THE Grass SECTION

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

Vol. 14—No. 8 **"THERE IS NO SUBSTITUTE FOR WATER"** *January 1968*

Moves To TWCA

BILL J. WADDLE

Bill Waddle, staff assistant in the office of the High Plains Underground Water Conservation District No. 1 since 1964, has resigned to become General Manager of the Texas Water Conservation Association with offices in Austin, Texas, effective February 1. Waddle succeeds J. E. (Judge) Sturrock who is resigning after 24 years as General Manager of the State wide organization.

A look at Bill Waddle's multi-phased career in agriculture and water conservation in Texas emphasizes the "rightness" of this appointment. Bill's education includes a degree in Agricultural Education from Texas Technological College in 1958, with additional courses on the graduate level. His experience includes three years with the Texas Agricultural Extension Service, College Station, Texas; three years with the Lubbock Chamber of Commerce as Assistant Manager for Agriculture; four years with the High Plains Underground Water Conservation District, Lubbock, Texas, with experience in every phase of the operation of the largest water conservation district in the United States.

The Directors and Staff of the Water District are reluctant to have Bill move away from the High Plains. They do feel, however, that the Texas Water Conservation Association has made a wise choice in the selection of a General Manager, whose job will be expanded into working with problems over the entire State.

DISTRICT ELECTION

The annual election of the High Plains Underground Water District was held January 9. This years' election featured the annexation of Crosby County to the District, the election of three district directors and the selection of 28 county committeemen.

Crosby County voters voted to join the 14 County High Plains Underground Water Conservation District No. 1, but on the same ballot failed by one vote to assume their pro-rata share of the maintenance tax by which the District is supported.

Consequently, upon official canvass of votes by the Water District Directors, it was announced that Crosby County failed to become a part of the District. The vote to become a part of the District was 330 in favor and 289 against. The vote on the proposition of financing obligations failed to carry by one vote in a 310 to 309 count.

The negative vote on the financing proposition precludes entry of Crosby County into the District at this time.

The area of Crosby County involved in the annexation was the area above and west of the Caprock escarpment.

This annexation election was the second such election held in Crosby County. In an earlier election, in January 1967, the residents of the county failed to vote annexation into the Water District.

The three District Directors elected to the Board of Directors of the Water District were: Weldon Newsom, Russell Bean, and Chester Mitchell. All three were re-elected to the Board for a two year term.

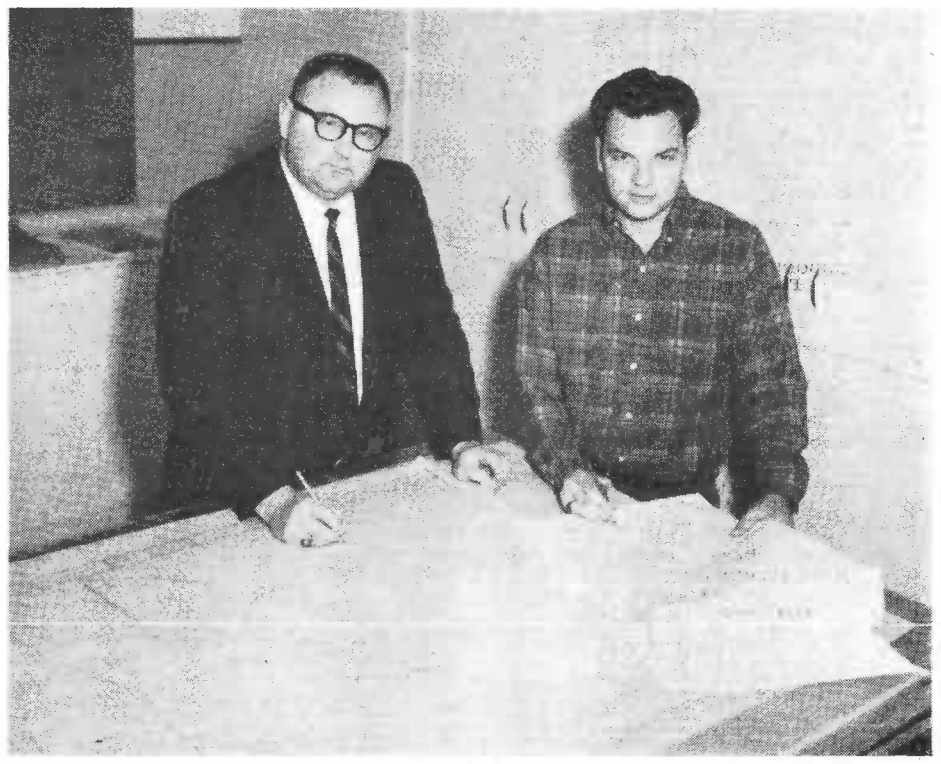
Weldon Newsom resides and farms at Morton, Texas. He represents Cochran, Hockley and Lamb Counties.

Bean resides in Lubbock and is a farmer and local businessman. He represents Lubbock and Lynn Counties.

Mitchell resides and farms at Lockney and represents Floyd and Hale Counties.

Twenty-eight County Committeemen were elected to serve for three years. These individuals will serve their county on the local Board, approving drilling permits and recommending policies to the District Board.

These County Committees are the "back bone" of the High Plains Water District. Their ideas and recommendations are depended on greatly by the District Board.



F. A. Rayner, Chief Engineer, and Tony Schertz, Draftsman, of the High Plains Underground Water District, review and plot digital-computer print out data on base maps, in preparation of the 1967 cost-in-water-depletion, income-tax allowance, guideline maps.

INDIVIDUALS ELECTED TO THE COUNTY COMMITTEES ARE:

ARMSTRONG COUNTY
Guy Watson, Wayside, Texas
John Patterson, Wayside, Texas

BAILEY COUNTY
Lloyd Throckmorton, Rt. 1, Box 115, Muleshoe, Texas
R. L. Davis, Enochs, Texas

CASTRO COUNTY
Morgan Dennis, Star Rt., Hereford, Texas
Donald Wright, Box 65, Dimmitt, Texas

COCHRAN COUNTY
Don Keith, Rt. 1, Morton, Texas
Ronald Coleman, Rt. 1, Morton, Texas

DEAF SMITH COUNTY
Billy Wayne Sisson, Rt. 5, Hereford, Texas
Harvey Fuqua, Rt. 1, Hereford, Texas

FLOYD COUNTY
M. J. McNeill 833 W. Tenn., Floydada, Texas
M. M. Julian, Box 65, South Plains, Texas.

HALE COUNTY
Harold D. Rhodes, Box 100, Petersburg, Texas
John C. Alford, Box 28, Petersburg, Texas

HOCKLEY COUNTY
Harold R. Phillips, Rt. 5, Levelland, Texas
Ewel Exum, Rt. 1, Ropesville, Texas

LAMB COUNTY
Gene Templeton, Star Rt. 1, Earth, Texas
Artis Barton, Hwy 70, Earth, Texas

LUBBOCK COUNTY
Glen Blackmon, Rt. 1, Shallowater, Texas
Andrew (Buddy) Turnbow, Rt. 5, Lubbock, Texas

LYNN COUNTY
Reuben Sander, Rt. 1, Slaton, Texas
O. R. Phifer, Jr., New Home, Texas

PARMER COUNTY
Guy Latta, Friona, Texas
Edwin Lide, Rt. D, Bovina, Texas

POTTER COUNTY
Jim Line, Bushland, Texas
Temple Rodgers, Rt. 1, Amarillo, Tex.

RANDAL LCOUNTY
R. B. Gist, Jr., Rt. 2, Box 43, Canyon, Texas and Melvin Schaeffer, Rt. 1, Happy, Texas tied—tie will be decided by flip of coin.
Carl Hartman, Jr., Rt. 1, Canyon, Texas

Staff members of the District will meet with each County Committee in the next few weeks. Purpose of these meetings will be to inform the committees of problems facing the District and get suggestions for solutions. All new Committeemen will be briefed on their duties for the coming three years.

The Board of Directors of the Water District is very appreciative of all candidates who ran but were not elected. The Board sincerely solicits any suggestions they might have to make our District stronger.

THE Cross SECTION

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

Published monthly by the High Plains Underground Water Conservation District No. 1
1628 15th Street, Lubbock, Texas 79401
Telephone PO2-0181

BILL J. WADDLE Editor

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District Office Lubbock

Tom McFarland ..... District Manager
Bill J. Waddle, Cross Section—Public Relations
Tom Moorhead, Cross Section—Public Relations
Frank Rayner ..... Chief Engineer
Kenneth Seales ..... Field Representative
Ed Holly ..... Field Representative
Herb Spradlin ..... Field Representative
Obbie Goolsby ..... Field Representative
Tony Schertz ..... Draftsman
Ernestine Cox ..... Bookkeeper
Mrs. Doris Hagens ..... District Secretary
Clifford Thompson ..... Secretary
Jo Ann Chilton ..... Secretary

BOARD OF DIRECTORS

Precinct 1
(LUBBOCK and LYNN COUNTIES)
Russell Bean, President ..... 2801 21st St., Lubbock, Texas

Precinct 2
(COCHRAN, HOCKLEY and LAMB COUNTIES)
Weldon Newsom, Secretary-Treosurer .... Morton

Precinct 3
(BAILEY, CASTRO and PARMER COUNTIES)
Ross Goodwin ..... Muleshoe, Texas

Precinct 4
(ARMSTRONG, DEAF SMITH POTTER and RANDALL COUNTIES)
Andrew Kershen ..... Rt. 4, Hereford, Texas

Precinct 5
(FLOYD COUNTY)
Chester Mitchell, Vice- President Lockney, Tex.
Field Office, Hereford
Mrs. Mattie K. Robinson ..... Secretary
Field Office, Muleshoe
Mrs. Billie Downing ..... Secretary

COUNTY COMMITTEEMEN

Armstrong County
John Patterson, 1971 ..... Wayside, Texas
Foster Parker, 1970 ..... Rt. 1, Happy Texas
George Denny, 1969 ..... Rt. 1, Happy, Texas
Guy Watson, 1971 ..... Wayside, Texas
James Bible, 1970 ..... Wayside. Texas

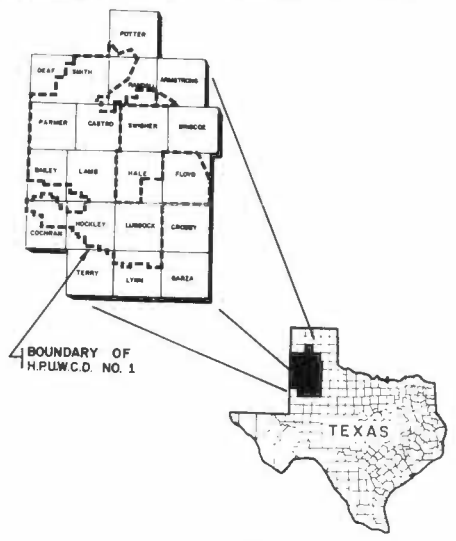
Bailey County
Mrs. Billie Downing
High Plains Water District
Box 594, Muleshoe, Texas
Lloyd Throckmorton, 1971 .... Box 115, Muleshoe
Ernest Ramm, 1970 ..... Rt. 2, Muleshoe
W. L. Welch, 1970 ..... Star Rt., Maple
J. M. Witherspoon, 1969 ..... Box 261, Muleshoe
R. L. Davis, 1971 ..... Box 61 Maple
Committee meets last Friday of each month at 2:30 p. m., 217 Avenue B, Muleshoe, Texos.

Castro County
E. B. Noble
City Hall Dimmitt, Texas
Calvin Petty, 1969 ..... Box 605, Dimmitt, Texas
Dale Maxwell, 1970 .. Hiway 385, Dimmitt, Tex.
Frank Wise, 1970 .. 716 W. Grant, Dimmitt, Tex.
Donald Wright 1971 ..... Box 65, Dimmitt Texas
Morgan Dennis, 1971 .... Star Rt. Hereford, Tex.
Committee meets on the last Saturday of each month at 10:00 a. m., City Hall, Dimmitt, Texas.

Cochran County
W. M. Butler Jr.
Western Abstract Co., Morton, Texas
Ronald Coleman, 1971 ..... Rt. 1, Morton, Texas
D. A. Ramsey, 1970 .... Stor Rt. 2, Morton, Teaxs
Willard Henry, 1969 ..... Rt. 1, Morton, Texas
Hugh Hansen 1970 ..... Rt. 2, Morton, Texas
Don Keith, 1971 ..... Rt. 1, Morton, Texas
Committee meets on the second Wednesday of each month at 8:00 p. m., Western Abstract Co., Morton, Texas.

Deaf Smith County
Mattie K. Robinson
317 N. Sampson, Hereford, Texas
W. H. Gentry, 1969 ..... 400 Sunset, Hereford
Billy Wayne Sisson, 1971 ..... Rt. 5 Hereford
Frank Zinser, 1970 ..... Rt. 5, Hereford
L. B. Wortham, 1970 ..... Rt. 3, Hereford
Harvey Fuqua. 1971 ..... Rt. 1, Hereford
Committee meets the first Monday of each month at 7:30 p. m., High Plains Water District office, Hereford, Texas.

Floyd County
Sam Puckett
325 E. Houston St., Flaydada, Texas
Pat Frizzell 1970 ..... Box 1046, Lockney
J. S. Hale, Jr., 1969 ..... Rt. 1, Floydada
Tate Jones, 1970 ..... Rt. 4 Floydada
M. M. Julian, 1971 ..... Box 65, South Plains
M. J. McNeill, 1971 ..... 833 W. Tenn., Floydada
Committee meets on the first Tuesday of each month at 10:00 a. m., Farm Bureau Office, Floydada Texas.



Hale County
J. B. Mayo
1617 Main, Petersburg, Texas
Charles Schuler, 1970 ..... Petersburg
Don Hegi, 1970 ..... Box 160 A, Petersburg
W. D. (Dub) Scarborough 1969 ..... Box 174, Petersburg
Harold D. Rhodes, 1971 .... Box 100, Petersburg
J. C. Alford, 1971 ..... Box 28, Petersburg
Committee meets first Monday each month at Water District office in Petersburg.

Hockley County
Murray C. Stewart
208 College Levelland, Texas
Ewel Exum, 1971 ..... Rt. 1, Ropesville
J. E. Wade, 1970 ..... Rt. 2, Littlefield
Jimmy Price, 1970 ..... Rt. 3, Levelland
H. R. Phillips, 1971 ..... Rt. 4, Levelland
S. H. Schoenrock, 1969 ..... Rt. 2, Levelland
Committee meets first and third Fridays of each month at 1:30 p. m., 917 Austin St. Levelland, Texas.

Lamb County
Calvin Price
620 Hall Avenue, Littlefield, Texas
Gene Templeton, 1971 ..... Star Rt. 1, Earth
Jack Thomas, 1970 ..... Box 13, Olton
W. B. Jones, 1969 ..... Rt. 1 Anton
Lee Roy Fisher, 1970 ..... Box 344, Sudan
Artis Barton, 1971 ..... Hiway 70, Earth
Committee meets the first Thursday of each month at 8:00 p. m., Crescent House Restaurant, Littlefield.

Lubbock County
Mrs. Doris Hagens
1628 15th Street, Lubbock Texas
Glen Blackmon, 1971 ..... Rt. 1, Shollowater
R. F. (Bob) Cook, 1970 ..... 804 6th St., Idalou
Bill Dorman, 1970 ..... 1910 Ave. E, Lubbock
Edward Moseley, 1969 ..... Rt. 2, Slaton
Andrew (Buddy) Turnbow, 1971 Rt. 5, Lubbock
Committee mets on the first and third Mondays of each month at 1:30 p. m., 1628 15th St. Lubbock, Texas.

Lynn County
Mrs. Doris Hagens
1628 15th Street, Lubbock, Texas
Don Smith, 1969 ..... Box 236, New Home
Roy Lynn Kahlich, 1970 ..... Wilson
Roger Blakney, 1970 ..... Rt. 1, Wilson
Reuben Sanders, 1971 ..... Rt. 1, Slaton
O. R. Phifer,, Jr. 1971 ..... New Home
Committee meets the third Tuesday of each month at 10:00 a. m., 1628 15th Street, Lubbock, Texas.

Parmer County
Aubrey Brock
Wilson & Brock Insurance Co., Bovina, Texas
Guy Latta, 1971 ..... Friona
Webb Gober, 1969 ..... RFD Farwell
Henry Ivy, 1970 ..... Rt. 1, Friona
Jim Ray Daniel, 1970 ..... Friona
Edwin Lide, 1971 ..... Rt. D, Bovina
Committee meets on the first Thursday of each month ot 8:00 p. m., Wilson & Brock Insurance Agency, Bovina, Texas.

Potter County
Fritz Meneke, 1970 ..... Rt. 1, Box 538 Amarillo
W. J. Hill, Jr., 1969 ..... Bushland
Jim Line, 1971 ..... Bushland
Vic Plunk, 1970 ..... Rt. 1, Amarillo
Temple Rodgers, 1971 ..... Rt. 1, Amarillo

Randall County
Mrs. Louise Knox
Randall County Farm Bureau Office, Canyon
R. B. Gist, Jr. 1971 ..... Rt. 3, Box 43 Canyon
Melvin Schaeffer, 1971 ..... Rt. 1, Happy
Ralph Ruthart, 1969 ..... Rt. 1, Canyon
Carl Hartman, Jr. 1971 ..... Rt. 1, Canyon
Marshall Rockwell, 1970 ..... Canyon
Richard Friemel, 1970 ..... Rt. 1, Canyon
Committee meets on the first Monday of each month at 8:00 p. m. 1710 5th Ave., Canyon, Tex.

Water, Inc. Chief Named

Col. C. H. Chamberlain, who soon will retire from the U. S. Army Corps of Engineers, has been named general manager of Water, Inc., John J. Kendrick of Brownfield, president of the Lubbock-based organization, announced recently.

Chamberlain, a native of Falls County (Marlin) and a 1940 graduate of Texas A&M, is serving as an Army staff engineer in Hawaii. His appointment to the Water, Inc. post will become effective Feb. 1.

Retirement ceremonies for Chamberlain are scheduled Feb. 1 at Oakland, Calif. Army Base. He will retire in the grade of colonel after 27 years of active commissioned service.

Registered Engineer

Chamberlain is a registered professional engineer in Texas. He and his wife expect to arrive in Lubbock about Feb. 5.

His Army assignments have included three years as chief of the Corps' Military Engineering Division office in Washington and three years as a planning officer with the NATO Allied Forces Headquarters in Southern Europe, Naples. Italy.

Chamberlain was chief of engineering for the Corps' ballistic missile construction office in Los Angeles for four years.

While he was there, the Los Angeles office completed engineering and constructing Air Force ballistic missile sites in 17 states at a cost of two and one half billion dollars.

Varied Assignments

Chamberlain once served as division engineer with the 9th Infantry Division, Ft. Carson, Colo., and for three years was assistant professor of military science at Georgia Institute of Technology.

He has had other engineer assignments with the Army in Virginia, Korea, Texas, Kansas and Washington, D. C.

He was assigned to an artillery unit during World War II and spent almost four years in the Philippine Islands.

Chamberlain is an advanced course graduate of the Artillery Guided Missile School at Ft. Belvoir, Va., of the Command and General Staff College at Ft. Leavenworth, Kan.; and of the Industrial College of the Armed Forces in Washington.

Holds Medals

His decorations include the Legion of Merit ,Bronze Star, Army Commendation Medal, Air Force Commendation Medal and Purple Heart.

He holds the Philippine Presidential Citation Badge and his unit in World War II was awarded the Presidential Distinguished Unit Badge on three occasions.

Mrs. Chamberlain is the former Louise Peacock of Marlin. The Chamberlains have a daughter, Cynthia, now living in Denton, and a son, William Clif, a freshman at Texas A&M.

Water, Inc. is a nonprofit corporation formed last year to help bring supplemental imported water into the High Plains and adjacent areas.

Kendrick said a primary function of the organization is to work with local, state and federal agencies in water development and planning.

In announcing employment of a general manager, Kendrick said Col. Chamberlain "was very highly recommended. We are extremely pleased to have a man with his knowledge and qualifications in charge of our activities.

COL. C. H. CHAMBERLAIN

Howard Boswell New TWDB Exec. Director

Howard Boswell, Manager of the development fund for the Texas Water Development Board has recently been named to replace Joe Moore as Executive Director of the Board.

Mr. Boswell will take over the reins as Chief Administrator, effective February 1. The decision was announced by Board Chairman, Mills Cox, after Secretary of the Interior, Stewart Udall, made the announcement that Mr. Moore had been appointed Commissioner of the Federal Water Pollution Control Administration, Washington, D. C.

Mr. Boswell acted as Executive Secretary to the Board when it was only a financing agency, and is its senior employee. He was Assistant State Conservationist of the Soil Conservation Service and was Executive Director of the Association of State Conservation Districts before joining the Water Development Board in 1962.

Mr. Boswell made one of his first appearances as Executive Director of the Development Board at a meeting of the Sabine River Development Board in Longview last week. At that time, he stated that the revised Texas Water Plan is expected to be released early in the spring.

Include A Tailwater System In Your 1968 Budget

"A BLUEPRINT FOR YOUR FUTURE

and Your Future Looks Bright"

Chester Mitchell, Lockney; Ross Goodwin, Muleshoe; Andrew Kershen, Hereford, and Russell Bean of Lubbock, four members of the Board of Directors of the High Plains Water Conservation District were present at the annual meeting of the Sabine River Basin Development Association last week and heard Harry Burleigh of the Bureau of Reclamation tell the members of the association and the Sabine River Authority how bright the future looked for the Sabine Valley. Mr. Burleigh's remarks were based on the data gathered from a joint study being made by the Bureau and the Corps of Engineers relating to the importation of Mississippi River water to Texas and Eastern New Mexico. But then he added, as he moved into that part of his report effecting East, Central, and West Texas, as well as Eastern New Mexico, "I just emphasize that no decisions have been made in the matter of importation and the topic is merely at a study stage and nothing else."

"If the people of West Texas and New Mexico are to get water from the Mississippi they will do so under conditions dictated by the people of the Mississippi Delta." Burleigh stated, "But the water is available. Over five hundred million acre feet of it flows into the Gulf of Mexico from the mouth of the Mississippi each year. We are only talking in terms of a possible ninteen million acre feet for diversion." Burleigh pointed to five possible diversion routes that could bring water across Texas and into Eastern New Mexico — the Arkansas River, Red River, Sabine River, Brazos River and the Colorado River, each of which he pointed out offered some advantages and disadvantages.

Col. Jack W. Fickessen, District Engineer of the Corps of Army Engineers, Fort Worth, Bill Clayton, State Representative from Springlake, Howard Boswell, new Executive Director of the Texas Water Development Board were among the speakers on the program.

A total of 12 people from West Texas, representing the High Plains Water District, the North Plains Water District, and Water, Inc., were present at the day and a half conference.

Both East and West seemed to be in perfect accord in their discussions of solving the water problems for the State. An attitude of thinking and working together permeated the convention. The wisdom and engineering know-how of the Texas Water Development Board, the U. S. Corps of Engineers, and the U. S. Bureau of Reclamation, as pointed out by Mr. Boswell, Col. Fickessen, and Mr. Burleigh are already being employed in the search for a way for Texans to help themselves as much as they can.

WATER, Inc. Needs Your Support— JOIN TODAY!

West Texas Water Institute Conference

The sixth annual West Texas Water Conference will be held in Lubbock, Texas, February 2nd, beginning at 8 a. m. in the Student Union Building on the Texas Tech Campus.

The conference will feature a luncheon address by Dr. Edward Teller, atomic physicist and a key developer of the hydrogen bomb. Dr. Teller, one of the scientific giants of the 20th Century, is consulting professor on the faculty of the Department of Physics at Texas Technological College.

Dr. Teller's topic for his address will be, *"Application of Nuclear Energy to Water Resources Problems".*

The conference is sponsored by the West Texas Water Institute, a nonprofit regional organization to emphasize wise use of water resources and to promote more research and to encourage better educational programs relating to the value and utilization of water.

Printed below is the program for the conference. Make plans now to attend this important conference.

PROGRAM

Registration 8-9 a. m.
Welcome and Introduction 9-9:20 a. m.

SESSION I—9:20-10:20 a. m.
- Probable Effects of Grassland Restoration on Water Resources
  C. A. Rechenthin, SCS
- The Duck Creek Watershed Project
  Jim Barron, manager, Spur Ranch

SESSION II—10:45-11:45 a. m.
- Water Importation—Current Outlook
  John Vandertulip, chief water engineer, TWDB
- West Texas Lake Basins—What the Geology Tells Us
  C. C. Reeves, Jr., geologist

LUNCHEON—12 noon-1:30 p. m.
- Application of Nuclear Energy to Water Resources Problems
  Dr. Edward Teller, physicist

SESSION III—1:40-2:40 p. m.
- Effects of Agricultural Practices on Nitrate Pollution of Groundwater
  B. A. Stewart, USDA-ARS
- Movement of Bacteria from Recharge Wells
  O. R. Jones and Victor Hauser, USDA-ARS
- Control of Surface Water Pollution from Feedlot Runoff
  Walter Grub, agricultural engineer, and T. R. Owens, agricultural economist

SESSION IV—3:05-4:20 p. m.
- Economic Issues in Water Development Investments
  Herbert Grubb, agricultural economist
- Water Law in Terms of Planning
  Roger Tyler, chief water lawyer, Texas Attorney General's office
- Water, Inc.—Organization, Goals and Prospects
  John Kendrick, president, Water, Inc.

1968 Board of Directors of The High Plains Underground Water Conservation District, Left to Right: Weldon Newsom, Morton; Andrew Kershen, Hereford; Russell Bean, Lubbock; Ross Goodwin, Muleshe and Chester Mitchell Lockney.

Extending Well Permits

Frequent questions that arise in the District are questions concerning the extension of a permit to drill a well. Many persons who hold permits for wells feel that they can get a four month extension of this permit automatically. This is not true.

Rule 12 of the rules of the High Plains Underground Water Conservation District states:

Time During Which A Permit Shall Remain Valid

Any permit granted hereunder shall be valid if the work permitted shall have been completed within four (4) months from the filing date of the application. It shall thereafter be void. Provided, however, that the Board, for good cause, may extend the life of such permit for an additional four (4) months if an application for such extension shall have been made to the County Committee during the first four (4) months period. Provided, further, that when it is made known to the Board that a proposed project will take more time to complete, the Board, upon receiving written application may grant such time as is reasonably necessary to complete such project.

To extend a permit, a person must have a valid reason for not drilling the well within the four months period covered by the permit.

The reason must be more than a simple, "I didn't get it done" or "I haven't had time."

If a person feels he has adequate cause for an extension he may obtain an Extension Form, furnished by the County Secretary. The form must be filled out and signed by the person desiring the extension.

The form is then returned to the County Secretary for recommendation by the County Committee and then sent to the Board of Directors of the District before the extension is granted.

A request for an extension of time must be made on or before the expiration date of the original permit and only one extension may be granted for any permit.

PLEASE CLOSE THOSE ABANDONED WELLS ! ! !

Water District Director Honored

ROSS GOODWIN

Water District Director, Ross Goodwin, Bailey County farmer for 29 years, was recently named Conservation Farmer of the Year by the Muleshoe Chamber of Commerce. Mr. Goodwin, who is serving his second term as Director of the High Plains Water Conservation District, was presented a plaque in recognition of his work in conservation by the Blackwater Valley Soil Conservation Service.

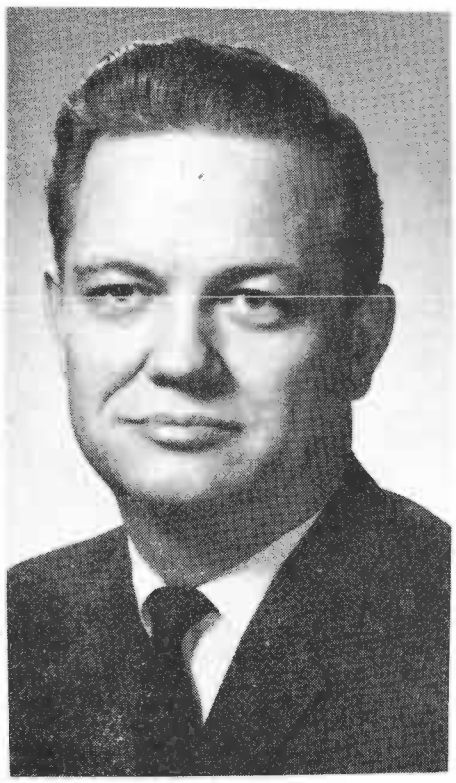
Board members of the Water District would like to add their congratulations to Mr. Goodwin with the emphasis that—it couldn't have happened to a nicer guy!

WHEN YOU MOVE—

Please notify the High Plains Underground Water Conservation District, Lubbock, Texas on Post Office Form 22S obtainable from your local postmaster, giving old as well as new address, to insure no interruption in the delivery of "The Cross Section."

INCLUDE YOUR ZIP CODE NUMBER

A Tap On The Shoulder



JOE MOORE

The high caliber of water leadership in Texas was recognized again last week when Secretary of the Interior, Stewart Udall, tapped on the shoulder — Joe Moore, Executive Director of the Texas Water Development Board since September 1, 1965, to be come Commissioner of the Federal Water Pollution Control Administration, effective February 1.

Secretary Udall had been trying to get Mr. Moore into the Department of the Interior since 1966, but Governor Connally had refused to allow an offer to be made until recently.

Governor Connally has been quoted as saying "Texas deeply regrets losing Joe Moore. His leadership and dedication to the Water Development Board and its water planning efforts has had a great impact on the preparation of the Texas Water Plan and the development and conservation of Texas water resources — the groundwork he has laid could lead to the proper development of our water resources for the lasting benefit of all Texas and all Texans."

Moore said that his Federal job, as he sees it, is a chance to tie local, State and Federal water pollution control personnel into a unified team attacking water pollution problems.

Just as the play must go on—the work of developing a water plan for Texas must also go on under the careful guidance of new leadership.

Thought For The Month

I COMPLAINED BECAUSE
I HAD NO SHOES—
UNTIL I MET A MAN
WHO HAD NO FEET!

TWCA MEETING

The Texas Water Conservation Association will hold its annual meeting, February 21-23, at the Statler-Hilton Hotel in Dallas.

The climax banquet, February 22, will be dedicated to Judge J. E. Sturrock who has been with the TWCA since its founding.

During the convention, Bill J. Waddle, staff assistant with the High Plains Underground Water Conservation District, Lubbock, Texas, who has been chosen to succeed Judge Sturrock, will be getting his initial introduction into the fine work carried on year by year by the many panels of TWCA.

Mr. Howard Boswell, newly appointed executive director of the Texas Water Development Board will be a speaker on the program along with Mr. Floyd Dominy of the Bureau of Reclamation, Washington, D. C., who will give the luncheon address.

The Indispensible Man

SOMETIMES WHEN YOU'RE FEELING IMPORTANT
SOMETIMES WHEN YOUR EGO'S IN BLOOM
SOMETIMES WHEN YOU TAKE IT FOR GRANTED
YOU'RE THE BEST QUALIFIED MAN IN THE ROOM.

SOMETIMES WHEN YOU FEEL THAT YOUR GOING
WOULD LEAVE AN UNFILLABLE HOLE
JUST FOLLOW THIS SIMPLE INSTRUCTION
AND SEE HOW IT HUMBLES YOUR SOUL.

TAKE A BUCKET AND FILL IT WITH WATER
PUT YOUR HAND IN IT UP TO THE WRIST
PULL IT OUT, AND THE HOLE THAT REMAINS
IS THE MEASURE OF HOW YOU WILL BE MISSED.

YOU MAY SPLASH ALL YOU PLEASE WHEN YOU ENTER
YOU MAY STIR UP THE WATER GALORE
BUT STOP, AND YOU WILL FIND IN A MINUTE
THAT IT LOOKS JUST THE SAME AS BEFORE.

THE MORAL IN THIS IS QUITE SIMPLE
DO JUST THE BEST THAT YOU CAN
BE PROUUD OF YOURSELF, **BUT REMEMBER**
THERE'S **NO INDISPENSABLE MAN!**

Your Water Statement

January in the Water District will mean income tax time for some, Christmas bills for others, seed and fertilizer buying time for many, and observation well measuring time for the personnel of the Water District.

Annually, the District makes water level measurements of more than 700 observation wells in the 14 county area within the District.

The wells in the District are a portion of over 1,700 wells that will be measured by the High Plains Underground Water Conservation District, North Plains Water District and the Texas Water Development Board.

The importance of the observation well program to the landowner has been ably demonstrated by the tax depletion allowances that were allowed land owners in 1966 for groundwater used in the business of irrigation farming. Data assembled, from detailed records kept on observation wells, was used to prove the annual decline of the water table under thousands of acres of farm land. This decline was used in calculating the tax depletion allowance.

The observation well program is the general basis for computing the decline of the water table for the entire District. A good thorough back log of data is available on every well and gives a good clear picture of what is happening to the groundwater reservoir in a certain area.

Observation wells in the Southern High Plains, South of the Canadian River, are the wells that determine the amount of decline shown in the Water District.

Water levels in the observation wells reflect the stages of the water reservoir. The readings reveal the extent to which water supplies are depleted by drought, by heavy pumping for irrigation, industrial uses and public water works, and also the extent which they are replenished by rainfall and snow.

The observation wells are measured in January of each year because of the ability to get a "fair" picture of the water table. By waiting until January to measure the well, it has had time to recover from the summer pumping. If the wells were measured in September, the reading would not give a true picture because of the pumping stress placed on it during the irrigation season.

The Water District has spent considerable time in establishing its fine system of observation wells, and they have proven to be of great value to all landowners of the Southern High Plains who are taking advantage of the water depletion ruling.

High Plains Underground Water
Conservation District No. 1
1628 Fifteenth Street
Lubbock, Texas 79401

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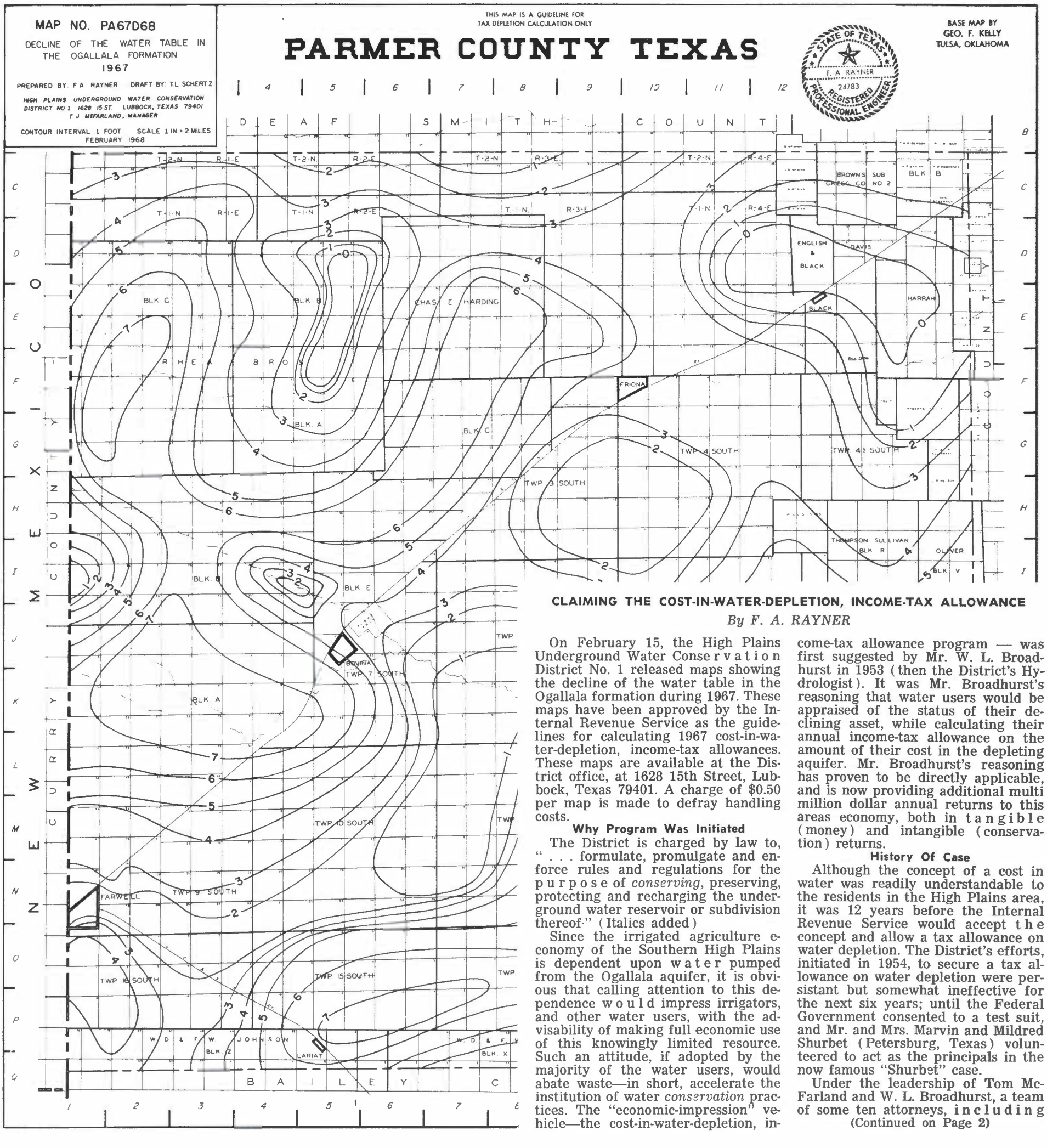
THE Cross SECTION

Vol 14—No. 9 **"THERE IS NO SUBSTITUTE FOR WATER"** *February 1968*



CLAIMING THE COST-IN-WATER-DEPLETION, INCOME-TAX ALLOWANCE

By F. A. RAYNER

On February 15, the High Plains Underground Water Conservation District No. 1 released maps showing the decline of the water table in the Ogallala formation during 1967. These maps have been approved by the Internal Revenue Service as the guidelines for calculating 1967 cost-in-water-depletion, income-tax allowances. These maps are available at the District office, at 1628 15th Street, Lubbock, Texas 79401. A charge of $0.50 per map is made to defray handling costs.

Why Program Was Initiated

The District is charged by law to, " . . . formulate, promulgate and enforce rules and regulations for the purpose of *conserving*, preserving, protecting and recharging the underground water reservoir or subdivision thereof." (Italics added)

Since the irrigated agriculture economy of the Southern High Plains is dependent upon water pumped from the Ogallala aquifer, it is obvious that calling attention to this dependence would impress irrigators, and other water users, with the advisability of making full economic use of this knowingly limited resource. Such an attitude, if adopted by the majority of the water users, would abate waste—in short, accelerate the institution of water *conservation* practices. The "economic-impression" vehicle—the cost-in-water-depletion, income-tax allowance program — was first suggested by Mr. W. L. Broadhurst in 1953 (then the District's Hydrologist). It was Mr. Broadhurst's reasoning that water users would be appraised of the status of their declining asset, while calculating their annual income-tax allowance on the amount of their cost in the depleting aquifer. Mr. Broadhurst's reasoning has proven to be directly applicable, and is now providing additional multi million dollar annual returns to this areas economy, both in tangible (money) and intangible (conservation) returns.

History Of Case

Although the concept of a cost in water was readily understandable to the residents in the High Plains area, it was 12 years before the Internal Revenue Service would accept the concept and allow a tax allowance on water depletion. The District's efforts, initiated in 1954, to secure a tax allowance on water depletion were persistant but somewhat ineffective for the next six years; until the Federal Government consented to a test suit, and Mr. and Mrs. Marvin and Mildred Shurbet (Petersburg, Texas) volunteered to act as the principals in the now famous "Shurbet" case.

Under the leadership of Tom McFarland and W. L. Broadhurst, a team of some ten attorneys, including

(Continued on Page 2)

THE Cross SECTION

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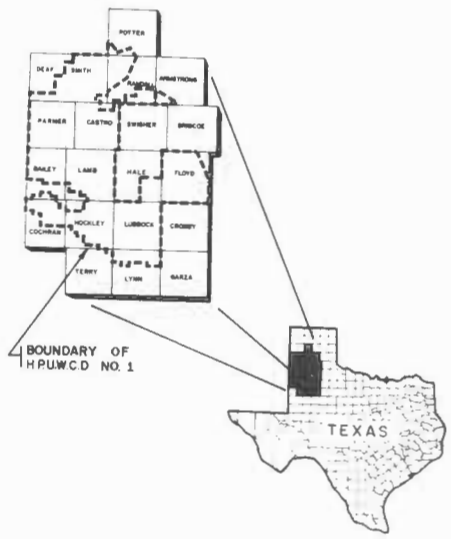


COST-IN-WATER-DEPLETION (continued from page 1)

George McCleskey, Lubbock; Clancey Brazill· Lubbock; Ed Kahn, Washington, D. C.; Joe Greenhill, Austin; and numerous accountants, agriculturists, economists, geologists, engineers, hydrologists and other types of consultants, including P. T. Flawn, Austin; C. E. Jacob, Los Angeles; W. F. Guyton, Austin; Ed Reed, Midland; Frank Hughes, College Station; Don Reddell and A. W. Wyatt· Lubbock; and many other professional and lay persons were assembled to bring the District's efforts to a successful conclusion through the Shurbet suit.

This appeal was finally recognized by the Internal Revenue Service, in November of 1965, after the decision for the District supported Shurbet et al v. the United States cost-in-water-depletion, income-tax-allowance case was upheld by the 5th Circuit Court of Appeals. The Court stated, "We agree with the finding of the district court that:

> *'Ground water in the Ogallala formation of the Southern High Plains is a mineral and a natural deposit within the meaning of the federal tax statutes and regulations governing deductions for cost depletion'."*

The Court further stated " . . . we would confine the holding in this case to the water extracted by taxpayers from the Ogallala formation in the Southern High Plains." This decision permitted land owners, who had a cost in their ground water and who were using ground water to create income, to claim an income-tax allowance on the amount of the annual depletion of the aquifer beneath their land.

The mechanics for claiming this income-tax allowance were developed by the District, in cooperation with the Internal Revenue Service. This program consisted of developing tables of allowable costs in water (based on land sales); the construction of saturated-thickness maps (thickness of the water-saturated interval in the Ogallala formation, and associated rocks) for the years 1938, 48, 58 and 63; and the construction of annual decline of the water-table maps, for 1962, 63, 64 and 65, for each county in the District.

