center, Bushland, Texas 79012.

of PVC (polyvinylchloride) pipe. A "glycol" solution circulates through the pipe. When the heat pump starts to heat, the heat is absorbed from the ground through the glycol solution and brought into the house. During cooling, heat is taken from the house and transferred to the ground through the same glycol solution.

The house had 2250 square feet of space to be heated and cooled. It was not classified as an "energy efficient" home but rather a normal or well constructed home. A four ton unit was used which maintained a daytime temperature of 74°F and a night-time temperature of 68°F. A separate electric meter is installed on this unit. His average electric bill for 1976 was

\$17.50 per month.

Since 1975, this system has been installed in 15 houses in Lubbock and surrounding towns. One area builder has used this system in ten of his "energy efficient" homes.

The heat pump has a coefficient of performance of "three"; which means that for every unit of electrical energy used to drive the heat pump system, you get three units of energy in return. A house heated and cooled by resistance electric heating receives only one unit of energy for every unit of electricity purchased. This three to one ratio provides ample reason for the lower energy bill by use of underground heat and use of the ground as a heat sink.

WEATHER... continued from page 2

area. As Dr. Donald Harragan of Texas Tech University pointed out, "before we can determine cloud seedability, we must understand the natural processes within cloud systems in this area".

Although the Texas HIPLEX program has been in operation for several years, relatively few conclusions can be drawn from these experiments and more time will be required to verify statistical observations. There are however, substantial gains in understanding of specific cloud modification in the Texas High Plains area.

