THE Cross SECTION

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

Volume 6— No. 8 "THERE IS NO SUBSTITUTE FOR WATER" January 1960

3-Year-Old Falls Into Well

By ALLAN H. WHITE

The thing that has been dreaded for so long has happened. A child has fallen into an abandoned irrigation well.

A 3-year-old boy, Randy Gene McKinley, and his family were visiting his grandfather at Christmas time on his farm near Dell City, Texas. Randy and a group of playmates were playing near an abandoned well, which was covered with a barrel. Some of the children pushed the barrel away from the hole. Randy stepped into the well and fell feet-first approximately 68 feet to the water that stood in the well. The 300-foot deep well was cased with 16-inch pipe from top to bottom. Randy apparently clung to the casing to hold his head out of the water.

The other children ran to the house which was nearby, and hysterically told Randy's mother, Mrs. Floyd McKinley, and her sister, Mrs. C. L. Spradlen, of the accident. Mr. McKinley had gone to El Paso with Randy's grandfather, F. W. O'Bannion.

The women and children ran back to the well. The mother tried to comfort Randy by telling him not to cry nor be alarmed and that she would get him out.

J. Manuel Carrol, a Mexican who works on the O'Bannion place, realizing that the boy's life would surely be lost in a very short time, suggested that he be lowered head-first into the 16-inch well.

A rope was secured to the feet of the 125-pound Corral and he started the 68-foot head-first decent into the small dark well shaft. He became lodged many times and had to claw himself free. He became dizzy from the inverted position of his body. The foul smell of the long-unused well, the pain inflicted to his ankles by the rope and the thought that he might become stuck in the well undoubtedly caused Corral to approach a point of panic many times during the long 15-minute period it required to reach the boy. Only the thought of little Randy being in the water below kept him squirming and inching his way steadily closer to the end of his mission. Finally, Corral reached the cold and crying lad after Randy had been in the well about an hour. Both were pulled back to the surface.

The greatest Christmas gift that could possibly have been presented Mr. and Mrs. McKinley was given to them the day before Christmas—their son, well and no worse for the ordeal.

Imagine, if you can, the paralyzing fear that surely gripped the very being of this small lad, and the mental and physical anguish that the young mother must assuredly have experienced.

This story has a happy ending — a frightened boy returned to the warm and protecting embrace of a mother's arms. A man's courage, expressed in utter disregard for his personal safety and well-being. Think though how tragically this story might have ended if circumstances would have been altered even ever so slightly.

At the time this near-tragedy was unfolding, many of you were no-doubt reading the December edition of "The Cross Section." You will remember the story carried that pertained to abandoned wells in our area. The story stressed the importance of closing abandoned wells properly and attempted to show the dangers in allowing open wells or improperly covered wells to remain in that state.

One of the most tragic realities of life is found in the fact that human beings do not become concerned about important matters until the proverbial horse escapes through the open gate. What will it take to stir us from our natural complacency? Must a small boy or girl be sacrificed at each open abandoned well to show us how urgently important is this matter?

If you are guilty of maintaining an open well on your property you may well be inviting a tragedy of such proportion that its imprint would go with you through life.

Close your wells properly — no matter how isolated they may seem. Don't flirt with anything so important as life itself.

What does the law have to say concerning the proper abandonment of wells? For your information the following excerpt is re-printed.

PENAL CODE

ARTICLE 1721. COVERING AND PLUGGING

Section 1. It shall be unlawful for the owner or operator of any well or cistern, as much as ten (10) feet deep, and not less than ten (10) inches nor more than (6) feet in diameter to fail to keep it entirely covered at all times with a covering capable of sustaining weight of not less than two hundred (200) pounds, except when said well or cistern is in actual use by the owner or the operator thereof.

Section 1. a. It shall be unlawful for any person who shall drill, dig, or otherwise create, or cause to be drilled, dug or otherwise created, any well or hole of as much as ten (10) feet in depth and not less than ten (10) inches in diameter to abandon said well or hole without first completely filling said well or hole from its total depth or not less than ten (10) feet from the surface and completely filling the same from said plug to the surface.

This act does not modify or repeal any existing laws.

Section 2. Any person violating the provisions of this Act shall upon conviction be guilty of a misdemeanor and be fined not less than One Hundred Dollars ($100.00) nor more than Five Hundred Dollars ($500.00). Acts 1949, 51st. Leg., p. 509, ch. 281.

T. W. C. A. Will Appoint Committee

The Board of Directors of the Texas Water Conservation Association, in session in early January, accepted an invitation from the State Board of Water Engineers to establish an advisory group from within their membership to "assist, aid and consult" with the Water Board in matters involving the planning and development of the State's water resources.

The Water Board's invitation asked that two persons be appointed from the board of directors of T.W.C.A. to the committee, along with one person from each of the six panels within the organization. The six panels represent the fields of water use in Texas—ground water, irrigation, navigation, municipal, industrial and river authorities.