The materials and procedures for claiming the cost-in-water-depletion, income-tax allowance were presented to the general public at the Texas Tech Tax Institute, held at Texas Technological College, March 11, 1966. The proceedings of this Institute were published by the District, in cooperation with the Institute. Instructions for claiming the depletion allowance were also published in the March 1966 issue of the *Cross Section.*

Tax Rebates

For the years 1962, 63 and 64 amended tax returns filed with the Internal Revenue Service resulted in the refunding of about $1,400,000 to taxpayers in the District. This represents an average of about $226 per claim. Refunds for the years 1965 and 1966 were estimated to be $1,000,000 and $1,200,000 respectively; or about $400 and $480 per claim.

In the past, the number of claims filed per year continued to grow until about 2,500 claims were filed for the 1966 tax year. It has been conservatively estimated that this represents less than 50 percent of the taxpayers presently eligible to claim the cost-in-water-depletion tax allowance. At the 1966 level of tax allowance per claim, nearly 2.5 million dollars would be returned annually to taxpayers in the District if all eligible taxpayers claimed this allowance· If projected into the future, this in itself is a conservative estimate; because land transactions will make more taxpayers eligible to claim this type of tax allowance, and increased costs in water will increase the individual allowances.

Constructing Decline Maps

Records obtained by the measurement of water levels in several hundred observation wells, in January of each year, are used to construct the annual decline maps. The decline in water levels, as measured in January 1967 and January 1968, were used to construct the 1967 decline maps. These data represent a one year record for 82 percent of the 800 observation wells within the District.

Nearly all of the observation wells are operational irrigation wells. The water-levels in the District are measured during the first two week each January. This measurement period was chosen because it allows the maximum rest period for the filling of the individual cone of depression developed around each pumping well during the summer irrigation season. This early January measurement also provides a safety factor, before the preplant irrigation season, in the event that weather or other problems should delay the normal early-January measurements. Measuring the water levels earlier in the year (December or November) would introduce a several hundred fold probability of error due to pumping conditions in this area, and as a result of the rates of water-level recovery being experienced by each well during November and December.

Although experience has shown the January measurements produce acceptable and usable water-level data, they are (as are all water level measurements made in a depleting aquifer) pseudo static water levels. There are numerous other factors, governed by geologic, hydrologic, pumpage and weather conditions, and human errors, that sometimes produce anomalous or missed water level measurements. All of these factors must be considered before water-level data can be used to construct the annual decline maps.

Anomalous change-in-water-level data are sometimes adjusted to better reflect historical records, or conditions as exemplified by nearby observation well records, before they are plotted on the decline maps. Wells are assigned a zero decline, when acceptable water-level records indicate an annual rise in the water level.

The District has developed a digital-computer program that pinpoints some of the anomalous water-level measurements; makes the six (sometimes seven) mathematical operations performed on each water-level measurement; and accounts for any excess or deficit in the decline assigned each well. This program prevents the long-term adjustment in water-level-change records that do not agree, in time, with field measurements.

The water level decline data for each well are entered on a composit, land-grid base map of the District. These points are then contoured — that is, continuous lines are drawn through points of equal decline in the water table. The contour interval represents one foot of decline.

Using Decline Maps

The land owner can plot each parcel of land, on which he wishes to claim a cost-in-water depletion allow-

TWCA State Meet

Addresses by eminent water authorities shared the spotlight with committee meetings and caucus reports at the 24th annual meeting of the Texas Water Conservation Association (TWCA) February 21-23 in Dallas.

Representing the High Plains Underground Water District No. 1 at the sessions in the Statler-Hilton Hotel were Tom McFarland, Russell Bean, Frank Rayner, Tom Moorhead, Andrew Kershen, Ross Goodwin, Weldon Newsom and Chester Mitchell.

Thursday was devoted primarily to committee meetings, and the conference concluded with caucus reports.

The Thursday night banquet, with President John W. Simmons acting as Master of Ceremonies, was highlighted by the honoring of Judge J. E. Sturrock, who is retiring as General Manager of the TWCA. Of equal importance was the recognition of Bill J. Waddle, former staff employee of the High Plains Underground Water Conservation District No. 1, as the newly selected General Manager.

Floyd E. Dominy, commissioner of the Bureau of Reclamation, Washington, D. C., made a key address Friday afternoon.

"Texas Water Conservation Association—Past, Present and Future," was the topic of Judge Guy C. Jackson, Jr., president emeritus of the organization, in a Thursday night report.

Friday speakers included Hugh C. Yantis, executive director of the Texas Water Quality Board; J. R. Singleton, executive director of the Texas Parks and Wildlife Dept.; Frank R. Booth, executive director of the Texas Water Rights Commission; and Howard B. Boswell, executive director of the Texas Water Development Board, all of Austin.

6th Annual West Texas Water Conference

Water depletion problems and avenues of remedy came in for close scrutiny at the Sixth Annual West Texas Water Conference held Feb. 2 on the Texas Tech campus in Lubbock.

An impressive list of speakers, including Dr. Edward Teller, dubbed chief architect of the hydrogen bomb, were on hand to discuss water-related problems.

More than 250 area water-conscious farmers ranchers and business and professional men were present.

New directors elected to the institute included Frank Rayner, chief engineer, High Plains Water District. Also named were Victor Houser, Bushland; Dan Wells of Texas Tech; and Neal Johnson, KCBD farm news director, Lubbock.

Attending 6th Annual West Texas Water Institute, left to right, Howard Boswell, Dr. Dan Wells and John Vandertulip.

Dr. Teller predicted at the Friday meeting that pumping energy required to bring water from the Mississippi basin to the High Plains "won't cost much more than $10 per acre-foot" by the time such a project could be implemented.

His estimate was well below that of some authorities who have forecast costs of about $45 an acre-foot.

All agree that lifting such water a total of about 3,000 feet to points above the Caprock would represent a substantial amount, some saying 60 to 70 percent, of the total costs.

Dr. Teller outlined the decreasing costs of energy as one of "the greatest accomplishments of modern technology," and followed through with the statement that this is "one of the biggest reasons why water resources problems have become solvable."

He expressed the possibility for use of atomic energy in both transport of water into the area and in it's use in forming storage basins beneath the ground.

B. A. Stewart of the Agricultural Research Service, Fort Collins, Colo., urged more intensive efforts to determine "to what extent agricultural practices are impairing our soil and water resources."

"Agriculture is facing a tremendous challenge because it must produce near maximum yields to be efficient," he emphasized.

Another key speaker, Roger Tyler, Jr., with the Texas Attorney General's office, spoke on "Water Laws in Terms of Planning."

He defined his role as raising all legal questions which might arise from importation of water from the Mississippi to the High Plains, bringing them to attention of the convention.

"If the source of water is not found, Texas economy will double by 1980 from what it is presently, but then will decrease to less than 30 percent of what it is now," he prophesied.

Other speakers included O. J. Barron, C. A. Rechenthin, John Vandertulip, C. C. Reeves, Jr., O. R. Jones, and John Kendrick, who is president of Water, Inc.

Kendrick spoke on "Organization, Goals and Prospects" of Water, Inc. and said that the organization "was designed so we could work closely with the many different groups connected with this type of work for the things needed for the water supply in our area."

ance, on these maps. By this method the taxpayer can best determine which contour line most nearly represents the decline of the water table beneath his land. The Internal Revenue Service requires that the taxpayer claim that decline represented by the contour line that is closest to the center of each continuous tract of land under consideration. As shown by the example illustration, the taxpayer owning tract A would claim 4 feet decline, while the owner of tract B would claim 6 feet of decline.

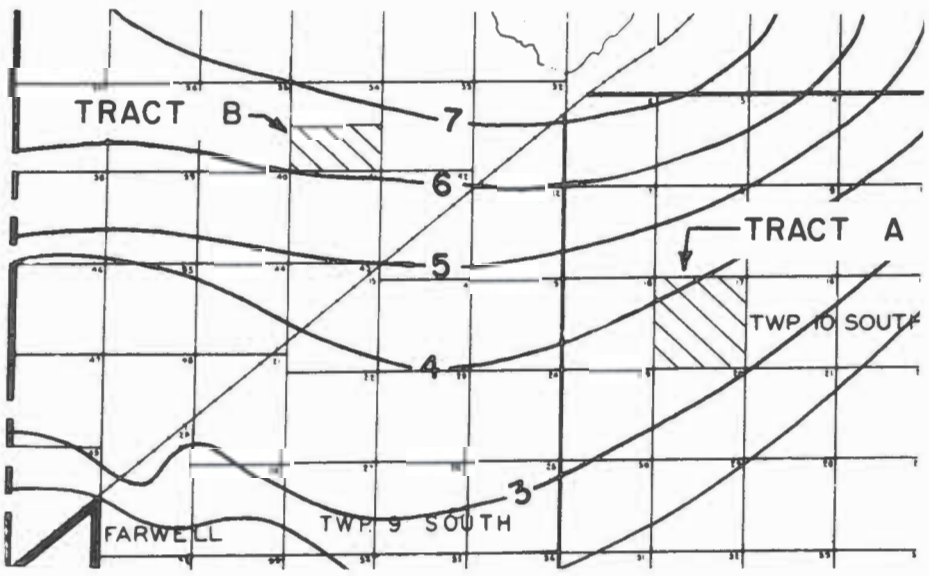
Who Can Claim Depletion Allowance

The 5th Circuit Court of Appeals decision applied to all taxpayers in the Southern High Plains who had a cost in their ground water and who pumped water from the Ogallala formation to create income.

The Internal Revenue Service has ruled that taxpayers that purchased land prior to 1948 did not have a cost in the water thereunder and are, therefore, not entitled to a depletion allowance.

The time of year chosen to make the annual water level measurements, and the time necessary to make and process these measurements, prevents the compilation and release of the annual decline maps until about February 15 of each year. This is the date on or before which persons deriving income from farm operations must file their final tax return for the previous tax year; unless such taxpayer has filed an estimate of tax with the Internal Revenue Service by January 15. By filing such an estimate of tax, the final return can be delayed until April 15. Taxpayers who wish to claim each years depletion allowance should file an estimate of tax in order to delay the filing of their final return until after the decline maps are available. However, persons who derive income from farming operations can, as can all other taxpayers, file an amended return for each and any of the previous three tax years. That is to say, eligible taxpayers can, by April 15, 1968, file an amended return claiming the depletion allowance for 1964, 65, 66 and 67.

Taxpayers who have not previously claimed the depletion allowance for 1962 and 1963 have lost the privilege of claiming these tax year depletion allowances. Taxpayers who do not claim the 1964 depletion allowance by April 15, 1968, will also lose any applicable allowance for the 1964 tax year.



EXAMPLE OF DECLINE MAP INTERPRETATION

USGS Opens Office

RICHMOND F. BROWN

The United States Geological Survey opened an office in Lubbock Feb. 1, 1968 with Richmond F. Brown as Project Chief. This office is located at 3635, 34th Street, and is staffed at the present time by Mr. Brown and Don Signor, engineer, who came to the U. S. G. S. after performing agricultural research at Bushland, Texas. By the end of the present year the staff is expected to be expanded to a seven (7) man operation.

Mr. Brown stated that his office does not intend to duplicate the efforts of any other agency, past or present, but has as its function a two fold purpose in West Texas and Eastern New Mexico:

1) Attempt to determine the feasibility of putting imported surface water into ground water storage and experiment with artificial recharge methods.

2) Evaluate significance of water in playa lakes.

Mr. Brown comes to Lubbock from St. Paul, Minnesota. His family consists of his wife and two children, ages 16 and 18, who plan to join him in Lubbock soon.

NACD Holds 22nd National Convention

"Water — Not War — May be the Greatest Question of Our Time," Rep. Jim Wright (D-Tex.) strongly implied in a keynote address early in February at the 22nd Annual Convention, National Association of Soil and Water Conservation Districts (NACD) held in Dallas.

A. L. Black of Friona an NACD director, was among those attending the information-packed conference. Black is a former Water District officer and currently is a director of Water, Inc. He presided in a February 5th morning session of the NACD meeting to open the conference.

Wright addressed the convention at a Tuesday luncheon.

He warned that American must solve its water crisis "before it becomes a widespread irreversible famine."

Verifying a warning long issued by your own water district, Congressman Wright said that "the United States, richest and most powerful nation in the world, is running out of its most indispensible commodity — clear, usable water".

He asserted, however, that despite severity of the problem, "It can be solved if we act with bold imagination, determined resolution, and a sufficient sense of urgency".

He stressed that the public must be made aware that water developments pay for themselves many times over.

He called for a stepped-up desalination program, intensified study of weather modification, more attention to oceanography, and earnest planning to facilitate long-distance water transport.

"The country has neither the time nor the water to waste," he declared.

Other program participants included Mrs. Charles O. Dean, Leland, Mississippi, president of the National Council of State Garden Clubs; Paul A. Leonardi, Swedesboro N. J. Nationally-honored Explorer Scout; Floyd E. Heft, Cincinnati, Ohio, temporary president, Association of State Soil Conservation Administrative Officers; and Mrs. Del Krenik, Madison Lake, Minn., president of the NACD Auxiliary.

Also Lt. Gen. William F. Cassidy, U. S. Army Chief of Engineers; Bernard F. Hillenbrand, Bethesda, Md., executive director of the National Association of Counties; and Samuel S. Studebaker, NACD president.

Black, Friona farmer-conservationist and cattleman, also serves NACD on its district operations committee and its Great Plains committee.

TAILWATER INSTALLATIONS ON HIGH PLAINS PROVEN AS GOOD INVESTMENT

This tailwater installation in Floyd County belongs to Chester Mitchell of Lockney, Texas. Vital statistics of this pit show it to be 40' wide, 100' long and 10' deep. The pump is a 6" Dobbs floating pump capable of pumping 300 gallons per minute.

This is the second crop year for this system, and before its installation Mr. Mitchell was losing a large amount of water by runoff. Now his "cropping" is uniform and yield is balanced out across the field with no tailwater waste.

The most significant advantage of this system has proven to be in the number of rows Mr. Mitchell can now water with the same amount of water pumped. Before this tailwater installation he was able to water 50 rows at a time — now he is watering 70 rows with the same wells and the same amount of pumped water. *A worthwhile installation.*

This tailwater return system was installed on the farm of Billy Wayne Sisson, 18 miles west of Hereford, Texas. The pit has a 700,000 gallon capacity with a return pump capacity of 500 gallons per minute. This entire installation, including dirt work and pump, cost Mr. Sisson less than $2,000.00.

During the peak season this return system will have eight irrigation wells flowing into it with four of five wells on virtually a constant basis.

All over the High Plains, farmers are installing tailwater return systems and in the process, practicing conservation of water and reaping the immediate benefits in an increase in profits from their farming operation.

High Court Vetoes Oil-Well Flooding

AUSTIN — The Texas Supreme Court ruled against Sun Oil Co. recently, according to Associated Press, in what was to have been a test case of water uses on oil leases, but said earlier action prevented the high court from considering the case on its merits.

There was widespread interest in the case, and 15 to 20 additional briefs were filed other than by Sun and the other parties in the suit, Hockley County landowner Earnest Whitaker and his son-in-law, Doyle Henderson.

The suit involved Sun's lease on Whitaker's 267 acres, and the use by Sun of fresh, underground water from the Ogallala Formation in secondary oil recovery operations.

Water District Intervenes

Whitaker and the High Plains Underground Water Conservation District No. 1, which intervened in the suit, contended that Sun's lease did not entitle the company to use the water as it proposed, and also that injection of the fresh water into the San Adres oil formation would be "waste" of water, as prohibited by Texas law.

However, the Supreme Court noted in an opinion by chief justice Robert W. Calvert, that all parties to the suit agreed that the issue of "waste" or "escape" of underground water from one reservoir to another should not be considered.

Calvert said judgment of the 121st District Court in Hockley County and the Amarillo Court of Civil Appeals denying Sun a temporary injunction to stop Whitaker and Henderson from preventing use of the water were based on this conclusion: "that the parties to the lease did not intend that Sun should have free use of water from the Ogallala source for a water flooding pressure maintenance program when such use would result in substantial damage to the surface owner's estate in the land".

Must Be Affirmed

The judgements must be affirmed, the supreme court said, but not for the reasons used by the lower courts.

Calvert wrote that "to warrant issuance of the writ (temporary injunction)" an applicant "needs only to plead a cause of action and to show a probable right on final trial to the relief he seeks and probable injury in the interim."

However, he said, "the agreement that issue would not be joined and arguments would not be made concerning the issue of statutory waste" —raised by Whitaker and the water district—"completely destroyed Sun's ability to show its probable right on final trial to a permanent injunction."

He said even if Sun's interpretation of the lease was right—that it has the right to use all water from the Ogallala reasonably necessary to produce oil from under the land — "Sun would yet not be entitled to a permanent injunction to protect it from interference with its water flooding program if its proposed use of the water is prohibited by statute."

Determination Difficult

Calvert said, "with the latter issue stipulated out of this trial and appeal, we are not at liberty to determine the merits of the issue; therefore, we cannot hold that the statute does not prohibit Sun's use of the water and that Sun has permanent injunction.

"If we should hold that under a proper interpretation of its lease Sun has a legal right to free use of all water from the Ogallala Formation reasonably necessary for production of the oil underlying the land, as Sun would have us do, and leave the statutory waste issue undertermined, as we are required to do, our decision could well be nothing more than an advisory opinion."

The high court said it could not approve trying temporary injunction suits on "piecemeal issues. Permitting it in this case might resolve the major issue; but if it were permitted in this case, the right could be claimed with equal logic by other litigants in other cases. The ultimate result would be to make a mockery of our long-established rules governing the trial of temporary injunction proceedings."

HIGH PLAINS AGRICULTURE— CREATES TEXAS JOBS!

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

Volume 14—No. 10 **"THERE IS NO SUBSTITUTE FOR WATER"** *March 1968*

OBSERVATION WELL RECORDS . . .

THE ANNUAL WATER STATEMENT, 1967-1968

By F. A. RAYNER

During the first two week in January 1968, personnel of the High Plains Underground Water Conservation District No. 1 and the Texas Water Development Board measured the depths to water in 716 "observation" wells within the District.

The January 1962, 1967, and 1968 depths to water below land surface measurements made in observation wells in Castro, Floyd, Lubbock and Parmer Counties, and those wells in the District in Armstrong, Bailey, Cochran, Deaf Smith, Hale, Hockley, Lamb, Lynn, Potter, and Randall Counties are presented in the tables on pages 2 through 7. In the very limited number of cases where neither a January 1962, 1967, or 1968 measurement was available, a measurement made in Jaunary 1963 or 1964 was listed. *(See notations in Tables)*

The locations of the wells listed in the tables are shown on the accompanying maps.

OBSERVATION WELLS

An observation well is a well that has been selected for inclusion in the annual water-level measuring program. This program consists primarily of the measurement of the depths to the static water levels in these wells in January of each year. A well that is maintained in the records as measurable, and/or subject to annual measurement, is considered a current well.

All observation wells are privately owned—none of the wells in this program are owned by the District or the State. Permission to measure these wells is secured from the landowner, or his agent, before such wells are added to the program. Almost all of the observation wells are farmer-owned, irrigation wells. The majority of these wells are equipped with large capacity turbine pumps.

METHOD OF MEASURING

Practically all of the annual depth to water measurements are made with steel, "highway-drag" tapes. These tapes, spooled in 300 and 500 foot lengths, are graduated in feet throughout their entire length—with the first (free end) 30-feet graduated in tenths and hundredths of a foot.

After consulting the water-level records, the individual measuring the well applies carpenter's chalk (which turns dark blue in color upon contact with water) to the free-end, graduated part of the tape, and enters enough tape into the well annullus — the space between the pump column and the well casing— to insure immersion of a part of the chalked tape. The depth to water is determined by subtracting the amount (in feet, tenths and hundredths of a foot) of the wetted tape from the value of the footmark held at the M. P. (the measuring point at the well-head). An attempt is made to use the same M. P. for each annual measurement, in order to provide comparable depth to water records. The depth to water below the M. P. is then adjusted to a common land surface datum, by subtracting the height of the M. P. above land surface—usually one to two feet—from the depth to water measurement made therefrom. Depths to water below land surface datum are listed in the tables.

VALIDITY OF MEASUREMENTS

The depths to water, as listed in the tables, were taken directly from field measurement records. If the individual measuring a well did not note any circumstance or condition that would reflect upon the authenticity of that water-level measurement, the measurement was listed as reported. No attempt was made to screen (to disregard apparently anomalous water-level measurements) these data. However, it is apparent that a limited number of such measurements are not representative of the static water level in the well to which the measurement was accredited.

Some of the conditions that result in invalid water-level measurements are:

1) Measured well has been pumped recently.
2) Nearby well pumping, or had been pumped recently.
3) Surface water had entered the measured well, or a nearby well.
4) Well open to two or more zones of different hydrostatic pressure (head).
5) Wet casing and/or pump column (condensation in well).
6) Water entering casing above static water level in well.
7) Well contaminated with algae.
8) Oil (turbine) in annulus.
9) Tape hangs on casing or pumping equipment.
10) Casing ruptured or misaligned (double casing programs).
11) Entrance into well restricted, preventing the free hanging of tape.
12) Large capacity pumping equipment in relatively small diameter well (small annular space).
13) Obstruction in well annulus immediately below the static water level.
14) Well plugged (not open to the aquifer), but containing water.
15) Debris floating on water surface.
16) Failure to check an apparently valid water level measurement (not measuring the well two or more times).
17) Arithmetical errors in calculating depth to water below M. P., and adjusting same to land surface datum.
18) Measurement made from wrong M. P.
19) Measurement made in wrong well.

Measuring from the wrong M. P., and more particularly measuring the wrong well, are probably the two most prevalent causes for reporting invalid water-level data. The District's observation well upgrading program (initiated in November 1966) will abate these two primary causes *(See ietms 18 and 19 above)* of invalid water-level data.

IMPROVING PROGRAM

The District's observation well upgrading program consists primarily of:

1) Developing a detailed and accurate field sketch showing the location of each well.
2) Photographing each well for identification purposes.
3) Photographing the M. P.
4) Attaching an identification tag to the wells concrete base.
5) Modifying some wells to facilitate the entrance of the measuring tape therein.

COMPUTATIONS

All of the arithmetical operations involving the January 1962 through January 1968 water-level data were performed by digital computer.

The decline *(see the notation "Computed Decline" in the tables)* shown for those wells wherein the water level was not measured in 1967, but was measured in 1968, and some previous year (1962, 63, 64, 65 or 66) was computed by subtracting the next previous water-level measurement from the 1968 measurement; and dividing this difference by the number of intervening years between measurements.

AVERAGE DECLINE

The average decline (or rise) per year of the water level as measured in each well is also listed in the tables on pages 2 through 7. These values were determined by subtracting each years water-level measurement from the next proceeding years measurement; algebraically adding the values thus determined; and dividing this sum by the number of individual-year decline or rise values considered. This method of averaging would, in most cases, abate the large errors inherent in using only two water-level measurement records—such as subtracting the January 1962 measurement from the January 1968 measurement, then dividing by six (the number of years between measurements)—in the event one or both such measurements are invalid.

The average decline values can, in most cases, be used as a guide in determining the validity of the 1967-1968 decline records. As a general rule, the 1967-1968 decline should not exceed the average by more than a

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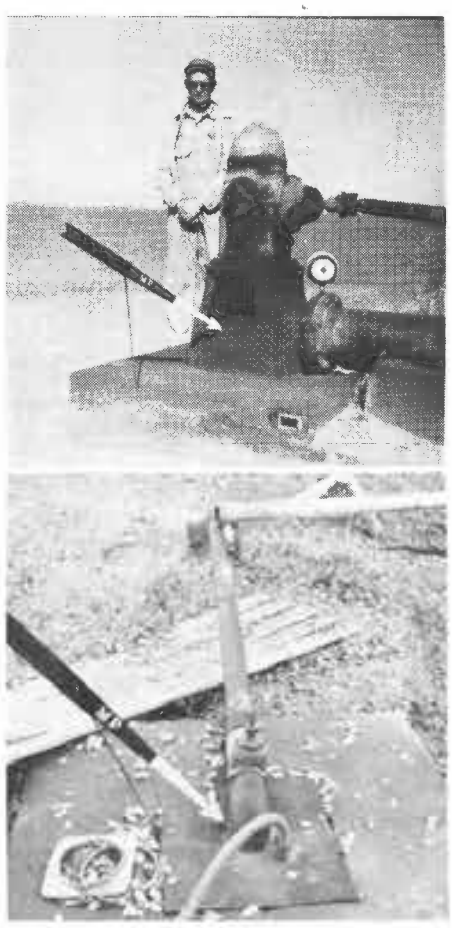
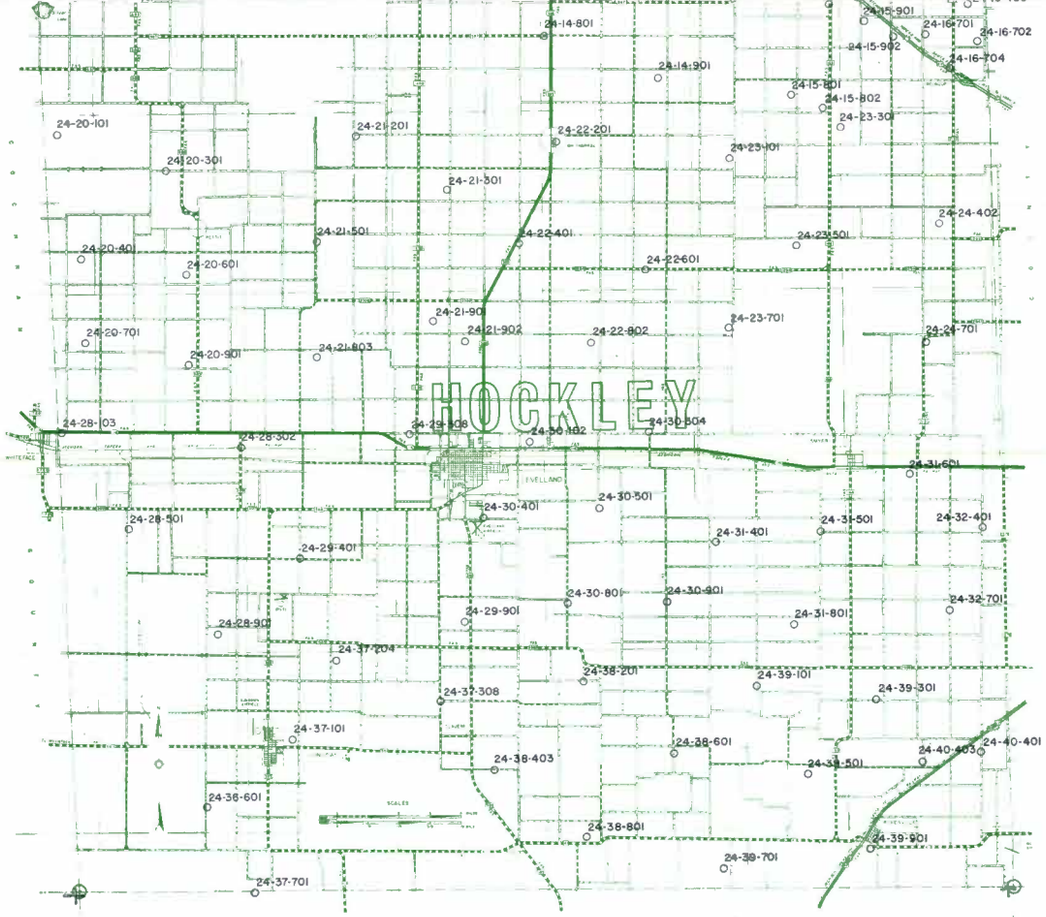


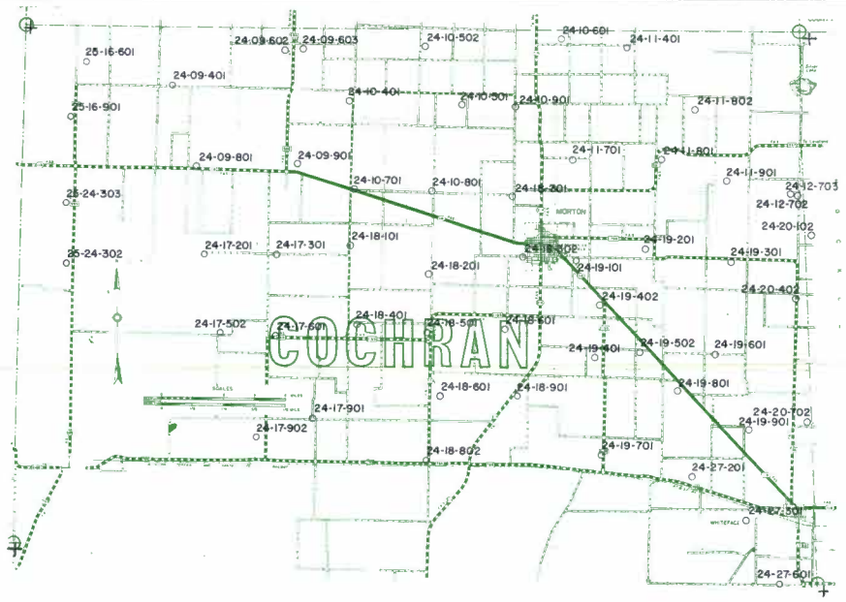
Irrigation wells showing measuring points (MP). Note metal identification plate on side of concrete base in uppermost photograph.



HOCKLEY COUNTY

Well No.	Depth To Water 1962	Depth To Water 1967	Depth To Water 1968	Decline 1967-1968	Average Decline Per Year
24 14 501	----	109.05	108.73	+ 0.32	0.66
24 14 801	50.27	54.48	56.23	1.75	0.99
24 14 901	----	99.39	99.55	0.16	0.72
24 15 501	63.90	73.15	72.15	+ 1.00	1.38
24 15 502	----	79.86	79.07	+ 0.79	0.83
24 15 504	61.90	68.16	67.68	+ 0.48	0.96
24 15 601	90.02	102.53	106.03	3.50	2.67
24 15 602	103.03	115.61	118.05	2.44	2.25
24 15 603	98.32	112.94	113.65	0.71	2.56
24 15 605	84.26	93.95	94.05	0.10	1.63
24 15 801	129.00	132.58	----	----	0.72
24 15 802	173.30	179.27	178.66	+ 0.61	0.89
24 15 901	41.20	45.03	42.57	+ 2.46	0.23
24 15 902	34.64	48.85	41.30	+ 7.55	1.11
24 16 402	124.29	130.15	130.47	0.32	1.03
24 16 403	93.55	104.65	105.88	1.23	2.06
24 16 701	58.38	65.88	63.87	+ 2.01	0.92
24 16 702	85.47	95.33	93.26	+ 2.07	1.30
24 16 704	85.60	107.21	107.44	0.23	6.71
24 20 101	129.37	152.34	158.03	5.69	4.78
24 20 301	115.21	131.66	132.13	0.47	2.82
24 20 401	111.08	121.22	123.19	1.97	2.02
24 20 601	133.24	147.80	149.30	1.50	2.68
24 20 701	142.00	145.45	145.70	0.25	0.59
24 20 901	120.72	----	141.47	3.44*	3.47
24 21 201	----	42.67	44.17	1.50	1.12
24 21 301	81.87	90.19	90.65	0.46	1.46
24 21 501	137.18	153.60	153.96	0.36	2.80
24 21 803	----	153.75	157.62	3.87	2.87
24 21 901	141.77	152.28	156.00	3.72	2.37
24 21 902	150.52	167.94	169.20	1.26	3.11
24 22 201	----	78.65	78.70	0.05	0.83
24 22 401	----	----	86.05	0.52*	0.54
24 22 601	----	100.19	100.84	0.65	0.52
24 22 802	----	126.60	125.08	+ 1.52	2.03
24 23 101	----	108.95	108.88	+ 0.07	0.79
24 23 301	178.60	191.79	190.00	+ 1.79	1.90
24 23 501	----	106.26	104.84	+ 1.42	0.79
24 23 701	----	103,63	104.46	0.83	1.22
24 24 402	136.78	----	152.01	2.21*	4.18
24 24 701	----	126.97	126.66	+ 0.31	0.49
24 28 103	----	145.75	147.59	1.84	1.78
24 28 302	----	126.51	126.85	0.34	+0.21
24 28 501	----	148.75	150.26	1.51	1.26
24 28 901	----	160.59	163.18	2.59	2.45
24 29 308	----	144.25	145.87	1.62	2.89
24 29 401	----	142.86	143.40	0.54	0.87
24 29 901	169.44	187.75	189.30	1.55	3.31
24 30 102	----	138.10	142.65	4.55	3.60
24 30 304	----	102.51	103.92	1.41	1.57
24 30 401	117.17	129.32	130.54	1.22	2.23
24 30 501	----	123.05	125.62	2.57	2.68
24 30 801	----	168.80	170.15	1.35	1.49
24 30 901	----	154.99	155.85	0.86	2.16
24 31 401	----	128.76	130.03	1.27	2.50
24 31 501	----	80.14	80.32	0.18	1.33
24 31 601	113.81	120.08	119.88	+ 0.20	1.01
24 31 801	----	145.58	145.97	0.39	0.92
23 32 401	99.50	107.10	104.50	+ 2.60	0.83
24 32 701	----	117.10	116.16	+ 0.94	0.88
24 36 601	----	154.70	145.95	+ 8.75	0.41
24 37 101	----	141.82	145.46	3.64	2.07
24 37 204	----	144.28	145.54	1.26	1.64
24 37 308	----	145.02	146.85	1.83	3.26
24 37 701	151.00	151.05	152.15	1.10	0.19
24 38 201	----	167.57	168.86	1.29	2.88
24 38 403	----	160.13	161.30	1.17	1.92
24 38 601	119.80	131.42	132.07	0.65	2.04
24 38 801	----	165.91	167.00	1.09	2.42
24 39 101	----	154.24	----	----	1.98
24 39 301	----	149.32	151.30	1.98	1.80
24 39 501	----	137.22	136.83	+ 0.39	1.41
24 39 701	----	118.75	119.28	0.53	2.44
24 39 901	90.70	94.81	95.54	0.73	0.81
24 40 401	131.52	142.00	143.25	1.25	1.96
24 40 403	----	148.95	148.75	+ 0.20	1.80

*Computed Decline.



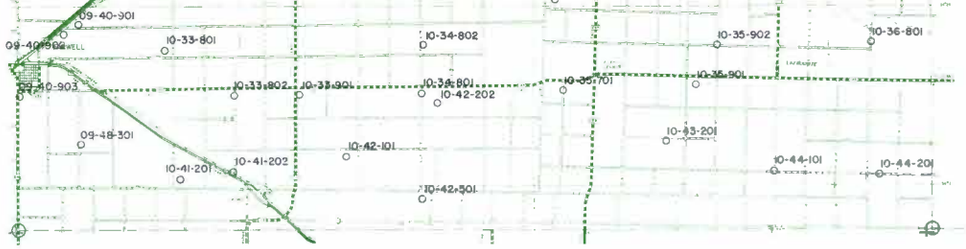
COCHRAN COUNTY

Well No.	Depth To Water 1962	Depth To Water 1967	Depth To Water 1968	Decline 1967-1968	Average Decline Per Year
24 09 401	----	----	86.78	----	----
24 09 602	103.68	118.56	120.80	2.24	2.85
24 09 603	99.31	114.39	118.57	4.18	3.40
24 09 801	120.76	124.53	124.40	+ 0.13	0.61
24 09 901	93.53	103.31	104.53	1.22	1.83
24 10 401	106.30	110.70	112.20	1.50	0.98
24 10 501	92.96	94.85	94.40	+ 0.45	0.24
24 10 502	86.49	87.92	88.70	0.78	0.37
24 10 601	88.90	93.89	96.25	2.36	1.22
24 10 701	148.16	160.85	162.90	2.05	2.46
24 10 801	123.98	135.10	132.70	+ 2.40	1.45
24 10 901	91.72	94.14	96.15	2.01	0.74
24 11 401	127.52	----	----	----	4.75
24 11 701	122.22	127.22	127.70	0.48	0.91
24 11 801	103.43	108.99	109.13	0.14	0.95
24 11 802	98.24	109.99	109.30	+ 0.69	1.84
24 11 901	115.09	124.56	124.44	+ 0.12	1.56
24 12 702	120.11	143.15	148.38	5.23	4.71
24 12 703	117.23	138.48	144.25	5.77	4.50
24 17 201	----	----	147.41	----	----
24 17 301	127.16	139.15	139.82	0.67	2.09
24 17 502	----	----	159.78	----	----
24 17 601	136.43	148.01	148.29	0.28	1.98
24 17 901	159.78	166.93	175.90	8.97	2.69
24 17 902	----	----	155.30	----	----
24 18 101	143.30	149.59	149.61	0.02	1.05
24 18 201	157.34	172.10	174.60	2.50	2.88
24 18 301	125.82	131.95	131.05	+ 0.90	0.87
24 18 302	142.73	160.77	159.50	+ 1.27	-2.80
24 18 401	138.06	147.53	149.97	2.44	1.98
24 18 501	----	----	194.02	2.61*	2.60
24 18 601	156.47	167.97	----	----	2.30
24 18 801	173.95	194.54	199.96	5.42	4.34
24 18 802	161.67	170.01	----	----	1.67
24 18 901	115.37	114.96	115.20	0.24	+0.03
24 19 101	129.72	----	----	----	3.36
24 19 201	134.12	145.82	147.32	1.50	2.20
24 19 301	150.37	164.86	166.25	1.39	2.65
24 19 401	140.57	154.28	153.03	+ 1.25	2.08
24 19 402	133.03	145.75	148.38	2.63	2.56
24 19 502	152.18	169.78	175.22	5.44	3.84
24 19 601	144.57	154.30	153.17	+ 1.13	1.43
24 19 701	144.07	162.97	159.27	+ 3.70	2.53
24 19 801	144.35	160.00	164.50	4.50	3.36
24 19 901	124.93	125.89	126.00	0.11	0.18
24 20 102	120.04	141.98	150.90	8.92	5.14
24 20 402	134.61	147.40	149.27	1.87	2.44
24 20 702	143.28	154.00	159.70	5.70	2.74
24 27 201	168.70	177.35	180.30	2.95	1.93
24 27 301	176.66	180.47	181.00	0.53	0.72
24 27 601	----	----	184,30	----	----
25 16 601	55.40	----	----	----	1.30
25 16 901	----	----	90.91	----	----
25 24 302	----	----	148.67	----	----
25 24 303	----	----	127.02	----	----

*Computed Decline.

ARMSTRONG COUNTY

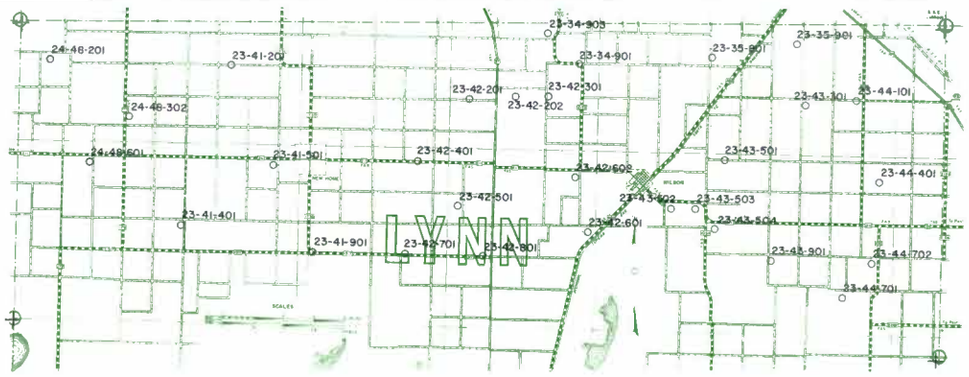
Well No.	Depth To Water 1962	Depth To Water 1967	Depth To Water 1968	Decline 1967-1968	Average Decline Per Year
11 12 401	107.50	112.19	113.95	1.76	1.08
11 12 701	112.65	125.52	127.72	2.20	2.51
11 12 702	----	138.78	146.37	7.59	4.64
11 12 801	124.80	133.13	143.36	10.23	3.09
11 12 802	124.90	139.52	143.46	3.94	2.20
11 12 803	108.90	117.15	120.30	3.15	1.90
11 12 901	109.00	118.87	----	----	1.97
11 12 904	100.80	106.17	106.62	0.45	0.97
11 13 701	95.48	105.53	109.53	4.00	2.34



PARMER COUNTY

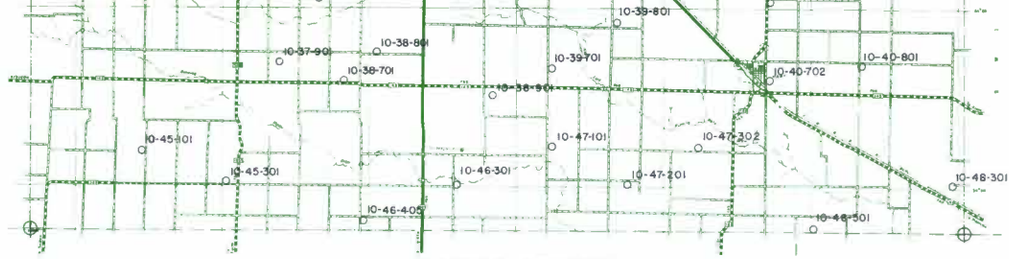
Well No.	Depth To Water 1962	Depth To Water 1967	Depth To Water 1968	Decline 1967-1968	Average Decline Per Year
09 24 601	286.05	314.61	317.21	2.60	5.07
09 32 301	306.14	.....	.....	.....	.....
09 32 901	.....	236.55	227.23	+ 9.32	+3.26
09 40 601	239.59	.....	.....	.....	2.59
09 40 901	226.64	263.91	249.93	+13.98	3.88
09 40 902	198.53	.....	221.03	2.10*	4.58
09 40 903	206.38	224.55	246.29	21.74	6.65
09 48 301	191.54	205.28	224.45	19.17	4.88
10 17 301	.....	192.01	205.31	13.30	3.58
10 17 401	241.84	262.72	268.35	5.63	2.86
10 17 501	230.00	250.00	252.61	2.61	3.77
10 18 501	.....	283.82	289.27	5.45	6.02
10 18 701	203.35	229.83	239.62	9.79	6.04
10 18 901	207.68	223.02	233.37	10.35	4.28
10 19 101	232.00	255.64	258.89	3.25	4.48
10 19 301	.....	250.18	252.51	2.33	3.15
10 19 401	191.50**	.....	.....	.....	.....
10 19 601	201.09	217.48	215.04	+ 2.44	2.32
10 20 401	.....	209.10	210.58	1.48	3.56
10 20 502	151.34	160.40	161.81	1.41	1.74
10 20 801	144.60	.....	.....	.....	5.71
10 25 101	.....	322.60	318.25	+ 4.35	4.68
10 25 301	274.05	289.34	294.14	4.80	3.59
10 25 501	.....	167.09	169.48	2.39	1.75
10 25 701	212.68	239.50	248.61	9.11	6.26
10 26 101	289.22	309.90	315.06	5.16	4.79
10 26 301	272.40	288.00	291.38	3.38	2.75
10 26 701	181.40	193.35	197.71	4.36	2.72
10 26 801	.....	208.65	199.25	+ 9.40	+0.32
10 27 101	.....	246.67	250.83	4.16	6.03
10 27 301	252.15	274.78	279.89	5.11	4.62
10 27 401	245.37	264.34	267.78	3.44	2.88
10 27 501	.....	309.29	311.47	2.18	2.92
10 27 901	208.00	228.59	232.89	4.30	4.15
10 28 201	.....	249.38	250.61	1.23	+2.54
10 28 501	.....	269.28	272.61	3.33	3.33
10 33 101	238.25	262.00	270.14	8.14	5.32
10 33 301	202.86	225.69	243.03	17.34	7.80
10 33 401	241.45	266.95	263.88	+ 3.07	+0.01
10 33 601	237.35	.....	267.21	4.89*	5.02
10 33 801	203.85	.....	.....	.....	8.18
10 33 802	168.47	189.18	195.30	6.12	4.41
10 33 901	165.98	186.05	197.16	11.11	5.20
10 34 101	.....	201.55	203.42	1.87	1.87
10 34 301	186.80	195.76	203.28	7.52	2.75
10 34 401	235.85	259.76	251.18	+ 8.58	2.56
10 34 801	175.46	197.25	211.46	14.21	9.46
10 34 802	201.04	228.22	223.21	+ 5.01	3.70
10 35 304	.....	193.44	196.00	2.56	3.56
10 35 401	204.15	223.51	227.30	3.79	2.89
10 35 501	194.50	218.48	222.68	4.20	5.82
10 35 601	169.60	187.96	191.91	3.95	3.72
10 35 701	182.78	202.93	213.42	10.49	5.11
10 35 901	.....	224.90	238.12	13.22	7.70
10 35 902	196.41	223.48	233.34	9.86	8.61
10 36 101	165.80	186.17	191.98	5.81	4.36
10 36 601	.....	181.87	206.50	24.63	10.56
10 36 801	156.82	179.62	198.12	18.50	6.88
10 41 201	137.28	146.34	157.79	11.45	4.40
10 41 202	123.35	141.31	145.28	3.97	3.66
10 42 101	138.20	155.08	177.69	22.61	8.16
10 42 202	163.80	185.85	191.99	6.14	4.70
10 42 501	124.23	141.67	145.25	3.58	3.89
10 43 201	163.85	187.16	204.36	17.20	6.75
10 44 101	.....	164.24	177.60	13.36	6.25
10 44 201	159.70	.....	185.84	4.49*	7.75

*Computed Decline.
**January 1964 Water Level.