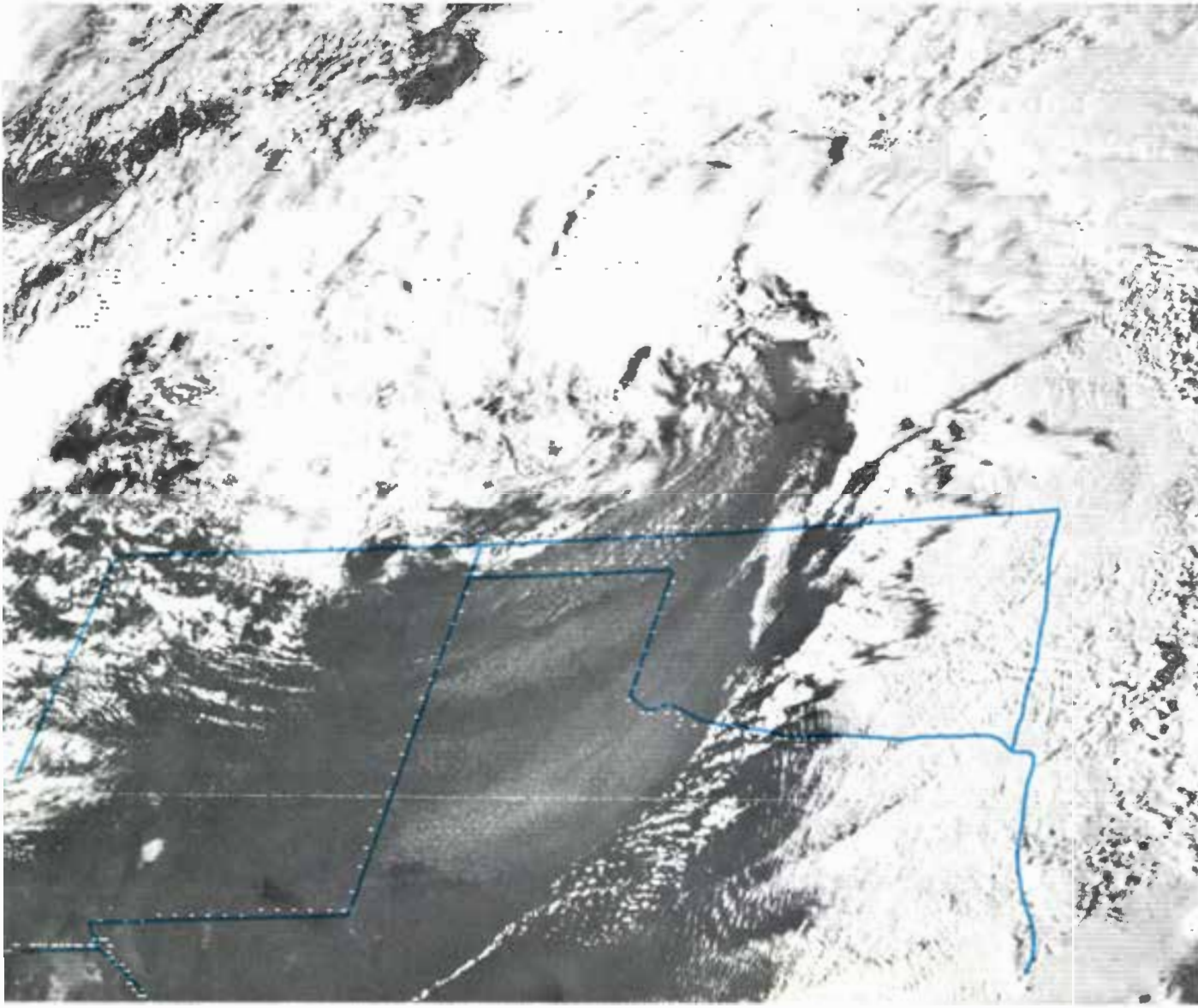
Social and Legal Aspects

Usually when the topic of weather modification is approached, a great deal of mixed and emotional reactions come to light. As Howard Taubenfeld of Southern Methodist University explained, most of these reactions represent conflicts of interest. It is easy to understand that when rainfall augmentation projects are discussed, there will arise some conflict between, as an example, the irrigation farmer and the dryland farmer. Since these two con-

flicting interest groups are usually found coexistent in the same general area, one can easily see the problems which might arise.

Upon concluding the conference, there was a general feeling for the need to develop a greater understanding between the scientific community and the public. It was expressed that through better public relations work, along with further experimentation, the problems facing the weather modifier and the populace as a whole can be worked out. The scientific community is fully aware that the advancement or possible halt to their activities greatly depends on public acceptance.

The thrust of most weather modification efforts is directed toward enhancement of our nations' agricultural productivity. As Dr. Pierre St. Amand explained, "we must have the cooperation and assistance of the agricultural populace and we scientists must realize that our farmers are the only chance the U. S. has to maintain a balance in World trade and therefore retain our status as a nation".



Dr. Edwin Kessler of the National Severe Storms Laboratory, N.O.A.A., Norman, Oklahoma, introduced the above geostationary satellite photograph of March 2, 1977, during the "Weather Modification Today" conference held in Austin. Dr. Kessler observed and presented discussion on his thesis that the southwestern limit of severe dust storms in Texas coincide remarkably with the Texas-New Mexico border. (Note

the light gray formation over the West Texas area. The other massive light colored areas represent cloud cover on this particular day.) In his presentation Dr. Kessler voiced the opinion that the differences between land use and groundwater ownership in the states of Texas and New Mexico may possibly have some bearing on the origin of these type dust storms.

BRIEF . . . continued from page 1

The Board of Directors in their deliberation of the issues involved in the Friendswood case, evidenced considerable concern that if the Supreme Court were to follow the principles urged by the plaintiffs or those apparently announced by the Court of Civil Appeals, a substantial invasion would occur into the Doctrine of Absolute Ownership of Groundwater. The purpose for the *amicus curiae* brief is to communicate to the Supreme Court the magnitude of any decision or wording of their opinion insofar as it affects groundwater rights and ownership in all areas of the state.

The unique geologic and hydrologic conditions in the Houston area, which give cause for the action, are essentially confined to that portion of the state and the aquifer thereunder. The distinguished characteristics of a geologic formation subject to land surface subsidence because of aquifer withdrawals coincident with an area where such subsidence would allow invasion of adjoining surface water is not duplicative in any other region of the state.

DISTRICT BOARD MEETS

The District's Board of Directors held their regular monthly meeting in the Lubbock office on November 8th. In routine business, the Board approved the payment of outstanding bills; approved 22 applications for Water Well Permits and authorized purchase of an assortment of hand tools for the field representatives.

In other action, the Board set the date for the upcoming District election to be held on the 3rd Saturday in January and the hiring of attorney Elmer East as a special consultant for the election; the employment of Charles A. Whitfield as a special appraisal consultant to help establish cost-of-water guidelines; authorized the law firm of McCleskey, Harriger, Brazill and Graf to prepare an *amicus curiae* brief in a Houston area case before the Texas Supreme Court.

Meeting with the Board, Dr. Bill Ott, Superintendent of the Texas Agriculture Experiment Station at Lubbock, briefed the Directors on water related research at the Station. The Board also discussed with Dr. Ott other areas of mutual interest and concern. Special consultant, A. Wayne Wyatt of Austin reported to the Board on numerous aspects of the District's operations including a proposed budget for 1978.

TAILWATER . . . continued from page 1

costs. The return system consists of a collection system (field ditch or diversion channel), storage reservoir (dug-out pit or modified playa) and return equipment (pump, driver, and pipeline). The return system captures, stores, and then returns the tailwater runoff back to the field for reuse.

The cost of a return system varies considerably due to the many factors involved, such as length and size of pipeline needed, capacity of pump desired, feet of head to be overcome, and size of storage pit. Since the cost does vary with each installation, each sys-

tem should be estimated individually.

Some technical assistance in the planning and design of a return system may be needed. Technical advice is available from government agencies, state agencies or local consulting firms, equipment dealers and from the High Plains Underground Water Conservation District No. 1.

Should the quantity of irrigation tailwater not appear adequate to justify a return system, alternatives are available to control the loss of this natural resource. Some of the more favorable alternatives include changes in irrigation techniques (row length, application

rate, time length of sets, etc.), changes in field slopes or other farming practices (contour farming or land leveling), or the use of earthen borders on the low end of the field and the installation of sprinkler systems.