T.W.C.A. President Max Starcke and

(Continued on Page 3)

Pictured above is the abandoned irrigation well into which three-year-old Randy McKinley fell. The barrel shown at left was knocked over by children at play to expose the open well and permit little Randy's feet-first entrance. J. Manuel Carrol, 125-pound farm and ranch laborer, pictured above, quickly suggested that he be lowered head-first to the lad 68-feet below, who was frantically trying to keep his head above 240 feet of water. He pulled the boy to safety about an hour after Randy fell into the well. Picture at right shows the wheel rim that has now been welded over the well by F. W. O'Bannion, owner of the well and Randy's grandfather, to guard against a repeat of this near tragedy.

—Photos Courtesy Gene Lutrick, Dell City, Texas

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ALLAN WHITE
Editor

Fertilizer Lowers Pr

Fertilizer increased grain yields in a test on mixed land soils in 1959. This was located on the Billy Clayton farm one mile east and one mile north of Springlake in Lamb County. Bill Kimbrough, Lamb County Agent, and Mr. Clayton made the initial agreement for the work to be done on this farm.

Data showing total inches of irrigation water used was collected by the High Plains Underground Water Conservation District. Planting and production practices for the fertilizer test area were done by Mr. Clayton the same as in his regular farming program. The fertilizer was applied and harvest yields measured by personnel of the Texas Agricultural Experiment Station, Substation No. 8.

Irrigation dates and amounts of water applied were as follows:

Date	*Acre Inches*
April 12 (preplant)	4.21
August 1	4.56
August 12	3.50
August 25	3.91
Total	16.18
April to September rainfall	12.40
Total irrigation and rainfall	28.58

Twenty seven different fertilizer treatments were applied in July as an early side dressing. Nitrogen levels in pounds per acre were 0, 40, 80 and 120. Phosphorus was used at 0, 20, 40 and 80 pounds per acre. Potassium was applied at three levels of 0, 40 and 80 pounds per acre. These rates of the three major fertilizer elements were used alone and in certain combinations to see which rates or combinations gave the best results. Farmers are very often satisfied with the results from using a treatment of 40 pounds of nitrogen per acre but for next year they may wonder what 80 or 100 pounds of nitrogen per acre would do. Also how much, if any, phosphorus or potassium should be used with the selected nitrogen rate. This is a very important question because profit margins are smaller for grain sorghum than for cotton. The most profitable yield is what every farmer wants with grain sorghum and this will probably not be the same as the highest possible yield.

Ammonium sulfate (21%), superphosphate (46%) and muriate of potash (60%) were sources of fertilizer used in this test. Equal amounts of other fertilizer materials, properly applied, would be expected to give approximately the same results. Placement of the sidedressed fertilizer in this test was on 20-inch centers and 4 to 5 inches below seed furrow level. A fertilizer spacing on 40-inch centers is considered more desirable for later side-dressing when more sorghum roots are out in the "middle".

Fertilizer costs were figured on the basis of:

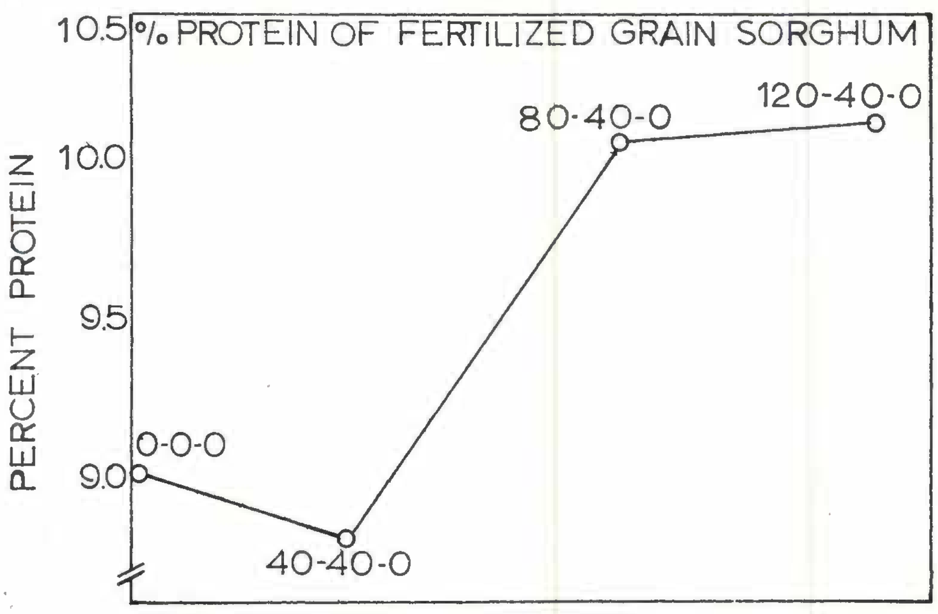
7c per pound for nitrogen,
10c per pound for phosphorus, and
4c per pound for potash.

$1.00 per acre was added for cost of fertilizer application, and grain prices were figured at $1.45 per hundred pounds.

Prices used are of course not stable and different locations will require certain adjustments in costs and grain prices. However, the prices used in this report are realistic and should be typical for the southern High Plains area.