LYNN COUNTY

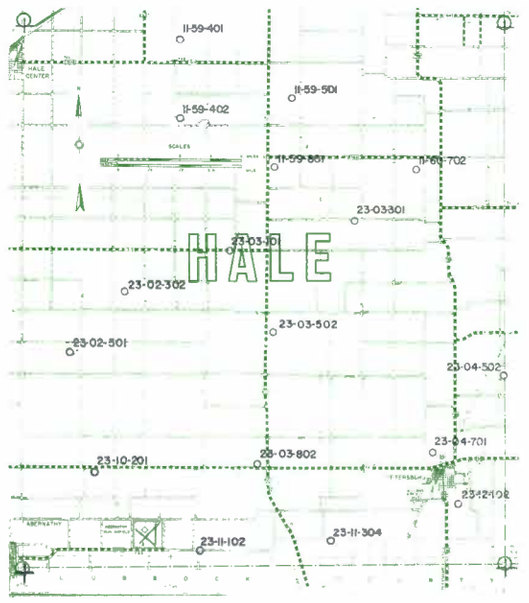
Well No.	Depth To Water 1962	Depth To Water 1967	Depth To Water 1968	Decline 1967-1968	Average Decline Per Year
23 34 901	119.61	133.85	136.28	2.43	2.78
23 34 903	133.73	154.30	159.31	5.01	5.44
23 35 801	81.34	87.30	87.10	+ 0.20	1.12
23 35 901	86.64	90.56	90.97	0.41	0.72
23 41 201	93.83	103.70	105.90	2.20	2.01
23 41 401	83.68	90.57	91.22	0.65	1.26
23 41 501	68.57	73.20	73.77	0.57	0.87
23 41 901	122.97	128.25	129.44	1.19	1.08
23 42 201	127.70	129.14	131.30	2.16	0.56
23 42 202	102.43	119.95	123.90	3.95	3.58
23 42 301	102.68	103.19	103.39	0.20	0.12
23 42 401	108.63	117.34	119.21	1.87	1.76
23 42 501	90.79	100.55	102.98	2.43	1.28
23 42 601	41.11	49.56	49.52	+ 0.04	1.40
23 42 602	79.18	86.43	86.94	0.51	1.29
23 42 701	.....	102.60	105.40	2.80	+2.02
23 42 801	64.79	69.10	69.33	0.23	0.76
23 43 301	25.89	37.55	39.90	1.35	2.17
23 43 501	69.95	76.59	72.60	+ 3.99	0.44
23 43 502	74.20	68.35	76.10	7.75	0.32
23 43 503	81.94	85.65	86.20	0.55	0.71
23 43 504	75.68	79.00	78.89	+ 0.11	0.54
23 43 901	64.74	65.47	64.60	+ 0.87	+0.02
23 44 101	58.14	67.55	69.83	2.28	1.95
23 44 401	56.19	60.85	52.59	+ 8.26	+0.78
23 44 701	50.74	78.58	.....	.....	6.51
23 44 702	37.58	40.70	43.30	2.60	0.95
24 48 201	91.70	101.30	102.14	0.84	1.74
24 48 302	99.06	111.07	112.08	1.01	2.17
24 48 601	83.72	93.59	93.50	+ 0.09	1.63



CASTRO COUNTY

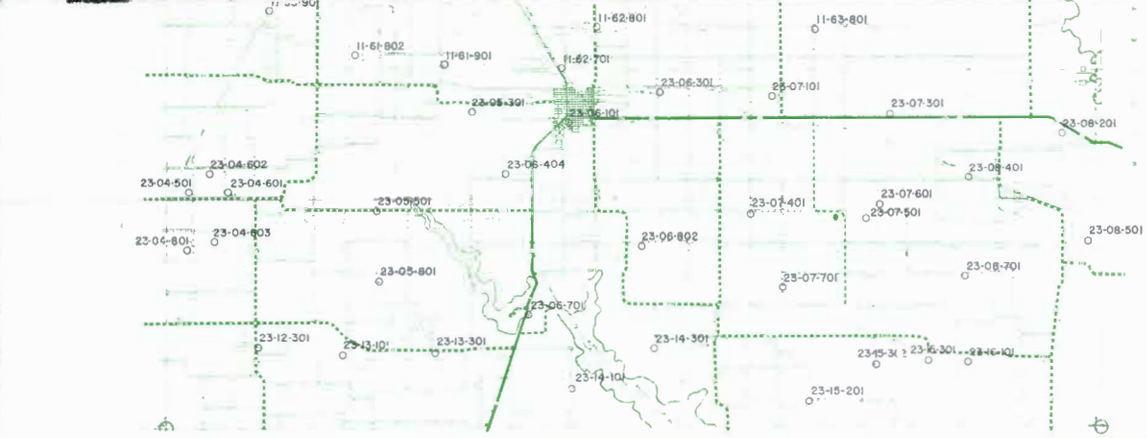
Well No.	Depth To Water 1962	Depth To Water 1967	Depth To Water 1968	Decline 1967-1968	Average Decline Per Year
10 21 401	108.19	.....	130.49	3.45*	3.85
10 21 501	111.83	129.06	132.49	3.43	3.44
10 21 601	122.60	.....	146.11	2.77*	5.07
10 21 701	163.65	185.30	195.42	10.12	5.30
10 21 801	.....	170.89	176.47	5.58	5.29
10 21 901	.....	145.16	147.02	1.86	4.16
10 22 101	137.20	.....	.....	.....	4.21
10 22 201	.....	146.84	151.68	4.84	3.97
10 22 301	.....	.....	119.65	2.94*	1.91
10 22 401	106.57	127.06	127.49	0.43	3.49
10 22 501	110.43	.....	.....	.....	4.02
10 22 601	87.60	.....	.....	.....	3.00
10 22 801	.....	141.30	141.01	+ 0.29	3.85
10 22 901	123.69	144.63	145.58	0.95	3.46
10 23 701	104.63	.....	134.31	3.84*	8.60
10 23 801	148.50	148.48	148.74	0.26	0.04
10 24 201	.....	173.70	.....	.....	1.22
10 24 401	176.50	185.45	187.31	1.86	1.80
10 24 601	.....	159.93	163.28	3.35	+2.38
10 24 701	.....	179.58	181.92	2.34	2.23
10 24 801	158.86	175.69	178.88	3.19	3.74
10 28 301	224.41	256.15	260.48	4.33	6.01
10 29 302	.....	241.75	247.80	6.05	5.51
10 29 601	195.75	222.82	244.45	21.63	8.12
10 29 701	200.89	224.33	230.21	5.88	4.89
10 29 901	176.84	.....	217.90	8.98*	4.34
10 30 101	190.32**	.....	.....	.....	4.67
10 30 201	185.52	213.14	214.61	1.47	4.85
10 30 401	.....	228.89	230.78	1.89	3.32
10 30 505	.....	210.37	213.59	3.22	2.14
10 30 601	185.25	203.57	206.36	2.79	3.84
10 30 801	172.18	193.08	198.08	5.00	4.32
10 30 901	.....	218.72	219.14	0.42	3.76
10 31 201	139.18	157.12	162.14	5.02	3.83
10 31 301	.....	174.11	172.29	+ 1.82	1.75
10 31 501	.....	191.89	200.02	8.13	2.01
10 31 601	.....	150.52	152.00	1.48	3.35
10 31 701	202.59	239.24	236.33	+ 2.91	+0.25
10 31 801	198.38	222.35	223.54	1.19	3.03
10 32 201	.....	155.20	158.30	3.10	2.45
10 32 501	125.64	130.81	134.92	4.11	2.00
10 32 703	180.03	200.28	202.87	2.59	3.64
10 32 801	166.10	185.00	190.80	5.80	4.17
10 37 201	155.45	175.47	176.65	1.18	3.38
10 37 401	128.85	146.77	149.93	3.16	3.51
10 37 601	113.03	127.72	129.70	1.98	2.78
10 37 901	.....	132.06	135.61	3.55	3.47
10 38 401	126.26	143.28	146.50	3.22	1.91
10 38 601	.....	130.29	134.43	4.14	3.13
10 38 701	123.24	139.86	140.99	1.13	2.96
10 38 801	125.10	141.09	142.81	1.72	2.95
10 38 901	113.50	130.26	137.85	7.59	4.06
10 39 101	153.30	175.78	179.35	3.57	4.32
10 39 401	.....	150.50	155.47	4.97	2.80
10 39 501	129.54	153.90	155.90	2.00	4.39
10 39 701	.....	130.52	128.99	+ 1.53	3.00
10 39 801	.....	140.86	143.81	2.95	2.95
10 40 401	138.81	162.26	164.89	2.63	4.35
10 40 501	170.20	190.76	194.69	3.93	4.08
10 40 702	130.61	.....	.....	.....	4.06
10 40 801	146.92	166.39	171.15	4.76	4.04
10 45 101	134.44	149.56	152.69	3.13	3.46
10 45 301	140.91	156.16	158.26	2.10	2.89
10 46 301	52.64	69.40	72.63	3.23	3.33
10 46 405	136.66	152.01	159.49	7.48	3.80
10 47 101	.....	123.61	124.98	1.37	3.29
10 47 201	.....	157.31	159.56	2.25	4.11
10 47 302	121.76	140.29	.....	.....	4.75
10 48 301	112.77	136.35	.....	.....	7.21
10 48 501	.....	135.48	139.01	3.53	5.13

*Computed Decline.
**January 1963 Water Level.



HALE COUNTY

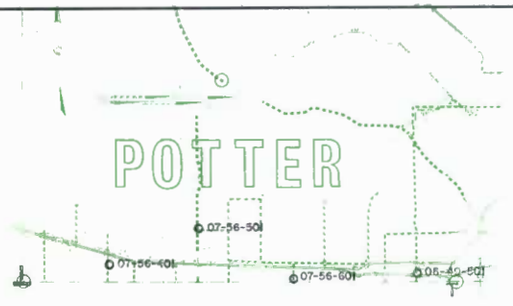
Well No.	Depth To Water 1962	Depth To Water 1967	Depth To Water 1968	Decline 1967-1968	Average Decline Per Year
11 59 401	127.75	155.61	159.85	4.24	5.35
11 59 402	69.70	85.76	89.14	3.38	3.24
11 59 501	79.04	85.43	81.45	+ 3.98	0.40
11 59 801	99.28	107.72	108.10	0.38	1.66
11 60 702	77.52	84.39	91.53	7.14	2.34
23 02 302	.....	111.74	105.14	+ 6.60	+0.43
23 02 501	133.91	172.58	165.58	+ 7.00	5.28
23 03 101	108.40	.....	108.85	0.69	+0.23
23 03 301	86.50	102.13	101.89	+ 0.24	2.56
23 03 502	101.22	122.00	123.23	1.23	3.67
23 03 802	132.19	158.98	161.18	2.20	4.83
23 04 502	129.56	.....	179.59	5.88	10.79
23 04 701	117.89	140.55	143.60	3.05	4.28
23 10 201	140.92	162.05	162.00	+ 0.05	3.74
23 11 102	151.60	.....	186.74	3.91	6.83
23 11 304	139.12	155.70	163.42	7.72	4.05
23 12 102	.....	167.04	171.05	4.01	4.22



FLOYD COUNTY

Well No.	Depth To Water 1962	Depth To Water 1967	Depth To Water 1968	Decline 1967-1968	Average Decline Per Year
11 44 901	102.28	122.90	136.28	13.38	5.67
11 44 902	.....	123.85	128.71	4.86	4.89
11 45 802	129.68	143.20	149.40	6.20	3.29
11 45 803	140.27	.....	.....	.....	2.04
11 45 902	143.26	.....	160.82	4.56*	2.11
11 46 701	158.40	181.15	185.94	4.79	4.59
11 46 801	212.84**	.....	.....	.....	4.46
11 47 701	220.52**	.....	.....	.....	.....
11 52 301	109.13	136.81	141.89	5.08	5.46
11 52 302	115.80	142.71	146.81	4.10	4.28
11 52 303	135.33	169.37	171.20	1.83	5.98
11 52 304	127.07	151.50	.....	.....	6.10
11 52 601	136.84	.....	.....	.....	3.46
11 52 602	142.30	163.70	.....	.....	4.28
11 52 603	133.93	153.67	173.59	14.92	6.28
11 52 604	132.34	.....	.....	.....	2.70
11 52 801	127.65	161.79	152.29	+ 9.50	4.11
11 52 901	143.38	164.47	.....	.....	4.21
11 52 902	142.30	157.90	157.25	+ 0.65	1.88
11 52 903	148.40	157.65	161.01	3.36	1.78
11 52 905	146.40	161.28	164.86	3.58	3.00
11 52 906	145.20	164.69	164.18	+ 0.51	3.16
11 53 101	127.75	157.20	182.64	25.44	9.15
11 53 201	126.38	142.60	145.14	2.54	3.13
11 53 202	126.98	144.08	152.64	8.56	4.28
11 53 203	130.69	141.97	143.57	1.60	2.15
11 53 402	143.79	163.10	170.51	7.41	4.39
11 53 501	159.74	182.96	188.80	5.84	4.84
11 53 701	146.10	162.07	171.78	9.71	4.28
11 53 702	134.38	155.20	160.71	5.51	4.39
11 53 703	144.38	166.59	172.97	6.38	4.76
11 53 704	154.24	.....	.....	.....	1.80
11 54 301	209.24	231.71	236.76	5.05	3.22
11 54 401	165.32	174.19	174.12	+ 0.07	1.47
11 54 901	205.65	.....	.....	.....	2.54
11 55 701	214.70	232.90	238.36	5.46	3.94
11 55 901	264.96	283.95	287.30	3.35	3.72
11 60 301	132.95	.....	152.49	3.49*	3.02
11 60 302	138.73	158.10	160.94	2.84	3.70
11 60 303	136.41	155.42	157.00	1.58	3.43
11 60 501	122.13	146.29	158.75	12.46	6.10
11 60 601	135.91	.....	.....	.....	5.50
11 60 602	134.70	155.08	165.30	10.22	5.10
11 60 901	121.36	147.73	149.01	1.28	4.61
11 61 101	147.91	171.90	167.96	+ 3.94	3.34
11 61 102	151.54	.....	.....	.....	4.00
11 61 103	143.08	161.30	166.39	5.09	4.21
11 61 104	139.57	163.14	168.81	5.67	4.11
11 61 105	143.73	171.60	173.51	1.91	4.96
11 61 203	159.73	182.54	188.64	6.10	4.82
11 61 204	150.42	177.42	180.08	2.66	4.93
11 61 301	37.29	41.51	.....	.....	0.84
11 61 401	145.89	178.88	182.81	3.93	6.15
11 61 403	138.14	173.75	176.54	2.79	6.40
11 61 404	143.79	177.72	182.69	4.97	6.48
11 61 601	44.64	50.93	53.04	2.11	0.80
11 61 801	153.40	191.92	204.41	12.49	8.50
11 61 802	140.83	187.82	206.30	18.48	10.91
11 61 901	146.36	181.73	185.73	4.00	6.56
11 62 201	.....	142.01	148.38	6.37	2.95
11 62 401	53.44	59.70	59.50	+ 0.20	+1.06
11 62 601	.....	152.29	157.80	5.51	2.48
11 62 701	117.98	120.99	121.55	0.56	0.24
11 62 702	93.08	98.75	100.60	1.85	1.25
11 62 801	89.36	100.09	102.00	1.91	2.11
11 62 901	171.04	.....	181.62	2.07*	0.22
11 63 101	154.90	158.28	158.96	0.68	0.68
11 63 801	198.42	203.30	201.89	+ 1.41	0.58
11 64 101	210.18	230.60	244.89	14.29	5.78
11 64 401	237.66	.....	.....	.....	+0.38
11 64 502	.....	264.28	272.40	8.12	2.16
23 04 501	142.75	.....	.....	.....	7.56
23 04 601	138.78	162.14	.....	.....	4.67
23 04 602	148.89	177.40	180.55	3.15	5.28
23 04 603	141.68	180.62	189.33	8.71	7.94
23 04 801	126.24	159.10	157.51	+ 1.59	5.21
23 05 301	153.44	182.18	190.98	8.80	6.26
23 05 501	171.78	198.50	206.94	8.44	7.58
23 05 801	183.10	210.20	195.38	+14.82	4.51
23 06 101	148.24	162.13	165.98	3.85	2.96
23 06 301	155.41	161.07	168.69	7.62	2.21
23 06 404	161.47	200.59	207.39	6.80	7.65
23 06 701	179.82	204.70	223.29	18.59	7.18
23 06 802	183.42	216.77	222.83	6.06	6.95
23 07 101	217.38	211.35	229.87	18.52	2.90
23 07 301	.....	222.58	211.04	+11.54	+2.90
23 07 401	.....	265.22	305.36	40.14	14.38
23 07 501	231.16	284.10	.....	.....	10.59
23 07 601	234.48	285.90	292.43	6.53	9.61
23 07 701	.....	200.00	203.90	3.90	+1.87
23 08 201	261.73	266.15	.....	.....	0.88
23 08 401	.....	280.55	293.29	12.74	5.55
23 08 501	252.58	261.06	266.89	5.83	2.38
23 08 701	.....	274.40	275.91	1.51	2.95
23 12 301	138.97	183.35	188.60	5.25	8.27
23 13 101	154.76	180.62	183.21	2.59	4.78
23 13 301	188.22	.....	.....	.....	4.04
23 14 101	.....	236.20	245.72	9.52	10.29
23 14 301	195.12	209.40	214.20	4.80	3.18
23 15 201	240.33	255.90	265.91	10.01	4.58
23 15 301	258.21	282.21	293.07	10.86	5.81
23 15 302	254.32	279.26	292.50	13.24	6.36
23 16 101	261.04	291.74	311.24	19.50	8.37

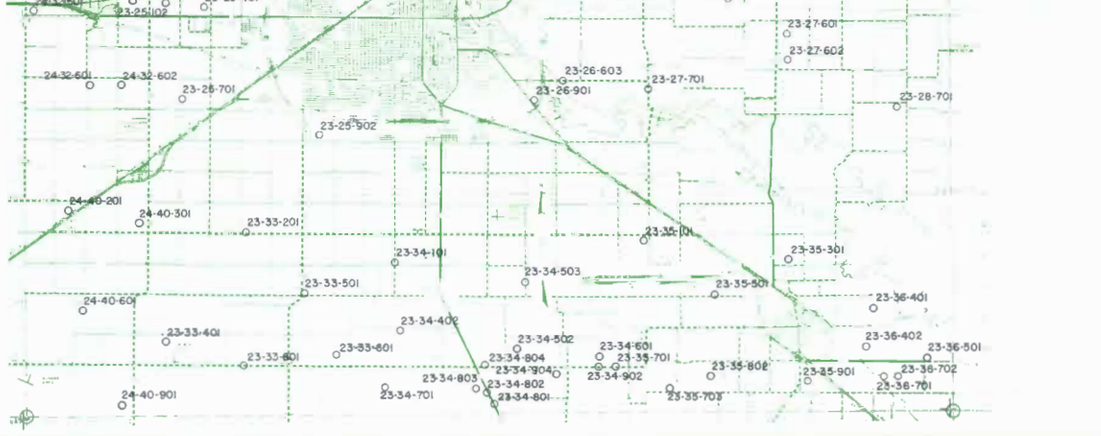
*Computed Decline.
**January 1964 Water Level.



POTTER COUNTY

Well No.	Depth To Water 1962	Depth To Water 1967	Depth To Water 1968	Decline 1967-1968	Average Decline Per Year
06 49 501	176.57**	.....	.....	.....	3.89
07 56 401	.....	216.34	214.39	+ 1.95	3.37
07 56 501	.....	214.89	217.04	2.15	3.37
07 56 601	.....	205.32	204.15	+ 1.17	4.05

**January 1963 Water Level.

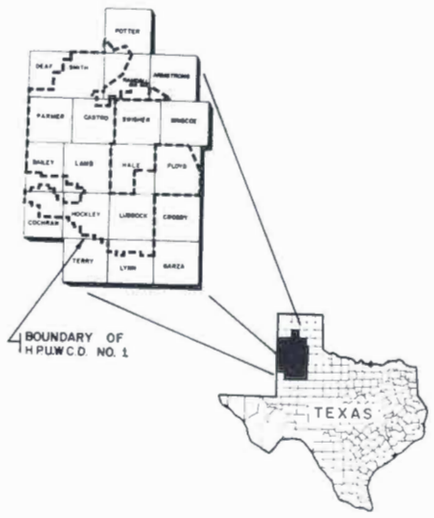


LUBBOCK COUNTY

Well No.	Depth To Water 1962	Depth To Water 1967	Depth To Water 1968	Decline 1967-1968	Average Decline Per Year
23 09 501	142.82	157.76	157.54	+ 0.22	2.45
23 09 601	123.09	141.23	142.32	1.09	3.21
23 09 701	132.21	150.86	.....	.....	3.73
23 09 901	169.54	190.91	194.60	3.69	4.18
23 10 501	158.80	175.95	173.69	+ 2.26	3.03
23 10 702	153.81**	.....	.....	.....	.....
23 10 801	144.55	166.32	164.25	+ 2.07	3.28
23 11 401	156.93	184.95	.....	.....	5.60
23 11 601	145.88	161.66	162.35	0.69	2.75
23 11 701	146.93	168.02	177.25	9.23	5.05
23 11 702	142.94	163.92	167.50	3.58	4.09
23 11 901	127.09	153.28	157.15	3.87	4.34
23 11 902	141.92	157.73	159.09	1.36	2.86
23 11 903	128.61	155.78	160.14	4.36	5.26
23 12 401	149.53	165.89	167.04	1.15	4.44
23 12 402	150.33	170.60	173.34	2.74	3.84
23 12 803	137.70	163.44	168.09	4.65	5.07
23 17 201	132.77	139.17	.....	.....	1.28
23 17 202	129.49	140.20	142.17	1.97	1.89
23 17 501	112.13	126.52	124.02	+ 2.50	1.98
23 17 701	96.10	112.20	114.99	2.79	3.15
23 17 703	86.86	99.45	100.28	0.83	2.85
23 17 704	70.14	74.82	75.10	0.28	0.85
23 17 705	.....	88.63	83.31	+ 5.32	0.73
23 17 706	83.22	103.22	100.95	+ 2.27	2.96
23 17 801	75.13	85.13	.....	.....	0.35
23 17 802	54.34	78.85	68.62	+10.23	2.38
23 17 804	52.53	65.22	.....	.....	.....
23 17 901	73.47	.....	79.62	0.52*	1.28
23 18 201	128.97	151.71	152.40	0.69	3.91
23 18 301	145.56	171.46	174.58	3.12	4.84
23 18 401	55.21	.....	.....	.....	1.21
23 18 402	112.27	133.11	134.03	0.92	3.63
23 18 403	113.12	121.32	124.35	3.03	1.87
23 18 404	118.57	135.51	138.43	2.92	3.31
23 18 502	.....	121.78	122.20	0.42	2.84
23 18 601	118.81	134.88	136.80	1.92	4.19
23 18 702	78.11***	.....	.....	.....	2.47
23 18 703	.....	94.42	86.25	+ 8.17	+3.31
23 18 704	.....	84.33	83.65	+ 0.68	0.77
23 19 301	149.11	183.52	184.47	0.95	5.89
23 19 302	146.82	162.70	.....	.....	8.34
23 19 402	126.80	150.20	152.45	2.25	4.28
23 19 403	127.28	154.70	157.40	2.70	4.15
23 19 501	138.53	.....	182.25	9.34*	3.18
23 19 502	109.49	133.94	.....	.....	4.13
23 19 701	76.68	82.15	91.30	9.15	2.44
23 19 802	83.01	96.02	94.48	+ 1.54	1.91
23 19 804	.....	92.58	93.68	1.10	2.57
23 19 901	108.29	148.31	151.40	3.09	7.19
23 20 401	139.18	173.96	176.02	2.06	6.14
23 20 701	125.12	141.69	176.70	35.01	14.23
23 20 802	.....	169.21	184.90	15.69	5.24
23 25 101	134.52	140.91	143.28	2.37	1.46
23 25 102	131.77	143.78	145.49	1.71	2.29
23 25 302	.....	.....	71.03	+ 0.77*	0.50
23 25 303	73.31	84.82	.....	.....	2.30
23 25 304	65.23	67.06	63.86	+ 3.20	+0.44
23 25 401	131.00	142.83	143.80	0.97	1.66
23 25 701	110.42	122.52	126.75	4.23	2.72
23 25 902	103.77	.....	125.94	4.40*	2.28
23 26 101	72.30	.....	69.00	+ 1.07*	2.05
23 26 301	89.48	94.32	94.68	0.36	0.78
23 26 603	12.82	9.18	6.05	+ 3.13	+1.13
23 26 901	49.73	41.27	50.30	9.03	1.26
23 27 101	89.26	96.12	95.95	+ 0.17	1.30
23 27 201	84.31	.....	89.46	0.39*	1.09
23 27 202	73.80	91.58	86.83	+ 4.75	2.17
23 27 203	75.44	85.74	.....	.....	2.55
23 27 204	81.85	88.36	89.95	1.59	1.35
23 27 302	66.78	79.15	80.52	1.37	2.29
23 27 601	74.66	84.32	85.70	1.38	1.84
23 27 602	87.10	95.31	93.24	+ 2.07	1.02
23 27 701	.....	87.86	86.76	+ 1.10	+2.54
23 28 701	59.62	67.75	68.90	1.15	1.55
23 33 201	125.11	130.87	130.40	+ 0.47	0.72
23 33 401	100.13	105.22	105.53	0.31	0.90
23 33 501	.....	109.50	111.42	1.92	1.04
23 33 601	101.40	107.65	107.54	+ 0.11	1.02
23 33 801	94.17	101.72	101.71	+ 0.01	1.26
23 34 101	106.83	117.48	115.65	+ 1.83	1.47
23 34 402	.....	.....	115.80	.....	.....
23 34 502	126.72	134.49	136.73	2.24	3.46
23 34 503	115.32	119.88	120.62	0.74	0.88
23 34 601	113.84	121.50	122.64	1.14	1.47
23 34 701	.....	.....	118.20	.....	.....
23 34 801	128.92	146.51	144.73	+ 1.78	2.64
23 34 802	129.80	146.75	151.88	5.13	3.68
23 34 803	127.80	130.92	135.84	4.92	1.34
23 34 804	125.00	135.56	142.42	6.86	2.68
23 34 902	121.93	130.60	130.80	0.20	1.48
23 34 904	117.62	127.64	128.49	0.85	1.82
23 35 101	.....	87.66	84.51	+ 3.15	+0.48
23 25 301	.....	.....	116.88	.....	.....
23 35 501	.....	92.35	99.05	6.70	4.68
23 35 701	114.86	133.14	133.07	+ 0.07	4.65
23 35 703	116.67	129.57	131.54	1.97	2.48
23 35 802	104.86	112.35	115.04	2.69	1.58
23 35 901	.....	.....	156.15	.....	.....
23 36 401	.....	106.24	106.30	0.06	0.06
23 36 402	.....	.....	104.09	.....	.....
23 36 501	194.70	179.69	187.98	8.29	+1.12
23 36 701	.....	.....	119.37	.....	.....
23 36 702	.....	.....	214.67	.....	.....
24 16 501	108.19	118.61	118.59	+ 0.02	1.73
24 16 601	122.16	125.25	124.78	+ 0.47	0.44
24 16 901	162.33	163.25	168.12	4.87	0.96
24 16 902	144.46	152.41	160.45	8.04	2.66
24 24 201	61.36	71.98	57.06	+14.92	+0.72
24 24 302	128.50	145.78	.....	.....	3.46
24 24 501	116.32	136.19	139.34	3.15	3.84
24 24 601	71.04	80.71	.....	.....	1.93
24 24 901	130.28	141.82	.....	.....	2.31
24 32 301	128.52	139.16	142.86	3.70	2.39
24 32 501	114.20	124.90	124.33	+ 0.57	1.69
24 32 601	120.61	128.50	128.49	+ 0.01	1.31
24 32 602	121.21	139.47	143.62	4.15	3.74
24 40 201	114.01	130.90	.....	.....	3.38
24 40 301	140.07	.....	145.53	0.43*	1.15
24 40 601	116.62	119.31	119.48	0.17	0.48
24 40 901	66.03	69.39	69.82	0.43	0.20

*Computed Decline.
**January 1964 Water Level.
***January 1963 Water Level.

Water Level Measurements In Observation Wells In High Plains Water District



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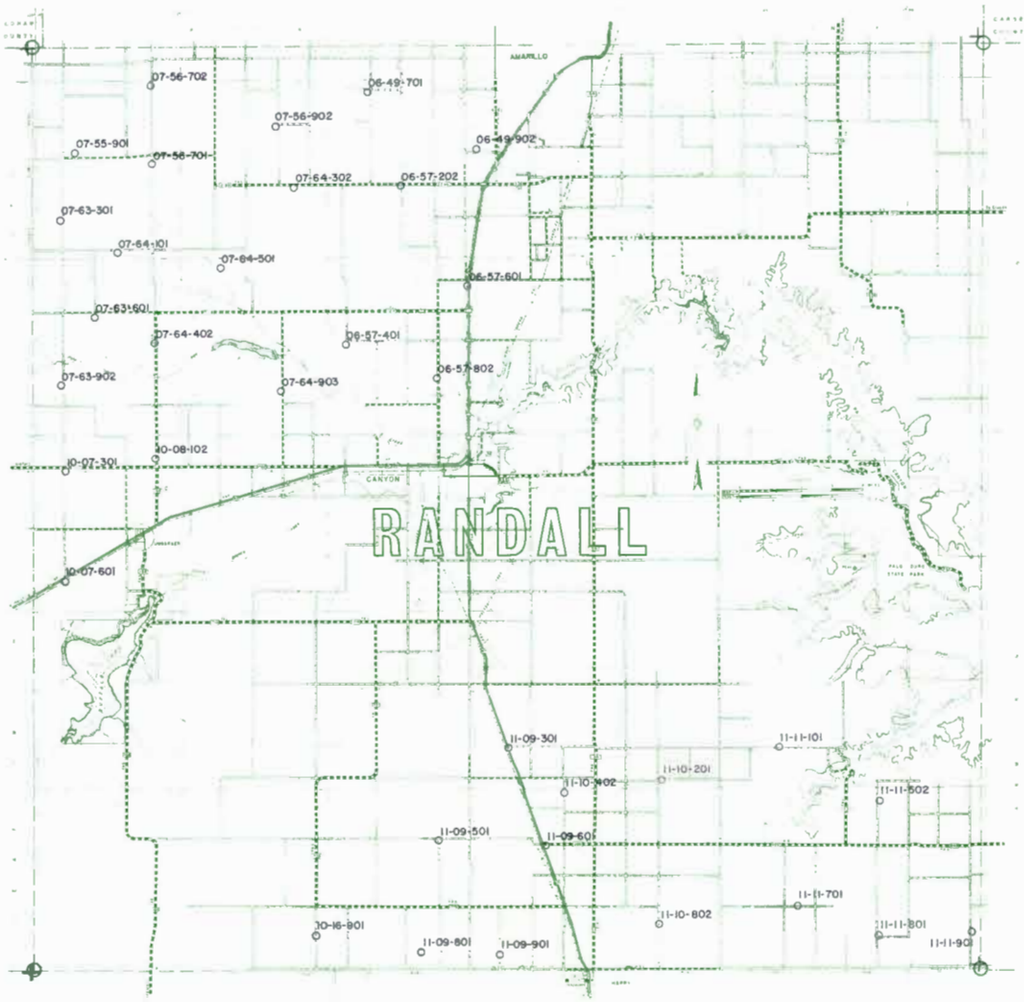
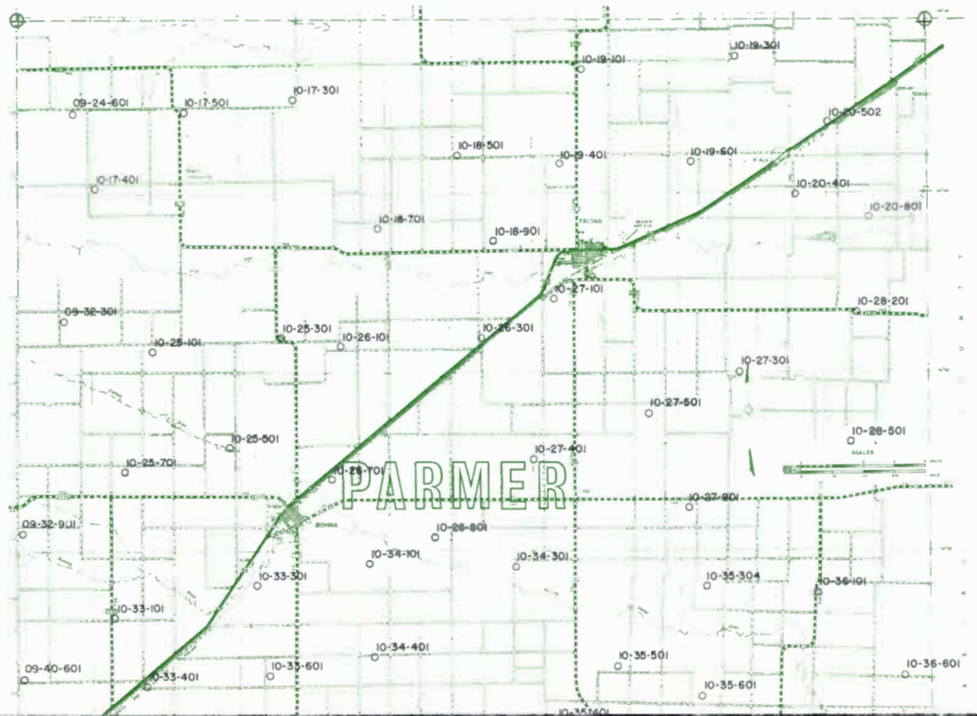
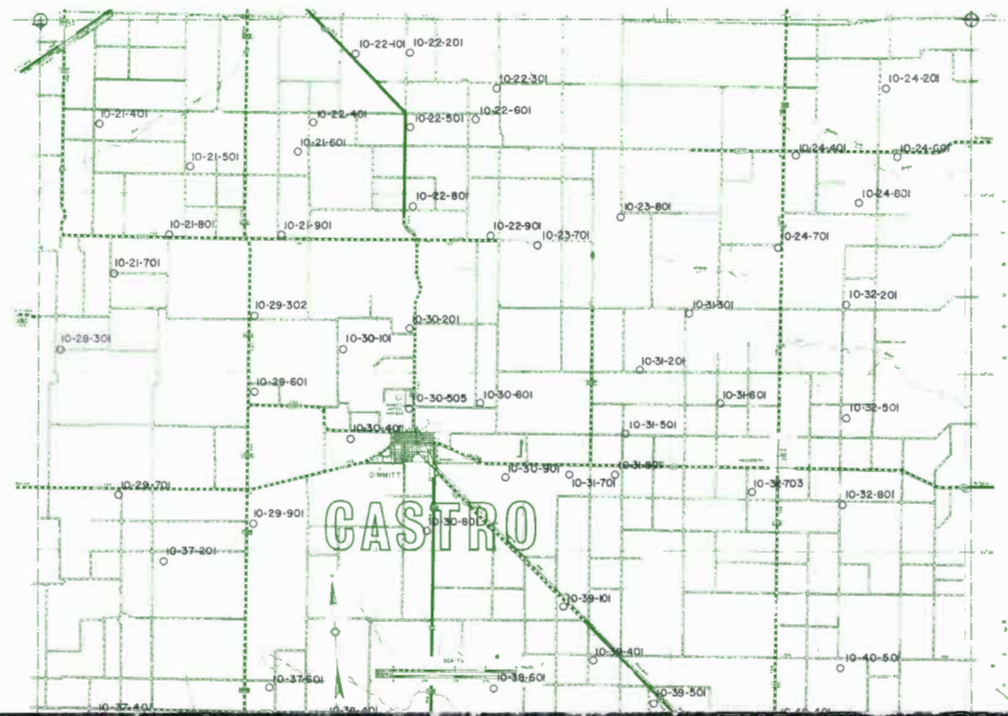


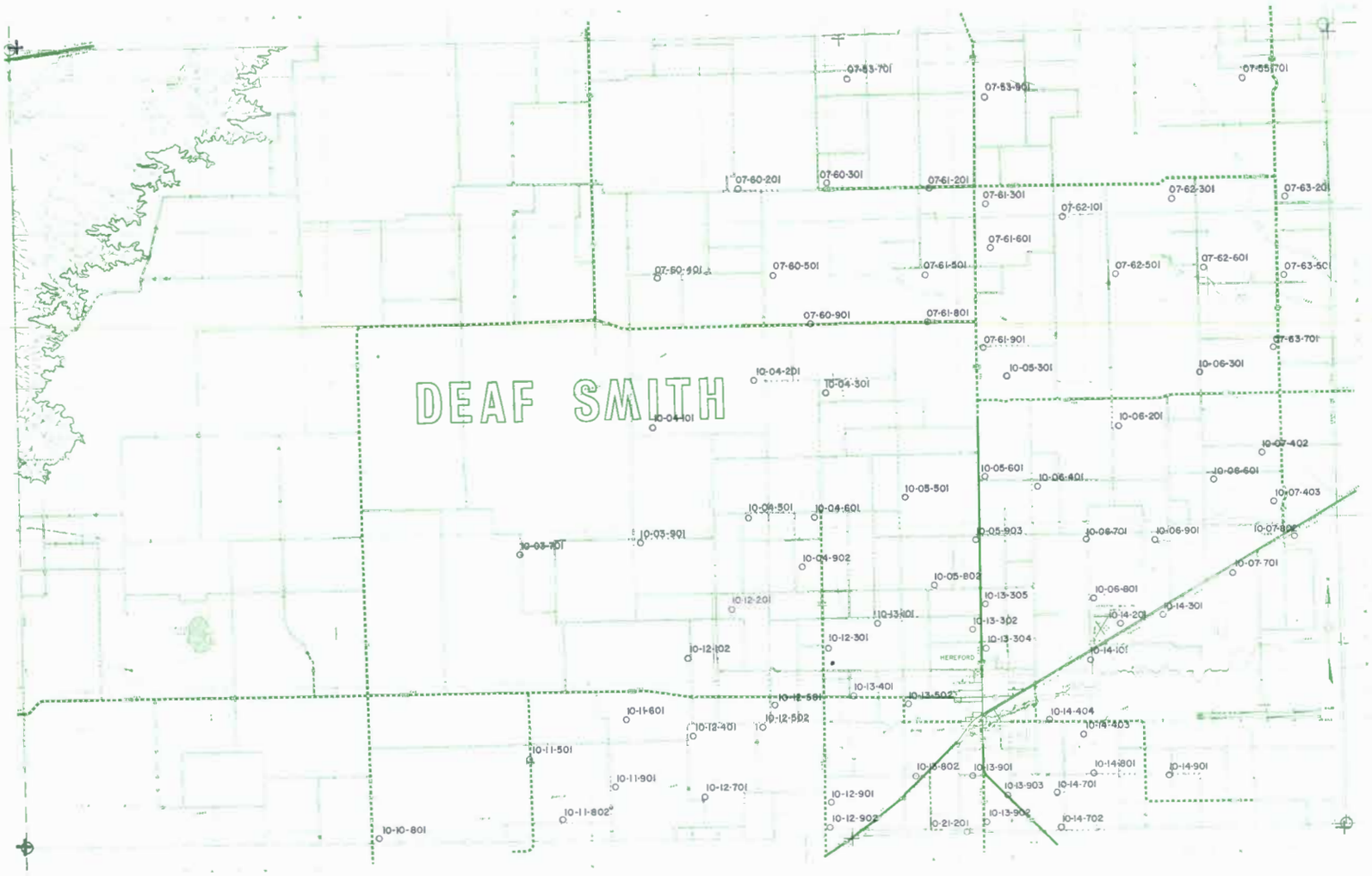
RANDALL COUNTY

Well No.	Depth To Water 1962	Depth To Water 1967	Depth To Water 1968	Decline 1967-1968	Average Decline Per Year
06 49 701	.....	222.61	226.00	3.39	5.14
06 49 902	.....	.....	203.63	2.55*	0.72
06 57 202	.....	185.71	188.89	3.18	3.07
06 57 401	152.36	166.45	.....	.....	5.87
06 57 601	149.04	161.96	164.73	2.77	2.62
06 57 802	.....	148.58	144.60	+ 3.98	3.57
07 55 901	.....	.....	186.41	3.13*	4.93
07 56 701	165.89	190.45	197.90	7.45	5.34
07 56 702	187.97	198.12	.....	.	1.55
07 56 902	.....	177.72	185.79	8.07	3.29
07 63 301	.....	183.10	203.57	20.47	8.25
07 63 601	123.30	137.70	140.55	2.85	2.88
07 63 902	.....	118.90	121.35	2.45	3.03
07 64 101	.....	196.08	198.76	2.68	8.64
07 64 302	139.64	148.66	151.36	2.70	4.02
07 64 402	.....	103.11	105.11	2.00	1.01
07 64 501	.....	134.05	135.07	1.02	0.55
07 64 903	132.64	141.02	143.49	2.47	3.77
10 07 301	.....	124.54	126.14	1.60	2.21
10 07 601	.....	93.89	96.67	2.78	1.26
10 08 102	131.10	135.96	138.15	2.19	1.43
10 16 901	.....	.....	179.17	0.27*	1.40
11 09 301	.....	159.08	.....	.....	0.61
11 09 501	.....	.....	178.70	1.06*	1.26
11 09 601	187.11	194.71	193.54	+ 1.17	1.07
11 09 801	173.41	186.81	188.26	1.45	3.62
11 09 901	166.44	181.45	185.19	3.74	3.40
11 10 201	.....	152.69	.....	.....	0.34
11 10 402	169.48	170.48	170.84	0.36	0.23
11 10 802	.....	170.57	172.43	1.86	2.34
11 11 101	.....	130.18	131.43	1.25	0.28
11 11 502	.....	.....	161.05	6.34*	0.67
11 11 701	.....	162.20	164.29	2.09	2.76
11 11 801	.....	.....	108.14	2.09*	2.29
11 11 901	.....	118.82	116.91	+ 1.91	2.98

*Computed Decline.