With the publication of this handbook the District hopes tailwater problems may be solved both easily and practically. Copies of the "Guide to Irrigation Tailwater Recovery" may be secured free of charge by contacting the High Plains Underground Water Conservation District No. 1 at 2930 Avenue Q, Lubbock, Texas 79405, or calling 806-762-0181.

THE Cross SECTION

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December, 1977

'78 Water District Election Set For January 21

The annual elections of the High Plains Underground Water Conservation District No. 1 will be conducted January 21, 1978, to name three Members to the Board of Directors and 16 County Committeemen.

These elections will be held only in those counties located within Director's Precinct One (Crosby, Lubbock and Lynn), Precinct Two (Cochran, Hockley and Lamb), and Precinct Five (Floyd and Hale). Directors will serve two-year terms and County Committeemen will serve four years.

Absentee balloting will be conducted from January 2, 1978, through January 17, 1978, in the District office, 2930 Avenue Q, Lubbock, Texas, for Crosby, Lubbock, and Lynn Counties; the District office, 1617 Main, Petersburg, Texas, for Hale County; the District office, 609 Austin, Levelland, Texas, for Hockley County; the District office, 509 Phelps Avenue, Littlefield, Texas, for Lamb County; and the County Clerks offices in Cochran and Floyd Counties.

Qualifications to Vote

A qualified voter in the District's election is any person possessing a valid voter registration certificate and residing within the delineation of the District and within the county where a vote will be taken.

Balloting Procedures

Each qualified voter shall vote only for the District Director for the Director's Precinct in which said voter resides and likewise each qualified voter shall vote only for the County Committeemen who are candidates from the particular County Commissioner's Precinct or the County Committeemen's Precinct in which the voter resides. All voters within a county may vote for the County Committeemen-at-large from such voter's county.

Each voter shall vote for the candidates of his choice by placing an "X" in the square beside the candidate's name in each election position.

This election shall be held and conducted and returns made to the Board of Directors of the High Plains Underground Water Conservation District No. 1, for canvassing in accordance with the Election Code of the State of Texas.

Polling Places

For the 1978 election, a total of 25 polling places have been established in the eight counties.

The names and addresses of the candidates, the location of polling places and the names and addresses of the election judges are listed below.

NOMINEES FOR DISTRICT DIRECTOR

Director's Precinct No. One—Territory within the District which is situated in each of the following counties: Crosby, Lubbock and Lynn.

James P. Mitchell, Box 517, Wolforth, Texas

Frank A. Rayner, 1706 - 26th, Apt. 1, Lubbock, Texas

Director's Precinct No. Two—Territory within the District which is situated in each of the following counties: Cochran, Hockley and Lamb.

Selmer H. Schoenrock, 112 Rip, Levelland, Texas

Director's Precinct No. Five—Territory within the District which is situated in each of the following counties: Floyd and Hale:

Malvin A. Jarboe, 906 W. Kentucky, Floydada, Texas

NOMINEES FOR COUNTY COMMITTEEMEN

COCHRAN COUNTY

Residents from Committeemen's Precinct east of State Highway 214 vote for one

Robert Yeary, Route 2, Box 66, Morton, Texas

Residents vote for one Committeeman-at-large

Keith Kennedy, Star Route 2, Morton, Texas

CROSBY COUNTY

Residents vote for two Committeemen-at-large

Mike Carlisle, Route 1, Box 274, Lorenzo, Texas

Alvin C. Morrison, 309 Tyler Avenue, Lorenzo, Texas

FLOYD COUNTY

Residents from Commissioner's Precinct No. 2 vote for one

Charles Huffman, Route 1, Lockney, Texas

Residents from Commissioner's Precinct No. 4 vote for one

Gilbert L. Fawver, Route 4, Floydada, Texas

HALE COUNTY

Residents vote for two Committeemen-at-large

Gaylord Groce, Box 314, Petersburg, Texas

Bill John Hegi, Route 2, Petersburg, Texas

HOCKLEY COUNTY

Residents vote for one Committeeman-at-large

J. E. Wade, Route 2, Littlefield, Texas

continued on page 3... ELECTION

WATER DEPLETION TAX ALLOWANCE INFORMATION AVAILABLE JANUARY 16, 1978

The cost-in-water depletion, income-tax-allowance information for the 1977 tax year will be made available as of January 16, 1978. The District's Board of Directors voted in its December 22 meeting to release the 1977 decline maps or water depletion information for individual land parcels as of this date. During this meeting, the Board of Directors also voted to add the counties of Armstrong, Potter and Randall to the individual parcel system already used in the counties of Bailey, Castro, Deaf Smith, Floyd, Lamb, and Parmer.

Landowners in the counties in which information is published by individual land tracts must contact the District's Lubbock office (by phone or mail) to supply the information needed in order to locate the parcel and determine the water-level decline thereunder.