Highest yield in this test was 6550 pounds of grain with 120 pounds of nitrogen and 80 pounds of phosphrous; however, the most profitable yield considering fertilizer cost and yield increase, was 6135 pounds of grain per acre produced with a fertilizer treatment of 80-40-0 per acre. Net profit per acre, due to fertilizer, on the 80-40-0 treatment was $14.77 per acre and $14.00 per acre where the high yielding treatment 120-80-0 was used. The yield of unfertilized grain in this test was 4385 pounds which is a good average yield for a number of acres. The level of grain production on unfertilized land is extremely important in figuring profits from increases due to fertilizer. As the unfertilized check yield goes up, profits from increases with fertilizer are smaller. When the yields are low on unfertilized land and plant food is the limiting factor of production, yields can be profitably increased with fertilizer.

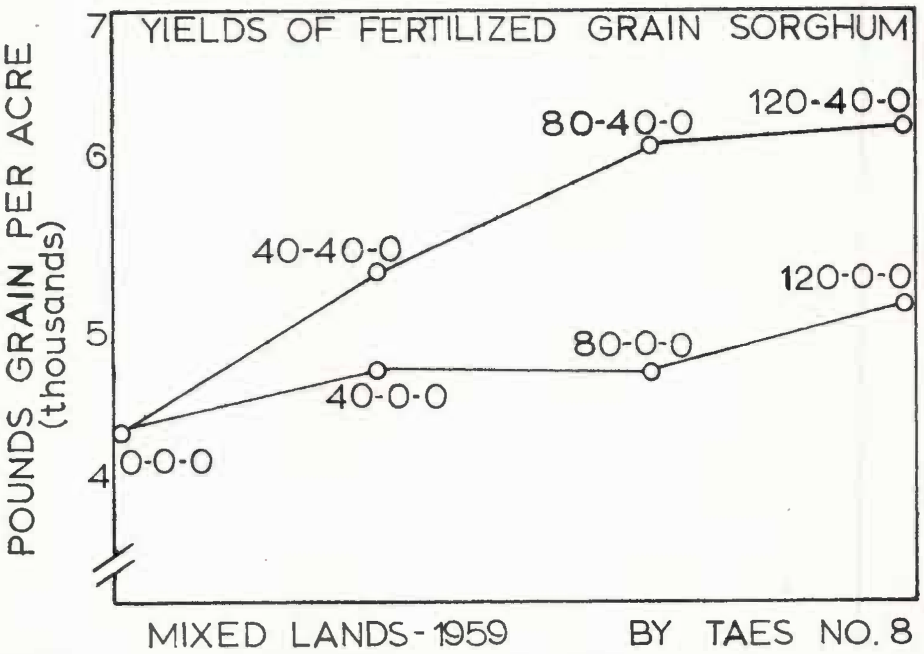
An important fact shown by this test is that when only nitrogen was used, the average yield increase per pound of nitrogen applied was 6 pounds of grain. When 40 pounds of phosphorus was used with nitrogen rates then the average yield increase per pound of nitrogen used was about 20 pounds of grain. Rates of 40, 80 and 120 pounds of nitrogen increased grain yields but a greater increase



MIXED LANDS-1959 BY TAES NO 8

oduction Cost Of Irrigated Grain Sorghum

By HARVEY J. WALKER
Assistant Agronomist, Texas Agricultural Experiment Station, Substation No. 8, Lubbock, Texas



was obtained with the same nitrogen rates in combination with 40 pounds of phosphorus. This is shown by the graph for yields of fertilized grain sorghum.

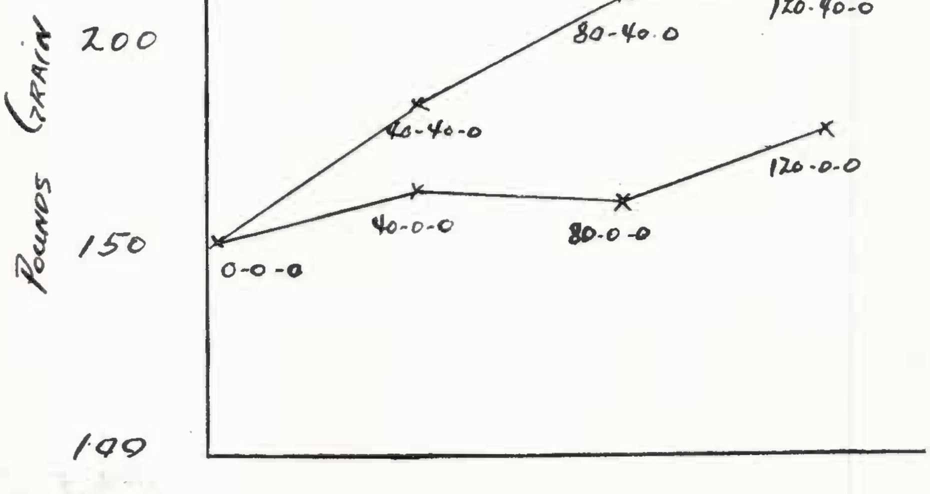
The necessity of using phosphorus with nitrogen for grain sorghum on the mixed land soils has been shown in other experimental work. This is particularly true after using nitrogen alone for two years in a cropping system where grain sorghum is grown continuously on the same land. Soil tests are extremely valuable sources of information for determining the need of phosphorus and/or potassium to balance nitrogen fertilizer applications.