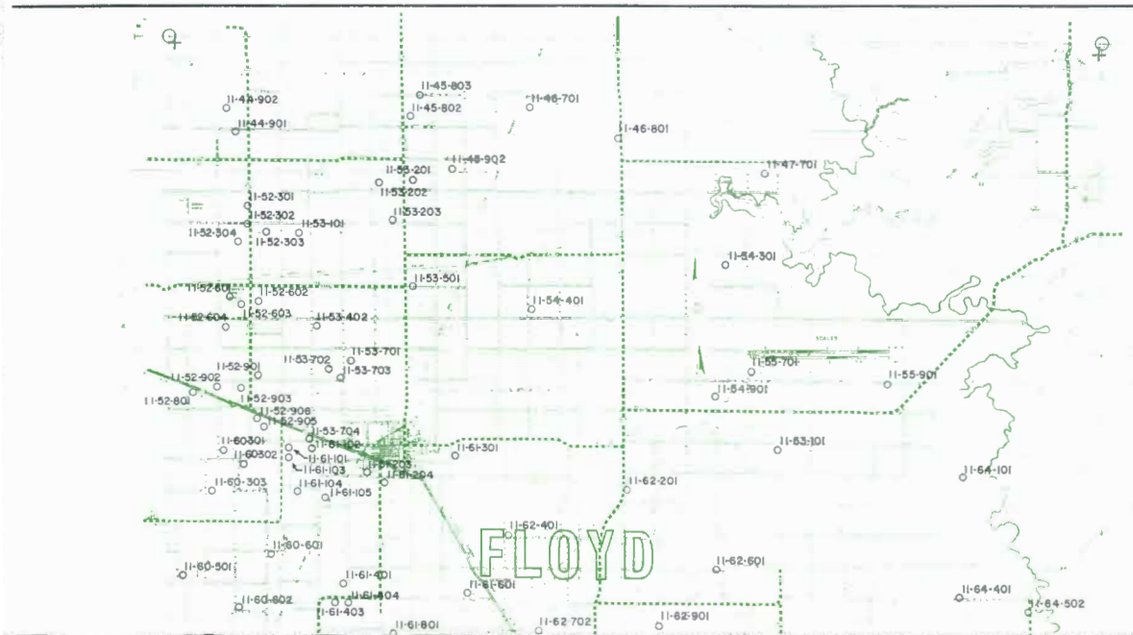


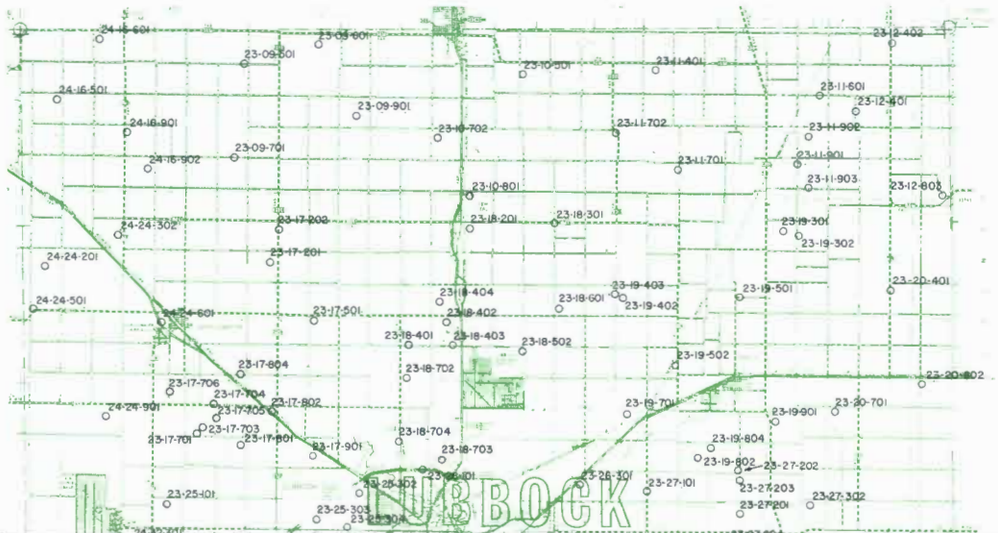


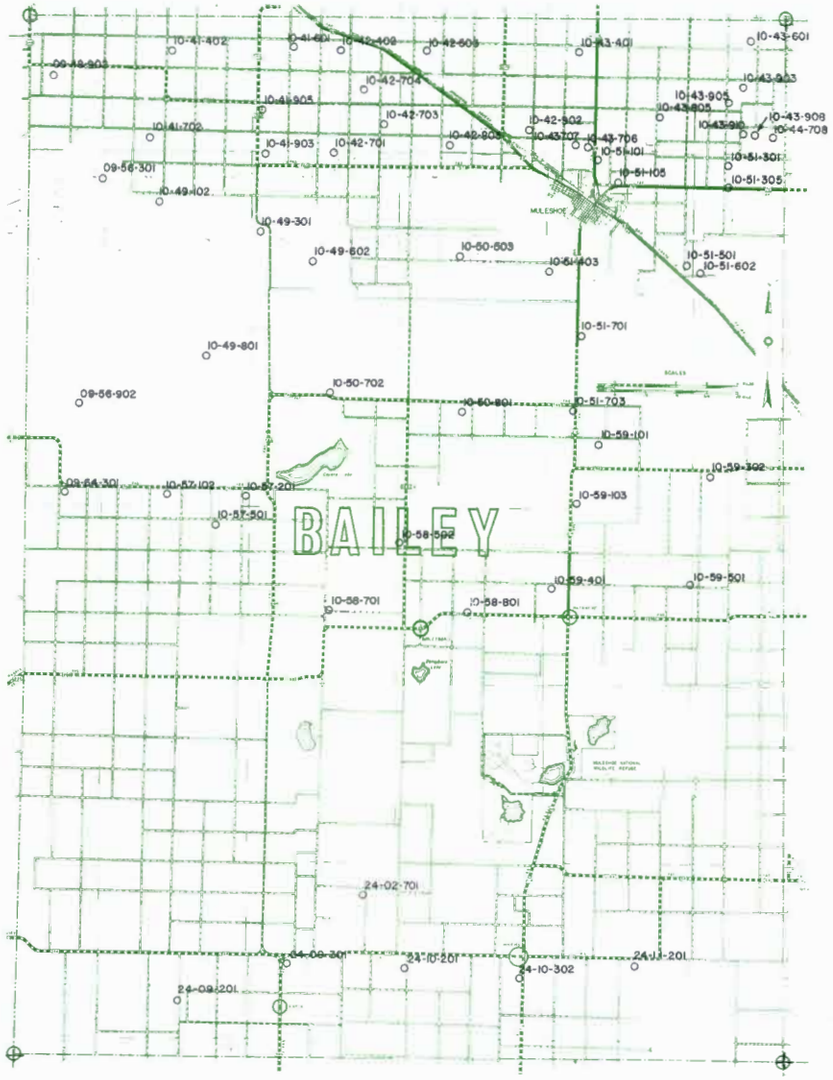
DEAF SMITH COUNTY

Well No.	Depth To Water 1962	Depth To Water 1967	Depth To Water 1968	Decline 1967-1968	Average Decline Per Year
07 53 701	204.53	223.46	224.55	1.09	1.09
07 53 901	188.15	218.92	220.73	1.81	5.43
07 55 701	179.07	202.45	205.60	3.15	4.22
07 60 201	.....	272.99	278.29	5.30	3.51
07 60 301	226.40	245.68	248.68	3.00	3.87
07 60 401	.....	275.09	288.02	12.93	0.30
07 60 501	210.72	232.55	237.83	5.28	5.67
07 60 901	.....	202.17	204.75	2.58	2.10
07 61 201	.	214.46	.....	.	2.99
07 61 301	.	204.51	202.43	+ 2.08	3.55
07 61 501	.	173.48	177.36	3.88	2.69
07 61 601	.	173.84	177.28	3.44	3.39
07 61 801	.....	173.81	175.58	1.77	2.32
07 61 901	139.06	.....	154.67	2.57*	2.67
07 62 101	161.03	187.49	193.05	5.56	3.60
07 62 301	161.87	177.76	180.85	3.09	3.16
07 62 501	134.40	150.63	149.80	+ 0.83	3.14
07 62 601	133.97	.....	173.14	8.60*	5.49
07 63 201	149.15	171.40	175.29	3.89	6.58
07 63 501	109.98	.....	119.40	1.70*	0.92
07 63 701	126.22	147.28	146.59	+ 0.69	3.40
10 03 701	.....	.	222.22	220.94	+ 1.28	+1.06
10 03 901	212.00	231.87	235.39	3.52	3.90
10 04 101	275.05	292.38	296.15	3.77	3.52
10 04 201	235.32**	.....	.....	.....	5.96
10 04 301	226.23	250.36	259.52	9.16	5.55
10 04 501	219.44	247.48	.....	.....	6.51
10 04 601	.....	217.38	223.79	6.41	5.62
10 04 902	.....	.....	164.83	2.19*	0.33
10 05 301	134.90	146.81	159.67	12.86	4.13
10 05 501	135.27	170.18	175.17	4.99	6.65
10 05 601	.....	132.89	137.13	4.24	4.09
10 05 802	118.43	143.28	143.13	+ 0.15	4.12
10 05 903	.....	145.12	149.10	3.98	4.15
10 06 201	117.87	.....	138.99	3.15*	3.18
10 06 301	129.80	154.02	156.17	2.15	2.37
10 06 401	126.96	147.81	151.80	3.99	4.14
10 06 601	120.35	136.27	143.75	7.48	3.90
10 06 701	52.25	67.42	68.25	0.83	2.95
10 06 801	66.14	88.79	87.46	+ 1.33	1.85
10 06 901	104.05	118.26	124.46	6.20	3.40
10 07 402	110.02	.....	138.38	6.70*	3.74
10 07 403	96.70	116.44	122.00	5.56	4.22
10 07 701	98.46	120.00	118.63	+ 1.37	0.04
10 07 802	122.07	.....	174.56	2.56*	11.84
10 10 801	185.90	194.49	195.97	1.48	1.68
10 11 501	171.99	187.99	184.00	+ 3.99	2.00
10 11 601	151.10	174.61	170.43	+ 4.18	3.42
10 11 802	.....	186.19	188.09	1.90	4.30
10 11 901	.....	.....	160.30	+12.86*	2.39
10 12 102	136.70	167.41	159.33	+ 8.08	2.50
10 12 201	67.66	71.39	74.90	3.51	1.21
10 12 301	129.21	136.28	153.63	17.35	4.07
10 12 401	.....	170.15	176.10	5.95	4.82
10 12 501	153.53	.....	.....	.....	3.79
10 12 502	112.37	132.26	140.90	8.64	4.76
10 12 701	120.23	137.17	142.98	5.81	3.93
10 12 901	112.21	131.36	142.50	11.14	5.92
10 12 902	148.25	165.45	.....	.....	3.44
10 13 101	132.68	157.65	158.86	1.21	4.36
10 13 302	102.10	114.91	125.10	10.19	4.13
10 13 304	115.03	132.97	139.12	6.15	5.35
10 13 305	.	118.65	125.79	7.14	2.83
10 13 401	117.12	135.60	138.88	3.28	3.12
10 13 502	134.72	149.68	158.95	9.27	4.04
10 13 802	105.84	.....	.....	.....	8.67
10 13 901	122.07	134.10	140.27	6.17	3.03
10 13 902	125.06	143.42	147.40	3.98	3.01
10 13 903	126.62	146.49	151.47	4.98	4.14
10 14 101	.	83.86	.....	.....	3.81
10 14 201	70.93	.....	114.19	6.50*	7.37
10 14 301	69.25	69.18	77.59	8.41	0.86
10 14 403	93.69	110.59	114.93	4.34	3.54
10 14 404	.....	.....	114.55	4.08*	.....
10 14 701	139.55	160.76	166.75	5.99	4.53
10 14 702	139.05	158.91	166.36	7.45	4.55
10 14 801	122.26	136.37	138.43	2.06	2.70
10 14 901	101.86	.....	.....	.....	1.28
10 21 201	148.60	.....	186.00	6.68*	5.34

*Computed Decline.
**January 1963 Water Level.



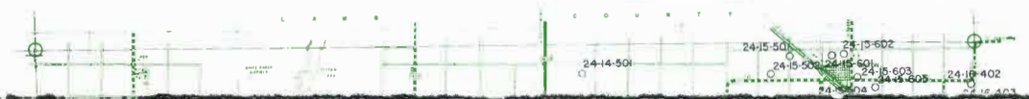


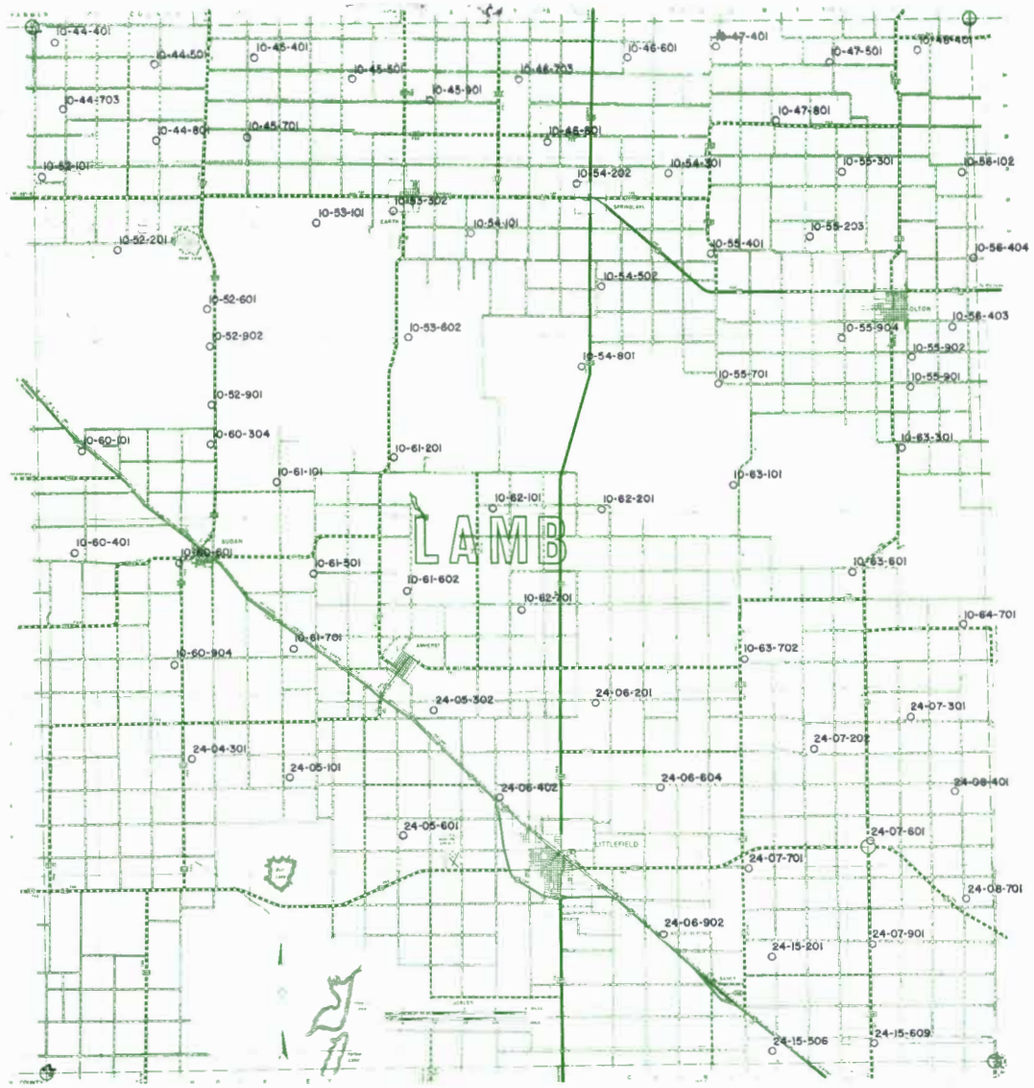


BAILEY COUNTY

Well No.	Depth To Water 1962	Depth To Water 1967	Depth To Water 1968	Decline 1967-1968	Average Decline Per Year
09 48 902	.....	127.14	130.28	3.14	3.28
09 56 301	61.45	66.80	77.76	10.96	2.72
09 56 902	38.20	39.48	39.69	0.21	0.25
09 64 301	.....	56.96	56.91	+ 0.05	1.38
10 41 402	120.40	137.02	139.88	2.86	3.25
10 41 601	108.90	124.20	136.15	11.95	4.54
10 41 702	70.89	.....	.....	.....	2.57
10 41 903	60.30	72.46	72.50	0.04	2.03
10 41 905	82.29	97.98	97.27	+ 0.71	2.50
10 42 402	100.36	112.70	115.19	2.49	2.47
10 42 503	93.63	106.37	107.31	0.94	2.28
10 42 701	65.47	82.20	81.71	+ 0.49	2.71
10 42 703	78.10	90.82	91.32	0.50	2.20
10 42 704	.....	101.22	99.28	+ 1.94	1.66
10 42 805	56.75	68.72	69.12	0.40	2.06
10 42 902	63.85	73.86	72.61	+ 1.25	1.46
10 43 401	88.00	100.60	103.86	3.26	2.64
10 43 601	.....	111.24	113.12	1.88	3.04
10 43 706	67.80	76.88	75.81	+ 1.07	1.34
10 43 707	68.97	83.21	81.33	+ 1.88	1.47
10 43 805	63.66	78.02	76.81	+ 1.21	2.19
10 43 903	.....	91.20	92.40	1.20	2.74
10 43 905	65.47	79.35	83.81	4.46	2.38
10 43 908	63.56	77.20	78.68	1.48	1.75
10 43 910	60.31	77.94	78.11	0.17	2.57
10 44 708	63.79	80.24	81.61	1.37	2.97
10 49 102	40.30	47.70	.....	.....	0.96
10 49 301	25.88	24.65	32.55	7.90	1.11
10 49 602	41.26	48.64	.....	.....	1.48
10 49 801	73.96	75.42	75.19	+ 0.23	0.20
10 50 503	35.83	48.94	.....	.....	3.75
10 50 702	.....	86.00	86.54	0.54	0.90
10 50 801	69.34	73.90	74.88	0.98	0.92
10 51 101	59.59	64.80	65.10	0.30	0.92
10 51 105	.....	56.14	54.94	+ 1.20	2.07
10 51 301	48.46	51.52	52.12	0.60	1.22
10 51 305	45.38	49.00	52.68	3.68	1.22
10 51 403	29.66	31.56	30.78	+ 0.78	0.19
10 51 501	25.11	33.20	35.11	1.91	0.88
10 51 602	25.35	34.06	34.61	0.55	1.54
10 51 701	60.30	62.01	61.81	+ 0.20	0.32
10 51 703	82.00	84.70	82.22	+ 2.48	0.04
10 57 102	.....	78.32	78.71	0.39	0.21
10 57 201	.....	26.03	26.41	0.38	0.03
10 57 501	37.09	34.14	34.66	0.52	+1.38
10 58 502	.....	73.49	73.68	0.19	+0.24
10 58 701	.....	47.38	46.21	+ 1.17	+0.07
10 58 801	.....	23.48	21.02	+ 2.46	0.45
10 59 101	.....	112.32	111.81	+ 0.51	+0.87
10 59 103	92.85	103.42	100.78	+ 2.64	0.74
10 59 302	.....	110.06	122.10	12.04	3.95
10 59 401	103.59	115.37	126.99	11.62	3.90
10 59 501	.....	105.77	.....	.....	1.13
24 02 701	.....	59.42	61.10	1.68	0.44
24 09 201	142.72	.....	.....	.....	2.31
24 09 301	.....	89.45	89.48	0.03	0.06
24 10 201	.....	126.89	118.00	+ 8.89	3.70
24 10 302	.....	.....	86.02	+ 2.81*	0.56
24 11 201	.....	.....	108.88	1.45*	+0.58

*Computed Decline.





LAMB COUNTY

Well No.	Depth To Water 1962	Depth To Water 1967	Depth To Water 1968	Decline 1967-1968	Average Decline Per Year
10 44 401	103.42	127.06	131.52	4.46	4.68
10 44 501	.....	120.45	123.65	3.20	3.53
10 44 703	.....	.....	93.30	1.78*	4.02
10 44 801	64.00	.....	79.60	2.84	2.36
10 45 401	.....	121.71	125.50	3.79	3.42
10 45 501	.....	138.42	141.02	2.60	2.25
10 45 701	.....	83.86	86.99	3.13	3.12
10 45 901	.....	139.32	142.89	3.57	2.67
10 46 601	.....	161.30	164.68	3.38	3.85
10 46 703	135.79	153.83	157.50	3.67	3.62
10 46 801	133.50**	.....	.....	.....	.....
10 47 401	119.08	134.76	138.87	4.11	3.30
10 47 501	.....	130.13	133.80	3.67	3.53
10 47 801	147.05	161.66	165.39	3.73	3.05
10 48 401	125.90	.....	146.54	3.13*	3.60
10 52 101	57.64	67.50	70.70	3.20	2.18
10 52 201	.....	.....	.....	.....	0.61
10 52 601	28.13	31.20	32.70	1.50	0.76
10 52 901	59.02	64.60	63.80	+ 0.80	0.80
10 52 902	46.45	49.74	49.83	0.09	0.56
10 53 101	.....	56.14	59.48	3.34	0.12
10 53 302	63.51	74.61	78.90	4.29	2.57
10 53 602	42.02	48.60	49.16	0.56	1.19
10 54 101	72.36	.....	.....	.....	2.15
10 54 202	112.52	125.84	128.37	2.53	2.64
10 54 301	132.28	146.82	154.43	7.61	3.70
10 54 502	.....	94.12	95.90	1.78	2.07
10 54 801	59.93	64.96	65.72	0.76	0.96
10 55 203	.....	151.93	156.83	4.90	3.39
10 55 301	.....	171.46	175.40	3.94	4.41
10 55 401	.....	154.05	157.35	3.30	2.57
10 55 701	.....	76.63	77.90	1.27	1.32
10 55 901	.....	113.36	115.23	1.87	3.25
10 55 902	115.10	132.93	136.52	3.59	3.57
10 55 904	110.66	128.21	130.53	2.32	3.31
10 60 101	110.52	121.81	122.61	0.80	2.02
10 60 304	.....	71.08	65.07	+ 6.01	+0.90
10 60 401	122.57	131.27	134.85	3.58	2.05
10 60 601	109.83	99.99	98.55	+ 1.44	+1.88
10 60 904	.....	140.34	140.86	0.52	0.70
10 61 101	.....	72.57	74.84	2.27	2.21
10 61 201	48.76	55.07	57.14	2.07	1.40
10 61 501	.....	110.84	116.70	5.86	2.64
10 61 602	.....	92.28	95.40	3.12	1.15
10 61 701	.....	116.00	115.70	+ 0.30	2.37
10 62 101	.....	51.84	51.43	+ 0.41	1.02
10 62 201	.....	97.47	98.73	1.26	1.48
10 62 701	105.31	124.63	123.73	+ 0.90	3.07
10 63 101	.....	.....	58.40	+ 3.94*	0.83
10 63 301	83.20	.....	.....	.....	2.48
10 63 601	.....	100.46	107.80	7.34	1.60
10 63 702	120.11	.....	133.29	0.96*	2.82
10 64 701	.....	112.73	116.40	3.67	2.65
24 04 301	.....	58.63	57.90	+ 0.73	0.99
24 05 101	.....	40.45	39.76	+ 0.69	0.57
24 05 302	95.50	.....	.....	.....	2.28
24 05 601	.....	98.50	98.80	0.30	2.25
24 06 201	.....	128.87	131.77	2.90	3.50
24 06 402	82.40	88.05	87.20	+ 0.85	0.80
24 06 604	.....	117.62	127.79	10.17	4.02
24 06 902	79.77	94.95	94.24	+ 0.71	2.41
24 07 202	131.51	144.37	147.24	2.87	2.62
24 07 301	113.61	127.09	130.16	3.07	2.76
24 07 601	130.56	143.10	143.91	0.81	2.22
24 07 701	123.05	135.40	138.74	3.34	2.61
24 07 901	.....	108.09	112.70	4.61	2.52
24 08 401	.....	145.00	145.92	0.92	2.10
24 08 701	.....	125.52	129.30	3.78	3.58
24 15 201	.....	111.63	112.40	0.77	1.81
24 15 506	67.92	79.20	80.89	1.69	2.16

TABLE 1 Summary of Water-Level Measurements

County	January 1967 No. of Wells Measured	Depth To Water (Ft.) Min.	Max.	Avg.	January 1968 No. of Wells Measured	Depth To Water (Ft.) Min.	Max.	Avg.
Armstrong	9	105.53	139.52	121.87	8	106.62	146.37	126.41
Bailey	55	23.43	137.02	76.21	53	21.02	139.88	79.19
Castro	60	69.40	256.15	166.51	62	72.63	260.48	169.03
Cochran	43	87.92	194.54	140.44	50	86.78	199.96	141.34
Deaf Smith	64	67.42	292.38	165.70	71	68.25	296.15	165.87
Floyd	88	41.51	291.74	181.71	84	53.04	311.24	187.28
Hale	14	84.39	172.58	129.41	17	81.45	186.74	135.43
Hockley	73	42.67	191.79	124.65	74	41.30	190.00	124.73
Lamb	63	31.20	173.46	110.12	68	32.70	179.40	111.77
Lubbock	104	9.18	190.91	124.01	105	6.05	214.67	125.33
Lynn	30	37.55	154.30	90.19	29	38.90	159.31	91.61
Parmer	58	141.31	322.60	224.07	61	145.25	318.25	229.64
Potter	3	205.32	216.34	212.18	3	204.15	217.04	211.86
Randall	29	93.89	222.61	158.47	31	96.67	226.00	161.55

TABLE 2 Summary of the 1967-1968 Changes in Water Levels

County	No. of Wells Measured	Change in Water Levels, in Feet, Jan. 1967-Jan. 1968 Min.	Max.	Avg.
Armstrong	8	0.45	10.23	4.17
Bailey	51	+ 8.89	12.04	1.21
Castro	57	+ 2.91	21.63	3.36
Cochran	41	+ 3.70	8.97	1.76
Deaf Smith	60	+ 8.08	17.35	4.07
Floyd	81	+14.82	40.14	5.92
Hale	14	+ 7.00	7.72	1.11
Hockley	71	+ 8.75	5.69	0.53
Lamb	63	+ 6.01	10.17	2.41
Lubbock	91	+14.92	35.01	1.61
Lynn	29	+ 8.26	7.75	1.01
Parmer	58	+13.98	24.63	5.82
Potter	3	+ 1.95	2.15	+0.32
Randall	25	+ 3.98	20.47	2.87

ANNUAL WATER STATEMENT—

(Continued from Front Page)

factor of three. This same rule can be applied to rises in water levels. If the 1967-1968 change in water level is positive (a rise), but the average decline for the same well approaches 3-feet per year, the 1967-1968 change should be disregarded.

SUMMARY OF RECORDS

Table 1 summarizes the January 1967 and 1968 water level measurements. This table shows the minimum and maximum depth to water, as measured in the observation wells in each respective county. The average depth to water values were determined by adding all of the water-level measurements made in each of the observation wells in each county, and dividing this sum by the number of wells measured in the respective county during the given year. As an example, the average depth to water below the land surface in Bailey County (as measured in 55 wells) was 76.21 feet in January of 1967, while the average depth to water below the land surface in Parmer County (as measured in 58 wells) was 224.07 feet. The average values for these same two counties had increased to 79.19 feet and 229.64 feet respectively by January of 1968.

The minimum measured depth to water in January 1967 was 9.18 feet in well 23-26-603, in Lubbock County. The depth to water in this same well was 6.05 feet in January 1968. This well is located in an area being irrigated with (City of Lubbock) sewage effluent.

The maximum depth to water in January 1967 was 322.60 feet, as measured in well 10-25-101, in Parmer County. The measured depth to water in this well in January 1968 was reportedly 318.25 feet. Applying the "rule of thumb", as previously outlined, would suggest that the 1967 or 1968, or both, measurements are invalid or invalidly compared.

In January of 1962, the average of the depths to water below land surface as measured in all observation wells throughout the District was approximately 127 feet, this average had increased to more than 146 feet in January of 1968.

Table 2 presents the minimum and maximum change experienced in the water levels, from January 1967 to January 1968, as measured in all wells in each county. Very little authenticity can be attributed to these minimum and maximum values, since they are most likely to be perpetrated by the comparison of invalid 1967 or 1968, or both, measurements. However, the average decline (all values shown represent declines in water levels except for the averaged value shown for Potter County, which represents a rise of 0.32 foot) values as listed in this table are reasonable representations of the water-level decline experienced by each county.

District-wide, the minimum decline —a rise of 14.92 feet—was reported for well 24-24-201, in Lubbock County. A review of the water-level-measurement records for this well indicates considerable variation in the amount of annual water-level changes. This suggests the annual measurements may have been made in two or more wells. This well is located near Yellow House Draw, which receives rainfall runoff, some of which recharges the aquifer during excess rainfall periods (such as the June 1967 storm). This condition could account for the anomolous annual variations in water-level measurements. However, the magnitude of the 1967-1968 change (+14.92 feet) would, when subjected to the rule previously described, tend to discredit the acceptability of this well's water-level records.

The maximum decline for the period from January 1967 to January 1968 was the 40.14 feet reported for well 23-07-401, in Floyd County. This record is considered invalid.

The maximum average decline, from January 1967 to January 1968, was the 5.92 feet for the 81 wells measured in Floyd County.

The minimum decline (disregarding the records of the three wells measured in Potter County), from January 1967 to January 1968, was the average of 0.53 feet for the 71 wells measured in Hockley County.

Table 3 shows the decline per year that would have been experienced by each observation well, if the year-to-year declines (from January 1962 to January 1968, or for each wells period of record) of each well were averaged as previously outlined. These values are reasonable representations of the average annual decline in the water level beneath the respective counties.

The six-year maximum average annual decline was the 4.47 feet per well computed from the 627 water-level measurements made in the 103 current observation wells in Floyd County.

The six-year minimum decline was the average of 1.37 feet per year for the 30 current observation wells in Lynn County. District-wide, the average decline of all the 652 wells that were measured in both January 1967 and January 1968 was 2.87 feet. This value agrees very closely with the average annual, District-wide decline —for the six-year period from January 1962 to January 1968—of about 2.90 feet.

TABLE 3 Average Decline Per Well

County	No. of Decline (or Rise) Values Considered	Avg. Decline In Feet, 1962 1968. or for the Period of Record
Armstrong	50	2.26
Bailey	280	1.63
Castro	307	3.59
Cochran	261	2.06
Deaf Smith	335	3.45
Floyd	494	4.47
Hale	84	3.97
Hockley	396	1.74
Lamb	343	2.68
Lubbock	547	2.53
Lynn	164	1.37
Parmer	275	4.39
Potter	16	3.68
Randall	160	2.42

STATUS OF PROGRAM

The District added 14 new observa- wells to the program in 1967. Some wells that had previously been dropped from the program, because entrance thereto was restricted, were modified, measured in 1968, and re-added to the current list of observation wells. Eight wells were apparently dropped (records for same were not included in the current field-record books) from the program prior to the January 1968 measuring season. There are now a total of 798 current observation wells in the District.

Table 4 lists the total number of current observation wells within each county in the District, and the percentage of these wells that were measured in 1968. A total of 716 wells were measured in January 1968. This represents about 87.7 percent of the current observation wells in the District.

TABLE 4 Observation Wells in the District

County	No. of Current Wells	% Measured In 1968 (For No. See Table 1)
Armstrong	9	80.8
Bailey	70	85.8
Castro	70	86.0
Cochran	55	90.5
Deaf Smith	79	87.8
Floyd	103	81.6
Hale	17	100.0
Hockley	76	95.6
Lamb	74	91.4
Lubbock	121	88.2
Lynn	30	92.0
Parmer	66	91.6
Potter	4	70.2
Randall	35	83.0

High Plains Underground Water Conservation District No. 1
1628 Fifteenth Street
Lubbock, Texas 79401

Second Class Permit

THE Cross SECTION

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

Volume 14—No. 11 "THERE IS NO SUBSTITUTE FOR WATER" *April 1968*

The Man-Made Water Cycle

Because High Plains underground water is depletable, every possible means to prolong its availability for agriculture is encouraged by the High Plains Underground Water Conservation District. For the past several years one of the primary practices of underground water conservation that has been stressed by the Water District is the installation and proper use of tailwater return systems. Hundreds of these systems now dot the High Plains in audible testimony of their economic practicability. Hundreds of farmers will testify as to their saving in water, money, fertilizer and soil since their tailwater system was installed.

Such a farmer is Billy Wayne Sisson who farms 18 miles west of Here ford, Texas. This pit has a 700,000 gallon capacity with a return pump capacity of 500 gallons per minute. His entire installation, including dirt work and pump, cost Mr. Sisson less than $2,000.00. During the peak season this return system will have 8 irrigation wells contributing tailwater to it with four or five wells on virtually a constant basis.

The numerous tailwater systems that cover the High Plains today are the final results of long hours of study and evaluation of new ideas, methods and equipment that were used in a few experimental systems installed by the Water District. The experimental installations have proven the following advantages for the High Plains farmer:

ADVANTAGES—

1) Prevents the ponding of water at the lower end of the field which interferes with plant development and causes reduced crop yields.

2) Prevents the flooding of adjoining neighbors farm land, thereby reducing the threat of legal action.

3) Prevents the flooding of public roads and eliminates sources of automobile accidents.

4) Prevents the flooding of public road drainage ditches and reduces county expense for road maintenance and repairs.

5) Prevents mosquito breeding by eliminating the shallow, tepid waters necessary for mosquito breeding.

6) Improves the efficiency of water distribution by allowing the farmer to use a larger head of water to get the water to the end of the rows quicker. This provides for a more uniform moisture penetration by eliminating deep moisture penetration in the upper portion of the field, not enough moisture in the middle of the field, and deep penetration at the lower portion of the field where ponding occurs.

7) Providing an additional source of irrigation water, in some cases increasing it by as much as 20 to 25 percent.

8) Reduces the amount of irrigation labor necessary. Many farmers using recirculation systems state that one man can now irrigate as much as two or three men before the recirculation system was installed.

9) Recovers and reapplies nutrients carried from the farm in tailwater. Water District tests show that about 30 pounds of nitrogen in the form of nitrates were being lost per acre-foot of tailwater. The recirculation system salvages these nutrients as well as the tailwater.

10) Recovers and reapplies rich top soil carried from the farm in tailwater. Water District tests show that on the average 9 to 10 tons of soil are carried off the farm in each acre foot of tailwater. Recirculation systems are reclaiming approximately 50 percent of this top soil and returning it to the farm.

11) Improves plant growth rate because tailwater is much warmer than ground water. Cold ground water causes a temporary cooling of the soil and reduces the rate of plant growth for a few days. The warm tailwater does not lower the soil temperature appreciably, and allows the plant to continue its normal growth rate.

DESIGN OF INSTALLATION—

Measurements of the available tail water is very helpful in designing the installation, but normally 125 GPM per contributing well is a pretty good "rule of thumb" when planning an installation. The pit size and the pump capacity are then matched to the available water supply, with consideration given to the required time to empty the pit by the pump.

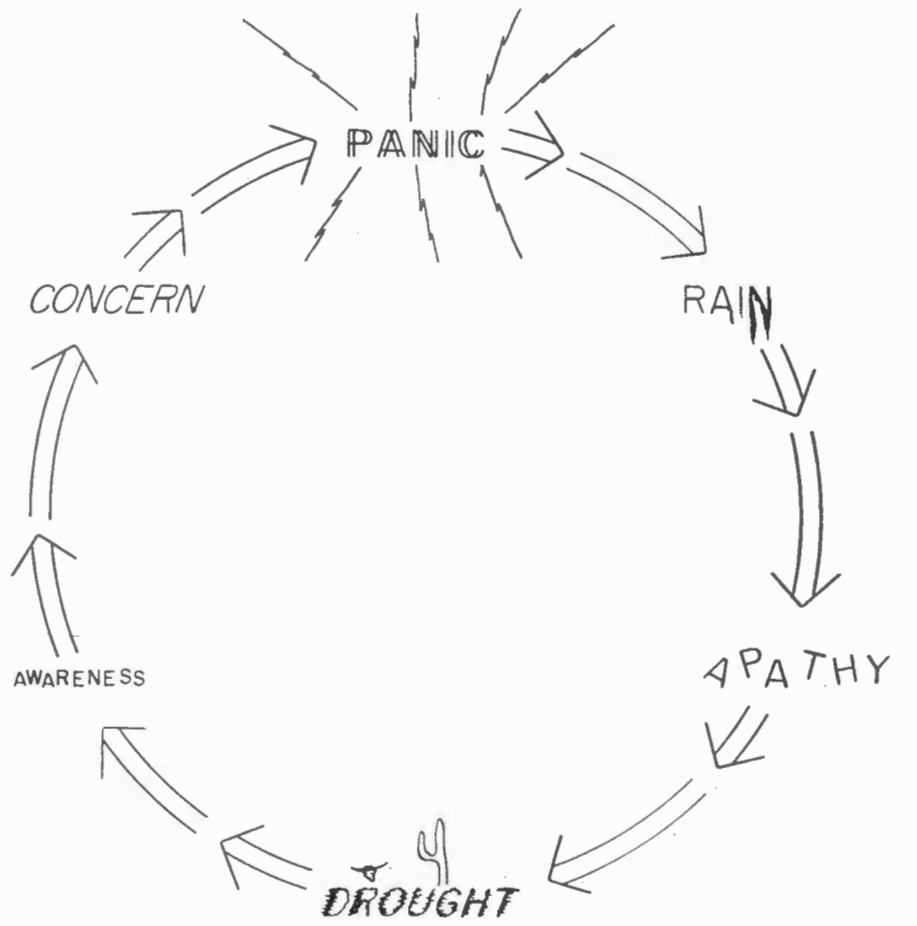
EXAMPLE: Pit Capacity—

Two 8" wells contributing tail water:

125 GPM x 2 wells = 250 GPM.
250 GPM x 60 min. = 15,000 GPH.
15,000 Gal. x 24 hrs. = 360,000 per day.
360,00 Gal. divided by 325, 829 = 1.1 acre feet.

Irrigation tail water losses vary during the watering season due to many conditions; therefore, a slightly larger pit of approximately 1.5 acre feet capacity should be considered. A pump capacity of about 250 GPM will almost insure a continuous supply of water from a pit this size when two

(Continued on Page 4)



THE HYDROILLOGICAL CYCLE

A TIMELY BILLBOARD

High Plains Agriculture Creates Texas Jobs

THE Cross SECTION

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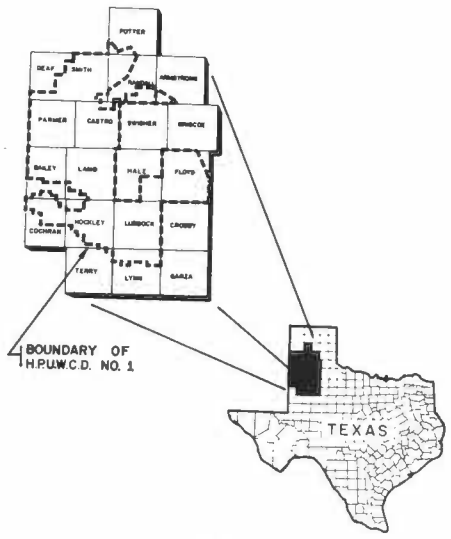


WELL PERMITS

The first and most successful step in profitable relationships often is simply "getting acquainted".