The information needed to determine this decline figure is 1) the landowner's name, address, and social security number; 2) the taxpayer's agent's name and address; and 3) the

legal description of the land involved.

The legal descriptions of land must include the following: county in which the land is located, block and section, indications as to the part of the section which is owned, league and labor, survey, township, range, and number of acres in each tract of land claimed.

NOTE

Accountants are urged to promptly supply the District with all information necessary to compute their claimant's 1977 water-level decline. Accountants should also note the additional counties which will be included in the water level decline individual land parcel claim procedures.

The decline maps, depicting the decline of the water table by county, may be purchased at the District for the following counties: Cochran, Crosby, Hale, Hockley, Lubbock, and Lynn.

The cost of the maps and decline parcels will remain the same as set by the District's Board of Directors in previous years with each decline map at \$7.50 and each land parcel at \$5.00.



Internal Revenue Service Engineers B. C. Seldon and Jack Page review with Charles A. Whitfield, the results of land sales in the High Plains area and the degree of change in land values as they relate to allowable cost-in-water on irrigated farms.



A MONTHLY PUBLICATION OF THE HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1

2930 Avenue Q, Lubbock, Texas 79405

Telephone 762-0181
D. D. SMITH, Editor

Second Class Postage Paid at Lubbock, Texas
District Office at Lubbock

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Don McReynolds Geologist
Tony Schertz Draftsman
Obbie Goolsby Field Representative
J. Dan Seale Field Representative
Oscar Riemer Field Representative
Butch Bates Field Representative
Clifford Thompson Head, Permit Section
Kenneth Carver Asst., Permit Section
Mrs. Norma Fite Secretary-Bookkeeper
Miss Pennye Newberry Secretary
Miss Kathy Redeker Receptionist

BOARD OF DIRECTORS

Precinct 1

(CROSBY, LUBBOCK and LYNN COUNTIES)
James P. Mitchell, Vice President Wolfforth

Precinct 2

(COCHRAN, HOCKLEY and LAMB COUNTIES)
Selmer H. Schoenrock, Secy.-Treas. Levelland

Precinct 3

(BAILEY, CASTRO and PARMER COUNTIES)
A. W. Gober, President Farwell

Precinct 4

(ARMSTRONG, DEAF SMITH, POTTER and RANDALL COUNTIES)
Ray Gerk Hereford

Precinct 5

(FLOYD and HALE COUNTIES)
Malvin A. Jarboe Floydada

COUNTY COMMITTEEMEN

Armstrong County

Carroll Rogers, Secretary
Wayside, Texas

Cordell Mahler, 1979 Wayside
James Bible, 1979 Wayside
Guy Watson, 1981 Wayside
Bill Heisler, 1981 Wayside
Leslie Adams, 1981 Wayside

Bailey County

Doris Wedel, Secretary

H&R Block, 224 W. 2nd, Muleshoe

Marshall Head, 1979 Rt. 3, Muleshoe
Harold Layton, 1979 Rt. 2, Morton
Eugene Shaw, 1981 Rt. 2, Muleshoe
David Stovall, 1981 Rt. 2, Muleshoe
Ernest Ramm, 1981 Rt. 2, Muleshoe

Castro County

Garnett Holland, Secretary

City Hall, 120 Jones St., Dimmitt

Anthony Acker, 1979 Rt. D, Nazareth
Glenn Odom, 1979 Rt. 4, Box 135, Dimmitt
Jackie Clark, 1981 Rt. 1, Box 33, Dimmitt
W. A. Baldrige, 1981 608 W. Grant, Dimmitt
Frank Wise, 1981 Rt. 4, Box 10, Dimmitt

Cochran County

W. M. Butler, Jr., Secretary

Western Abstract Co., 108 N. Main Ave., Morton
Jessie Clayton, 1978 706 S. Main, Morton
Robert Yeary, 1978 Route 2, Morton
Hershel M. Tanner, 1980, Route 2, Box 36, Morton
Danny Key, 1980 Star Route 2, Morton
H. H. Rosson, 1980 Star Route 2, Morton

Crosby County

Clifford Thompson, Secretary

2930 Avenue Q, Lubbock

Donald Aycock, 1978 Lorenzo
Alvin Morrison, 1978 Box 6, Lorenzo
Tommy McCallister, 1980 209 N. Van Buren,
Lorenzo
Edward S. Smith, 1980 102 N. Van Buren,
Lorenzo
Pat Yoakum, 1980 Box 146, Lorenzo