It should be noted that all fertilizer treatments received the same total amount of moisture and yet yields varied. The important conclusion to be drawn from this fact, is that soil fertility must be balanced in order for growing plants to properly utilize water applied. When plants need certain nutrients, no amount of water, whether it be rainfall or irrigation water, will cause the plant to yield properly. Consequently, good soil fertility is of the utmost importance when attempting to make the highest crop yields per inch of water used.

Protein content of fertilized grain sorghum was greater than in unfertilized grain sorghum. The percent of protein for the unfertilized grain sorghum was 9.09 percent and for the 80-40-0 treatment it was 10.19 percent. On the basis of actual yields in this test for the 0-0-0 and 80-40-0 treatments this means an extra 67 pounds of protein per acre from the fertilized grain. Using a figure of 8.29c per pound of protein, based on a price of $68.00 per ton for cottonseed meal having a protein level of 41 percent, 67 pounds of protein is worth $5.55. Grain sorghum is not sold by the farmer on the basis of protein content but this is extremely important to the cattle and sheep feeder in balancing rations. Proteins in swine and poultry rations have to be balanced according to quality which means that merely a larger amount of protein may be of no value to these feeders. It is generally known that the protein content of irrigated grain sorghum may go as low as 6 percent while in dryland grain sorghum a 14 percent protein content is not uncommon.

A table showing yield of grain per acre/inch of total water received, and protein content for eleven of the twenty seven treatments in this test is given below:

Fertilizer Treatment	*Pounds grain per acre*	*Pounds grain per acre/inch of total water*	*Percent Protein*
0-0-0	4385	153	9.09
40-0-0	4758	167	7.99
80-0-0	4701	164	9.70
120-0-0	5181	181	9.99
40-40-0	5361	187	8.69
80-40-0	6135	214	10.19
120-40-0	6264	219	10.29
120-80-0	6550	229	10.50
80-40-40	5963	208	10.00
120-40-40	5696	199	10.89
120-80-80	6361	222	11.35



CONSERVATION CONVERSATION

The lengthy report of June 1958, "Water Developments and Potentialities of the State of Texas," prepared by the Board of Water Engineers, the U. S. Corps of Engineers, the Bureau of Reclamation, and the Soil Conservation Service, had the following to say about the Ogallala ground-water reservoir in Texas. This reservoir is the primary source of our southern High Plains water supply.

"The Ogallala ground-water reservoir is spread over about 35,000 square miles, comprising 95 percent of the Texas Panhandle and all the South Plains. Withdrawals from this reservoir are made in sufficient quantity and are of suitable chemical quality to supply present irrigation needs. Available information shows that 4,300,000 acres were irrigated by ground water from this reservoir in 1956. Annual withdrawals exceed combined withdrawals from all other ground-water reservoirs in the State and greatly exceed the natural recharge. In response to pumpage, the water level in the highly developed parts of the reservoir has declined steadily. The supply of water underlying some areas of the Southern High Plains where the Ogallala is thin has been seriously depleted, whereas thick saturated sections of the Ogallala underlying many areas of the High Plains contain an ample supply for many years to come.

"The useful life span of the entire Ogallala ground-water reservoir depends upon many hydrologic and economic variables. Hydrologic variables include non-uniform distribution of permeable rocks and non-uniform rates of pumpage owing to wide ranges in annual precipitation. Economic variables include fluctuations in the price of agricultural products, acreage controls, and pumping costs. The Board of Water Engineers has estimated on the basis of incomplete data that the amount of water in storage which can be recovered by wells is in the order of magnitude of 300 to 400 million acre-feet."

COMMITTEE APPOINTED—

(Continued from Page 1)

General Manager J. E. Sturrock will make these advisory committee appointments in the very near future.

Water Board member Otha Dent of Littlefield pointed out that the committee suggestion was being offered in an effort to consolidate the thinking of people from all phases of water development in matters concerning the state's water resources.

WELL DRILLING STATISTICS FOR DECEMBER

During the month of December, 40 new wells were drilled and registered with the District office; 9 replacement wells were drilled; and 4 wells were drilled that were either dry or non-productive for other reasons. 176 permits were issued by the County Committees.

The permits issued and wells completed for December follow by counties:

County	*Permits Issued*	*New Wells Drilled*	*Replacement Wells*	*Dry Holes Drilled*
Armstrong	0	0	0	0
Bailey	3	0	0	0
Castro	10	1	1	0
Cochran	9	1	0	0
Deaf Smith	6	5	2	0
Floyd	22	9	1	1
Hockley	35	2	0	2
Lamb	17	5	2	0
Lubbock	34	7	0	1
Lynn	21	3	0	0
Parmer	8	5	1	0
Potter	2	0	2	0
Randall	9	2	0	0
Totals	176	40	9	4

Water District Officials Elected January 12

The annual elections of Directors and County Committeemen for the High Plains Underground Water Conservation District were held January 12. Two Directors were elected and one Committeeman for each county was elected.

In Director's Precinct No. 2, consisting of Cochran, Hockley and Lamb Counties, Roy Hickman of Morton was elected to replace Roy B. McQuatters, Sr. of Littlefield, on the Board of Directors.

In Director's Precinct No. 5, consisting of only Floyd County, J. R. Belt, Jr. of Lockney was re-elected to continue serving on the five-man Board of Directors.

Directors are elected for a term of two years. The Board of Directors is the governing body of the Water District.