Monthly, weekly and daily the irrigation farmers of the High Plains and the personnel of the High Plains Underground Water Conservation District No. 1 work profitably together. The "Partnership in Conservation" job is made easier for both by clear understanding, mutual respect, and awareness of the needs, challenges and opportunities at hand.

One of the best means of getting acquainted is made easy through a provision of the rules of the District that set out permit requirements for drilling of wells throughout the area.

It is true that the Application for Permits can be sent to the District's offices by a hired hand or other messenger, but staff personnel this month have re-emphasized their invitation for the landowner, or operator, himself, to arrange for the permits.

In the 16 years of District operation, numerous plans have been "given birth," services given and ideas explored—all in the visits that started out simply as application for a well-drilling permit.

The District farmer is entitled to latest information on water conservation studies, with the related special studies on tailwater return systems artificial recharge, depletion studies, import needs. etc., and a visit at the District's offices provides excellent opportunity for understanding of the current problems and plans. Now, about that Drilling Permit—

First step in making an application for a well-drilling permit is for the landowner, or his agent, to submit pertinent information to the County Committee of the county within which the proposed well will be located.

This information includes:

1) Owner and legal description of the land.

2) Measured yards from proposed well site to two nearest property lines, quarter-section lines or labor lines.

3) Measured yards from proposed well site to the three nearest wells that are within 440 yards, or a quarter of a mile.

Further requirements are outlined in the "Rules of High Plains Underground Water Conservation District No. 1" published April 10, 1962, and available at the District Offices, 1628 15th Street, Lubbock.

Spacing for a proposed well site must meet the published rules and regulations for the size well desired before the application can be recommended for approval by any three of the five County Committeemen.

These published spacing regulations are:

Four-inch or smaller well must be 200 yards minimum from nearest well or pending permit.

Five-inch well must be 250 yards from nearest well or pending permit.

Six-inch well must be 300 yards from nearest well or pending permit.

Eight-inch well must be 400 yards from nearest well or pending permit.

10-inch well or larger must be 440 yards from nearest well or pending permit.

The various sized permits also specify a maximum yield in gallons per minute. These maximums are:

Four-inch well (inside diameter of column pipe) or smaller, 265 gallons per minute (GPM).

Five-inch well, 390 GPM.

Six-inch well, 560 GPM.

Eight-inch well, 1000 GPM.

10-inch well or larger, more than 1000 GPM.

$10 deposit is required of each applicant. and this is refunded in full when the log of the formation and the description of the pump is furnished the County Committee.

Forms for submitting this information are furnished the applicant.

The most important things to remember about drilling a well are 1) to make application and have the County Committee recommend for approval the permit before the well drilling operation is commenced; and 2) the well must be drilled within 10 yards of the specified location for the permit to be valid.

Approximate date that drilling operations are to begin is another of the related bits of information needed in the application.

Basically the boregoing information is the "meat" of the application.

Additional information and discussion of special situations, etc., can easily be outlined in the visits that have been invited.

We hope that the above invitation and the information here can be of benefit to you. If there should be any questions in your mind that are still not clear, or even questions that have not yet arisen, please contact your county secretary or one of your County Committeemen or one of the District office personnel, any of whom will be glad to go into your particular problem more thoroughly.

WHAT IS A FARMER?

What is a farmer? A farmer is a paradox—he is an executive with his home his office; a scientist using fertilizer attachments; a purchasing agent in an old straw hat; a personnel director with grease under his fingernails; a dietitian with a passion for alfalfa, aminos, and antibiotics; a production expert with a surplus; and a manager battling a price-cost squeeze.

He manages more capital than most of the businessmen in town.

He likes sunshine, good food, state fairs dinner at noon, auctions, his neighbors, his shirt collar unbottoned and, above all, a good soaking rain in August.

He is not much for droughts, gullies, throughways, weeds, the 8-hour day, grasshoppers, or helping with housework.

Farmers are found in fields—plowing up, seeding down, rotating from, planting to, fertilizing with, spraying for, and harvesting. Wives help them, little boys follow them, city relations visit them, salesmen detain them and wait for them, weather can delay them, but it takes Heaven to stop them.

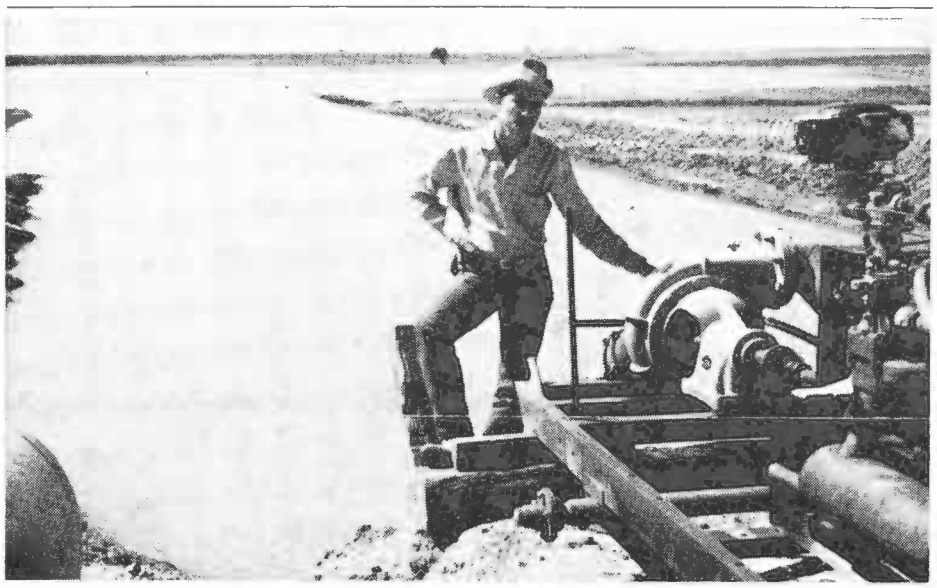
A farmer is both Faith and Fatalist—he must have faith to continually meet the challenges of his capacities amid an over-powering possibility that a late spring, and early frost, tornado, flood, drought, disease, or bugs can bring his business to a standstill.

He is your countryman—a denimdressed, businesswise, fast-growing statesman of stature. And when he comes in at noon, having spent the energy of his hopes and dreams, he can be recharged anew with the magic words: "The market's up".

THE PROBLEM... TAILWATER WASTE

THE SOLUTION... TAILWATER RETURN SYSTEMS

Judge Howard Davidson "Swears in" newly elected HPUWCD Directors Chester Mitchell, Weldon Newsom and Russell Bean.



AN EXCELLENT LAKE MODIFICATION

WATER CYCLE—Continued for page 1

8" wells are contributing irrigation tail water. Selection of the pump and power unit depends on many things—such as the type of installation the operator desires, location of the pit, quantity of water to be pumped balanced with the number of feet of lift. Individual dealers will be happy to assist operators with these calculations.

With the water table in the High Plains becoming lower and lower each year, it behooves every operator and every custodian of this precious commodity—WATER—to do his utmost to use this God-given product in the wisest possible way.

Thought for the Month

TILL TAUGHT BY PAIN,
MEN REALLY KNOW NOT
WHAT GOOD WATER'S
WORTH.—Byron.

Tailwater Program

At the beginning of 1968 the High Plains Underground Water Conservation District began an intensive program to stop the waste of irrigation water.

Three field representatives are working full time on the problem. To date, six counties have been covered. Every state and county road has been driven out. Notes have been made of flagrant wasters, for future contacts. These records are kept on a permanent basis. It is the District's plan to follow through with this program on a month by month contact with the landowners.

The Water District was instrumental in beginning the program of tailwater return systems. In the last two years several hundred systems have been installed over the High Plains. Millions of gallons of water that otherwise would have been wasted is now being put to a beneficial use.

It is the District's intention to keep traveling — to travel every highway and road within the District in an effort to eliminate the wasting of water.

A part of the job of the Water District personnel is to give technical assistance wherever they can, or pass along the experience and ideas of other landowners relating to installation and use of tailwater recirculating pits.

Waste of water must be stopped.

District Personnel and Friends at Directors' Swearing-In Ceremony

Drilling Statistics Jan., Feb., Mar. 1968

County	Permits Issued	Wells Completed	Replacement Wells	Dry Holes
Armstrong	0	0	0	0
Bailey	30	16	5	0
Castro	37	20	0	0
Cochran	12	3	0	0
Deaf Smith	83	48	3	2
Floyd	45	17	0	0
Hale	15	9	1	0
Hockley	48	20	0	1
Lamb	36	17	4	0
Lubbock	95	58	3	0
Lynn	35	10	0	0
Parmer	40	39	0	0
Potter	1	1	0	0
Randall	14	10	0	0
TOTAL	491	268	16	3

High Plains Underground Water
Conservation District No. 1
1628 Fifteenth Street
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THE Cross SECTION

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

Volume 14—No. 12 **"THERE IS NO SUBSTITUTE FOR WATER"** *May 1968*

MAN'S USE OF GOD'S WATER

By HARDY CLEMONS, Th. D.

EDITORS NOTE: — Dr. Clemons was born in Plainview, Texas and has lived most of his life on the High Plains in such towns as Plainview, Whiteface, Lockney and Lubbock. He received his Bachelor's Degree from Texas Tech in 1955 and continued his education at the Southwestern Baptist Theological Seminary, Ft. Worth, Texas where he earned his Doctorate in 1966. Dr. Clemons is presently serving as pastor of Second Baptist Church, Lubbock, Texas.

Although water is one of the most important of all our resources, modern man tends to take it for granted. Those of us who live in the city are particularly guilty of assuming that all we have to do to get water is turn on the faucet. We forget that water is one of the few really important resources God has given us.

The Importance of Water

Next to air, water is the most absolutely necessary of all the resources upon which the existence of man depends. We could live indefinitely without gold or silver or steel. We must have water. Among its many uses, the following are important: (1) for humans and animals to drink, (2) for industrial and domestic use, (3) as a means of transportation, (4) for the generation of power, (5) for protection against fire, (6) for recreation, and (7) for agricultural purposes.

Consider just two of these uses. Industry must have water. It is estimated that to manufacture a gallon of gasoline it takes ten gallons of water; a pound of paper requires 20 gallons; a pound of steel, 33 gallons; a pound of synthetic rubber, 300 gallons! No industry considers a location without carefully ascertaining the availability and the quality of water supplies.

Modern man has developed a recreational use for water that has existed only partially in the past. With more and more leisure time being at our disposal, water becomes important in yet another way.

Ancient man recognized the importance of water. As early as 2300 B. C. Lake Moeris on the upper Nile was used as a great reservoir for regulating the floods that ravaged the land around the Nile. The ancient Egyptians not only learned to store water, they also developed canals which furthered agriculture through irrigation. Ancient man knew he needed to conserve water; we are in danger of forgetting.

Water in the Bible

The deep significance of water in the Bible deserves a study of its own. At this point, it is sufficient to say that water in the Hebrew-Christian Scriptures is equated with life. The Old Testament constantly stresses the use of water in purification ceremonies and personal cleanliness. It even goes to the extent of commanding that washing be done in *running* water—a point to which medical science has come only in the last few hundred years.

The New Testament quotes Jesus as referring to himself as "the Water of Life". In this and many other ways the Bible teaches that water is basically important to life. Yet, we still take it for granted.

Two Approaches to Life

There are two kinds of resources in our world: those which are not renewable and those which are. Gold, oil, and iron are examples of resources that do not renew themselves. There is just so much of each one. When this is used up, there is no more.

Water is a renewable resource. It is in a constant process of replacing itself. It moves in a constant cycle from the atmosphere to the earth (on land or ocean) and then back again. The Creator has constructed our world so that water will always be plentiful—IF it is used properly. Water is like plant life, or animals, or the soil itself. If it is used as God intended, it is not used up. Instead it replenishes itself.

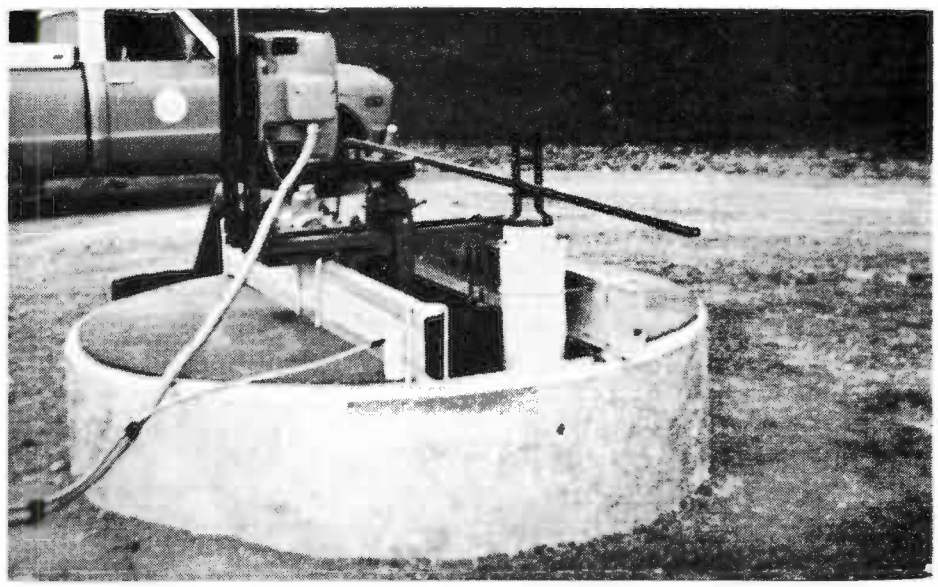
The fact of these two kinds of resources points up a further fact of two approaches to the use of these resources. One approach is to assume that resources are here for our use, therefore we should use them. The other approach is to realize that resources are here for the use of all mankind, therefore they must be conserved as well as used. Otherwise we will use them up.

Trees, for example, will replenish themselves if wisdom and planning are exercised in their use. However, if we simply cut them down without planting and tending them, it doesn't require great insight to see that they are soon gone. It takes a much shorter time to cut down a tree than to grow another. The same is true with the soil or water.

The Christian approach to life involves each of us in living as contributors and not just consumers. If we recognize the necessity of living unselfishly, life tends to respond to its God-given opportunities. If we take

(Continued on Page 2)

An Experimental Tailwater Return System



This installation is on the Donnie Clayton farm, Springlake, Texas and is being closely watched and performances duly tabulated because of the several experimental features this system has when compared to more orthodox tailwater return systems.

STATISTICAL DATA

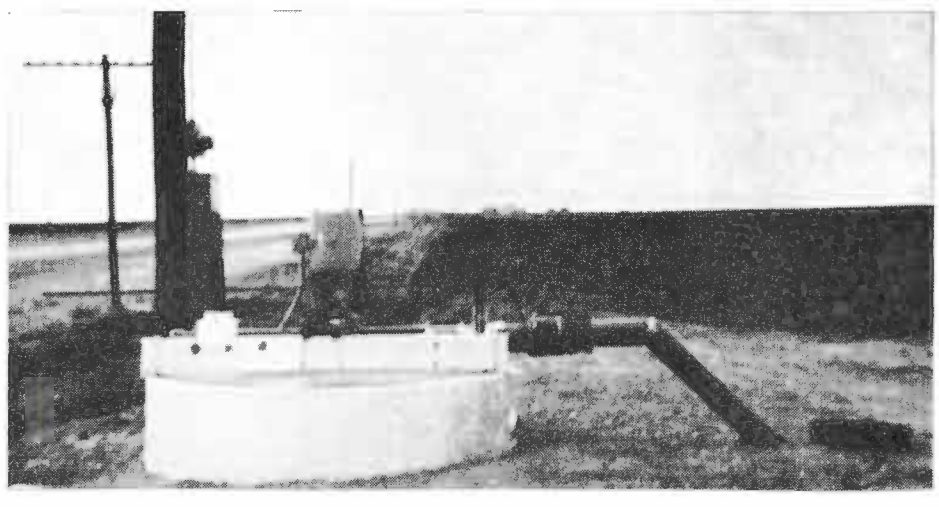
This system entails a partially buried steel tank, 14 feet deep, 7 feet across with a 4600 gallon capacity. Power is furnished by a 3 phase, 15 horsepower electric motor. The pump has a 500 gpm capacity with the capability of being reduced to 100 gpm as needed. Mr. Clayton has installed one half mile of asbestos underground pipe to return the tailwater to his land. Unusual features of this installation are (1) reduction feature effecting capacity of pumping system and (2) manual flap valve for backwashing trash off impellers.

Two 8-inch wells are contributing tailwater to this installation.

CONCLUSIONS

As this installation is experimental and of very recent vintage it is too early to arrive at any conclusions. However, there are several obvious advantages that are readily apparent. Among them are (1) reduction in amount of water lost through evaporation (2) conservation of space involved in the digging of a pit and (3) silt is kept in suspension and pumped back on the land.

The Water District will keep accurate records on this installation. Observations will be on a continuing basis and the complete data will be kept compiled, and this information should prove of interest to farmers all over the High Plains to whom tailwater waste has become such as expensive problem and answers have been and are being constantly sought. Every means at our disposal and every method our collective brains and intellects can conjure up need to be focused in an all-out effort to eliminate this disasterous practice of wasting our irreplacable God-given asset—WATER!



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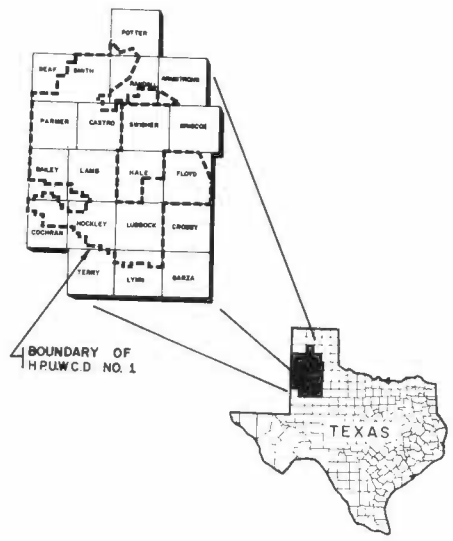


Recharge Studies For High Plains By USGS

Hydrologists of the Geological Survey, in cooperation with the Bureau of Reclamation, Department of the Interior, have begun theoretical studies of data from every available source to determine the feasibility of recharging declining groundwater supplies of the "Llano Estacado" — the High Plains of Texas and New Mexico.

These early studies are to be followed by research and field testing of recharge methods considered to be most promising. The effort will be aided by a newly-established U. S. Geological Survey field office in Lubbock, Texas which will coordinate the study under the over-all direction of Trigg Twichell, the Survey's District Chief Austin, Texas.

Twichell said that major target for study is the strategic "Ogallala Formation"—the principal aquifer in the High Plains.

RICH FARMING AREA

"Ground water pumped from the sand and gravel of this formation" said Twichell, "has been used for irrigation in this rich farming area. Use of this water has exceeded natural recharge from precipitation, and water levels have been declining for many years."

In order to support present economy, up to seven million acre feet of water annually—or about 2.5 trillion gallons each year—must be imported to the High Plains to serve a 35,000 square mile area.

Twichell emphasized that "because surface reservoir sites in the area are inadequate to store the water between growing seasons, and because evaporation losses from a reservoir surface are high, it would be desirable for as much as one half of the imported water to be stored underground."

NEVER ATTEMPTED

The U. S. G. S. spokesman noted that "although artificial recharge projects have been undertaken in other areas of the nation with varying degrees of success, recharge of such large volumes of water has never been attempted before. We hope to develop new techniques of injecting water into the ground, new methods of preventing sediment problems in recharge wells, and new analytical and sampling methods for predicting the movement of injected water. Extensive studies of significant changes in the chemical quality of injected imported and 'native' water will also be made".

"Techniques of artificial recharge might be economically feasible in many areas," Twichell continued, "and if methods can be adequately refined through research, management of water through the use of underground storage may be one of the most economically important techniques for water development and management to emerge in many years."

Preliminary studies being supported by the Bureau of Reclamation have begun with Richmond F. Brown (The Cross Section, Feb. 1968) a Geological Survey research hydrologist, as project chief. Intensified studies are expected to be started by July 1.

High Plains Agriculture Creates Texas Jobs!

GOD'S WATER, Cont'd from page 1

life and its resources for granted, if we grasp and use to the exclusion of giving and conserving, we short-circuit the plan of the Creator.

Water Is Plentiful

There is no real reason for modern man to ever be short of water. The annual runoff from rainfall in the United States, evenly spread over the country, would yield nearly 9 inches of water. Our national needs—domestic, industrial, and agricultural—could be met with only one to one and a half inches of this average annual supply.

One might ask: Then where is any problem? The problem is akin to most of the rest of mankind's problems: misuse of God-given resources. Thru waste, pollution, and misuse we make a great deal of our water unfit for any use. Most likely today both you and I were guilty of waste.

Is There An Answer?

The answer to our waste problems, according to the experts, is simple: use it wisely instead of indiscriminately. The Biblical word for "wise-use" is stewardship. The idea of stewardship is most clearly seen by recognizing that God is the owner of all that we are and have. I am merely a tenant. God is the landlord. I cannot refer to "my farm," "my stock," "my business". Possessions are "ours" only in the sense that God lends them to us for a time. He loans them with the expectation that we will enhance their usability, not destroy it.

Water is not a luxury. It we misuse it, we destroy one of life's basic necessities. If we assume it is ours, we will use it unwisely and selfishly. If we realize it is God's, we will use it as his stewards.

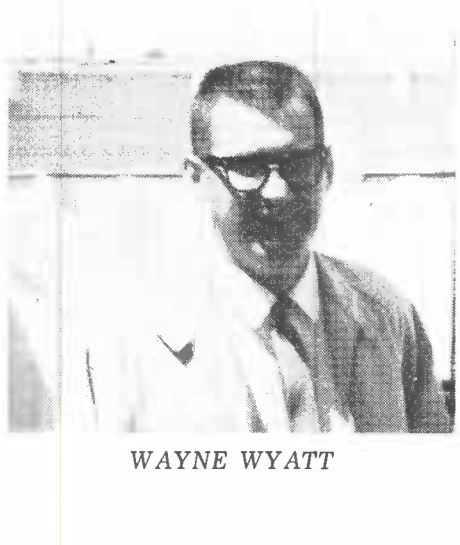
Water District No. 4 Opens Office

South Plains Underground Water Conservation District 4 has opened an office in the Terry County Chamber of Commerce and Agriculture Building at 221 Lubbock Road, Brownfield, Texas.

Wayne Wyatt, manager of the water district, serving Cochran, Terry, Yoakum and Gaines counties, extends an invitation to all residents of the water district to come by the office and get acquainted. "I will be happy to try to help any one with water problems."

Wyatt says that the water district is still operating on a limited basis and that it will be necessary for him to be out of the office some, collecting basic data and doing field work.

The High Plains Water District offers its congratulations and best wishes to our new water district neighbor.



WAYNE WYATT

SOME FARMING SCENES ON THE HIGH PLAINS OF TEXAS

Playa Lakes Again Dot the High Plains

Thought for the Month—

Man and nature are twin agents of the perennial revolution which shapes and reshapes the face of the earth and the character of man's activites. That struggle, sometimes violent and sporadic, at others, gentle and consistent, yet forever demanding a new response to each new challenge, activates the potential energies of man and nature, molding them into a grand pattern of advance or retreat, of creative interaction or of disasterous antagonism and of promise or failure.

—E. A. Gutkind

DELEGATES TO NATIONAL RIVERS-HARBORS CONVENTION

The Board of Directors of the High Plains Water District (Russell Bean, Lubbock; Chester Mitchell, Lockney; Andrew Kershen, Hereford; Ross Goodwin, Muleshoe; and Weldon Newsom, Morton) and Tom McFarland, General Manager of the Water District have been designated as delegates to the 55th Annual National Convention of the National Rivers and Harbors Congress, by Governor John Connally of Texas.

The Annual Convention will be held in Washington, D. C. June 4-7, 1968.

The National Rivers and Harbors Congress is an unofficial, nationwide, non-partisan organization. Its objective is an adequate, orderly, and prudent development of the use and conservation of the nations water resources. The areas of interest include reclamation, inland navigation, flood pollution and erosion control, water supply and irrigation.

Report Indicates Import Water Is Available

In a recent story filed by Ed Johnson, Lubbock Avalanche Journal's Washington correspondent, it was stated that a likely place of water-short West Texas and Eastern New Mexico to import outside water is the lower Mississippi River and future studies are being aimed in that direction according to Rep. George Mahon of Lubbock.

Mr. Mahon and other West Texas congressmen have been informed that the Bureau of Reclamation and the Army Corps of Engineers have completed a preliminary appraisal of water importation into wide areas of the two states.

FIRST STEP OF MANY

The congressman described the report as the first step "in a long, exhaustive study" that will have to consider the water needs of the Mississippi valley states before a final program is worked out.

Under 1967 legislation sponsored by Mr. Mahon, the Army engineers and the reclamation department have been evaluating on a reconnaissance basis alternative plans for importing water from various sources to the portion of Texas west of a line from Red River north of Wichita Falls to the Rio Grande at Del Rio and to the portion of New Mexico east of the divide separating the Canadian and Pecos River basins from the Rio Grande basin.

The continuing studies are expected to result in completion of a more detailed report by the fiscal year 1972.

WATER AVAILABLE

The preliminary studies reveal that the High Plains region will need to import 16.5 million acre-feet of water a year in order to meet its agricultural, municipal, and industrial requirements by the year 2020.

Mr. Mahon said the preliminary survey showed there is no question but what water will be available in the Mississippi River for export during some periods of most years, but determination of the amounts and times when water can be exported will require exhaustive studies to establish future needs in the valley states.

The report said these conclusions are supported by the investigations to date:

It is physically feasible to transport the projected requirements from the surplus of the Lower Mississippi river system to West Texas and Eastern New Mexico. The water could be transported through a combination of several routes studied. However, the more southern routes appear to be the most desirable for future study. The studies indicate the project would lend itself to stage development.

Regardless of the route, the cost per acre foot of water appears certain to exceed substantially irrigators ability to pay for such water.

Economic benefits of irrigation to nonfarm elements in the area's economy are large and appear to be sufficient to warrant payment by those nonfarm elements of costs of import water in excess of the irrigator's ability to pay.

The cost of delivering import water probably could be reduced and economic feasibility of the project enhanced by incorporating in the project provisions for purposes other than water supply.

Mr. Mahon pointed out that the second conclusion, the prohibitive cost to irrigators, could be met by municipalities and industrial firms, as suggested in the third conclusion. "The whole of West Texas economy needs the water," Mr. Mahon said.

The congressman also interpreted the fourth conclusion, for purposes other than water supply, to mean that a navigation canal could be made of the rivers from which the Mississippi waters are brought into the two needy areas.

PLEASE CLOSE THOSE ABANDONED WELLS ! ! !

SOME TAILWATER WASTE CONTINUES

High Plains Underground Water
Conservation District No. 1
1628 Fifteenth Street
Lubbock, Texas 79401

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THE Grass SECTION

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

Volume 15—No. 1 "THERE IS NO SUBSTITUTE FOR WATER" *June 1968*

PACKING PLANT PRACTICES WATER CONSERVATION

By TOM MOORHEAD

Industry has joined the farmer in an all-out effort to conserve underground water. For years it has been the primary undertaking of the High Plains Underground Water Conservation District No. 1—to conserve, to the best of our abilities, our supply of underground water.

Such an interested industry is the Missouri Meat Packers, Friona, Texas. This multi-million dollar operation was located at Friona through the combined efforts of many people—vital roles were played by A. L. Black, Andy Hurst and Dr. Lloyd Shakelford.

The Friona area had long been observed for just such a plant because of the amount of grain sorghum and other farm products that are grown in such large amounts in this area. The presence of a good water supply (via wells) and the location of several large capacity cattle feeding operations were also factors in the location of this packing plant in Friona.

Missouri Meat Packers built their new plant approximately three miles southwest of Friona and held their formal opening on April 20, 1968 on what Bill Ellis, Editor of the Friona

(Continued on Page 3)

SETTLING LAGOON

THE PASSING OF A PIONEER

A. H. McFARLAND

"Good, — friendly, — generous, — always happy — he loved these high plains," are the ways his friends speak of Mr. Mac".

"Mac was young when the West was young" a prominent High Plains jurist remarked recalling the opening of the "Cherokee Strip" in Oklahoma and how young McFarland, riding beside his father in a spring wagon, made "the run" for land and settled near what now is the city of Enid, Oklahoma. For the first few years, he lived in a sod house with his father, mother and a small sister helping his father break the land and put it into cultivation. The first permanent building on the claim was a big barn" . . . "because a barn would build a house but a house wouldn't build a barn," was the way Mr. Mac recalled his dad saying it. In the early days of the Ringling Bros. Barnum and Bailey Circus when beautiful horses were hitched in matched teams to draw heavy circus wagons the McFarlands made a little extra money by raising draft horses and breaking them for the Ringling Bros. Mac and his father bought more land in Oklahoma, but in 1914 they came west to the High Plains " . . . just to look around". And then they bought.

In 1915, Mac, with his bride, Irene, moved to West Texas and settled on their new land in Lamb County just east of Littlefield. A part of their "eating money," Mac earned by riding an old motorcycle he had brought with him from Oklahoma up dusty cow trails and dirt roads to Amarillo to get windmill parts for neighboring ranchers.

A Sunday sport was chasing coyotes or antelope on his "two lunger" until one day he folded the front wheel in a badger hole.

"That Plains will be the greatest farming country in the nation someday," Mrs. McFarland recalls Mac saying as he talked to her about moving West with him. "From a comfortable school teaching job in Oklahoma to a West Texas housewife, living in a three-room shack, took a lot of imagination, she recalled. "But think of all the good life we would have missed. Tom was born in that shack you know," she added.

On Memorial day, (May 30, 1968) Mr. McFarland passed away, but his enthusiasm for life and the country he loved never waivered until the time of his illness two years ago.

THE Cross SECTION

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

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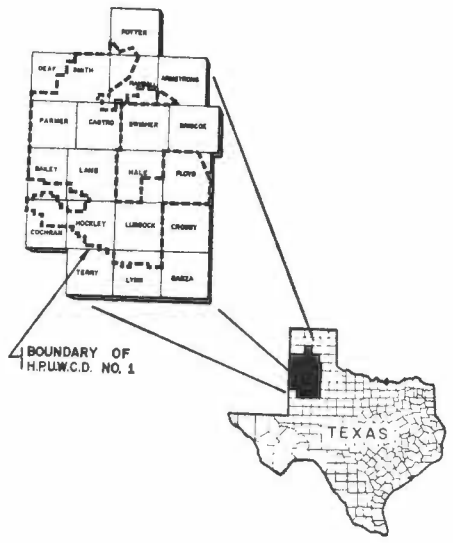

STATE WATER OFFICIAL SPEAKS

JUDGE OTHO DENT

Mr. Otho Dent, Texas Water Rights Commissioner spoke at the dedication ceremonies marking the formal opening of the Greenbelt Municipal and Industrial Water Authority lake near Clarendon, Texas, on June 2, 1968.

The Greenbelt Authority was created in 1954, at the first called session of the 53rd Texas Legislature. However, vestages of this project can be traced back some 42 years, with the filing of a petition by the Red River Valley Irrigation Association, seeking permission to have a project feasibility study made of the upper reaches of the Red River (the Greenbelt lake is located on the Salt Fork of the Red River).

In speaking of the obstacles confronting such water projects, Mr. Dent noted:

A great national leader of his time once publicly said of the West, including this area: "What do we want with this vast worthless area . . . this region of savages and wild beasts, of deserts of shifting sands and whirlwinds of dust. Of cactus and prairie dogs? To what use could we ever hope to put these great deserts . . ." There are others who shared Daniel Webster's opinion of this area. Some of our neighbors and friends of recent time have said that the project would never be built.

Others pursued a negative course providing obstacles that had to be overcome. It would be most gratifying to you, if those of the past who had a dim view of this area and this project, could only see this project in its reality. Webster and others did not have the foresight to conceive or comprehend the potential of the area, nor the integrity of its people.

In my opinion, it is good for the issues involved in the merits and demerits of a project to be weighed, discussed, and even debated. The end results are usually beneficial to the proposal. I propose that a tribute of respect and honor be paid to the men who were in the forefront of the struggle for the project. That they be recognized for their toils and personal sacrifices — and assure them that their unselfish deeds have spoken eloquently to us—and that we are grateful.

The State's accelerated population and industrial growth creating new opportunities cannot continue too far into the future, especially in some areas, unless additional supplies of water are made available. Demands on most of the State's existing supplies are growing faster than the development of new sources. Should we experience another drought comparable to that of the mid 50's, many towns, cities, industries and farms would face a greater crisis, as development of supplies is not keeping pace with needs. Should such a drought occur, many jobs would be lost, industry and agriculture would be forced by water shortage to curtail production or shut down altogether.

During the last three decades, we have had a great movement of population from the rural areas to the larger cities. I am fully persuaded that within the next ten years, we will see this trend in reverse. Those moving into some of our larger cities will be meeting others coming back. Recent population studies show that in the last few years, 8 out of 10 of the nation's larger cities have lost population—Chicago, Detroit, Baltimore, Cleveland and we could name others. Many within the larger cities are now looking for more space and better living conditions. Automation has caused an even greater dispersion of industry, since automated production processes are carried out more efficiently in the sprawling one story factories. The land needed for automated complexes and for better family living is being found in the spacious countryside and not in the cramped confines of the metropolitan cities. We cannot equate the future with the frustration and hopelessness of the past. Neither can we take for granted that all the turbulent waters are behind us and contemplate only smooth sailing ahead.

I am not one to say that this body of potable water is the answer to all the area's social and economic needs, but I am saying that it is a foundation stone for this area, upon which a better social and economic structure can be built. You of the Greenbelt area cannot afford to hang up your hats and rest on your laurels. Rather, you must, and I know that you will, hang up your coats and put your shoulders to the wheel. The road of social and economic progress does not stop with this project. In reality, it begins here.

THOUGHT FOR THE MONTH

You cannot play with the animal in you without becoming wholly animal, play with falsehood without forfeiting your right to truth, play with cruelty without losing your sensitivity of mind. He who wants to keep his garden tidy doesn't reserve a plot for weeds.

—Hammerskjold.

Water Is Your Future, Conserve It!

Packing Plant

(Continued from Page 1)
Star called "Friona's Day of Destiny". At the time of this writing the plant is operating at about one-half capacity, or 800 carcasses per day, according to William Gilbert, General Manager of the Friona plant. More cattle feeding operations and more "fed-out" cattle in the area will permit operation at full capacity.

The plant has three six-inch water wells located on the property. This water is used profusely throughout the plant at the rate of approximately 432,000 gallons per day. This water leaves the plant carrying waste of all types resulting from washing and cleaning of cattle and carcasses. The water goes into settling lagoons (two in number) capable of holding 23,400,0000 gallons of water. Impurities are allowed to settle out and thence the water goes into a very large playa lake. At least two high plains farmers have installed lake pumps for the return of large amounts of lake water to their farms from this playa lake. Records will be kept on how much water is ejected from the packing plant, quality of the water, and how many acres are being watered by these playa lake systems and any other pertinent information that results from this facility and our farmers find interesting.

We extend our heartiest welcome to the Missouri Meat Packers to the High Plains of Texas and applaud their excellent beginning in the conservation of underground water.

Missouri Meat Packers—Playa Lake Pump

WATER DISTRICT DIRECTOR HONORED

ANDREW KERSHEN

"We must take care of the soil and water or starve."

These are the sincere, heart-felt words of Andrew Kershen of Hereford, Texas, farmer, rancher, citizen, conservationist and father.

This director for the High Plains Underground Water Conservation District No. 1 since 1965 has recently been recognized as the Conservation Farmer of the Year for the Tierra Blanca Soil and Water Conservation District.

In addition to serving as Director of the High Plains Underground Water Conservation District, Mr. Kershen is a member of the Deaf Smith County Chamber of Commerce Water Resources Committee; Director for the Hereford Grain Corp.; Past President of the Deaf Smith County Wheat Growers Association; Director of the Texas Wheat Growers; Past Director of Farm Bureau and Farmers Union; and is Past Master of the Knights of Columbus for Northwest Texas.

A detailed study of the farming and ranching activities of Mr. Kershen will reveal his love for the soil and his complete dedication to the conservation of soil and water. His progress from a small beginning to his rather extensive operation today is audible testimony to hard work and dedicated conservation practices.

Mr. and Mrs. Kershen have reared six fine children and have been eminently successful in helping to launch each of them toward his individual quest in life.

Andrew Kershen is a man who does things—and does them well.

Collection Rate Increase Offered

County Tax Assessors and Collectors in a 14-county South Plains area stand to benefit appreciably if a realistic proposal by the High Plains Underground Water Conservation District No. 1 Board of Directors is successful.

The District's Board passed a resolution doubling the amount the Water District is willing to pay the affected counties for assessing and collecting the District's maintenance taxes.

Legislative action, likely in form of a local bill, will be required for implementation of the proposal.

Since 1952, the District has paid one per cent compensation for assessing, one per cent for collecting, and in case of delinquent taxes—five per cent for collection.

Under the new proposal, two per cent would be paid for assessing and two per cent for collecting to compensate for rising costs being experienced by the county agencies. Delinquent collections still would be compensated at the five per cent rate.

A proposed amendment to the existing related legislative acts has been forwarded by the High Plains District to Rep. Bill Clayton, Springlake, the Chairman of the Interim Water Committee of the legislature.

The Board, acting through its manager, has asked opportunity to make a presentation before the committee at its next meeting to discuss the proposal.

Efforts also are being explored to get the amendment on the agenda for the special legislative session recently called by Gov. Connally.

Counties affected would include: Armstrong, Bailey, Castro, Cochran, Deaf Smith, Floyd, Hale, Hockley, Lamb, Lubbock, Lynn, Parmer, Potter and Randall.

Grain Sorghum Loan Rate Adjusted Upward

The grain sorghum loan rate has been adjusted upward on the High Plains for 1968. The increase will average about 6 cents per hundred weight for the area counties. The increase has come about as the result of efforts in Washington by Grain Sorghum Producers Association. A producer with 160 acres of sorghum should realize approximately $600.00 more income this year over last year —all as a result of having a worthwhile organization working for the best interest of sorghum producers. Our congratulations to GSPA officials and the producers who support it.

High Plains Agriculture Creates Texas Jobs

WHAT IS A FATHER?

When you are small, a father is two large hands. These hands pick you up real easy, and help you cross the street. They put worms on fish hooks better than any other hands in the whole world.

A father is the man who sits at the head of the table. He gets two pork chops . . . you get one. He is nice to be near when there's thunder and lightning . . . or other big trouble.

A father understands when you think you're too old to be kissed good night. He is the one who teaches you how to tie your shoe laces. He buys your first razor, and gives you permission to take the car . . . sometimes, then comforts mother when you aren't home on time. Sometimes he helps you fail algebra and geometry.

A father spends most of his life reaching in his pocket for money to give someone for something. His favorite words are, "Now, when I was your age . . . "

A father is the person you want to be like when you grow up . . . especially when he takes you fishing or lets you sit on his lap and help steer the car when you are little, or lets you have the keys to the car when you're a little older.

A father is someone you can ignore; but you can never forget him. Sometimes a father gets angry and hollers real loud; but he never stays mad very long. All in all . . . he's a pretty good guy. I think he likes me more than he ever says . . . I can tell by the way he looks at me, or pats my head, shakes my hand or gives my shoulder a squeeze every now and then.

A father is a small boy grown taller and wiser. He buys Life Insurance to make sure mother and we kids will always have a house to live in, food to eat, shoes to wear, and that we kids all get to finish high school . . . sometimes even college.

$892,000 FOR STUDY

Import Water Bill Passes First Test

A recent story filed by Ed Johnson, Avalanche Journal's Washington Correspondent stated that the House Appropriations Committee, in reporting a bare-bones public works spending bill recently, left untouched a recommended $892,000 to continue the reconnaissance study of importing water to West Texas and Eastern New Mexico from points outside the two states.

In Lubbock, the action was hailed as a step of extreme importance in the race to get a new irrigation water supply for the South Plains as soon as possible.

The over-all public works measure called for $4.5 billion in projects across the country, but the committee trimmed President Johnson's budgetary requests by $408 million, leaving the lowest dollar figure in several years.

However, Rep. George Mahon of Lubbock, Chairman of Appropriations, was able to sustain the $892,000 recommended in the Johnson budget for the water import study.

That figure broken down into $467,0000 for the Bureau of Reclamation's feasibility study and $425,000 for the Corps of Engineers to coordinate the survey. In the current fiscal year, the two agencies get a total of $400,000 for the study, aimed at a long range source of water for all possible uses in a vast portion of Texas and New Mexico.

Guided carefully through the legislative mill by Mahon, the study got a boost in May when the Engineers and reclamation Bureau made public a preliminary appraisal.

They concluded that a possible source of water is the lower Mississippi River valley and said future studies would be aimed in that direction.

Mahon, at the time, described the preliminary report as the first step in a "long, exhaustive study" that will have to consider the water needs of the lower Mississippi states before a final program is worked out.

"This is great," Cliff Chamberlain, executive director of Water, Inc., said in Lubbock when he learned of the committee action. "This will permit both the Corps of Engineers and the Bureau of Reclamation to continue their studies at an increased level. Right now, the target date for a final report is 1972, but we hope to shorten that time. Any substantial reduction in the recommended appropriation would have delayed progress."

Water, Inc. was organized last year as a means of hurrying the importation of water into this region.

Chamberlain said the Corps of Engineers is determining how much surplus water there is along the lower Mississippi, where and when it might be available and navigational aspects of a route of importation across Louisiana into Texas.

Meanwhile, the Bureau of Reclamation is refining its study of the reclamation and irrigation aspects of the project, including terminal storage areas and distribution systems.

Last month, the Bureau concluded it would be feasible from an engineering standpoint to import 16.5 million acre feet of water annually from the Mississippi to West Texas. The end point would be Bull Lake, northwest of Lubbock in Lamb County.

Some engineers have calculated the area's underground water sources, on which crop irrigation now is dependent, cannot be counted on beyond the year 2000. Declining availability has been predicted before then, in fact, with some expecting a shortage in parts of the area by 1980.