Deaf Smith County

B. F. Cain, Secretary

County Courthouse, 2nd Floor, Hereford

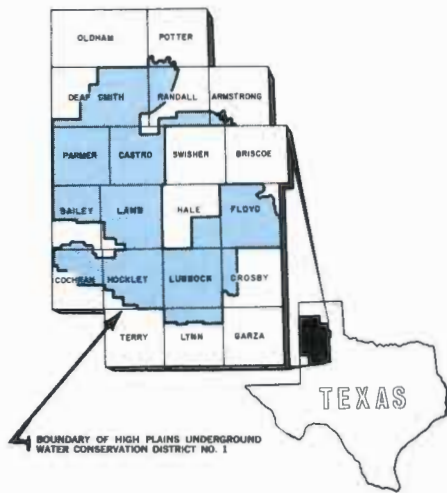
George Ritter, 1979 Rt. 5, Hereford
Bill Cleavinger, 1979 Route 1, Wildorado
James E. Higgins, 1981 200 Star St., Hereford
Garland Solomon, 1981 303 Sunset Dr., Hereford
Tom Robinson, 1981 211 Cherokee Dr., Hereford

Floyd County

Verna Lynne Stewart, Secretary

Floyd Co. Abstract, 215 W. California, Floydada

Joe Cunyus, 1978 Lockney
Gilbert L. Fawver, 1978 Rt. 4, Floydada
C. O. Lyles, 1980 Route 4, Floydada
Connie Bearden, 1980 Route 1, Floydada
M. M. Smitherman, 1980 Silverton Star Rt.,
Floydada



BOUNDARY OF HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1

Hale County

J. B. Mayo, Secretary

Mayo Ins., 1617 Main, Petersburg

Henry Kveton, 1978 Route 2, Petersburg
Gaylord Groce, 1978 RFD, Petersburg
Clint Gregory, Jr., 1980 Box 98, Petersburg
Homer Roberson, 1980 Box 250, Petersburg
Henry Scarborough, 1980 Route 2, Petersburg

Hockley County

Jim Montgomery, Secretary

609 Austin Street, Levelland

J. E. Wade, 1978 Route 2, Littlefield
Jimmy Price, 1978 Route 3, Levelland
Billy Ray Carter, 1980 Route 5, Levelland
Leon Young, 1980 Route 1, Ropesville
Robert Phillips, 1980 218 Redwood, Levelland

Lamb County

Robert Richards, Secretary

509 Phelps Avenue, Littlefield

Billy J. Langford, 1978 Box 381, Olton
Edward Fisher, 1978 Box 67, Sudan
P. A. Washington, 1980 Box 124, Springlake
Jack Stubblefield, 1980 Box 397, Spade
Larry Lockwood, 1980 Star Rt. 2, Littlefield

Lubbock County

Clifford Thompson, Secretary

2930 Avenue Q, Lubbock

Dan Young, 1978 4607 W. 14th St., Lubbock
Clifford Hilbers, 1978 RFD, Idalou
Don Bell, 1980 Box 114, Wolfforth
Ronald Schilling, 1980 Route 1, Slaton
Granville Igo, 1980 Route 1, Shallowater

Lynn County

Clifford Thompson, Secretary

2930 Avenue Q, Lubbock

Orville Maeker, 1978 Route 1, Wilson
Freddie Kieth, 1978 New Home
S. B. Rice, 1980 Route 1, Wilson
W. R. Steen, 1980 Route 2, Wilson
Wendell Morrow, 1980 Route 1, Wilson

Parmer County

Ken Horn, Secretary

Horn Insurance Agency, Bovina

Floyd Reeve, 1979 Box 876, Friona
Ralph Roming, 1979 809 Ridglea Dr., Bovina
Troy Christian, 1981 Rt. 1, Farwell
Dalton Caffey, 1981 15th St., Friona
Ronald Elliott, 1981 Rt. 3, Muleshoe

Potter County

F. G. Collard, III, 1979 Rt. 1, Box 433, Amarillo
W. J. Hill, 1979 5503 Emil, Amarillo
Jim Line, 1981 Box 87, Bushland
Albert Nichols, 1981 Rt. 1, Box 491, Amarillo
Weldon Rea, 1981 Bushland

Randall County

Mrs. Louise Tompkins, Secretary

Farm Bureau, 1714 Fifth Ave., Canyon

John F. Robinson, 1979 1002 7th St., Canyon
Bill Dugan, 1979 Rt. 2, Box 30, Happy
Harry LeGrand, 1981 4700 S. Bowie, Amarillo
Joe Albracht, 1981 P.O. Box 81, Bushland
Jack Brandt, 1981 Rt. 1, Box 280, Canyon

INTERAGENCY STUDY INITIATED ON IRRIGATION WATER USE AND MANAGEMENT

A joint study aimed at increasing the conservation of water in the United States was announced December 7, 1977, by Secretary of the Interior Cecil D. Andrus, Secretary of Agriculture Bob Bergland, and Environmental Protection Agency Administrator Douglas M. Costle.

Implementation of the study is consistent with President Jimmy Carter's recommendations to the Congress in his Environmental Message of May 23, 1977. President Carter identified water resource policy as "one of the pressing domestic issues" and stated that "... we need comprehensive reform of water resources policy, with water conservation as its cornerstone".