One Committeeman was elected in each of the thirteen counties that comprise the High Plains Water District. Each Committeeman serves a term of three years on the respective five-man Committee.

The County Committees advise the Board as to the desires of the people in their county. They also sign drilling permits and handle all county business.

Shown above are newly elected members to the Board of Directors of the High Plains Underground Water Conservation District. Roy Hickman of Morton, left, was elected to represent Cochran, Hockley and Lamb Counties. J. R. Belt, Jr. of Lockney, right, was re-elected to serve as the representative from Floyd County.

County Committeemen elected are as follows:

ARMSTRONG COUNTY
Precinct No. 3—Dewitt McGehee

BAILEY COUNTY
Precinct No. 2—Ross Goodwin

CASTRO COUNTY
Precinct No. 1—E. E. Foster

COCHRAN COUNTY
Precinct No. 4—D. A. Ramsey

DEAF SMITH COUNTY
Precinct No. 2—L. E. Ballard

FLOYD COUNTY
Committeeman-At-Large
Chester Mitchell

HOCKLEY COUNTY
Precinct No. 4—M. H. Newton

LAMB COUNTY
Precinct No. 3—Albert Lockwood

LUBBOCK, COUNTY
Precinct No. 2—Bill Alspaugh

LYNN COUNTY
Committeeman-At-Large
Erwin Sander

PARMER COUNTY
Precinct No. 1—Lee Jones

POTTER COUNTY
Precinct No. 4—W. J. Hill, Sr.

RANDALL COUNTY
Precinct No. 1—J. R. Parker

Well Drilling Increases In 1959

In 1959, commercial well drilling in the High Plains Underground Water Conservation District increased almost two-fold over 1958. In 1959, a total of 1518 wells were drilled, as compared to 879 wells in 1958.

Because of the need for pre-planting irrigation water in the spring of 1958, the first six months of the past year showed a tremendous increase in drilling activity when compared to the first six months of 1958. The latter half of 1959 was about equal in numbers of wells drilled, to the last six months period of 1958.

Even though additional wells are being drilled, very little new land is being placed under irrigation for the first time. Most new wells are drilled in order to obtain additional water with which to supplement present decreasing supplies. Well capacities generally are dropping off and new wells added to an irrigation system merely serve to regain the original supply or add to the water available for faster irrigations.

Probably, another reason for the increased drilling activity in 1959, is because of the fact that generally excellent crops were harvested in the southern High Plains area during the fall of 1958. This not only re-filled the area's sagging pocketbook, but it also created an optimistic feeling toward additional capital investments.

Below is shown a table that breaks down the compiled statistical data by counties. The past two years are shown in order that comparisons may be made.

County	*Permits Issued* 1958	1959	*New Wells Drilled* 1958	1959	*Replacement Wells* 1958	1959	*Dry Holes Drilled* 1958	1959	*Total Wells Drilled* 1958	1959
Armstrong	4	6	2	5	0	0	2	1	4	6
Bailey	57	136	45	72	12	7	2	12	59	91
Castro	97	107	68	84	15	21	2	1	86	106
Cochran	36	82	29	50	1	5	3	9	33	64
Deaf Smith	118	155	85	87	17	34	4	7	106	128
Floyd	103	190	61	115	8	23	1	6	70	144
Hockley	232	299	110	225	12	12	17	26	139	263
Lamb	114	204	74	152	5	16	2	8	81	176
Lubbock	179	318	104	210	9	20	8	22	121	252
Lynn	68	129	29	86	0	3	10	12	39	101
Parmer	102	154	75	105	27	35	7	3	109	143
Potter	3	2	1	0	0	2	1	0	2	2
Randall	28	67	27	34	2	5	1	3	30	42
Totals	1141	1849	710	1225	108	183	60	110	879	1518

Water Levels In Wells Being Checked

Water levels in Southern High Plains observation wells are currently being measured by personnel of the High Plains Water District and the U. S. Geological Survey in cooperation with the Texas Board of Water Engineers.

Water District personnel making these measurements are Y. F. Snodgrass (Cochran, Lubbock and Lynn Counties) and Wayne Wyatt (Castro and Deaf Smith Counties).

Personnel of the U. S. Geological Survey who will be making the water-level measurements in 18 other Southern High Plains Counties, are Archie Long, White Deer; Paul Rettman, Plainview; and Gene McAdoo, Stamford.

Water-level measurements in the High Plains are an integral part of the statewide observation well program maintained by the Texas Board of Water Engineers in cooperation with the U. S. Geological Survey.

The 1959 and 1960 water-level measurements for the 13 Water District Counties will be published in "The Cross Section" at a later date.

High Plains Underground Water
Conservation District No. 1
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LUNCHEON IS SITE OF SWEARING-IN CEREMONIES FOR NEW DIRECTORS

Roy Hickman of Morton and J. R. Belt, Jr. of Lockney received the oath of office administered to members of the Board of Directors of the High Plains Water District, from District Judge Robert Bean during luncheon ceremonies in Lubbock on January 29.

Mr. Hickman was elected by the people of Director's Precinct No. 2 to represent Cochran, Hockley and Lamb Counties on the Board. Mr. Belt was re-elected by the people of Director's Precinct No. 5 to continue serving on the Board as the representative from Floyd County. Mr. Hickman and Mr. Belt will each serve two-year terms on the five-man District Board.