The $892,000 importation study, as with all appropriations in the bill okayed by the committee, would be for work in the new fiscal year which begins July 1.

Spending amounts are subject to change anywhere along the legislative route. The Mahon committee did say that the projects were "cut to the bone" and asked that Congress not try for any further reductions.

Committee members added no projects not recommended in the Johnson budget—and deleted some of the recommended ones. Cuts of at least five per cent were applied to each construction item that survived.

A Johnson recommendation for $200,000 for the Canadian River project in the Texas Panhandle was reduced to $190,000 in the bill. It provides for testing operations and for correction of deficiencies on the completed facilities.

Ordinarily, the Senate increases some figures after the House completes action on its version. With Congress bent on reducing expenditures this year by $6 billion because of the national financial squeeze, however, observers said it is difficult to predict what the final public works legislation will look like when it goes to President Johnson for his signature.

INTRODUCING . . .

MISS SUE McCORD

Sue McCord, Water District Secretary for Floyd County, 101 Wall St., Floydada, Texas.

Sue has been working for the Water District for one and one-half years and has proven to be a capable and efficient addition to the District. She is a native of Clarendon, Texas and declared to your reporter in a recent interview that her primary hobby is auto racing.

Farmers of Floyd County and other individuals interested in conservation of underground water are invited to visit your Floyd County office.

MRS. DARLENE HENRY

Mrs. Darlene Henry, Muleshoe, Texas, Water District Secretary for Bailey County. Darlene began working for the District May 15, 1968 and has already proven to be a valuable addition to our staff of employees. She is a native of Muleshoe, and is the daughter of pioneer Bailey County farmer B. H. Black. who has for many years played a vital role in water conservation on the High Plains.

Darlene is married to Kenneth Henry, enthusiastic young insurance executive in Muleshoe. She declares that her hobbies are home making for Kenneth and their two daughters, Sharla, 6, and Sherri, 4.

We welcome this fine young family to the high Plains Water District's "family" of employees.

High Plains Underground Water Conservation District No. 1
1628 Fifteenth Street
Lubbock, Texas 79401

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THE Cross SECTION

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

Volume 15— No. 2 "THERE IS NO SUBSTITUTE FOR WATER" *July 1968*

THE WATER OF LIFE

By Rutherford Platt

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If water were not so commonplace in our everyday lives we would look upon this marvelous liquid with utter astonishment. It is composed, in fact, of two of the most common elements on Earth, hydrogen and oxygen. Together, they create the only liquid that forms naturally on the Earth's surface, a supple, sparkling substance which rises and falls in ocean tides, spirals and crashes in surf, forms fluffy clouds and reflects the splendor of sunsets.

For about one and a half billion years water performed its wonders on a rocky, dead, volcano-tortured globe. Then tiny living cells appeared, pliant and sensitive to their surroundings, endowed with energy systems dependent upon water for their existence. And the correspondence between the physical characteristics of those living cells and drops of water is remarkably close.

Consider water's "skin," one of the natural wonders of the world. You glimpse it as water squeezes slowly from a dripping faucet, each bulging drop clinging tenaciously to the rim of the spout. When a drop has swollen until it is too heavy to resist the pull of gravity any longer, a glittering hemisphere becomes a long oval dangling doggedly for an instant from a thread of water. Suddenly the drop lets go — and, faster than the eye can see, a transparent "skin" snaps around the falling drop, turning it momentarily into a sparkling sphere.

This same skin forms instantly where water meets other materials, because the water molecules have greater attraction for each other than for molecules of other substances. As a result, they squeeze closer together when they're in contact with air or other matter, making a denser layer. We call this "surface tension." Carefully lay a steel needle horizontally on the still surface of a glass of water. Steel is much denser than water, yet the needle floats. It lies in a trough where the skin of the water bends under its weight, but it does not sink through.

Surface tension also spreads a rippling skin on puddles and ponds, the happy hunting ground for many fantastic creatures. Here is a long legged insect called a "water strider" whose tiny oval slippers dimple the water skin. Without lifting its feet, it scoots around swiftly to escape an enemy, using the elastic surface tension of the water to produce a skating motion.

In many other ways, water's amazing characteristics help support and sustain life. Let's look at a few:

Water Flexes Its Muscles

Water can glide through extremely slender tubes, and ooze through invisibly tiny holes. You see this happen when you dip the corner of a porous material such as a towel or soft paper in water: you see the water resist the pull of gravity and creep upward in the material.

This capillary action of water is a combination of two seemingly contradictory forces at work: the attraction of water molecules for each other, and the attraction of water molecules for those of other materials. A thread of water is almost all surface, and all pull; it moves onward because molecules at the head of the column are attracted by the dried spot just beyond: they reach to make it wet, tug on the molecules clinging to them in an exquisitely slender tail, and pull them along. The opposing force of gravity is negligible against this muscle of water. You test its great strength when you wring out the laundry. Twist and squeeze with all your might, you can never wring the laundry dry.

Capillarity lifts water up from under the ground, through porous soil to the roots of plants, then still upward through stems and leaves. Small plants are entirely dependent upon capillarity for feeding.

The Great Dissolver

Water literally takes other molecules apart — it can dissolve more substances better than any other liquid. Certain materials, like salt and sugar, dissolve immediately, right before our eyes. But even obdurate substances like iron, calcium and magnesium will eventually dissolve if left in water long enough.

The ability of water to dissolve almost everything is a property that led directly to living cells. It is difficult to imagine a situation more impossible for life than that on our scorched planet after it cooled enough to have a crust. The atmosphere was poisonous, chiefly methane, ammonia fumes and hydrogen sulfide.

(Continued on Page 2)

An Interesting Tailwater Return System

By TOM MOORHEAD

GRASS WATERWAY

A subject of great concern to all high plains residents is methods of control of waste water from tailwater losses. The High Plains Underground Water Conservation District has long considered control of tailwater waste one of the primary functions and responsibilities of the district, and has been instrumental in helping to design and construct numerous tailwater return systems which now dot the high plains by the hundreds.

Mr. Cecil Curtis of Route 1, Dimmitt, Texas, who farms 5½ miles north of Springlake, has approached his tailwater problem by incorporating a unique innovation which has proven eminently satisfactory in solving his own particular problem. By looking at his practices other farmers can find some solutions for their own individual problems with regard to tailwater waste.

Vital Statistics

Mr. Curtis' system has an orthodox tailwater pit with return pump situated in the center of the east side of his farm. But whereas the usual tailwater return system has the return water flowing directly into the pit, carrying much silt into the pit with the water, resulting in the rapid buildup of silt in the pit which necessitates expensive cleaning out at regular intervals — Mr. Curtis has his tailwater returning to the pit by

(Continued on Page 3)

WATER TO PIT

THE Cross SECTION

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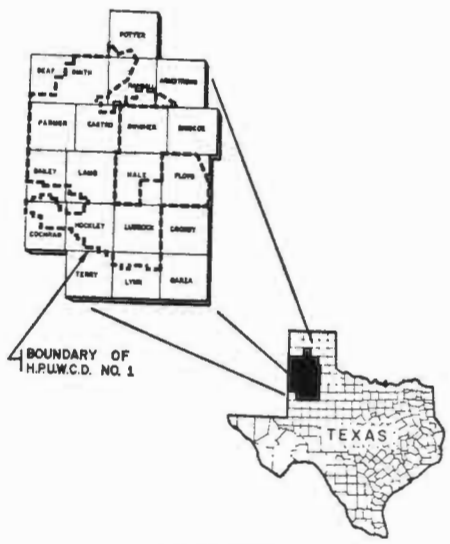


WATER OF LIFE—

(Continued from Page 1)

But in time steam vomited from volcanoes formed dark clouds, then fell as rain in century-long cloudbursts that drenched the rocks. Many elements found in living cells today — iron, calcium, sodium, phosphorus, potassium — were dissolved out of the rocks and poured into the great mixing bowl of the seas, where ultimately they could be assembled to imbue all living things with their elemental energies.

The same process goes on today. Every year the rivers of the world carry into the sea some five billion tons of minerals. A good portion of this immense volume of dissolved matter will be ingested by creatures in the sea — and then move on through the great chain of life.

Frozen, It Floats

If ice did not float, the oceans would be frozen solid from the bottom up, and there would be no life on earth. Here is yet another example of water's extraordinary qualities. Practically every other substance contracts as it becomes colder. Colder molecules are quieter, vibrate less, so they draw closer together and are denser. By this basic law of physics, ice should be denser and therefore heavier than the same volume of water. Under the circumstances, ice would sink. Why doesn't it?

Water does behave normally up to a point. But then, at 39° F., an astonishing thing happens. The water stops contracting. And exactly at its freezing point it expands, to have about ten-percent more volume as ice than as water! This makes it less dense than the water it displaces, so ice floats. The power of the sudden swelling is well known to those whose water pipes have burst in freezing temperatures.

Water's Super-Molecules

Water's marvelous properties are caused by its unusual molecular structure. Through most of man's history, water was mistakenly thought to be an element. Then in 1783, the Frenchman Antoine Laurent Lavoisier demonstrated that water is a compound of hydrogen and oxygen. Little more was learned about water until the development of atomic science and the discovery that the unusual properties of the molecule H2/O are directly traceable to its physical structure.

If you think of atoms with their orbiting electrons as spheres, the water molecule can be visualized as two grapes (hydrogen atoms) clinging to a fat orange (oxygen atom). If their centers, the nuclei of the three atoms, are joined by straight lines, they make an equilateral triangle. Because the two hydrogen atoms are set off at such an angle, the electrical hunger of the oxygen atom (two negative charges) is not satisified by the two plus-charge hydrogens. Thus H2/O molecules forever try to make electrical bonds with any molecules they contact.

To satisfy this appetite, they will join the molecules of cloth, paper, almost anything — making them "wet" and starting the dissolution process. Each triangular water molecule also attracts other water molecules and they cling together at the peaks of their pyramids, the molecules on the outside always reaching outward with unsatisfied charges. The result is an open texture, constantly shifting and reforming (the life of a cluster has been calculated to be about one billionth of a second), linking molecule to molecule, drop to drop — ocean to ocean.

The flexible strength of this "water fabric" is just right for the living world. The super-molecule clusters are easily separated by a swimming fish, yet instantly make new connections in its wake. En masse, the fabric is so strong that it is continuous throughout the seas of the world. Some time ago, scientists of the Lamont Geological Observatory in Palisades, New York, set off a small explosion 400 feet deep off southwest Australia. A listening instrument at the same depth off Bermuda recorded the sound. Its waves had carried 10,000 miles through the close-knit fabric of water!

A Big Appetite For Heat

Water can absorb more heat than almost any other common substance without considerable rise in temperature. Put cold water on to boil. Under temperatures that would cause many other substances to burst into flame, water rests quietly, soaking up heat. Soon you can see tiny air bubbles near the bottom of the pan. Then large bubbles of water vapor can be seen rising from the bottom only to collapse midway when they hit cooler water higher up and revert to liquid. When water has taken in heat enough to make it 212° F. from bottom to top, you hear a low-pitched throbbing sound as swollen steam bubbles finally burst through the surface tension.

The capacity to hold heat is important to life. Thus, the ancient oceans were able to be magnificent reservoirs of energy absorbed from sunlight. In this environment living cells developed, and thereafter water continued to quicken the chemical reactions of the energy systems of living organisms.

When plants and animals emigrated from the sea, elaborate arrangements had to be made, with threads of sap and bloodstreams, to keep every cell in their bodies in a watery environment. Because of this, it takes a lot of water to sustain life. The human body is 70 percent water. In an adult, water comprises 80 percent of the blood, 75 percent of the muscle. The material of bones is 25 to 30 percent water. And this water level must be constantly maintained — a man can die of dehydration in six days.

Water did not create life — but it did assembly the necessary elements and bring it forth. Does this tracing of so many properties of life to one inorganic compound, water, imply that life is in some sense "inherent" in matter? Many scientists today would say yes, given the right conditions. In the vast outer space beyond our solar system there are myriads of other solar systems where planets with the "right" gravity, temperature and atmosphere may be expected to exist. There, according to the universal laws of nature, oxygen and hydrogen will eventually find each other — and assume the characteristics of the marvelous substance we call water. When that happens, and enough time passes, life as we know it could appear.

RETURN SYSTEM—

(Continued from Page 1)

flowing through two bermuda grass grassways. This is accomplished by two diversion terraces that empty into waterways at each end of the system. These two grassways are 60 feet wide and one-fourth mile long each. When the water reaches the pit, all silt has been removed, and the water is as clear as when it was pumped from one of the two 8-inch wells incorporated into this system. Mr. Curtis has installed a 6 inch asbestos return line from the tailwater pit back into his regular irrigation line.

Conclusions

This system has been in operation for about two years and the silt buildup has not reached the point where "floating" back on the land with a land leveller has become necessary. The bermuda grass has a rapid growth because it has been watered so often and can be utilized by grazing during non-watering season or baling for hay when the growth reaches baling height. Mr. Curtis estimates that this system saves him at least 25% of his water from the two wells. The bermuda is of the Midland variety and the returned grass seed will not germinate, resulting in contamination of the regular crop. The Soil Conservation people of Lamb County are justifiably proud of this installation which is proof of what can be accomplished with complete cooperation among all interested parties.

Help From District

Farmers of the area and throughout the district are invited to observe this interesting tailwater system to see how one interprising farmer has overcome his problem of tailwater waste. Any information or technical assistance the Water District has at its disposal is available to any farmer interested in help with his tailwater problem.

CURTIS TAILWATER PIT

SOY BEAN GROWERS DEVISE PLAN

A 6-point program of self-help financing designed to combat a threatened surplus of U.S. soybeans has been formulated by representative leadership of national and state soybean producer organizations during a 2-day meeting in St. Louis.

The proposal calls for "unanimous support of a new, aggressive coordinated program of increased international market development and soybean research financed on a per-bushel basis."

Presidents of 14 state soybean associations and members of the executive and market development committees of the American Soybean Association launched the most energetic market development program in the 48-year history of ASA by personally pledging to contribute one-half cent per bushel on their own 1967 soybean production.

The group agreed to return home, personally contact other soybean growers and encourage them to join in "supporting a unified approach to a national problem with an international solution of increased worldwide market development."

A further point emphasized that they will "seek the advice and counsel of agribusiness — farm organizations, handlers and suppliers."

The group named ASA to headup the drive for grower support and program coordination.

Action came after speakers representing other commodity groups, equipment suppliers, elevators and soybean processors clearly outlined the problems and various approaches to a workable solution.

The ASA executive committee, soybean situation, gave an official green light to immediately initiate preliminary phases of the program of voluntary contributions by growers and agribusiness.

Texas Tech Researchers

Texas Tech farm researchers have figured that the loss caused by weeds among grain crops on the High Plains runs as high as $84 million a year.

Here's the way they figure it:

A weed-free grain sorghum field at the Tech research farm produced 4,900 pounds an acre.

Adjoining fields had weeds in various amounts, and these were counted by rows.

It was found that one weed every 32 feet of row reduced the yield 150 pounds an acre.

The Abundance Of Water In The Ground

Ground water is by far our largest water resource, and it is estimated that more than 95 percent of the fresh water available in the nation at any one time is in the porous beds of rock and sand that make up the crust of the earth. In many parts of the United States, such as the broad plains along the Atlantic Ocean and the Gulf of Mexico, incredibly huge quantities of ground water can be found. Florida's rock formations alone, for example, contain far more fresh water than the five Great Lakes combined, and many other parts of the nation have similar tremendous ground water resources.

Strictly speaking, there are no "underground rivers" anywhere in the world, except in places where caves or channels have been carved in buried layers of limestone. In other varieties of rock and in beds of loose sand and gravel, water fills all the cracks and open spaces, and the ground-water reservoir may extend in a thick layer under the land surface for many miles in all directions.

Today, when many rivers and lakes have been tapped for water supplies to their full capacity, or have been polluted to a dangerous degree, people are turning more and more to the pure ground water that can be found almost everywhere . . . and are learning, to their great surprise, that a well-water system is usually better, easier and more economical to operate than almost any other water-supply system. In the old days, ground water was thought of only as a source for household use. But today, it is tapped for large supplies by municipalities, industries, homes and irrigation systems all across the nation.

The amount of ground water that can safely be pumped year after year depends mainly on two factors: the quantity of water in the underground formations plus the climatic and geologic conditions that affect replenishment of the ground water source. Water already contained in a natural ground water reservoir has been accumulating over years, or even centuries, and is a largely-untapped reserve water supply to carry through periods of little or no rainfall.

If the amount of water taken from wells in a certain locality is less than the long-term replenishment from rainfall, pumping may be continued indefinitely without causing any harmful effects.

If pumpage is greater than the replenishment, however, inroads will be made on the water already stored in the earth. In such cases, continued pumping may slowly lower the water table. Thus, despite its abundance in almost every part of the country, ground water is not an inexhaustible resource. Like all natural resources, it must be conserved and properly developed to insure its availability in the future.

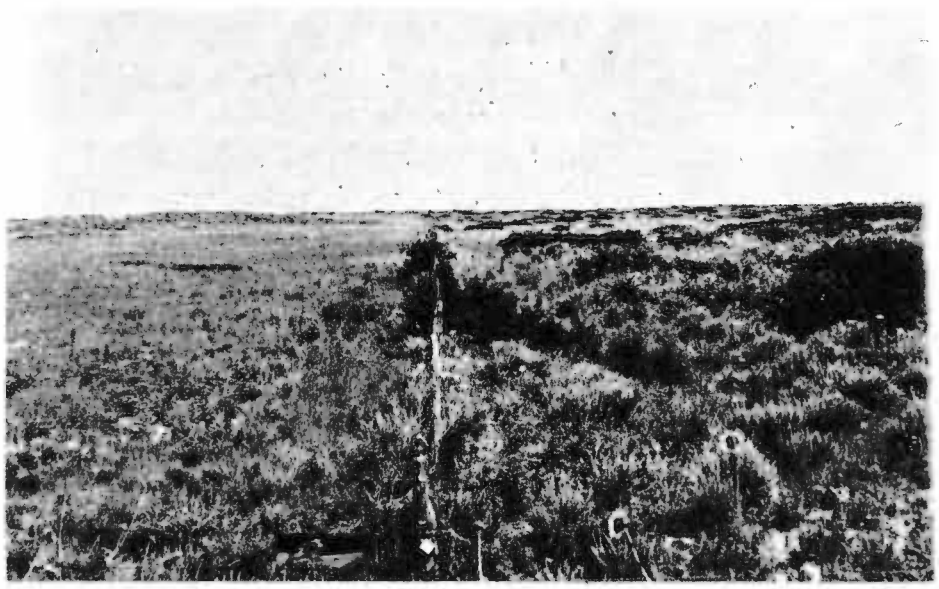
Conservation of a natural resource, in its true sense, means wise use of the resource. For a renewable resource such as ground water, conservation seeks to pattern its use on the basis of natural laws that govern its occurrence and replenishment.

One way in which we can maintain or even increase our supply of usable water is by removing polluting wastes from used water before disposing of it. Where water quality is excessively damaged, it cannot be used without extensive treatment. Conservation works in the present in day-to-day realities — with an eye to the future.

Each search for industrial plant sites or new housing areas raises the question of water supplies and the inter-related matter of sewage or waste disposal. The answers don't always come easily. All areas of water use and conservation are becoming much more important each passing year.

High Plains Underground Water District
Drilling Statistics For April, May, June 1968

COUNTY	Permits Issued	New Wells Completed	Replacement Wells Drilled	Dry Holes
Armstrong	30	14	0	1
Bailey	32	11	2	0
Castro	21	43	0	0
Cochran	9	12	0	0
Deaf Smith	54	54	0	2
Floyd	32	28	2	0
Hale	10	10	2	0
Hockley	16	15	0	0
Lamb	10	15	1	0
Lubbock	15	53	1	1
Lynn	3	12	0	0
Parmer	39	39	1	2
Potter	0	1	0	0
Randall	15	15	0	2
TOTALS	286	322	9	8



BRUSH CONTROL PAYS OFF — Shown above is a fence line contrast between a brush-infested pasture and one on which the brush has been destroyed. The picture was taken in the sand hills on the Frank Daugherty ranch south of Olton. The sand sage brush in the left pasture was shredded and deferred and the native grasses have made a good recovery. The pasture on the right was untreated at the time of the picture, but has been since. Several ranchers in the area have completed the same type sand sage brush treatment on their land.

GRASSLAND RESTORATION URGED

Needed Water Wasted

"Worthless brush and weeds waste nearly as much water as is used for all other purposes in Texas," according to H. H. Smith, State Conservationist of the Soil Conservation Service, Temple. "One of our greatest potentials for saving water is reducing this waste by non-economic plants."

Smith said at least 10 million acre-feet of water could be saved annually by a complete grassland restoration program in Texas. This is about three-fourths the amount now used by all consumers. This saving would go a long way to assist in easing future water shortages, he said.

This is part of the information in a new publication just released by the SCS, *"Grassland Restoration, Part V, Effect of Water Yield and Supply"*, by C. A. Rechenthin and H. N. Smith. The booklet is the fifth in a series dealing with Texas rangelands. It documents huge water losses that occur each year from brush and weed infestation. It shows how municipal, industrial and agricultural water supplies are reduced on watersheds infested with brush and weeds.

In a 1964 survey, SCS found that 88 million acres, or 82 percent of Texas' 107 million acres of grassland, are infested with brush. Range conservationists say that four out of every five acres are producing less than half their potential.

More than one-third of the rain that falls in the State each year is being used up by non-economic plants, according to estimates made by Dr. J. R. Johnston of the Agricultural Research Service. He says that 138 million acre-feet are being wasted by weeds and brush each year.

Since grass uses less water than most other plants, there are vast opportunities for cutting water losses by improving infested grassland.

Using the limited research available, Rechenthin and Smith give a detailed study in the new booklet of the effects of grassland improvement on water supplies.

Smith said that water has always been one of Texas' most valuable but least abundant resources. He said saving water by improving grasslands will benefit all Texans.

Water Is Your Future, Conserve It!

WATER BOARD CHAIRMAN HOPEFUL

Mills Cox, chairman of the Texas Water Development Board, said recently he is "hopeful" that the Congress will follow the House Appropriations Committee's recommendations to allocate $892,000 to the Bureau of Reclamation and the Corps of Engineers to continue their studies of importing water to Texas and New Mexico from outside the two states.

"The Texas Water Development Board and I were gratified by the Committee's action which recommended $467,000 for the Bureau of Reclamation for its part of the study and $425,000 to the Corps of Engineers to coordinate the study aimed at providing a long-range source of water for a large part of Texas and eastern New Mexico," said Cox. "It is our hope that the Congress will follow this recommendation."

Cox also praised U.S. Rep. George Mahon of Lubbock, chairman of the House Appropriations Committee, for his careful and skillful handling of President Johnson's recommendations for funds for the two federal agencies. "The states of Texas and New Mexico are indebted to Rep. Mahon for guiding the President's budget recommendations through the Committee," Cox said. "The continuation of these studies is important to Texas and to New Mexico, and I feel that the Congress, even though it is determined to reduce expenditures, will recognize the need to continue these important studies and appropriate the funds recommended by the President."

Committee approval of the recommended import study funds, said Cox, is an indication that the federal government is tacitly approving the Texas Water Development Board's plan to provide water for all sections of Texas. "It is further indication," he added, "of the desire of the Corps of Engineers and the Bureau of Reclamation to continue the excellent relationship that exists between the two federal agencies and the Texas Water Development Board."

The Bureau of Reclamation last month released its progress report on studies of importing water to West Texas and Eastern New Mexico. The preliminary appraisal concluded that a possible source of water is available from the lower Mississippi River and recommended aiming future studies in that direction.

Texas Water Development Board studies indicate that underground water resources, on which crop irrigation in West Texas is dependent, cannot be counted on beyond the year 2000. Declining availability of irrigation water in some parts of West Texas, particularly in the southern High Plains, is expected to produce a water shortage for irrigation by 1980.

Bill Clayton Resumes Water Travels

Since the called special session of the 60th. Legislature of Texas was concluded July 3, 1968, State Representative Bill Clayton of Springlake, Texas has been travelling extensively in behalf of water and water related problems.

Early in the month he attended the 2nd. Annual National Conference of State and Federal Water Officials in Detroit, Michigan; the week of July 19th he attended the Texas Water Code Revision Advisory Committee meeting in Austin; he was in San Antonio, Texas July 26th to preside at a public hearing of the House Interim Water Study Committee; and he will be leaving July 30th to attend the Southern Region of the Council of State Governments Water Resources Conference in Miami, Florida.

A legislative bill pertaining to the operation of the High Plains Underground Water Conservation District #1 could not be introduced at the special session of the legislature because it was not within the call of the Governor's Proclamation calling the special session. Clayton stated that the legislation could be introduced and passed early next year during the regular session of the 61st. Legislature.

Hats off to Representative Bill Clayton one of the busiest and most effective elected State Officials dealing especially with water and water related problems.

The 6 most important words:
I admit I made a mistake.
The 5 most important words:
You did a good job.
The 4 most important words:
What is your opinion?
The 3 most important words:
If you please.
The 2 most important words:
Thank you.
The 1 most important word:
We.
The least important word:
I.

HIGH PLAINS UNDERGROUND WATER
CONSERVATION DISTRICT NO. 1
1628 FIFTEENTH STREET
LUBBOCK, TEXAS 79401

SECOND CLASS PERMIT

THE Cross SECTION

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

Volume 15 — No. 3 "THERE IS NO SUBSTITUTE FOR WATER" *August 1968*

Computers and Agriculture

By Jim Schiermeyer, IBM Marketing Representative

The following is the result of a question and answer session between Jim Schiermeyer, IBM Marketing Representative and Tom Moorhead, Editor, *The Cross Section.*

QUESTION 1: *What general progress has been made in adapting computers to farming operations?*

ANSWER: The world's oldest and newest technologies—agriculture and data processing are meeting along an expanding frontier. In the few years since the first exploratory encounter between farmer and computer, a fruitful area of joint enterprise has developed.

Data processing services available to farmers today range from simple accounting aids to highly sophisticated methods using linear programming for least cost rations and farm planning, better known as resource allocation. The type of service needed in each individual case depends on the size and diversity of the farm and the specific goals of the enterprise. Ideally, the computer should help the farmer optimize usage of all available resources — land, labor, livestock, capital and equipment.

Computer applications for farmers are still in their beginnings and potential benefits have not yet been fully realized. But the magnitude of the promise is already apparent.

At present over 15,000 farm enterprises in the United States rely on automatic data processing in some phase of their operations. But it is estimated that more than a million farms may eventually benefit. This prediction rests on the premise that any farmer with more than $10,000 annual gross is a potential candidate for data processing services. Today this premise is being widely substantiated.

QUESTION 2: *Is there any sort of computer program available for smaller acreage operators — say on a rental or "subscriber to the service" basis?*

ANSWER: Until quite recently, it was widely assumed in the data processing industry that only large, diversified farming operations might reasonably employ computer services, and it is true that the more sophisticated methods of data analysis are mainly suited to large enterprises.

Jim Schiermeyer and Sally Scott

But within the last year or so, it has become evident that very simple data processing routines can be of considerable help, especially to small farmers.

The small farmer usually lacks both time and inclination for paper work. As a result his bookkeeping may be inadequate.

To help the farmer overcome this handicap, a growing number of local banks in farm areas now offer accounting procedures known as "Rec-Chek" or PAM (Personal Accounting Management).

In these systems, the farmer puts a three-digit code on every check he writes. This code identifies the purpose for which the check was written —fertilizer, fuel, seed, labor, etc. Deposit slips are similarly coded to show the source of the earned money. When the farmer gets his monthly bank statement, every debit and credit is clearly identified on a nine-column form which constitutes a complete income-and-expense account with up to 98 separate categories. Income or expenses can be allocated to separate enterprises such as specific crops, dairy, poultry or beef operations and to specific sub-categories such as labor, seed, fertilizer, harvesting, etc. In addition, the bank provides quarterly and yearly summaries.

The charge for this service is quite moderate. As an example, the Bank of Kremlin, Oklahoma (population 150) charges 10 cents per item processed. Even at this modest fee, the bank earned enough to offset the rental of the punched card equipment after the first six months of operation.

Continued on Page 2)

CHANGES – A SIGN OF THE TIMES

By Tom Moorhead

It is an elementary conclusion, obvious to even the least discerning of people, that change, and in most instances, rapid change, is the order of the day.

The High Plains farmer has not escaped from this swift-moving sign of our times. Some of these changes have to be listed as undesirable ones, but many of the changes must be classified as beneficial and have resulted from man's own ingenuity and his desire to better himself and leave the land he has enjoyed for so long a little bit better place because of his having been there.

Within the space of a very short few years, surely within the memory of this writer, has come one of these changes in farming concepts on the High Plains. Not so many years ago, I stood with an uncle who was showing us a farm he had just purchased in Northern Lamb County. Everything good about this half section of High Plains land was thoroughly covered and explained — slope of the land, location of the irrigation wells, type of soil, good points of the farm house, etc., "But" he said "the one big drawback is this 25 acre playa lake in the Northwest corner. It looks like there will be water there all the time as water drains into it from three directions." "But everything else on the farm looks good to me." Since that time this playa lake has become a valuable asset. He has long ago installed a lake pump and now pumps a large quantity of water back on his land; thereby reaching more of his crop with water and allowing his irrigation wells to rest more.

Steve Clements, who farms 12 miles northwest of Hereford, Texas, has a large playa lake on his property — probably 50 to 60 acres and 7 to 10 feet deep. For several years he has pumped an 8-inch pipe of water (approximately 1600 g.p.m.) from this lake back on his land. He has been able to water up to 200 acres of crops per year — including crops that require a lot of water — sugar beets, lettuce, etc. Mr. Clements estimates that he has pumped from 450 to 550 acre feet per year from this lake at a fuel cost of $2.20 per acre foot, and he has salvaged about 1 billion gallons of water since the beginning of his operation. This lake has been of immeasurable value to Mr. Clements — allowing him to rest his other wells, and getting the advantage of warm, nutrient-laden, "free" water at low cost. Mr. Clements further stated that he had observed this lake since 1951 and has pumped out of it for 8 years and has never seen it dry, and the presence of this lake was a large factor in persuading him to purchase the farm. He considers a playa lake to be a tremendous asset to any farmer. If a farm has a lake and it is not being used, it constitutes a huge waste of water.

Whether these lakes are the results of immense buffalo wallows from years gone by, eroded by wind and water, or merely the result of normal "lay of the land" circumstances, High Plains farmers have recognized them for what can be utilized from them — a welcome boost to the irrigation economy of our High Plains area.

CLEMENTS' LAKE & PUMP

THE Cross SECTION

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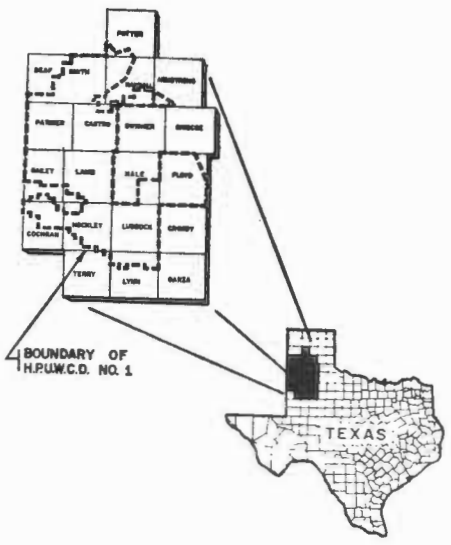


Computers And Agriculture

(Continued from Page 1)

QUESTION 3: *To what extent have High Plains farmers begun to put computers to use in their operations?*
ANSWER: We are unable to answer this question exactly, but we do know that some farmers are using their local banks data processing equipment to some extent. A company in Amarillo has now in operation an agribusiness firm as a service to farmers and ranchers in West Texas. They have a number of clients and are equipped to handle various and sundry aspects of farm and ranch operations.

QUESTION 4: *How about feed lot operations?*
ANSWER: Many feed lot operations have been put on data processing equipment. There are numerous operations in the feed lot business that are very readily adapted to operation by data processing. Among these in our local area are the Sudan Feed Lots in Sudan, Texas.

QUESTION 5: *Can the IBM 360 (pictured) be adapted for irrigation operation on The High Plains? How?*
ANSWER: Yes. Wells can be set to turn off and turn on by computer. Water flow can be regulated and measured by an analog devise attached to each well. This is being done with oil wells and could be done with water wells.

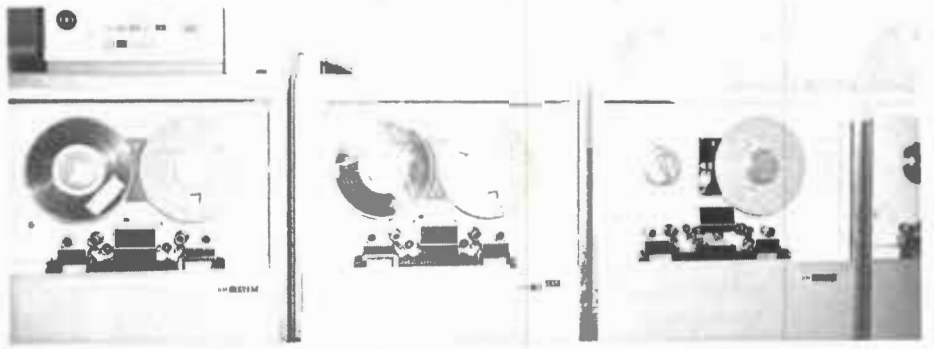
QUESTION 6: *Explain what computers and data processing equipment have developed with to water pollution.*
ANSWER: The IBM pusing Symposium c Resource Manageme series of symposiums sponsored by IBM to provide an opportunity for information exchange among leaders in various fields of mathematical and scientific computer usage. The aim of these meetings is to bring together those in science, industry, government, and education with broad experience who have made significant contributions to the use of digital computing equipment within their special fields.

This symposium was organized into sessions on water and air resource management in relation to operational data systems, research tools, models, and resources planning.

QUESTION 7: *Would you briefly summarize what future you can foresee for computers in farming operations?*
ANSWER: If the modern day farmer, large or small does not automate his records and some of his operation he will not long survive in today's competitive market.

A chicken in every pot and a car in every garage are American dreams long ago realized. Now it's a computer on every farm. Not literally on the farm, of course, but every farmer will have one of these "electronic brains" easily accessible to help him farm more intelligently.

Seen in the broad perspective, the conjunction of farming and data processing fits logically into the pattern of historic change that has transformed farming in our century. It is in line with the current transition from labor to capital ... major



IBM 2402 MAGNETIC TAPE DRIVES

Water Importation

A most interesting question being raised by the proposed importation of Mississippi River water to West Texas and Eastern New Mexico is, "What kind of governmental arrangement will be best suited to manage the whole program?"

The Nation Water Resources Council has been studying the possible alternatives for management of River Basins operations. There seems to be no "one best" solution and a regulatory body tailored to meet the specific problems will probably be developed. When water is delivered to the receiving basin, who is to be responsible for contracting for the water supply, conservation, and anti-pollution measures, enforcement and wholesaling to the retailers?

Probably, legislation will be required by both the exporting state and the importing state. Possibly, a federal agency or a joint federal-state agency will be required. Whatever its make-up or from wherever it derives its power, its creation should be guided by the thought of the most good for the most people.

In Texas an "import agency district" or water district could be created by a special legislative act with express powers. An alternative is a district created under the general law of the state relating to water control and improvement districts.

A third possibility is creation of a true master district with existing water districts being integrated into the master district and each existing district constituting a voting precinct.

A district created to transport water across the state can include

(Continued on Page 3)

Geology And Water Quality*

The primary aquifer in the Southern High Plains, the Ogallala aquifer, consists of the water saturated silts, sands, and gravels in the Ogallala Formation. In Texas, this formation underlies the caprock area extending from near the Canadian River south some 230 miles into Midland and Ector Counties, and from the caprock escarpment on the east westward some 110 miles to the Texas-New Mexico State line.

The thickness of the Ogallala aquifer decreases in a southern direction from a maximum of approximately 300 feet in Castro and Parmer Counties to less than 25 feet in Ector and Midland Counties. The depth to the top of the water table, the top of the aquifer, also decreases from north to south, from a maximum of about 300 feet in parts of Castro and Parmer Counties to less than 50 feet in parts of Ector and Midland Counties.

The soil of the Southern High Plains can also be described as gradually changing from a clay loam in the northern part, to a sandy loam in the central part, to a sand in the south part.

It is these combinations of geologic and hydrologic conditions, that is: 1) relatively slowly permeable soils, 2) relatively deep depths of water, 3) a relatively thick saturated interval (the aquifer), in the north; and the 1) very permeable soils, 2) relatively shallow depths to water

[illegible] generally containing [illegible] million dis-

proaching 1000 parts per million dissolved solids. It should be noted that these ideal conditions provide for the better quality water to be applied to the less permeable soils (in the northern part of the Southern High Plains), while the relatively poorer quality water is being applied to the very permeable soils; conditions that negate soil salinity buildup.

Replenishment to this aquifer is at present, as it has been in the geologic past, through downward percolation of percipitation falling on the land surface. This is to say that the water presently in the aquifer did at one time migrate downward through nearly the entire Ogallala Formation. These conditions of replenishment and storage have established water-to-matrix chemical compatibility.

Since water from the Ogallala aquifer is being reapplied to soils of the parent rock from which the water is being extracted, it is not surprising that this water is remarkably compatible to soils in this area—providing for the establishment of an irrigated agricultural complex that, for all practical purposes, is devoid of soil or water salinity problems.

The recirculation of irrigation water is suspected to be resulting in some degradation of the quality of the water in the Ogallala aquifer. However, at the present rate of depletion of this aquifer, this water supply will have been economically exhausted before qualify of water problems become generally burdensome to irrigated agriculture.

All of these desirable conditions are in reference to the Ogallala aquifer. There is one other minor aquifer, the Santa Rosa aquifer, that produces a high sodium-bicarbonate, sodium-sulfate water. This relatively deep lying aquifer produces usable quality of water only in the extreme northern part of the southern High Plains. Water from this aquifer contains about 95 percent sodium, with an SAR value of 18. Some of the soils that are being irrigated with this water are reportedly experiencing a reduction in their rate of water intake capacity. It is quite probable that this aqufier will also reach the point of economic exaustion

[illegible] blems become [illegible] ere was opposition in at least

tinue and possibly
ditional soil sampling and water
ity surveys in this area, if plans
uantities of surface
gh Plains are to be
pursued. Historical soil and water quality data will be necessary to anticipate and avoid the many hydrologic and soil and water quality problems that will probably be generated by such importation.

In the near future, I believe irrigators in the Southern High Plains will find it increasingly economically advisable to rely heavily upon soil-fertility analyses, and soil moisture tests.

Comments by Frank A. Rayner, Chief Engineer, High Plains Underground Water Conservation District No. 1, regarding the Geology and Water Quality, Southern High Plains of Texas; presented at the Soil and Water Salinity Workshop, Texas A & M University, July 16-18, 1968.

WATER IMPORTATION

(Continued from Page 2)

navigation, flood control, recreation, conservation and pollution control. It should be remembered that import of water to West Texas is part of the statewide water plan and any control agency must be made to fit into the State of Texas Plan, the Federal agency plan, and plans of neighboring states who will be involved as exporters or importers.

These are some of the problems we will face before import of water becomes a reality. These are problems we are all going to be required to take a stand on. It will be well for all of us to become informed, to decide which answer is best for us, and be prepared to back up our decision with logical argument.

HAPPENINGS IN OTHER DISTRICTS

Over a period of several months the Edwards Underground Water District, composed of Hayes, Comal, Bexar, Medina and Uvalde Counties, has been holding hearings for the purpose of "airing" some proposed amendments to the act of the Legislature which created their district. These meetings have been well attended and interested parties from many parts of our state have been present. Individuals and groups which amended legislation would effect directly have been present and expressed their opinions and impressions.

The following information has been released by the Edwards Underground Water District from their San Antonio office:

Findings and Recommendations of Hearings Committee

The Hearings Committee of the Edwards Underground Water District presented its report to the Board of Directors at its regular semi-annual meeting on July 9, 1968. The Hearings Committee found that:

1) With some exceptions the reaction throughout the District at the hearings was generally favorable to obtain effective powers to prevent waste and pollution, including the prevention of exporting water outside the District and the Edwards Underground Reservoir area when it is harmful to the landowners and users in the District.

two of the Counties in the District to amplifying the powers of the District to provide for exercise of eminent domain as to water and water rights.

3) Reaction in three of the five Counties of the District at this time was unfavorable to amend the Act creating the District to provide for the requiring of permits before a well could be drilled, and for the authorization of regulatory powers for production of water from wells.

4) It was noted at the hearings by the Committee members that recent legislation on a statewide basis providing for information as to the location and drilling and completion data of water wells should satisfactorily handle the water well needs of the District.

The Committee also made the following recommendations:

The Committee recommends no action be taken to change legislation creating the Edwards Underground Water District until a State Water Plan is made public and studied by the District, at which time the matter should be considered in light of the State Water Plan.

Representatives from the High Plains Underground Water Conservation District have been present at each of these hearings, and although not directly involved, were asked their opinion and position on vital points. The actions and activities of other Water Districts should be and are of importance to this District.

[illegible] ATIONS

of Springlake, is being listed in two important 1968 reference publications, of leaders in Texas.

He is listed in the first edition published of "Who's Who in Texas," which lists Texans who have distinguished themselves in various fields. Clayton is cited for his legislative and civic leadership, particularly in the development and conservation of water resources.

Another book, "Community Leaders in America," to be published early this fall, will include Clayton

[illegible] list his achievements in church, [illegible] area and State activities, that benefit his community.

Clayton is currently serving in his sixth year as a representative of the 78th Legislative District, comprised of Parmer, Deaf Smith, Castro, Lamb, Bailey, Oldham and Cochran Counties.

A farmer and businessman, Clayton and his wife, Delma, have two children, Brenda, who is a senior at Springlake-Earth High School, and Tommy, age 13. They are members of the Baptist Church. Clayton is a native of Lamb County and is a graduate of Texas A & M.

WATER DISTRICT DIRECTORS — Seated L to R, Russell Bean, Lubbock, Pct. 1; Chester Mitchell, Lockney, Pct. 5. Standing L to R, Ross Goodwin, Muleshoe, Pct. 3; Andrew Kershen, Hereford, Pct. 4 and Weldon Newsom, Morton, Pct. 2.