The study will identify irrigation water use and management problems and develop recommendations as to appropriate Federal objectives, policies, agency roles, and action programs.

To insure that the States are fully informed and have an opportunity to participate in the study, Governor Scott M. Matheson of Utah, in his role as chairman of the National Governors' Association Subcommittee on Water Management, has appointed State government representatives to participate in the study.

The Irrigation Water Use and Management Study is being undertaken because of the general lack of knowledge about the potential for water conservation through irrigation improvements and the economic, environmental, and social effects of such improvements. The study is responsive to recommendations in two recent reports by the General Accounting Office (GAO).

One GAO report, "Better Federal Coordination Needed to Promote More Efficient Farm Irrigation", dated June 22, 1976, recommended that the Department of Agriculture and the Department of the Interior jointly develop Federal objectives, policy recommendations, and action plans integrating the unique capabilities of the Bureau of Reclamation, the Soil Conservation Service, and the Extension Service to educate and assist farmers who wish to improve their irrigation efficiencies.

The report further recommended that the Secretaries of Agriculture and the Interior and the Administrator of the Environmental Protection Agency undertake a coordinated effort to develop more complete data on the adverse effects attributable to ineffi-

cient irrigation practices, determine the causes for such practices and the extent that each contributes to the problem, and determine what Federal actions should be taken to alleviate the inefficient practices.

A subsequent GAO report entitled "More and Better Uses Could be Made of Billions of Gallons of Water by Improving Irrigation Delivery Systems", dated September 2, 1977, further recommended that the Department of the Interior consider solutions to inefficient conveyance systems, including the development of coordinated Federal, State, and local objectives, policies, and action plans.

The Department of Agriculture, the Department of the Interior, and the Environmental Protection Agency have established an Interagency Task Force on Irrigation Efficiencies. The task force is based in Washington, D. C.

The task force has named a multi-disciplinary Technical Work Group, headquartered at Denver, Colorado, to accomplish the required assembly, review, and analysis of data and the preparation of a draft report. This work group consists of experts in irrigation and in other disciplines concerned with the use and management of water and related resources from each of the Federal agencies involved. It also includes two members who represent State governments. The Western States are expected to demonstrate considerable interest in the study.

Information and suggestions for the Irrigation Water Use and Management Study are being solicited from a broad range of public interest groups and organizations concerned with research, planning, development, and management of water and related natural and environmental resources. Study information will be mailed to these groups as it becomes available.

Public meetings will be held by the Technical Work Group before it develops recommendations for consideration by the Interagency Task Force. The general public may respond by mail or participate in the meetings.

Comments, suggestions, and inquiries should be sent to Sheldon G. Boone, Chairman, Technical Work Group, Cooperative Irrigation Study, P. O. Box 25007, Denver, Colorado 80225.

The study report is scheduled for completion and release in September 1978.

VOTING CITIZENS WILL HAVE NUMEROUS OPPORTUNITIES TO EXERCISE THE PRIVILEGE OF THE BALLOT IN 1978

START THE NEW YEAR RIGHT BY VOTING SATURDAY, JANUARY 21

NOTICE: Information regarding times and places of the monthly County Committee meeting can be secured from the respective County Secretaries.

Applications for well permits can be secured at the address shown below the respective County Secretary's name, except for Potter County; in this county contact W. J. Hill.

WATER DISTRICT ELECTION . . . continued from page 1

Residents from Commissioner's Precinct No. 3 vote for one
 Jack Earl French, Route 3, Box 125,
 Levelland, Texas

LAMB COUNTY

Residents from Commissioner's Precinct No. 1 vote for one
 Billy J. Langford, Box 381,
 Olton, Texas

Residents from Commissioner's Precinct No. 4 vote for one
 Edward Fisher, 602 Boesen Street,
 Sudan, Texas

LUBBOCK COUNTY

Residents vote for one Committeeman-at-large
 Owen Gilbreath, 3302 23rd Street,
 Lubbock, Texas

Residents from Commissioner's Precinct No. 3 vote for one
 Clifford Hilbers, Route 1, Box 14,
 Idalou, Texas

LYNN COUNTY

Residents from Commissioner's Precinct No. 1 vote for one
 Gary Houchin, Box 54,
 Wilson, Texas

Residents from Commissioner's Precinct No. 4 vote for one
 Freddie Kieth, Box 283,
 New Home, Texas