Further ceremonies during the luncheon included the introduction of present and former members, guests and staff members by District Manager Tom McFarland.

Mr. McFarland then briefly outlined to the group, work in which the Water District is involved and plans for 1960.

W. L. Broadhurst, District Chief Hydrologist, presented a resume concerning the present status of a Water District request to the U. S. Internal Revenue Service for an income-tax deduction for the depletion of underground water by residents of the High Plains Water District.

Jim Brashear, high school student at Petersburg, then presented a speech that he has written on water and soil conservation as a 4-H Club project.

Among the distinguished luncheon guests were the Honorable Jesse Osborn, State Representative from Muleshoe, Arthur P. Duggan, Jr. Littlefield attorney; John Aikin, Hereford attorney; George McCleskey, Lubbock attorney; and Frank Rayner, Lubbock representative for the State Board of Water Engineers.

Former Water District Board members present were, W. O. Fortenberry, Lubbock; Marvin Shurbet, Petersburg; W. M. Sherley, Lazbuddie; Willis Hawkins, Hart; E. C. Hatton, Lubbock; Gus Parish, Springlake, Virgil E. Dodson, Hereford; George Broome, Anton; A. H. Daricek, Maple; and Roy B. McQuatters, Sr. of Littlefield.

Lubbock District Judge Robert Bean is shown above at center as he administers the oath of office for public officials to J. R. Belt, Jr. of Lockney, left, and Roy Hickman of Morton. Mr. Belt was re-elected by the people of Director's Precinct 5, Floyd County, to serve an additional two-year term on the High Plains Water District Board, while Mr. Hickman was elected to the Board by voters in Director's Precinct 2, Cochran, Hockley and Lamb Counties, also for a two-year term.

Shown at left above is Tom McFarland, District Manager, as he explains to luncheon guests the work of the High Plains Water District and plans for 1960. At right, W. L. Broadhurst, District Hydrologist, is shown as he briefly explains the status of a District request for an income-tax deduction for the depletion of underground water.

Water District Notes Changes Made Recently In Staff Personnel

The High Plains Water District has recently added to its staff a new lady and two new men.

Joy Taylor has replaced Peggy Burkett, who resigned her secretarial position in the Lubbock office to assume the duties of a housewife. She recently married and moved to Pennsylvania.

Miss Taylor is from Anton, in Hockley County. She comes to work for the Water District after having graduated from Draughon's Business College in Lubbock and having been employed for approximately one year by a farm loan business. Miss Taylor's responsibilities will entail both secreterial and clerical duties.

Donald L. Reddell comes to the Water District directly from Texas Technological College in Lubbock. Mr. Reddell graduated from Tech in January 1960 with a B. S. degree in Agricultural Engineering. He will headquarter in Lubbock at the District office and will assist W. L. Broadhurst, District Chief Hydrologist, in various phases of field work and map preparation.

Mr. Reddell calls Gail, in Borden County, home. He is married to the former Minnie Ellen Cox of Lamesa, and they are expecting a child in July. The Reddell's live at 4204A 35th Street in Lubbock.

Bruce E. Fink is replacing Wayne Wyatt, Water District Field Representative in charge of the Hereford office. Mr. Wyatt resigned to enter private business in Lubbock.

Mr. Fink is a native of western

(Continued on Page 4)

Shown above are three new employees of the High Plains Water District. Joy Taylor, shown upper right, new secretary, will be located at the District office in Lubbock. Bruce Fink, Junior Geologist, at left, will be stationed at the District field office in Hereford. His office mainly serves the northern tier of Water District counties. Don Reddell, Junior Engineer, will be located in Lubbock and will assist with technical and mapping work.

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ALLAN WHITE
Editor

Alternate-Furrow Or Ea

The irrigation of crops down alternate furrows is a practice that has been used on the High Plains for more than 10 years and will gain in popularity as irrigation water decreases in supply.

In order to gain more information on alternate-furrow irrigation, the Texas Agricultural Experiment Station and the High Plains Underground Water District conducted 3 tests in 1959 to compare alternate and each furrow irrigation. One was conducted at Substation No. 8 and two cooperative tests were conducted on the farms of Mr. Grice Herrington 5 miles northeast of Idalou, Texas, and Mr. Buddy Winters 3 miles southwest of Idalou. The tests were so located because irrigation water used for test purposes could be measured accurately with "Sparling flow meters" that had been installed on the two farmers irrigation wells by the High Plains Underground Water District.

A discussion of the tests conducted in 1959 and a summary of 7 years test on alternate-furrow irrigation at Substation No. 8 are given in this article.

SUBSTATION NO. 8 TESTS

Summary of 7 years tests at Substation No. 8 comparing alternate and each furrow techniques of applying irrigation water are summarized in the accompanying tables. The tests were conducted on mixedland (fine sandy loam) that had been previously planted to cotton. Fertilizer was not used during the 7 years listed.