Tech Announces Grants

Texas Tech Water Resources Center Director, Dan M. Wells announced recently contracts have been signed authorizing two research projects totaling more than $113,000.

A contract between the Office of Water Resources Research in Washington, D. C., and Texas Tech and the High Plains Underground Water Conservation District No. 1 calls for expenditures of $98,578 for a "Mathematical Management Model Unconfined Aquifer" project.

"The research will investigate the application of existing techniques to the development of a mathematical model describing the flow of water in the Ogallala and similar aquifers," Dr. Wells said.

Improved Methods

"It also will study, as necessary, the development of new or improved methods for mathematical modeling of an aquifer, with the objective of achieving a tool to be used in operating aquifers," he said.

Dr. Wells and High Plains Water District Engineer, Frank Rayner, will serve as co-principal investigators responsible for planning and development of the work schedule and its technical quality.

The project calls for three objectives.

Coding procedures for computerizing well data will be developed; and an approach to calculating pumpage will be devised, the researchers said.

Mathematical modeling methods for the Ogallala formation will be developed, starting from the work of the California Department of Water Resources, with development of new and improved methods as necessary.

Wells said a limited amount of model testing will be accomplished, but final verification will not be possible within the scope of this project.

This is a two-year study.

General Electric

The TEMPO division of General Electric Company, Santa Barbara, California, will be coordinating related research being conducted by TEMPO with the Tech-Water District project. TEMPO will primarily be concerned with developing mathematical techniques to determine the aquifer's ability to store and yield water. Technical support and consultation from the TEMPO staff and its consultant, Dr. David K. Todd, will make available the results of this work to Tech and the Water District.

Messers Todd,, and Charles Meyer and Dr. David Kleinecke, of General Electric TEMPO, will travel to Lubbock on August 26 to tour the Tech and Water District facilities, and to participate in planning meetings with Tech and Water District personnel.

The Calfornians will also tour the High Plains area, in order to become familiar with the extent of the development of the Ogallala aquifer, and the areas other geographic characteristics.

Feedlot Pollution

A $15,000 contract was signed with the Texas Water Quality Board for a cattle feedlot pollution study. Wells said Tech's departments of Agricultural Engineering, Agronomy and Animal Husbandry will cooperate in this research.

The researchers will study modified environment feeding facilities to evaluate alternative feetlot cattle management and waste disposal systems. They will investigate plant tolerance limits to liquid runoff wastes and possible treatments for these wastes which would give them an economic value as a component of fertilizers.

Water Is Your Future, Conserve It!

PLEASE CLOSE THOSE ABANDONED WELLS

State FFA Convention

High Plains farming operations, including irrigation and conservation practices, came in for an educated scanning in mid-July by a lot of young folks who will inherit the fruits of today's planning.

The area became a veritable showcase as more than 5,000 future farmers of America (FFA) from throughout Texas gathered in Lubbock for their three-day 40th annual state convention.

En route to the state conclave, the young farmers — arriving from every direction — passed through irrigation areas and had plenty of questions to ask upon reaching their destination. The activities of farmers operating within the guidelines and protective measures of the High Plains Water Conservation District No. 1 were noted by many.

Further focusing attention on South Plains agriculture, Lubbock mayor W. D. Rogers, Jr. welcomed the aggregation, at one point, pointing out that "this is one of the most productive farming areas in the world."

As the meeting progressed, the youths participated in forums and heard speakers from their own number and from adult leaders emphasizing the rewards of conservation and productivity.

Greg Bamford, Haxton, Colo., the 21-year-old National FFA president, keynoted the sessions by challenging:

"A successful man is one who has tried, not cried; who has worked, not dodged; who has shouldered responsibility, not evaded it; who has gotten under the burden and lifted, not merely stood off looking on, giving advice and philosophizing on the situation."

Lending proof that the FFA members themselves already were well along this road to success, 791 of them received the Lone Star Farmer degrees at Thursday night (July 18) ceremonies.

Further recognitions included still more specialized award winners among the young men who more often than not count their net worth in the thousands of dollars.

There were 39 scholarships and awards, valued at over $15,000, presented in one Thursday meeting.

Stanley Obhneiser of Schulenberg won the soil and water conservation award, qualifying through projects including irrigation of 34 acres of grass.

The natural resources award went to Bob Yates of Cameron.

Bill Sarpalius, Clarendon Junior College student from Boys Ranch, was elected president of the state group, and Arlene Lucas of Pasadena was selected as sweetheart.

All in all — it was the cream of the crop — from the High Plains, the Black Bottoms and the Coastal Plains that was welcomed to the South Plains meeting. From hundreds of communities, the youths came and saw and no doubt will remember and profit from views of your farm — your conservation achievements or neglect.

Bamford drew standing applause when he took the podium to say:

"The horizons of opportunity are boundless . . . scan those horizons and find the opportunity that suits your fancy, and when you find it—get on it and ride it for all it is worth."

He also spoke of "the thrill and reward of moving worthwhile directions, of being for something good rather than for something bad . . . of all the directions in which to move, I am convinced the most rewarding and enriching is toward serving."

Throughout the convention, the words, "organization", "working together" and "productivity" entered repeatedly into conversations and addresses.

The young folks have caught on real fast — maybe faster than some of us of the earlier generation that could profit by more attention to these same word guidelines.

Especially are we aware within the framework of the High Plains Water Conservation District No. 1 of the benefits of organization, working together and productivity. Are you spreading the news—by word and by example?

Thought For The Month

No man is so great that he can handle his own life. He may control the men downtown, he may control his own business, he may be able to train his own. But when he comes to the private chapel of his own soul, God meets him there, and he must solve the question of eternal being.

F. G. Samson

HIGH PLAINS UNDERGROUND WATER
CONSERVATION DISTRICT NO. 1
1628 FIFTEENTH STREET
LUBBOCK, TEXAS 79401

SECOND CLASS PERMIT

THE Cross SECTION

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

Volume 15 — No. 4 "THERE IS NO SUBSTITUTE FOR WATER" *September 1968*

AQUIFER-MODELING RESEARCH PLANNED

Marino, Todd, Meyer, Kleinecke and Rayney discuss a proposed outline of research tasks.

The first planning meetings for the ongoing aquifer-modeling research (see Tech Announces Grants, the Cross Section, August 1968) were held in the District's Lubbock office on August 26 through the 30th.

This is a joint Texas Technological College-High Plains Underground Water Conservation District No. 1 project. Dr. Dan M. Wells, Director of the Water Resource Center, Texas Tech, and Frank Rayner, Chief Engineer for the District, are Co-principal investigators responsible for planning and development of the work schedule and its technical quality.

California Experts

Dr. David Todd, Professor of Civil Engineering, University of California at Berkeley (acting as consultant to General Electric TEMPO); Charles F. Meyer, Project Manager for Water Resources Research and Dr. David C. Kleinecke, both of General Electric TEMPO, Santa Barbara, California, traveled to Lubbock to tour the proposed modeling area, and to participate and advise in the planning of this research.

—continued on page 2

Rayner, Todd, Meyer, Marino and Kleinecke plan aerial tour.

House Interim Water Study Group Announces 8 Key Discussion Items

A hearing will be conducted in Hereford on October 5th, by the House Interim Water Study Committee.

Hearing location will be in the Bull Barn. Presiding will be a familiar spokesman for High Plains and Texas water, State Representative Bill Clayton, from Springlake, who is chairman of the important committee.

Committee members include Menton Murray, Harlingen; Neal Solomon, Mt. Vernon; Bill Finck, San Antonio; and Bill Swanson, Houston.

Significance of the meeting is hinted strongly by the eight provocative agenda items that have been scheduled for discussion. They are as follows:

(1) In view of the development of the total water resources in Texas, is there a need for change in the present ground water law pertaining to private ownership or should there be statewide control of ground water resources?

(2) Will the economic benefits of imported water justify the cost to the West Texas area?

(3) If water could be delivered to West Texas at approximately $20 per acre foot plus a 10 percent increase in all property taxes, would you be willing to contract for water at that price and pay the additional tax?

(4) Assuming the cost figures mentioned in item "3" are correct, would non-irrigation water users be willing to pay the 10 percent increase in property taxes?

(5) Would you favor a Master District, Agency or Authority to contract for imported water provided the District, Agency or Authority was given powers essential to its operation if those powers included the following:

(a) Power to contract with the United States, State of Texas and their respective agencies;

—continued on page 4

160-Acre Limitation Committee Appointed

Rep. Bill Clayton of Springlake has been named chairman of the Texas Water Conservation Association (TWCA) Committee on the 160-Acre Limitation Feature of the Reclamation Law, John W. Simmons of Orange, president of TWCA, announced today.

The 11-man committee, Simmons said, will work with other similar groups in the Western states in seeking modification of the acreage limitation provisions of the federal reclamation law. The Act, passed by the Congress in 1902, limits the number of acres to 160 for which a landowner can receive irrigation water from a project without paying interest on the cost of the project.

Other members of the committee are Robert D. Lemon of Perryton, Russell Bean of Lubbock, J. W. Buchanan of Dumas, E. W. Easterling of Beaumont, David H. Brune of Arlington, W. D. Parish of Mercedes, C. W. Weber of Houston, Walter J. Wells of Waco, Judge Guy C. Jackson, Jr., of Kerrville, who will serve as advisor to the committee, and Simmons.

Clayton, who has headed the House Interim Water Study Committee for several years, is considered one of the most knowledgeable members of the Texas House of Representatives in the field of water resources development. He and his committee are presently holding hearings in various parts of Texas on proposed water legislation.

Clayton said the TWCA committee would meet in the near future to plan its work and make plans for establishing contacts with similar groups in the other western and southwestern states.

THE Cross SECTION

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

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Armstrong County

John Patterson, 1971	Wayside, Texas
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George Denny, 1969	Rt. 1, Happy, Texas
Guy Watson, 1971	Wayside, Texas
James Bible, 1970	Wayside. Texas

Bailey County
Mrs. Darlene Henry
High Plains Water District
Box 563, Muleshoe Texas

Lloyd Throckmorton, 1971	Box 115, Muleshoe
Ernest Ramm, 1970	Rt. 2, Muleshoe
W. L. Welch, 1970	Star Rt., Maple
J .W Witherspoon, 1969	Box 261, Muleshoe
R. L. Davis, 1971	Box 61 Maple

Committee meets last Friday of each month at 2:30 p. m., 217 Avenue B, Muleshoe, Texas.

Castro County
E. B. Noble
City Hall Dimmitt, Texas

Calvin Petty, 1969	Box 605, Dimmitt, Texas
Dale Maxwell, 1970	Hiway 385, Dimmitt, Tex.
Frank Wise, 1970	716 W. Grant, Dimmitt, Tex.
Donald Wright 1971	Box 65, Dimmitt Texas
Morgan Dennis, 1971	Star Rt. Hereford, Tex.

Committee meets on the last Saturday of each month at 10:00 a. m., City Hall, Dimmitt, Texas.

Cochran County
W. M. Butler Jr.
Western Abstract Co., Morton, Texas

Ronald Coleman, 1971	Rt. 1, Morton, Texas
D. A. Ramsey, 1970	Star Rt. 2, Morton, Texas
Willard Henry, 1969	Rt. 1, Morton, Texas
Hugh Hansen 1970	Rt. 2, Morton, Texas
Don Keith, 1971	Rt. 1, Morton, Texas

Committee meets on the second Wednesday of each month at 8:00 p. m., Western Abstract Co., Morton, Texas.

Deaf Smith County
Mattie K. Robinson
317 N. Sampson, Hereford, Texas

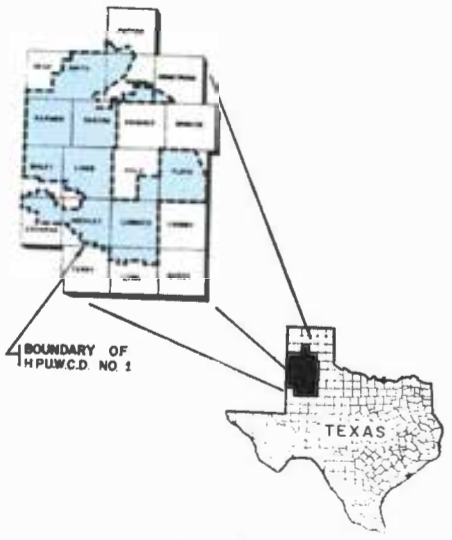
W. H. Gentry, 1969	400 Sunset, Hereford
Billy Wayne Sisson, 1971	Rt. 5 Hereford
Frank Zinser, 1970	Rt. 5, Hereford
L. B. Wortham, 1970	Rt. 3, Hereford
Harry Fuqua, 1971	Rt. 1, Hereford

Committee meets the first Monday of each month at 7:30 p. m., High Plains Water District office, Hereford, Texas.

Floyd County
Sue McCord, County Secretary
101 South Wall Street, Floydada, Texas

Pat Frizzell 1970	Box 1046, Lockney
J. S. Hale, Jr., 1969	Rt. 1, Floydada
Tate Jones, 1970	Rt. 4 Floydada
M. M. Jullan, 1971	Box 65, South Plains
M. J. McNeill, 1971	833 W. Tenn., Floydada

Committee meets on the first Tuesday of each month at 10:00 a. m., Farm Bureau Office, Floydada Texas.



Hale County
J. B. Mayo
1617 Main, Petersburg, Texas

Charles Schuler, 1970	Petersburg
Don Hegi, 1970	Box 160 A, Petersburg
W. D. (Dub) Scarborough 1969	Box 174, Petersburg
Harold D. Rhodes, 1971	Box 100, Petersburg
J. C. Alford, 1971	Box 28, Petersburg

Committee meets first Monday each month at Water District office in Petersburg.

Hockley County
Murray C. Stewart
208 College Levelland, Texas

Ewel Exum, 1971	Rt. 1, Ropesville
J. E. Wade, 1970	Rt. 2, Littlefield
Jimmy Price, 1970	Rt. 3, Levelland
H. R. Phillips, 1971	Rt. 4, Levelland
S. H. Schoenrock, 1969	Rt. 2, Levelland

Committee meets first and third Fridays of each month at 1:30 p. m., 917 Austin St. Levelland, Texas.

Lamb County
Calvin Price
620 Hall Avenue, Littlefield, Texas

Gene Templeton, 1971	Star Rt. 1, Earth
Jack Thomas, 1970	Box 13, Olton
W. B. Jones, 1969	Rt. 1 Anton
Lee Roy Fisher, 1970	Box 344, Sudan
Artis Barton, 1971	Hiway 70, Earth

Committee meets the first Thursday of each month at 8:00 p. m., Crescent House Restaurant, Littlefield.

Lubbock County
Mrs. Doris Hagens
1628 15th Street, Lubbock Texas

Glenn Blackmon, 1971	Rt 1, Shallowater
R. F. (Bob) Cook, 1970	804 6th St., Idalou
Bill Dorman, 1970	1910 Ave. E, Lubbock
Edward Moseley, 1969	Rt. 2, Slaton
Andrew (Buddy) Turnbow, 1971	Rt. 5, Lubbock

Committee mets on the first and third Mondays of each month at 1:30 p. m., 1628 15th St. Lubbock, Texas.

Lynn County
Mrs. Doris Hagens
1628 15th Street, Lubbock, Texas

Don Smith, 1969	Box 236, New Home
Roy Lynn Kahlich, 1970	Wilson
Roger Blakney, 1970	Rt. 1, Wilson
Reuben Sander, 1971	Rt. 1, Slaton
O. R. Phifer, Jr., 1971	New Home

Committee meets the third Tuesday of each month at 10:00 a. m., 1628 15th Street, Lubbock, Texas.

Parmer County
Aubrey Brock

Wilson & Brock Insurance Co., Bovina, Texas	
Guy Latta, 1971	Friona
Webb Gober, 1969	RFD Farwell
Henry Ivy, 1970	Rt. 1, Friona
Jim Ray Daniel, 1970	Friona
Edwin Lide, 1971	Rt. D, Bovina

Committee meets on the first Thursday of each month ot 8:00 p. m., Wilson & Brock Insurance Agency, Bovina, Texas.

Potter County

Fritz Meneke, 1970	Rt. 1, Box 538 Amarillo
W. J. Hill, Jr., 1969	Bushland
Jim Line, 1971	Bushland
Vic Plunk, 1970	Rt. 1, Amarillo
Temple Rodgers, 1971	Rt. 1, Amarillo

Randall County
Mrs. Louise Knox

Randall County Farm Bureau Office, Canyon	
R. B. Gist, Jr. 1971	Rt. 3, Box 43 Canyon
Ralph Ruthart, 1969	Rt. 1, Canyon
Carl Hartman, Jr. 1971	Rt. 1, Canyon
Marshall Rockwell, 1970	Canyon
Richard Friemel, 1970	Rt. 1, Canyon

Committee meets on the first Monday of each month at 8:00 p. m. 1710 5th Ave., Canyon, Tex.

Edward Altouney

Todd addresses the planning group.

Aquifer-Modeling . . .

—continued from page 1

Texas Tech Scientists

Participating in the planning meetings were Wells, Miguel A. Marino, Graduate Student, Bill Claborn, Associate Professor, Department of Civil Engineering, and Dr. George S. Innis, Director of Computer Services; all of Texas Technological College. Other Tech scientists that are scheduled to participate in this research are, Wayne T. Ford and Thomas A. Atchison, Associate Professors of Mathematics.

In addition to the planning meetings, a 5-hour, 600 mile air tour was also made of the Southern High Plains area. The California visitors were also taken on a short automobile tour of a part of the Yellowhouse Canyon (Lubbock County) area.

Work to Commence

The planning meetings resulted in a 3-month work outline for the District, Tech and TEMPO. Each of these participants were assigned an accelerated program of work objectives to be completed by November 1, 1968.

W. L. Broadhurst, former Chief Hydrologist for the District, now Head of the U.S. Geological Survey, Alabama, briefly addresses the planning group. Also shown is Bill Clairborn, a member of the planning group.

Object of Research

The ultimate objective of this 2-year research project is to develop a model of the Ogallala aquifer that is amenable to simulation by digital-computers. This model will also be adaptable to other similar unconfined aquifers throughout the United States.

—continued on page 3

Todd, Kleinecke, Meyer and Rayner discuss theories of origin of playas, and their recharge effect on the Ogallala Formation.

WATERING TO BOOST SOYBEAN YIELDS

IRRIGATION AGE magazine recently printed an article on the subject of how to water soybeans for maximum yields as the results of experiments in Nebraska. Maybe soybean farmers of the High Plains can find some useful information from one of our neighboring states.

For being as big as the crop is in the overall agricultural economy, soybeans are — under irrigated circumstances — a rather sensitive plant. Excess water from irrigation or rainfall reduces yields.

Nebraska is a big soybean state and the crop's productive volume is getting bigger there. A lot of water-related studies have been conducted in that state by University of Nebraska people. Their findings are interesting to all soybean growers.

Under dryland farming circumstances, when soybeans had abundant initial moisture in the root zone at planting time and a good balance of succeeding rainfall, some superior yields have been attained. Natural moisture isn't very often as complimentary to the crop on the Plains. So, when we grow soybeans in the semiarid plains irrigation belt it appears that we have to be pretty careful how we artificially apply moisture or the crop's somewhat temperamental yield can be upset.

At Nebraska, the research team of H. R. Mulliner, H. H. Hecht and P. E. Fischback, ferreted out soybean reaction to irrigation. They found that irrigating soybeans may increase yields 45 percent or more in most years, but these results were dependent on rainfall and whether off-season irrigation was practiced.

Soybeans produce their best yields in soils that have good internal and surface drainage. When excessive water hangs around, yield injury occurs. So, irrigated soybean fields should have a minimum slope of 0.2 feet per 100 feet to provide good surface drainage.

Working to better understand the crop at Holdrege and York, Neb., researchers found that high yields (52 bushels per acre) were obtained by maintaining soil moisture at 50 percent or more of its water holding capacity at the 12-inch depth.

It should be stressed that most of the water extracted by soybeans is from the top two or three feet of the soil, although a few roots may extend down to a five-foot depth. If the soil is moist to a depth of six feet at planting time, irrigation water should not penetrate deeper than two or three feet during the growing season.

If you're used to growing grain sorghum or corn and dealing with their rather extensive root systems, you will be surprised at the system that supports the soybean plant. It's not, by comparison, very extensive and, in fact, is rather limited up to the time of blooming.

Because it is limited in its early stages, soybeans may need to be irrigated early to supply the plant with its water needs until the roots penetrate down to moist soil.

Under Holdrege-based growing circumstances the crop was planted on May 16 and at York on June 2. In each case the most rapid water withdrawal occurred during the last week in July and the first week in August.

At the North Platte station, results showed that up to 41 bushels per acre could be produced on deep medium textured soils with an irrigation at the late bloom state, *providing* the soil was at field capacity to a depth of six feet at planting time and average precipitation occurred during the growing season. At North Platte average precipitation for this period is about 20 inches.

By contrast, sandy soils with limited soil depth and water holding capacity may well need to be irrigated every five to seven days during July and August in order to produce high yields.

We can level out what we know

—continued on page 4

Thought for the Month

Habit is often only

the antiquity of error.

Aquifer-Modeling . . .

—continued from page 2

Such a model will be of paramount importance to the equitable and economic development of this area's ground-water supply. This model will provide the hydrologic analyses that will be necessary if surface water is to be imported and stored in the subsurface.

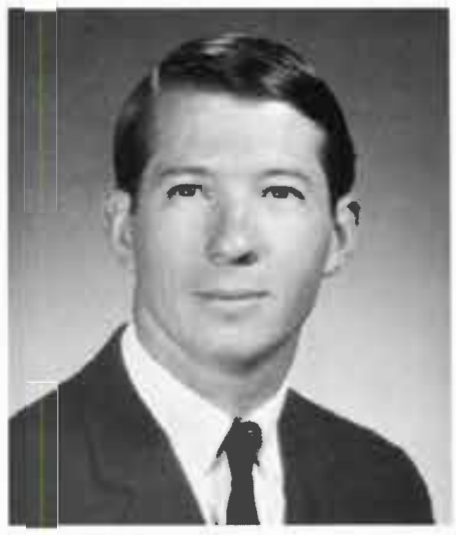
This research is being funded by a $98,578.00 grant from the Office of Water Resources Research, United States Department of Interior, to Tech and the District. Tech and the District will also jointly contribute $18,213.00 to this research.

A grant from OWRR to General Electric TEMPO provides for the participation of TEMPO and their consultant, Dr. Todd, in the Tech- District project. TEMPO is to supply $20,000.00 worth of technical services and consulting to the Tech- District research. TEMPO will also make available their work in developing techniques for determining the aquifer's ability to store and transmit water.

Office of Water Resources Research

Dr. Edward Altouney, OWRR Water Research Scientist, will be coordinating the Tech-District research with OWRR.

Dr. Roland R. Renne is the Director of OWRR. Mr. Eugene D. Eaton is the Deputy Director.



JIMMY M. ROSS

Newest Staff Member Has Area Farm Record

Jimmy Ross assumes duties with this issue as editor of THE CROSS SECTION, thus becoming the newest member of the team of the High Plains Water Conservation District No. 1.

The 25-year-old native of Flomot, however, is no newcomer to the irrigation belt, to conservation awareness, to agri-business or to the problems and opportunities of the High Plains farmer.

He is a graduate from West Texas State University, Canyon, with a BS degree in agriculture business. He also attended the University of Arizona at Tucson for one year.

Reared on a farm and cattle operation in Motley County, Ross since graduation from college has been self-employed, with his father, in the same type operation.

Not only has he been recipient of numerous scholastic awards throughout his school career, but he has been quite active and successful in 4-H Club enterprises, including special recognition in soil, water and range demonstrations.

He has been a state finalist in conservation demonstrations, attended American Legion Boys State while a high school junior, was a leader in school sports and was valedictorian of his senior class.

Management Is Key to Water Conservation

Efficient and economical irrigation practices, once only the concern of a few farmers, is now eyed with accelerating interest by retail businessmen, industrialist, financiers and civic worker, farmers and farm organizations alike—why the sudden interest?

The declining water table is coming more into focus as a problem of major concern to all residents of the High Plains; that is why.

As many cooperators in our district know, or more likely have experienced, wells that pumped a full eight-inch pipe a few years ago may be pumping only a four-inch pipe of water today.

The demand for life-giving water is becoming greater with the population increase, the metropolitan needs for water, the industrialists' needs, and the farmer's dependence upon it for his very livlihood.

The final answer to our problem, without a doubt, can only be found in the importation of water to the Plains area.

The "mechanics" of importing water in the amounts needed for our area are being explored, on a stepped-up scale.

The problems will be solved because of necessity — the absence of any choice. The water will be provided tomorrow — for your children and ours — but it will cost more — a lot more. The days of cheap water is rapidly disappearing.

Today the very best conservation practices are mandatory if we expect to have sufficient water to fill the time gap for the planning and engineering and construction of facilities capable of supplying water in the amounts Texas, and especially the Plains area, will need.

Careful management then is an important part of the answer; management by your self, your employees, your neighbors and the water conservation district to which you belong and cooperate.

It is an economic problem too.

Efficient water management can save thousands of acre feet of water

—continued on page 4

Meyer, Todd and Kleinecke view Lake Ransom Canyon in the Yellowhouse Canyon.

Management . . .

—continued from page 3

(to say nothing of dollars) year in and year out.

We have outgrown the period when the only value placed on an acre foot of water was the cost of pumping it.

Certainly this has proved to be a poor yardstick, because more than a few persons have discovered that on this basis it may seem cheaper to waste the water than to hire the labor to manage it efficiently.

The declining water table changes the balance between labor and pumping costs, and in the meanwhile, thousands of acre feet of water can be lost.

Of course, many things such as irrigation pipelines, good land leveling, sprinkler systems, etc., help increase efficiency, but as good as all these are, they are not the final answer.

Good water management must also include: (1) Irrigating at the right time, (2) applying the right amount of water — enough but no more, and (3) applying the water at a rate in which the soil can absorb it without excessive run-off.

When to irrigate, and how much to apply will vary with type of soil, stage of plant growth, and the pattern of natural rainfall. Different moisture-measuring devices are on the market that show the percent of moisture at different depths. Although these are good, some are expensive.

Use of a probe, though not as "sophisticated an operation", might be the best practice at hand. The probe, with a little elbow grease, can be used to get the soil samples at different depths. The percent moisture is determined by squeezing the soil sample in the hand to feel the moisture.

After a little practice, the farmer then can determine when to irrigate and how much water to provide to keep his crops alive and growing.

Hereford Hearing . . .

—continued from page 1

(b) Power to tax property for operational cost and to secure bonds;

(c) Power to sell these bonds.

(6) If you favor such a Master District, Agency or Authority, what territory should be included and, particularly, should your county be included?

(7) Does the Water Quality Act sufficiently cover pollution problems created from feed lots and other agri-business industries?

(8) As was suggested by an Association of Water District Managers from the Lower Rio Grande Valley, a question was posted as to whether there should be two distinct sets of statutes in the Water Control and Improvement District's Law; one set for Districts that provide domestic water services, and one set for Districts that provide water for irrigation purposes.

Soybeans . . .

—continued from page 3

from Nebraska growing tests and come to some practical conclusions:

Grow soybeans on soil that has good internal and surface drainage.

Pre-irrigate soybean growing ground to a depth of six feet, before planting.

Keeping the soil moisture at 50 percent or more of its holding capacity at the one-foot level.

Know the texture of your soil. The larger the soil particles (like sands), the less water-holding capacity for plants. The smaller the soil particles (like clays), the higher the water-holding capacity.

On deep fine textured soils (clay) two to three inches of water is the maximum to be applied to soybeans at one irrigation. On coarse textured sandy soils, one and one-half to two inches is maximum. But even this recommendation may need to be adjusted to your local situation — say 20 to 30 percent — to compensate for evaporation and runoff loss.

At North Platte, Neb., researchers found it took a total of 22 inches of water — including moisture in the soil profile, effective rainfall and irrigation — to make a 41-bushel crop.

Water Is Your Future, Conserve It!

PLEASE CLOSE THOSE ABANDONED WELLS

HIGH PLAINS UNDERGROUND WATER
CONSERVATION DISTRICT NO. 1
1628 FIFTEENTH STREET
LUBBOCK, TEXAS 79401

SECOND CLASS PERMIT

THE Cross SECTION

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

Volume 15 — 5 "THERE IS NO SUBSTITUTE FOR WATER" *October 1968*

HEREFORD HEARING

Representatives Finck, Murray, Swanson, Soloman and Clayton inspect a tail water return system.

A hearing conducted by the House Interim Water Study Committee, was held in Hereford October 5 and testimony was given by representatives from areas stretching from the farthest point of the Panhandle to El Paso.

Hundreds of persons were on hand at the Hereford Bull Barn to speak out on the importance of water to the Panhandle-High Plains area, and to discuss an eight points concerning water use and water conservation (see Water Study, the Cross Section, September 1968).

Chairman, Bill Clayton was pleased

—continued on page 2

★ ★ ★

Tom McFarland, Manager of the Water District, explains the tail water return system. Left to right, Rep. Finck, Rep. Swanson and McFarland.

IRRIGATION COST AND EFFICIENCY RESEARCH

An inefficient pump on an irrigation well can cost a farmer as much as 93.8 percent of his power input, as it did on one unit included in an irrigation efficiency study conducted by Texas Tech. The results of the Power Requirements and Efficiency Study of Irrigation Pumping Plants were released by Texas Technological College Department of Agricultural Engineering researchers Dr. Willie L. Ulich and Albert W. Sechrist. The study showed the efficiency and operating cost of irrigation pumping plants currently operating in the area.

The research study included complete testing and record keeping on numerous irrigation pumping plants. The farmers pumping plants were tested by the Agricultural Engineering Department personnel.

Each time a farmers pumping plant was tested the farmer was given a copy of the results of the test. The immediate results included the static and pumping water levels, the drawdown, the total operating head, and the amount of water being pumped. The amount of fuel or energy being consumed was measured and the efficiency of the major components was

—continued on page 4

West Texan Elected to Interstate Water Conference

State Representative Bill Clayton of Springlake was elected to the Executive Committee of the Interstate Conference on Water Problems during its annual meeting in New Orleans on Oct. 18.

The Conference, composed of State water officials, River Authority officials, River Authority officers and Legislators, concerns itself with all aspects of water conservation, development, pollution control and other water-related problems throughout the nation. Its officers and members closely follow legislation and federal agency regulations on water subjects to assure that the rights of states and local areas are fully protected from federal encroachment and domination.

Through Clayton's efforts at New Orleans the Resolutions Committee recommended to the Conference that during the next year particular study would be given to the 160-acre limitation in the law governing projects of the Bureau of Reclamation.

The conferees attending were impressed with Clayton's arguments on this subject, and it is anticipated that the Interstate Conference will soon take an official position urging modification of the existing federal law which was considered too stringent.

While at the Conference Clayton finalized arrangements with the Bureau of Reclamation and people from the lower Mississippi Valley Authority for a West Texas area tour.

The tour, scheduled for November 7-8, is considered vital in proving the future water requirements of West Texas. Helping in the tour arrangements with Clayton will be Water, Inc. and the High Plains Underground Water District.

TO IRRIGATE OR NOT TO IRRIGATE

To paraphrase an oft-uttered statement — "To irrigate or not to irrigate, that is the question."

On the High Plains, this question is answered easily in almost every crop variety except wheat. And as more research is instigated, more conclusive is the answer that irrigation of wheat is not economical in some instances.

At least this is the opinion of Jim Valliant, Soil Scientist at the High Plains Research Foundation.

Valliant says, "A four-year average, 1964 through 1967, of wheat within an 80-60-0 fertilizer level indicates that when wheat is irrigated for germination and not grazed during the winter months, a winter irrigation is not practical and reduces irrigation efficiency."

Explaining the Research Foundation's 1968 wheat irrigation and fertilizer study test, Valliant said Tascosa wheat was planted Oct. 18, 1967 at the rate of 100 pounds of seed per acre with a 10-inch drill on land from which grain sorghum was harvested.

In the test, three irrigation methods were used — Method 1: at germination, winter, jointing, early boot and

—continued on page 2

ALBERT SECHRIST

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ENGINEER JOINS DISTRICT STAFF

Mr. Albert W. Sechrist, a former Research Associate with the Agricultural Engineering Department, Texas Technological College, recently joined the engineering staff of the High Plains Underground Water Conservation District No. 1.

Mr. Sechrist received his Bachelor of Science Degree in Agricultural

—continued on page 3

THE Cross SECTION

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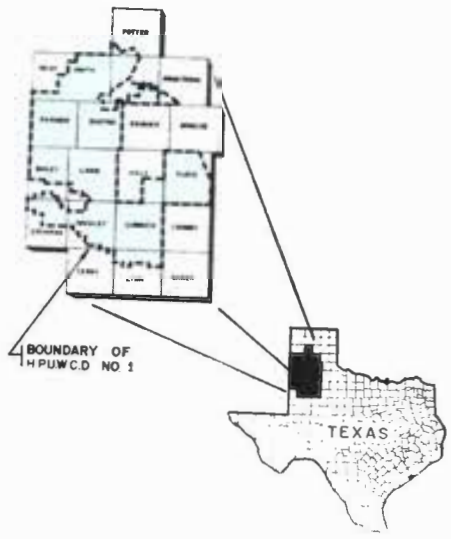


National Water Well Convention Held

The 20th Annual Convention and Exposition of the National Water Well Association was held in Washington, D.C. on September 22nd through the 26th, 1968.

★ ★ ★

F. A. RAYNER

The National Water Well Association is a national organization of water well drillers, contractors, suppliers, consultants, and representatives of all levels of government interested in groundwater development.

Frank Rayner, Engineer for the District, presented a paper at this convention, titled, "Mechanics For Calculating Water - Depletion Costs." Rayner's presentation outlined the procedures for the application of basic geohydrologic techniques in calculating water-depletion costs — stressing the increased reliance upon high speed, digital-computer processing of water-level records.

Mr. J. D. Kirkland, West Texas Drilling Inc., Hereford, is Past President, and currently a Member of the Board of Directors of N.W.W.A.

TO IRRIGATE . . .

—continued from page 1

soft dough; method 2: germination, jointing, early boot and soft dough; and method 3: germination, jointing and early boot.

All plots were planted dry and irrigated for germination October 19. Other dates of irrigation included winter, Jan. 2; joining, April 8; early boot, April 29 and soft dough, May 27.

Total irrigation amounts included 29.1 inches in method 1; 24.9 inches in method 2 and 17.4 inches in method 3.

"Rainfall during the season added 9.20 inches," Valliant said.

A self-propelled combine was used to harvest wheat plots July 1. Yields were adjusted to 12 per cent moisture and yields calculated from the corrected plot data.

"Results of the wheat irrigation study indicates that a winter irrigation on non-grazed wheat was not practical", Valliant said. "The yield was reduced significantly when compared to wheat not winter irrigated", he stated. "And the reduction in yield with the winter irrigation may have been due to winter kill of lush growth promoted by irrigation."

There was no difference in yield due to a soft dough irrigation. "However, the soft dough irrigation did reduce lodging", the soil scientist stated. "And lodging in the 1967-68 study was greater that previous years due to hail and high winds on June 9."

The Foundation study shows that in spite of hail damage, wheat under the method 1 system of irrigation yielded 38.8 bushels per acre while method 2 yielded 45.7 bushels and method 3 yielded 47.7 bushels.

Thought for the Month

Our children could
live on the water
we wasted yesterday.

HEARING . . .

—continued from page 1

with the hearing and, said "it was the most harmonious testimony from such a wide range of groups that we had ever heard." Clayton added "all are unified in the effort to get water imported into Texas."

This was the fourth hearing held in various parts of the State by the Committee, and Clayton explained that there will be one more in Austin to summarize the findings. The Committee, at the next session of the Legislature, will make recommendations based on the committees findings.

Members of Clayton's Committee include: Menton Murray, Harlingen; Neal Soloman, Mt. Vernon; Bill Finck, San Antonio; and Bill Swanson, Houston.

Preliminary reports by the Texas Water Development Board and the Bureau of Reclamation leave no doubt about the disastrous effects on the entire economy of an area so largely dependent on agriculture, should a water import plan not be implemented.

One of the possibilities for bringing water to the High Plains is from the lower Mississippi River. One of the studies now being made by the Corps of Engineers is the determination of the surplus flows of the Mississippi River that may be available for export; an evaluation of the practicality of improving the estuaries and wildlife refuges along the Louisiana coast as a part of this diversion proposal; and preparation of reconnaissance estimates for storage, diversion, and conveyance facilities from the Mississippi to the Sabine River. The work is being done through the Mississippi River Commission.

DAN SEALE

★ ★ ★

DAN SEALE JOINS DISTRIST STAFF

Joe Dan Seale, a 1963 graduate of Lubbock High School, was employed by the High Plains Underground Water Conservation District No. 1, on September 9th. He will be working on the District's observation-well network upgrading and expansion program.

Mr. Seale was formerly employed by the City of Lubbock Water Department.

He and his wife Dorothy reside at 2610 - 36th in Lubbock. They have one son, Jeff. Dan is a member of the Pioneer Methodist Church.

Dan has completed several of the Water Works Operators short courses, offered through the Texas A&M University Extension Service, and he holds a Grade B Water Works Operators license.

ENGINEER . . .

—continued from page 1

Engineering from Texas Technological College, in August of 1964. Since that time he has been conducting irrigation power requirements and pump efficiency research. He has completed most of his coursework toward a Masters Degree in Agricultural Engineering, and will continue this work while employed with the District. While at Tech, he studied under a Graduate Fellowship, and was on the Dean's Honor Roll.

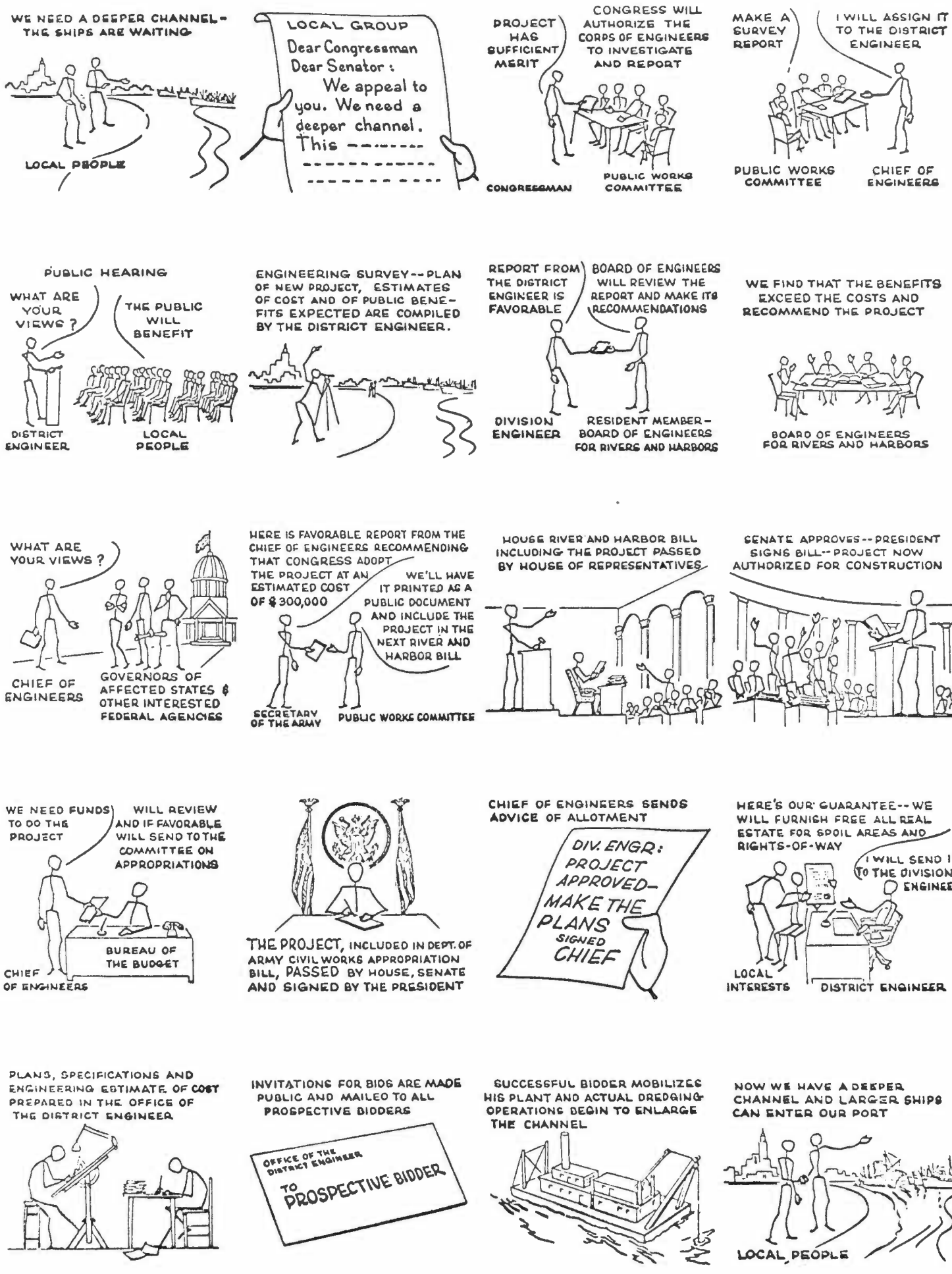
In his new capacity, Mr. Sechrist will be responsible for pumpage research that is a part of the ongoing Tech-District aquifer-modeling program (The Cross Section, September, 1968).

Mr. Sechrist is a native of Crosby County, having been born and raised on an irrigated farm near Lorenzo. Albert and his wife, Susan, and their little girl, Julie, presently reside in Lubbock.

Sechrist is a member of the American Society of Agricultural Engineers.

HOW WATER RESOURCES DEVELOPMENT PROJECTS ARE INITIATED, AUTHORIZED AND CONSTRUCTED

The Bureau of Reclamation and the Corps of Engineers follow these same procedures in dealing with the nation's water problems.



Albert Sechrist is shown above using a turbine flow meter to measure the amount of water pumped by an irrigation well druing the Irrigation Cost and Efficiency Research.

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EFFICIENCY . . .

—continued from page 1

computed for the farmer. At the time the pumping plant was first tested the original installation date, type of equipment and cost were obtained from the farmer.