POLLING PLACES AND JUDGES FOR 1978 ELECTION

COCHRAN COUNTY

Polling Place No. 1: County Activities Building, Morton, Texas

Presiding Judge: J. T. Lemons, Morton, Texas

Polling Place No. 2: G & C Gin, Morton, Texas

Presiding Judge: Max Clark, RFD 2, Morton, Texas

Polling Place No. 3: Star Route Gin, Morton, Texas

Presiding Judge: Mrs. Danny Key, Star Route 2, Morton, Texas

CROSBY COUNTY

Polling Place No. 1: Lorenzo Community Center, Lorenzo, Texas

Presiding Judge: Mrs. Ralph Wiese, 103 Harrison Avenue, Lorenzo, Texas

FLOYD COUNTY

Polling Place No. 1: County Courthouse, Floydada, Texas

Presiding Judge: Mrs. W. O. Newberry, 812 Mesquite, Floydada, Texas

Polling Place No. 2: Barker Ins. Agency, Main & Locust, Lockney, Texas

Presiding Judge: Barry Barker, Box 581, Lockney, Texas

HALE COUNTY

Polling Place No. 1: Community Center, Petersburg, Texas

Presiding Judge: Floyd Trowbridge, Box 646, Petersburg, Texas

HOCKLEY COUNTY

Polling Place No. 1: County Courthouse, Levelland, Texas

Presiding Judge: Mrs. Hilary Towles, 508 8th, Levelland, Texas

Polling Place No. 2: Ropesville Co-op Gin, Ropesville, Texas

Presiding Judge: Mrs. Frank Sylvester, Ropesville, Texas

Polling Place No. 3: City Hall, Sundown, Texas

Presiding Judge: Mrs. T. I. Elliott, 104 W. Gulf Street, Sundown, Texas

Polling Place No. 4: Whitharral Lions Club Building, Whitharral, Texas

Presiding Judge: Robert E. Avery, Jr., Route 2, Box 211, Levelland, Texas

Polling Place No. 5: City Hall, Anton, Texas

Presiding Judge: Orval Williams, 313 N. Main, Anton, Texas

LAMB COUNTY

Polling Place No. 1: Olton Grain Co-op, Olton, Texas

Presiding Judge: Eldon Franks, Box 36, Olton, Texas

Polling Place No. 2: Community Bldg. at City Hall, Earth, Texas

Presiding Judge: Perry Martin, Box 455, Earth, Texas

Polling Place No. 3: Community Center, Sudan, Texas

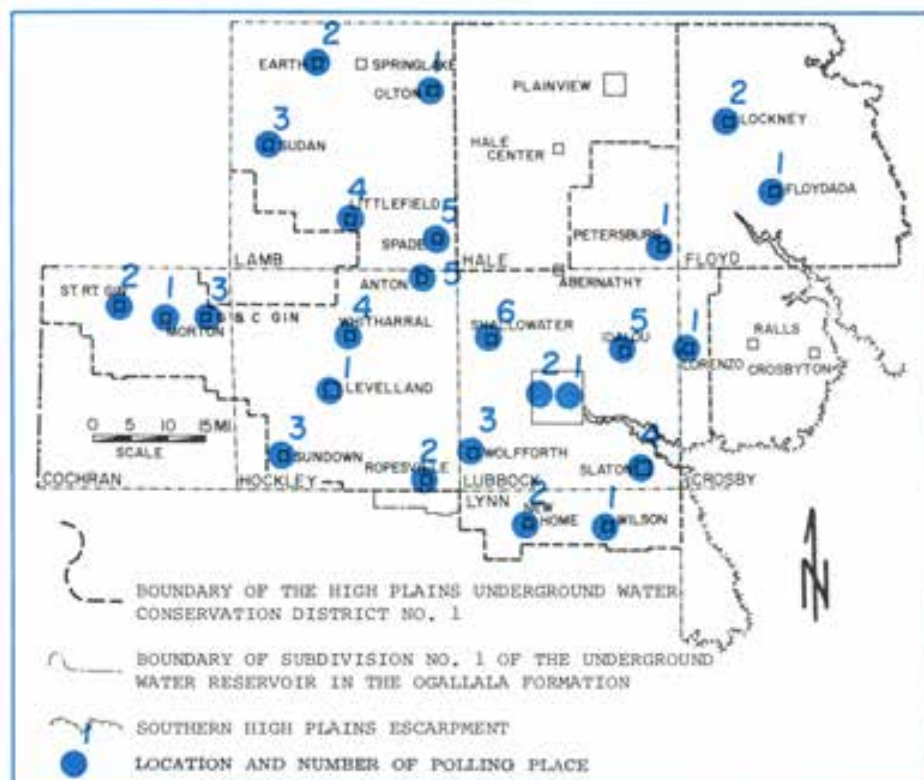
Presiding Judge: Nolan Parrish, Box 456, Sudan, Texas

Polling Place No. 4: County Courthouse, Littlefield, Texas

Presiding Judge: Mrs. Arthur Jones, 707 Littlefield Dr., Littlefield, Texas

Polling Place No. 5: Farmer's Co-op Gin, Spade, Texas

Presiding Judge: C. C. Byars, Box 343, Spade, Texas



Map showing the area — District Directors Precincts 1, 2 and 5 — and the locations of polling places wherein the election will be held on January 21, 1978.