The irrigation scheme for each year consisted of a six acre-inch preplant irrigation and one summer irrigation. The preplant irrigation was applied down each row and the one summer irrigation was applied down each row on part of the test area and down alternate rows on the remaining test area. Four acre-inches of water were applied when irrigated down each row and two acre-inches when irrigated down alternate rows. In all cases, the amount of water applied was measured onto the test area.

case of 1958, the soil profile was brought to field capacity by rainfall and one 3-inch rain was received 2 weeks after the field had been irrigated at peak bloom. The difference in the yields received from cotton irrigated alternate furrow from year to year is largely to seasonal rainfall distribution.

1959 HERRINGTON TEST

This test was conducted on tight, slowly permeable clay soil (Pullman silty clay loam) that had been planted in cotton for 3 previous years. The length of test rows were 1000 feet. Irrigation water was metered onto the test area with a "Sparling flow meter" that was installed between the pump discharge pipe and the vent stand leading to the underground irrigation pipe. Records were kept of the date and amounts of each irrigation necessary to produce the crop.

A preplant irrigation totaling 6.6 inches was applied down each row during the month of March. Lankart 57 cotton was planted in May and came up to a good stand. The cotton used for test was not fertilized in 1959 or the 3 previous years. The cotton was damaged slightly by sand on June 5 but recovered to make normal early growth.

Soil samples and gypsum block readings were taken weekly and used as a guide for the timing of summer irrigations. The test was composed of the following methods of applying irrigation water: (1) alternate furrow on 4 hour sets, (2) alternate furrow on 12 hour sets, (3) each furrow on 4 hour sets, (4) each furrow on 6 hour sets, (5) each furrow on 8 hour sets. Early summer rainfall delayed the first irrigation until July 26. All of the cotton received 3 irrigations except cotton irrigated down every row on 4 hour sets, and it required 4 irrigations. All of the treatments received no irrigations or significant amounts of rainfall after August 20.

A moderate infestation of verticillium wilt was noticed in the test area

TABLE 1 — POUNDS OF LINT PER ACRE

Method of Application	Number of Irrigations	1948	1949	1950	1956	1957	1958*	1959**	Avg.
Each Furrow	1	388	475	266	456	492	557	475	444
Alternate Furrow	1	266	437	293	386	448	544	441	402

*No preplant irrigation—Subsoil moisture brought to field capacity by rainfall.
**Cotton planted June 26, 1959.

TABLE 2 — LINT PER INCH OF TOTAL WATER*

Method of Application	No. Of Irrgs.	Total Irrg. Water	1948	1949	1950	1956	1957	1958	1959	Avg.
Each Furrow	1	10	24.5	15.2	13.6	34.0	28.6	38.0	20.4	24.9
Alternate Fur.	1	8	19.2	15.0	16.6	36.1	29.5	43.0	20.7	25.7

*Irrigation water plus rainfall May through September.

TABLE 3 — RAINFALL MAY THRU SEPTEMBER

Year	1948	1949	1950	1956	1957	1958	1959
Rainfall	5.86	21.27	9.59	4.42	7.19	4.54	13.27

SUMMARY OF SUBSTATION NO. 8 TESTS

In all but two cases, cotton irrigated down alternate furrows produced more pounds of lint per inch of water than cotton irrigated down each furrow. On the other hand, cotton irrigated down each furrow produced more total pounds of lint per acre. It becomes apparent that the timing of rainfall during the growing season is more important than the total amount of rainfall. For example, 1949 received the highest total rainfall (21.27 inches) yet did not produce the highest yields, and 1958 received next to the lowest total rainfall (4.54 inches) and produced the highest yields. In the

as the cotton reached maturity. It was heavier in the blocks that were irrigated down each row than in blocks irrigated down alternate rows. Heavier infestations had been noticed in these same areas in previous crop years.

The cotton irrigated down alternate furrows matured sooner than the cotton irrigation down each furrow. Both alternate furrow test areas were stripper harvested on October 26, 1959. The test areas irrigated down each furrow were not ready to be harvested until November 7.

Comparisons of grades and staple between the two irrigation techniques reveal that both grade and staple length are better for cotton irrigated

ch - Furrow Irrigation? --- That Is The Question

By JAMES S. NEWMAN and Y. F. SNODGRASS
Asst. Agronomist and Irrigationist, Texas Experiment Station No. 8, Lubbock, Texas; and Field Representative, High Plains Underground Water Conservation District, Lubbock, Texas.

Buddy Winters, left, and Grice Herrington, Lubbock County farmers, are shown reading flow-meters installed on their irrigation wells to record amounts of underground water pumped to alternate-furrow test areas on their farms.

down alternate furrows. The extremely low staple and grade for treatment (4) each row 6-hour sets were unexplainable. The grade and staple was taken from 4 bales stripped and ginned on November 8, 1959. The low grades apparent in the other each furrow treatments was believed to have been primarily due to the difference in harvest date which was from 12 to 17 days later than the alternate-furrow treatments. This difference in harvesting dates could be expected in most years. Cotton of the same grade