The farmer maintained daily operating records on their pumping plants. These records included operation time, quantity and cost of fuel or energy, the amount and cost of oil and repairs and the amount of time required to operate and maintain the pumping plant.

At the end of each year and at the end of the project these records were combined to provide an annual operating and cost record. The farmer was provided with a record showing his annual pumpage and a breakdown of the various costs involved in pumping water with his pumping plant. This includes all fixed and variable costs and not just the fuel of energy cost.

Pumping plants studied consisted of electric vertical hollowshaft motor powered pumps, electric submersible motor powered pumps, natural gas engine powered pumps and liquified petroleum gas powered pumps. The efficiency of the pumps tested averaged 52 percent and ranged from 6.2 percent to 82 percent. The cost per hour of pump operation ranged from 6 cents to $2.72 and averaged 82 cents. The total cost of water ranged from $1.82 to $72.76 per acre foot pumped and averaged $15.61 per acre foot for the pumping plants tested. Cost of pumping water per acre foot for each foot of lift ranged from $.0130 to $.8458. The average unit pumping cost was $.0808 per acre foot per foot of lift.

The pumping plants tested produced in a range of 20 gallons per minute up to 1,530 gallons per minute and averaged 432 gallons per minute. Efficiency of the pumps tested averaged 52 percent. The input to the plants ranged from 1.2 to 154 brake horsepower, the average was 44 brake horsepower. They operated from 390 to 4,515 hours annually and the acre feet of water pumped ranged from 9.8 to 715.8 during that same period of time.

The study showed the average cost per acre foot pumped is $15.61, however, in some cases the cost soared to as much as $72.76. The wide variation in pumping costs was attributed to a number of reasons. Some of these were the lowering of the water level, badly worn pumping equipment, inefficient design, improper installation, type of power unit used and in some cases, lack of proper maintenance of the power unit.

Many of the pumping plants in the project area were found to be operating inefficiently due to improper matching of the pump to the available water supply. This could be caused by poor design of the initial installation, by lowering of the water level in the well, and/or a lowering of the well yield.

The research shows that if the pump bowls and impellers installed are efficiently designed and properly combined to match the yield and drawdown of the well, the pump should operate at a high efficiency. If the water level changes significantly, the efficiency of the pump is reduced, creating a higher water cost.

Unless a farmer keeps records and attempts to calculate what he is paying for pumping water, he has no way of determining whether or not his irrigation system is economical. Many of the pumping plants studied were operating at a low efficiency and therefore the unit cost of pumping water was much higher than it should have been for the particular conditions. Most farmers were surprised to find out how much they were actually paying to pump irrigation water.

As a result of the test data and cost information provided to them many farmers realized that they were paying too much for their water. Several of these farmers made changes or repairs to their pumping plants. The report points to an example of one farmer's pumping unit in the tests; he spent $1,000 to repair his pump. Following the needed work, the farmer doubled the useful output of the pump while reducing his cost from $13.93 to $7.56 per acre foot of water pumped. He saved $637.00 during the first year following the repairs and raised his efficiency from 33 to 79 percent. This example indicates what can happen when a farmer makes the changes necessary to raise his pumping plant efficiency. Although it is not economically feasible to maintain a pumping plant at its maximum efficiency there is a point at which it is more feasible to repair or replace an existing pumping plant than to continue to operate with an inefficient unit. When a farmer is installing a new pumping plant he should insist on an efficient pumping unit in order to pump from his well at the lowest possible cost.

PLEASE CLOSE THOSE ABANDONED WELLS

DRILLING STATISTICS FOR JULY, AUGUST AND SEPTEMBER

County	Permits Issued	New Wells Completed	Replacements Wells Drilled	Dry Holes
ARMSTRONG	0	0	0	0
BAILEY	3	10	2	0
CASTRO	23	29	1	1
COCHRAN	0	2	0	1
DEAF SMITH	38	39	5	0
FLOYD	12	13	1	0
HALE	8	8	2	0
HOCKLEY	16	11	0	0
LAMB	6	5	2	0
LUBBOCK	21	18	1	0
LYNN	2	3	0	1
PARMER	26	17	0	1
POTTER	1	7	0	1
RANDALL	5	0	0	0
TOTALS	**161**	**162**	**14**	**5**

HIGH PLAINS UNDERGROUND WATER
CONSERVATION DISTRICT NO. 1
1628 FIFTEENTH STREET
LUBBOCK, TEXAS 79401

SECOND CLASS PERMIT

THE Cross SECTION

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

Volume 15 — 6 "THERE IS NO SUBSTITUTE FOR WATER" *November, 1968*

The tail-water and playa lake return systems . . .

Tailwater Pits, Lake Systems Provide Bonus

Model of Ogallala Aquifer Gets Attention In Second Planning - Work Review Meeting

The second planning and work review meeting of the Tech-District Aquifer - modeling research project (the Cross Section, September 1968) was held in the District's Lubbock offices on November 15.

Dr. Dan Wells, Director of the Water Resources Center, Texas Technological College, and Frank Rayner, Chief Engineer for the District, are co-directors of this project for Tech and the District respectively.

The object of this research is to investigate the possibility of developing a model of the Ogallala aquifer—this area's primary water supply.

It is hoped that this model can be so designed as to function as an accurate predictive tool through successive stages of depletion of this aquifer.

This model is expected to be very useful to the District's water conservation program, and to other agencies and individuals who are developing

—continued on page 2

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Among participants in the second planning-work meeting of the Adquifer modeling research project in Lubbock were, left to right, Bill Claiborn, Texas Tech, Dr. David K. Todd, Berkeley, Calif., and Charles F. Meyer, Santa Barbara, Calif.

What has more influence on High Plains agriculture than irrigation?

In fact, more and more people, agencies, industry and every segment of area economy have taken note that there is a necessity for good irrigation utilization — for the welfare of all.

With an economy geared to agriculture, and an agriculture geared to irrigation, it behooves us to take a long, hard look at the several aspects of irrigation.

One of the foremost ways of prolonging the water supply for you — and for myself and our neighbors is to get maximum benefit from all our available water.

The proper use of playa lake or tailwater run-off water is a mighty good place to start in prolonging the life of our agriculture economy.

As of 1960, tailwater pit and lake recovery systems were a rarity in the counties involved in the High Plains Underwater Water Conservation District No. 1.

In 1963, the District began an intensive water management study to determine the amount of water each well would contribute to tailwater, also to see how much silt and fertilizer was being lost.

Not only has your Water District been instrumental in bringing about ways and means of water conservation on the High Plains of Texas, but a lot of folks have recognized the sheer necessity of turning to playa lakes and tailwater as a valuable supply of water as the water table in the Ogallala Formation constantly declines.

The thousands of playa lakes on the High Plains collect about 1½ million acre feet of water in years of average rainfall, one study revealed.

Proper use of this water, together with tailwater, provides a bonus that cannot be overlooked.

Listed below are some answers found in the intensive studies of your District on tailwater pit and lake recovery systems. It is the hope of your District personnel that this com-

—continued on page 2

Crosby County Hearing

Petitions have been filed with the Board of Directors of the High Plains Underground Water Conservation District No. 1 asking for an annexation hearing to be held in Crosby County.

The petitions asked that Crosby County be made a part of the present existing Water District.

The Board has set the hearing for December 16th at 10:00 a.m. in the District Courtroom, County Courthouse, Crosbyton, Texas.

All interested individuals are urged to attend and voice their opinions, either for or against Crosby County voting to become a part of the Water District.

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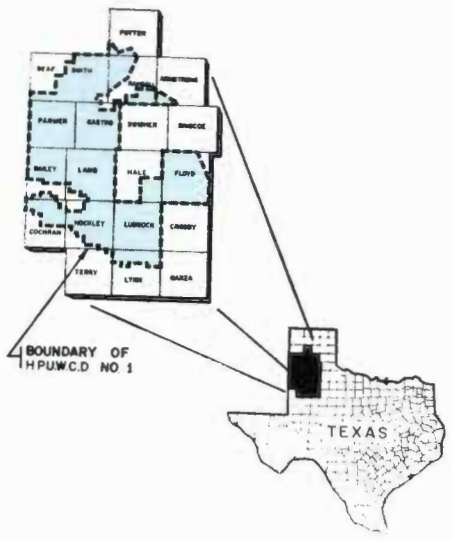

Raymond Boche, Texas Tech, Dr. Dan Wells, also of Tech, and Dr. David K. Todd, professor of civil engineering, University of California, are pictured at a recent study in Lubbock of the Ogallala Aquifer model project.

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AQUIFER MODEL . . .

—continued from page 1

plans for importation of surface water to this area.

Dr. David K. Todd, Professor of Civil Engineering, University of California at Berkeley, and Charles F. Meyer, Project Manager for Water Resources Research, General Electric TEMPO, Santa Barbara, California, traveled to Lubbock to participate in this planning meeting. TEMPO and their consultant, Dr. Todd, are consultants to the Tech-District project.

Messrs. Todd and Meyer spent a considerable part of their time at Texas Technological College, conferring with Dr. Wells and Bill Claiborn, Civil Engineering Department, Dr. George Ennis, Director of the Computer Center and members of the staff of the Mathematics Department.

The District presented a report, accompanied by maps, tables and other material, outlining the Districts accomplishments during the first quarter (August, September and October) of the research period. The District's report also outlined a suggested work program (for the District) to be followed during the second quarter (November, December, 1968, and January 1969).

PLEASE CLOSE THOSE ABANDONED WELLS

TAILWATER . . .

—continued from page 1

piled information will be enlightening regarding water conservation. We invite you to join those that are taking advantage of the God-given water resources—with full emphasis on their conservation.

STUDY FINDINGS

Lubbock County

146 lake systems; 13 return systems.

9,782 acre feet of lake water recovered at value of $391,280 annually.

PITS: 7,280 tons of silt kept on the land, and 1,040 acre feet of water recovered. Tailwater value alone: $41,600; nitrogen, 31,200 pounds; value of nitrogen: $2,028; plus 150,800 pounds of calcium, and 195,520 pounds of magnesium.

Deaf Smith County

179 return systems, 91 lake systems. 9,100 acre-feet of lake water at value of $364,000. Pits: 100,240 tons of silt kept on the land annually; plus 14,320 acre-feet of tailwater valued at $572,800. Nitrogen: 429,600 pounds valued at $27,924; plus 2,076,400 pounds of calcium, and 2,692,160 pounds of magnesium.

Parmer County

186 tailwater pits, 121 lake systems. 12,100 acre-feet of lake water at value of $484,000. PITS: 104,160 tons of silt; 14,880 acre-feet of tailwater with $595,200 value; 446,440 pounds of nitrogen for $29,016; 2,157,600 pounds of calcium; and 2,797,440 pounds magnesium.

Bailey County

4 lake systems, 8 return systems. 268 acre-feet of lake water at value of $10,720. PITS: 4,480 tons of silt; 640 acre-feet of water at $25,600; 19,200 pounds of nitrogen for $1,248; 92,800 pounds calcium; and 120,320 pounds of magnesium.

Floyd County

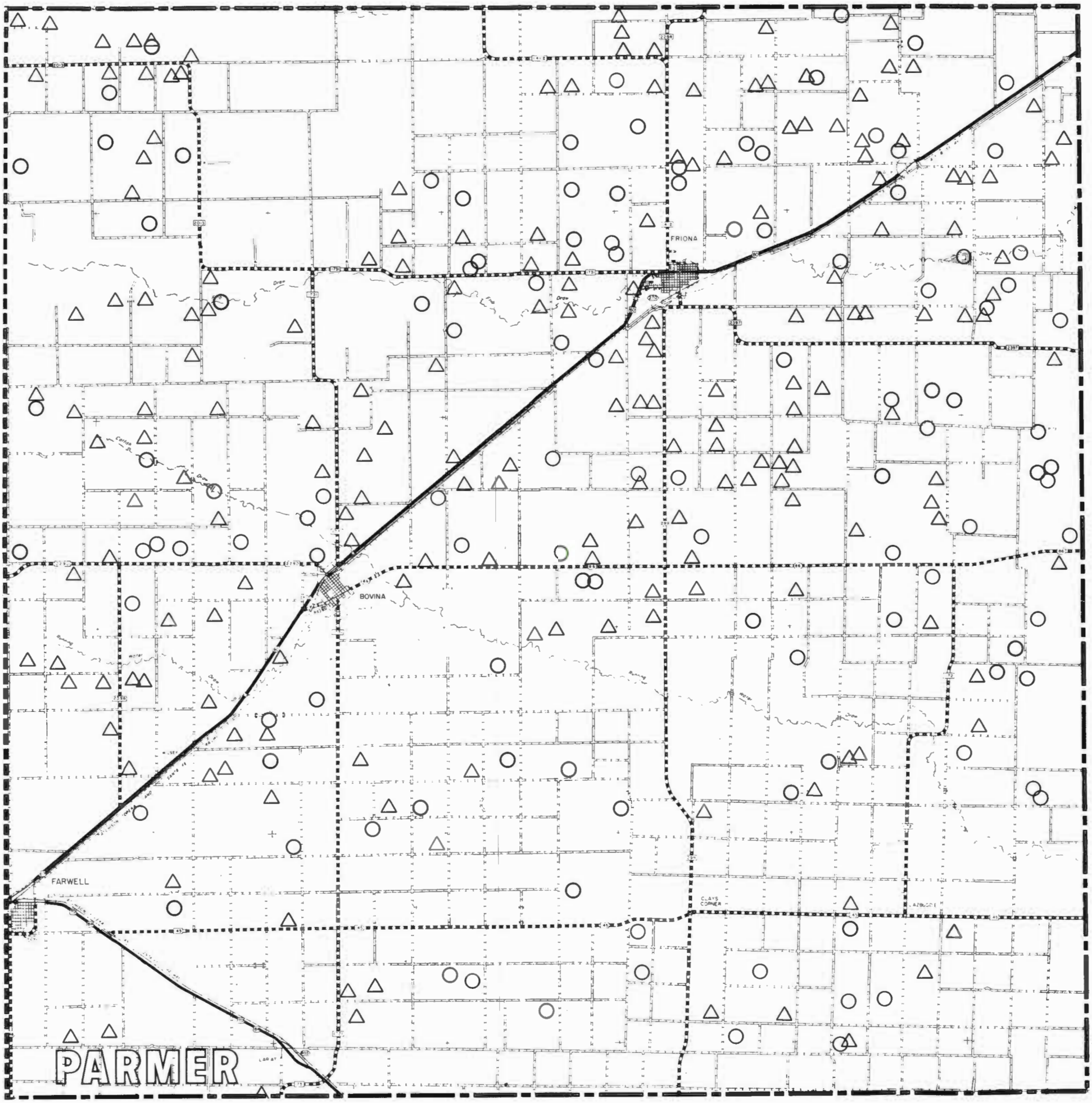
159 lake systems and 73 tailwater pits. 10,653 acre-feet of lake water valued at $426,120. PITS: 40,880 tone of silt retained; and 5,840 acre-feet of tailwater with value of $233,606. Nitrogen, 175,200 pounds valued at $11,288; 846,800 pounds calcium, and 1,097,910 pounds magnesium.

Castro County

140 lake systems and 135 return systems. 14,000 acre-feet of lake water valued at $560,000. PITS: 75,600 tons of silt; 10,800 acre-feet of tailwater with value of $432,000; 324,000 pounds of nitrogen at $21,060; 1,566,000 pounds of calcium; and 2,030,400 pounds of magnesium.

The High Plains Water District No. 1 is glad to assist in YOUR water recovery system, giving you benefit of the many man-hours of study it has conducted, and spelling out benefits in hard dollars and cents.

The findings spelled out in the brief paragraphs above indicate that water utilization is more than a "fringe benefit" — it is a very real part of a good and necessary over-all water use plan.



OPERATIONAL TAILWATER AND PLAYA LAKE RECOVERY SYSTEMS - 1968

LEGEND

△ TAILWATER RECOVERY SYSTEMS

○ PLAYA LAKE RECOVERY SYSTEMS

Mississippi River Water Plan For Plains, New Mexico Proposed

By GEORGE A WHETSTONE
Professor of Civil Engineering,
Texas Technological College

A paper presented on 12 October 1968 at the fall meeting of the New Mexico Section, ASCE, Las Cruces, New Mexico.

* * *

New Mexico is on the route of several water schemes. For years now some plan or other for augmenting the Colorado River flow — by tapping the Snake, Yellowstone, Columbia, or the coastal rivers of California and Oregon — has had its advocates. Many of these plans have involved secondary diversions of the San Juan and Gila to the Rio Grande. Some, in fact, were magnificent enough to furnish water for the High Plains of Eastern New Mexico and West Texas.

Plans for revising the drainage of the continent never neglect New Mexico. The North American Water and Power Alliance (NAWAPA) would provide a flow from near Lordsburg, via Roswell and Des Moines to Denver. The Central North American Water Plan (CeNAWP) would bring the water of Canada's prairie lakes via Mosquero and Las Vegas to the Rio Grande near Bernalillo. It would be lifted out later to flow down the Gila on its way to Los Angeles. (1)

While some modification of CeNAWP could very well prove to be an ultimate answer to the augmentation of New Mexico's water supply, realistic political considerations would indicate that the Lower Mississippi River should be developed first.

As you are well aware, the Bureau of Reclamation, Corps of Engineers, and Mississippi River Commission have been making reconnaissance studies of routes, quantities, and costs of providing Mississippi River water to the High Plains of Texas and New Mexico under a Congressional directive which restricted the westward border of the study area to the eastern limit of the Pecos River drainage basin.

The Bureau issued a progress report in May 1968 (2) studying nine alternative routes. The conclusions were:

1. It is physically feasible to transport the projected 2020 requirements of 16.5 million acre-feet per year from the lower Mississippi River system to West Texas and Eastern New Mexico if it is determined that there are surplus waters in the Mississippi River available to meet these requirements. Should surplus water be available it might be transported through a combination of several of the import routes studied. However, the more southern routes appear to be the most desirable for future study. The studies indicate that the project would lend itself to stage development.

2. Regardless of the route, the cost per acre-foot for delivering water from the lower Mississippi River system to irrigators in the study area appears certain to exceed substantially their ability to pay for such water.

3. Economic benefits of irrigation to non-farm elements of the study area's economy are large and appear to be sufficient to warrant payment by those nonfarm elements of costs of import water in excess of the irrigator's ability to pay.

4. The cost of delivering import water probably could be reduced and economic feasibility of the project enhanced by incorporating in the project provisions for purposes other than water supply.

5. Continuation of the investigation is warranted.

The import routes under study by the Fort Worth District of the Corps of Engineers include eight sketched on a series of maps issued with a four-page summary of the status of the investigation in July 1968. (3) All eight of the Corps' alternative plans include the conveyance westward of surplus waters from Northeast Texas and all include diversion from the Mississippi River near its mouth "since the availability of water from the Mississippi will be contingent upon satisfying all requirements of the Mississippi service area."

I shall not dwell on the seventeen routes mentioned nor speculate on others which will certainly be investigated. Rather, I wish to emphasize the concern of both the Bureau and the Corps with the question of availability of Mississippi River water.

This sensitivity to the prerogatives of the basin of origin results from the prolonged disputes over interbasin diversions of the Owens and Colorado Rivers to the Southern California coastal region, from the intemperately phrased aspirations of some Southwesterners for Columbia River water, and from the affront to Canadian sovereignty implicit in the promulgation of NAWAPA by a firm based in Los Angeles.

The reaction has taken the form of a ten-year moratorium on even the investigation of possible feasibility of water import to the Colorado River basin in a recent bill authorizing the Central Arizona Project (4), and has produced a public opinion in Canada highly antagonistic to any international ventures for the development and export of Canadian water. (5)

Kenneth Seales (pictured) and Obbie Goolsby are two of your District's field representatives that have been working hard to lay out "in black and white" the dollar value and the conservation value of water reclamation to the High Plains farmer. Some of the findings, including probably surprising facts and figures, are presented in this issue.

HIGH PLAINS UNDERGROUND WATER
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THE Cross SECTION

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Volume 15 — 7 "THERE IS NO SUBSTITUTE FOR WATER" *December, 1968*

Water Depletion Tax Allowance

By F. A. RAYNER

Taxpayers in the Southern High Plains of Texas and New Mexico, who have a cost investment in the groundwater beneath their land, and who pump water from the Ogallala Formation to create income, are entitled to an income tax allowance on the amount of the annual depletion of the aquifer beneath their land.

The IRS (Internal Revenue Service) ruled that landowners that acquired their land prior to 1948 do not have a cost investment in their groundwater, and, therefore, they are no entitled to a depletion allowance. Landowners who acquired their land during and after 1948, by purchase, gift, inheritance or exchange, are probably entitled to claim the depletion allowance. The one controlling factor being, what was the assignable value of the property at the time of its acquisition. The simplest way to determine ones eligibility is to compare ones cost investment, less any improvements, with allowable cost-in-water tables, prepared by the District at the direction of the IRS. These tables show the cost attributable to groundwater.

BENEFITS AVAILABLE

To illustrate the tax benefits available under this program, let us assume ownership of a 640 acre farm located 7 miles south of Bovina and 6 miles east of Farwell, Parmer County. If we purchased this farm for $352,000.00 ($550.00 per acre) in January 1963, and if the improvements (irrigation wells, underground pipe, etc.) thereon were valued at $35,200.00; then our total cost in the land and water would be $316,800.00 ($495.00 per acre). For the year of purchase, the cost-in-water guideline table shows that 65 percent of our cost in the land and water is attributable to our cost in the water—for a total cost in the water of $321.75 per acre.

Referring to the 1963 saturated thickness guideline map (prepared by the District), we find that the saturated thickness in the Ogallala Formation under this farm was 212 feet at the time of purchase. The decline guideline maps (also prepared by the District) indicate the dewatering of the Ogallala Formation beneath this property amounted to 8, 2, 3, 5 and 3 feet respectively for 1963, 64, 65, 66 and 67. Our tax rebate (or tax credit) for these same five years would have been $7,769.60; $1,941.76; $2,913.92; $4,855.68 and $2,913.92; for a total of $20,394.88.

Since the allowance of water-depletion tax claims, commencing in 1962, it is estimated that about 5 million dollars has been returned or allowed to taxpayers in this area through the 1967 tax year. It has been estimated that less than 60 percent of those taxpayers eligible to claim the water-depletion tax allowance have elected to do so.

FILING CLAIMS

Taxpayers with farming income must file Form 1040-ES and pay their estimated 1968 taxes to the IRS on or before January 15, 1969. If an estimate is filed with the IRS by this date, the taxpayer can delay filing a final return for 1968 taxes until April 15, 1969. If an estimate is not filed by January 15, then the taxpayers final return must be filed by February 17, 1969.

Since *the 1968 water-level-decline, guideline maps will not be published by the District until about February 17, 1969;* taxpayers should file an estimate by January 15, if they elect to claim their 1968 depletion entitlement on their 1968 tax return.

Most of the eligible taxpayers who have not previously claimed the water-depletion allowance can, by April 15, 1969, file an amended tax return (IRS Form 843) claiming any allowable rebate for 1965, 66 and 67.

Taxpayers seeking groundwater and cost-in-water information can contact the District's Lubbock office.

Water District Election

The annual election for the High Plains Underground Water Conservation District No. 1 will be held January 14, 1969. Voters will have several issues on which to make decisions.

At the end of this year, two of the five men who serve as members of the Board of Directors will conclude their present terms of office. They are Ross Goodwin of Muleshoe, who represents Bailey, Castro and Parmer Counties, and Andrew Kershen of Hereford, who represents Armstrong, Deaf Smith, Potter and Randall Counties.

The ballot will also include a nom-

—continued on page 4

DECLINE OF THE WATER TABLE

By F. A. RAYNER

The decline of the water table in the Ogallala Formation, from January 1967 to January 1968, is shown by the map on pages 2 and 3. This map represents a composite of the individual county, cost-in-water-depletion, income-tax-allowance guideline maps (for claiming 1967 tax allowances) released by the District on February 15, 1968.

The 1967 depletion guideline maps were prepared from water-level records collected as the result of the measurement of the depths to the static water levels in 716 observation wells.

CONTOUR INTERVALS

The contour lines (blue lines) on this map join points of equal decline (in one foot intervals) of the water table during 1967. As an example; the City of Dimmitt, in central Castro County, is located between the two and the 3-foot decline contours. This means that the water level (water table) in the Ogallala Formation beneath this area probably declined an average of 2.5-feet, from January 1967 to January 1968. This represents an estimated 2.5-feet of dewatering of the aquifer in this area.

WELL CAPACITY CONTROLS DECLINE

This map very pointedly reflects the conditions of groundwater availability and well capacities within the District.

In those areas where relatively thick water-saturated intervals in the Ogallala Formation yet remain — which, for the most part, controls the development of large capacity wells — relatively large amounts of water are being pumped; hence the greater decline of the water table in these areas. Quite the converse is true for those areas underlain by relatively thin saturated intervals of the Ogallala aquifer. In these areas large capacity wells can not be developed; hence the relatively modest decline of the water table — reflecting less water pumped.

DECLINE DETERMINES GROSS INCOME

Disregarding climatic influences, and all other controlling factors assumed negligible or constant, it could be generally surmised that this decline map indicates that the amount of water used annually by an irrigator is directly related and controlled by the pumping capacity of his wells.

If these analogies are correct, and

—continued on page 2

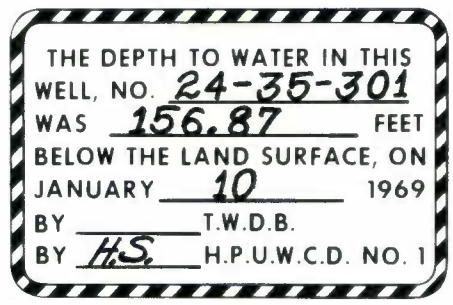
WATER LEVELS TO BE MEASURED

During January 1969, High Plains Underground Water Conservation District No. 1 (Lubbock) and Texas Water Development Board (Austin) personnel will measure (or attempt to measure) the depth to water below land surface in nearly 800 observation wells within the District.

Texas Water Development Board personnel will measure the water levels in observation wells in Armstrong, Bailey, Cochran, Hale, Hockley, Lamb, Lubbock and Lynn Counties. District personnel will measure water levels in Castro, Deaf Smith, Floyd, Parmer, Potter and Randall Counties.

During January 1969, a red and white, vinyl, stick-on tag will be affixed on or near the well-head equipment of every observation well. The observation well number; the depth to water below the land surface; the date of measurement; and the initials of the person who measured the well will be shown on each tag. In the event the well could not be measured, it will be so noted on the tag.

Well owners and/or operators are requested to remove these tags from any equipment removed from an observation well.



Complete water-level records for each observation well can be obtained from the District or the Texas Water Development Board.

The 1969 water-level measurements will be published in the March issue of the Cross Section.

Decline of the Water Table in the Ogallala Formation, High Plains Underground Water Conservation District No. 1, 1967 . . .

—continued from page 1

further considering the advanced state of efficiency of water use practiced by the High Plains farmer, it must be concluded that in areas of relatively large decline of the water table the irrigators are applying water to more crops and/or they are applying more water to those crops irrigated. In any event they are creating greater yields, resulting in a larger base income. Therefore, the overall pattern of the annual decline map is a direct indication of gross annual income of the area. This is to say, that a relatively large decline of the water table may reflect a greater gross income.

TABLE OF DECLINES

The following table lists the percentage of the land area in each county that is within the respective contour lines (decline intervals) shown on the 1967 decline map. The acres in each county can be multiplied by the percent of the area in each county in each deline interval, to determine the total land area experiencing the decline within each respective decline interval. This same procedure can be applied to the entire District.

AVERAGE DECLINE

A percentage distribution curve was constructed using the percentage of decline data for the entire District (the last line of the decline table). An analysis of this curve indicates the median decline for the entire District was approximately 2.5 feet. This is to say that the water table beneath 50 percent of the land surface of the District declined less than 2.5 feet, while 50 percent declined more than 2.5 feet.

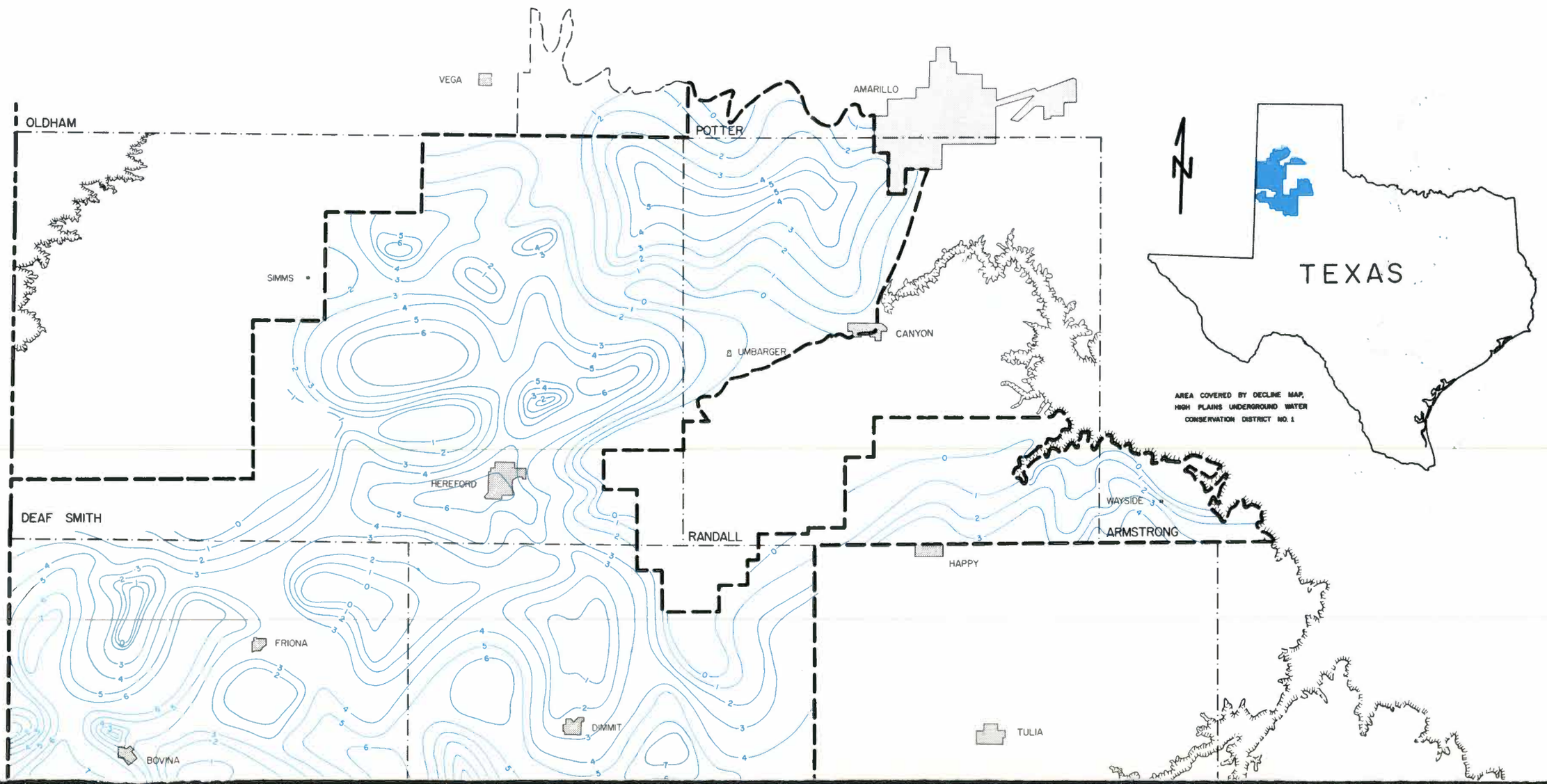
The median decline of 2.5 feet, as determined from the 1967 decline map, agrees closely with the average of 2.87 feet of decline per well, as determined by analysis of the individual observation well records (see the March 1968 issue of the Cross Section).

DECLINE IN 1968

Since the average water-level decline per well of 2.89 feet, for 1967, agrees closely with the average water level decline per well of 2.90 feet, for the six year period from January 1962 to January 1968, perhaps the median map decline of 2.5 feet, for 1967, is an average indicator of the median map deline that can be expected in 1968.

PERCENT OF THE TOTAL ACRES IN EACH COUNTY IN EACH WATER LEVEL DECLINE INTERNAL, FROM ZERO TO MORE THAN 8 FEET

County	Acres In District	No Decline	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	More Than 8
Armstrong	41,575	27.04	11.88	14.56	22.46	13.67	10.39				
Bailey	353,880	28.47	28.72	19.12	13.58	8.00	1.73	0.38			
Castro	539,657	1.81	2.27	20.34	20.50	23.21	17.23	10.36	3.57	0.72	
Cochran	218,963	26.57	28.81	22.27	10.82	7.13	3.28	1.12			
Deaf Smith	529,187	13.78	11.06	16.11	9.70	16.81	15.82	11.07	5.62		
Floyd	579,416	12.16	5.55	9.77	20.55	12.64	15.15	11.16	7.84	4.70	0.48
Hale	156,133	2.97	20.28	12.87	19.70	19.69	14.64	9.04	0.69	0.12	
Hockley	577,815	32.75	25.86	24.60	11.30	3.93	1.51	0.05			
Lamb	550,199	6.70	22.68	20.74	14.26	19.14	14.09	2.39			
Lubbock	580,940	25.83	19.04	23.52	15.20	9.91	3.26	3.24			
Lynn	154,083	27.93	33.69	18.35	13.46	4.73	1.02	0.82			
Parmer	546,401	2.02	2.79	10.89	16.15	20.18	13.34	14.72	13.76	5.72	0.43
Potter	18,495	17.81	24.08	23.58	31.62	2.91					
Randall	279,992	20.10	23.36	18.21	13.64	14.82	6.38	3.55			
Total for District	5,122,667	17.57	18.57	18.21	16.63	12.62	8.41	4.86	2.24	0.81	0.08



NEW MEXICO
TEXAS

PARMER
CASTRO
SWISHER
BRISCOE
BAILEY
LAMB
HALE
FLOYD
COCHRAN
YOAKUM
HOCKLEY
TERRY
LUBBOCK
LYNN
CROSBY
GARZA

FARWELL
LAZBUDDIE
HART
KRESS
SILVERTON
MULESHOE
EARTH
SPRINGLAKE
OLTON
PLAINVIEW
SOUTH PLAINS
LOCKNEY
HALE CENTER
SUDAN
BAILEYBORO
FLOYDADA
LITTLEFIELD
PETERSBURG
MAPLE
ABERNATHY
ANTON
MORTON
SHALLOWATER
IDALOU
LORENZO
RALLS
CROSBYTON
BLEDSOE
WHITEFACE
LEVELLAND
LUBBOCK
SLATON
SUNDOWN
ROPESVILLE
MEADOW
NEW HOME
WILSON
TAHOKA

0 2 4 8 16 MILES
SCALE

EXPLANATION

BOUNDARY OF THE HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1

BOUNDARY OF SUBDIVISION NO. 1 OF THE UNDERGROUND WATER RESERVOIR IN THE OGALLALA FORMATION

SOUTHERN HIGH PLAINS ESCARPMENT

CONTOUR LINE SHOWING DECLINE OF THE WATER LEVEL IN THE OGALLALA FORMATION, CONTOUR INTERVAL ONE FOOT

By: JP.
Draft: TLS
12-21-68

Election . . .

—continued from page 1

inee to fill a place on each of the five-man County Committee in the District. Each county in the District has a "County Committee" that approves well drilling permits and makes recommendations on various matters to the District Board.

The other issue on the ballot will be the annexation of Crosby County into the High Plains Underground Water Conservation District No. 1.

Residents of this County are applying for membership and the residents of the District will vote to accept or reject this County.

Residents living within the County of Crosby will vote to either join the District or remain separated from it. To vote on this proposal, one must be a qualified voter and must live in the area affected. A person who owns property in the area under consideration, but does not reside in the area is not eligible to vote on this proposal.

Qualified voters living within the District are eligible to vote for the District Director who lives in their District Precinct and for a County Committeeman from their Commissioner's Precinct if one is to be elected this year.

All qualified voters living within the District are eligible to vote for or against the annexation of certain parts of Crosby County.

A qualified voter is one who has a valid Voter Registration Certificate for 1968, and owns property within the District. This property can be a house and lot, farm, business property or land of any type. You do not have to be a farmer or own an irrigation well. School teachers, bankers, mechanics, grocers, or anyone who owns property that is taxed by the Water District is eligible to vote.

Nominations of qualified persons for District Directors and County Committeemen are made by the respective County Committees or they are made by a petition signed by twenty-five qualified voters in the area involved.

Voters must cast their ballots in their home counties; however, they may vote at any one of the voting places in that County.

Nominees for Directors and Committeemen's places are as follows:

NOMINEES FOR DISTRICT DIRECTOR

(One to be elected for each precinct)

Precinct No. Three (3),
Parmer, Castro, and Bailey
Ross Goodwin, Muleshoe, Texas

Precinct No. Four (4),
Deaf Smith, Randall, Armstrong and Potter
John Douglas Pitman, Box 1937, Hereford, Texas

NOMINEES FOR COUNTY COMMITTEEMEN

Armstrong County
Committeeman for Commissioner's Precinct No. 3
George Denny, Rt. 1, Happy, Texas
Carroll Rogers, Wayside, Texas

Bailey County
Committeeman-at-large
Jessie Ray Carter, Route 5, Muleshoe, Texas
James P. Wedel, 1714 W. Ave. H., Muleshoe, Texas

Castro County
Committeeman for Commissioner's Precinct No. 1
John Gilbreath, Route 2, Hart, Texas
Don Carpenter, Box 876, Dimmitt, Texas

Cochran County
Committeeman for Commissioner's Precinct No. 4
G. W. Lyons, Route 1, Morton, Texas
Keith Kennedy, Star Route 2, Morton, Texas

Deaf Smith County
Committeeman for Commissioner's Precinct No. 2
W. L. Davis, Jr., Box 312, Hereford, Texas
Rowland W. Hairgrove, Route 4, Hereford, Texas

Floyd County
Committeeman-at-large
Melvin Jarboe, Route 4. Floydada, Texas
C. M. Perry, Route 3, Floydada, Texas

Hale County
Committeeman for Commissioner's Precinct No. 2
W. D. Scarborough, Jr. Petersburg, Texas
Henry Scarborough, Route 2, Petersburg, Texas

Hockley County
Committeeman for Commissioner's Precinct No. 4
Douglas Kauffman, 110 Mike St., Levelland, Texas
Bryan Daniel, N. Sherman Levelland, Texas

Lamb County
Committeeman for Commissioner's Precinct No. 3
W. W. Thompson, Spade, Texas
Don McCarty, Spade, Texas

Lubbock County
Committeeman for Commissioner's Precinct No. 2
Alex Bednarz, Route 1, Slaton, Texas
Walter Heinrich, Route 2, Slaton, Texas

Lynn County
Committeeman-at-large
Don R. Smith, Box 236, New Home, Texas
Dale Zant, Route 1, Wilson, Texas

Parmer County
Committeeman for Commissioner's Precinct No. 3
Webb Goeber, R.F.D., Farwell, Texas
E. L. Cochran, Rt. 1, Farwell, Texas

Potter County
Committeeman for Commissioner's Precinct No. 4
F. G. Collard, Route 1, Amarillo, Texas

Randall County
Committeeman-at-large
Ralph Ruthart, Precinct 4, Route 1, Canyon, Texas
Melvin Schaeffer, Precinct 3, Route 1, Happy, Texas
Leonard Batenhorst, Precinct 2, Route 1, Canyon, Texas

FOR
AGAINST
The confirmation of the annexation of certain eligible lands in Crosby County to the High Plains Underground Water Conservation District No. 1.

FOR
AGAINST
The assumption by certain eligible lands of Crosby County of its pro rata share of all indebtedness, if any, and/or maintenance taxes that may be owed, contracted or authorized by or for the High Plains Underground Water Conservation District No. 1.

POLLING PLACES

Armstrong County
1) School House, Wayside

Bailey County
1) Enochs Gin, Enochs
2) State Bank, Muleshoe

Castro County
1) Brockman Hardware Co., Nazareth
2) County Court House, Dimmitt
3) Easter Community Center, Easter
4) City Hall, Hart

Cochran County
1) County Activities Bldg., Morton

Deaf Smith County
1) County Court House, Hereford

Floyd County
1) County Court House, Floydada
2) City Hall, Lockney

Hale County
1) Community Center, Petersburg

Hockley County
1) City Hall, Anton
2) Farm Center Gin, Ropesville
3) County Court House, Levelland
4) Whitharral Lions Club Bldg., Whitharral
5) City Hall, Sundown

Lamb County
1) City Hall, Sudan
2) Community Bldg., Earth
3) County Court House, Littlefield
4) Farmers Coop Gin, Spade

Lubbock County
1) Community Club House, Shallowater
2) City Hall, Wolfforth
3) New County Court House, Lubbock
4) City Hall, Idalou
5) Community Club House, Slaton

Lynn County
1) Co-op Gin, New Home
2) Wilson State Bank, Wilson

Parmer County
1) County Court House, Farwell
2) Wilson & Brock Insurance Agency, Bovina

Potter County
1) School House, Bushland

Randall County
1) Consumer's Fuel Assoc. Elevator, Ralph Switch
2) V.F.W. Hall, 1 mile North Canyon
3) Columbus Club Hall, Umbarger

Crosby County
1) Pioneer Memorial Bldg., Crosbyton
2) Chamber of Commerce, Ralls
3) Community Center, Lorenzo

ABSENTEE BALLOTING

Absentee balloting for the annual election of the High Plains Underground Water Conservation District No. 1 will be held December 24, 1968, through January 9, 1969, with two exceptions, absentee balloting will be conducted by the secretaries of the County Water District offices. Potter County residents may cast their ballots at the County Clerk's office. Armstrong County residents may cast their absentee ballots with John Patterson of Wayside.

Eligible voters of the Water District are urged to vote absentee if they are going to be absent from the County on January 14th.

Proposals on the ballot will be two (2) District Directors positions, fourteen (14) County Committeemen, and the acceptance or rejection of Crosby County.

Be sure to vote, either absentee or on January 14, 1969.

SECOND CLASS PERMIT

HIGH PLAINS UNDERGROUND WATER
CONSERVATION DISTRICT NO. 1
1628 FIFTEENTH STREET
LUBBOCK, TEXAS 79401