LUBBOCK COUNTY

Polling Place No. 1: East entrance to hallway, County Courthouse, Lubbock, Texas

Presiding Judge: Tom C. Ingram, 3810 39th Street, Lubbock, Texas

Polling Place No. 2: Fire Station No. 6, 35th and Indiana, Lubbock, Texas

Presiding Judge: Betty J. Cain, 3701 45th, Lubbock, Texas

Polling Place No. 3: City Hall, Wolfforth, Texas

Presiding Judge: Mrs. Ross Adamson, 1717 Norfolk, Lubbock, Texas

Polling Place No. 4: County Clubhouse, Slaton, Texas

Presiding Judge: Wayne Lyles, 305 S. 11th Street, Slaton, Texas

Polling Place No. 5: Community Clubhouse Building, Idalou, Texas

Presiding Judge: I. H. Grimes, 802 W. 7th, Idalou, Texas

Polling Place No. 6: Community Clubhouse, Shallowater, Texas

Presiding Judge: Mrs. George Blackmon, P. O. Box 224, Shallowater, Texas

LYNN COUNTY

Polling Place No. 1: Wilson Co-op Gin, Wilson, Texas

Presiding Judge: Mrs. W. C. Maeker, Box 92, Wilson, Texas

Polling Place No. 2: New Home Co-op Gin, New Home, Texas

Presiding Judge: Marlow Rudd, Route 1, Wilson, Texas

Water Levels To Be Measured

During the month of January, field personnel of the High Plains Underground Water Conservation District No. 1 will begin the annual measurement of the depth-to-water levels in the more than 800 observation wells in the District's fifteen county area.

These wells will be measured to find the depth to "static" water level within each well and a green and white identification tag will be placed on the well-head equipment for the owner's information.

Since most of the wells to be measured are operational irrigation wells, the month of January was selected to afford a reading in wells that have not been pumped for a sufficient period of time to allow recovery of the cones of depression developed during the pumping cycle. These readings will then reflect the depth to water levels at a time when the aquifer is most nearly at rest.

The information obtained from the observation well measuring program is utilized in assessment of remaining water in storage, long term projections of decline rates, and as a basis for the income-tax depletion allowance claims on landowners' tax returns.

The District would like to express our appreciation to those irrigators who voluntarily allow for these measurements to be taken from their wells.

Anyone sighting a blue-and-white vehicle with the District seal on the door should note that a District representative is conducting field work in the District's behalf.



District Field Representative Oscar Riemer measures the depth to water in an observation well by inserting a steel tape into the well. Each January, the District conducts such measurements in more than 800 wells lying within the boundaries of the District

as a part of the observation well program. The measurements are taken in order to determine the water-level declines or rises within the District during the past year.

WORTH REPEATING

The Question: How to keep industries from polluting streams and rivers? Periodic inspections? Fines? Jail?

According to reports, the Soviet Union doesn't bother trying to enforce complicated laws . . . it has the simplest solution imaginable.

Russian industries are being required to take their water at a point downstream from the plant site, and then dump their waste water at a point upstream from the plant site.

GMDA CONFERENCE HELD IN LINCOLN, NEBRASKA

Lincoln, Nebraska, was the setting for the annual meeting of the Ground-water Management Districts Association on December 6-7 and 8. More than 140 District Managers and Board Members registered and attended the various sessions covering topics ranging from new legislation to status of new energy technology.

Texas continues to be well represented on the Board of Directors with Mr. James McCray, President of the Panhandle Ground Water Conservation District and Mr. Ronald Neighbors, Manager of the Harris-Galveston Coastal Subsidence District elected to serve on the Board.

DISTRICT'S BOARD OF DIRECTORS MEET TWICE IN DECEMBER

The District's Board of Directors held their regular monthly meeting in the Lubbock office on December 12. In action concerning routine business, the Board approved payment of the outstanding bills; payment of the statement for the Lubbock County Audit and membership dues to Water, Inc.; and approved 51 applications for water well permits.

A written statement was delivered by Mrs. Carolyn Lanier, President of the League of Women Voters requesting that the Directors accommodate the voters in the City of Lubbock with at least one additional ballot box due to the inconvenience and possible overloading of the box located at the Lubbock County Courthouse. After discussion, the Directors agreed to establish another box jointly with the Lubbock County Water Control and Improvement District at Fire Station 6 on the corner of 35th Street and Indiana Avenue.

Also meeting with the Board, special consultant A. Wayne Wyatt discussed his final recommendations, "Management Study of the Operations and Responsibilities of the High Plains Underground Water Conservation District with Recommendations".

At the conclusion of the regular meeting the Board met in closed Executive Session. After reconvening in open session, the Members elected to call a special meeting of the Board of Directors on January 5 and 6, 1978, for the purpose of interviewing all prospective applicants for the position of District Manager.

In a second called meeting of the Board of Directors held on December 22, 1977, the water-depletion income-tax allowance procedures for 1977 were approved. In other action taken, the Board approved the ballots, selected election judges, approved the election notice and called for the election to be held January 21, 1978.

*Holiday
Greetings
from
Directors
and
Staff*