TABLE 1				HERRINGTON TEST			
	No. Of Irrigs.	Irrig Water*	Rain	Pounds Lint Per Inch Total Water**	Avg. Yield Lint/Acre	Avg. Grade	Avg. Staple
Alternate Furrow							
(1) 4 Hour Sets	4	12.4	15.0	22.3	610	31/32	SLM
(2) 12 Hour Sets	3	14.2	15.0	25.0	730	1"	SLM
Each Furrow							
(3) 4 Hour Sets	3	14.5	15.0	23.2	687	31/32	LM
(4) 6 Hour Sets	3	14.3	15.0	25.2	740	7/8	SLM Wasty
(5) 8 Hour Sets	3	14.7	15.0	21.3	632	31/32	LM

*Preplant plus summer irrigation.
**Total water equal rainfall plus irrigation.

has been observed to bring slightly more per pound earlier in the season and cotton harvested early in the season before frost has been observed to be of a higher grade. Since cotton irrigated down alternate furrows could generally be expected to be harvested earlier than cotton irrigated down each furrow, these two factors of better grades and higher prices for early harvested cotton could offset some of the decrease in yield experienced from the alternate-furrow treatments.

The yields were lower in the alternate-furrow treatments using 4-hour sets (610 pounds) than in the each

TABLE 1				WINTERS TEST			
Treatment	No. Of Irrigs.	Irrig. Water*	Rain	Pounds Lint Per Inch Total Water**	Avg. Staple	Avg. Grade	Lint Per Acre
Alternate Furrow	3	15	15.45	24.4	31/32	SLM	744
Each Furrow	3	20	15.45	22.3	15/16	SLM	791

*Preplant plus 3 summer irrigations.
**Total water equals rainfall plus irrigation water.

furrow treatments using 4-hour sets (687 pounds).

The alternate-furrow 12-hour set and the each-furrow 6-hour set treatments required the same total amount of irrigation water and produced for all practical purposes the same yield and the same pounds of lint per inch of total water. Apparently, the cotton plant can use the same amount of water equally well whether it is applied down every furrow or down alternate furrows.

The each-furrow 8-hour set treatment did not compare with the other treatments when efficiency or pounds of lint per inch of total water was considered.

1959 WINTERS TEST

This test was conducted on a medium textured slowly permeable soil (Pullman Silty Clay Loam) that had been planted to cotton for the two previous years and deep plowed 12 inches in February before the test was planted. The test rows were 1,000 feet in length and the irrigation water was measured with a "Sparling flow meter" before delivery into an open ditch leading to the test area. Records were kept of the date and amount of each irrigation made onto the test.

A preplant irrigation of 9.87 inches was applied down each row during the month of April. Twenty pounds per acre of acid delinted Lankart 57 cotton seed was planted May 5 and it came up to a good stand. The cotton was damaged slightly by sand on June 5, but replanting was not necessary. Fertilizer was not applied on cotton used for test in 1959 or the two previous years.

Gypsum block readings and soil samples were taken at weekly intervals and used as a guide for the timing of summer irrigations. The test was composed of the following methods of applying water: (1) down each furrow and (2) down alternate furrows.

The first summer irrigation was not necessary until July 25 because of early summer rainfall. The second and third irrigations were applied on August 9 and August 21 respectively.

Cotton irrigated down alternate furrows produced more pounds of lint per inch of irrigation water than cotton irrigated down each furrow. Average yields were higher from cotton irrigated down each furrow and the average staple was slightly lower. But for all practical purposes there was no difference between the grade, staple or micronaire of cotton produced by both irrigation techniques. Although cotton irrigated by both techniques was harvested the same date, cotton irrigated down alternate furrows could have been harvested 10 to 14 days before cotton irrigated down each furrow. This difference in maturity would be expected since less irrigation water is applied down alternate furrows.

CONCLUSION

Cotton irrigated down alternate furrows produced more pounds of lint per inch of irrigation water than did cotton irrigated down each furrow. For this reason, alternate-furrow irrigation has gained in popularity where irrigation water is in short supply. Alternate-furrow irrigation also allows irrigators to water more land with small capacity wells and to be more timely with limited amounts of irrigation water because land can be irrigated somewhat faster than down each furrow.

Since the High Plains receives 85 percent of the total annual rainfall (18-20 inches) during the growing season (April thru September), significant amounts of rainfall can be expected to fall during the growing season in a majority of the years. In years receiving favorable rainfall, data indicate that total yield differences between alternate and each furrow irrigation are smaller.

CONSERVATION CONVERSATION

The sixth annual "Grain Drying and Storage Conference" will be held March 2 and 3 on the Texas Technological College campus.

The conference is open to the public and will begin at 8:30 a.m. in the Student Union Building.

Among many outstanding speakers scheduled to appear on the program will be John C. White, Commissioner of Agriculture for the State of Texas.

* * * * *

The San Joaquin Valley of California pumps from underground water supplies nearly ten million acre-feet of water annually. This is about twice as much as the total amount of underground water pumped each year in the southern High Plains of Texas.

The "Legislative Digest," a newsletter published by the National Reclamation Association, states that heavy pumping in the San Joaquin valley has caused the land to subside over an area of some 2,000 square miles. The land in some places has sunk as much as 20 feet during the past thirty years.

* * * * *

The Board of Directors of the High Plains Underground Water Conservation District are drafting a proposed amendment to the rules of the District. The amendment will be an addition to the section that deals with problems of "Waste".

The new rule will require that all landowners and operators who have open abandoned wells on their farms, close them in such a manner that will offer protection to the underground water from contaminates that could reach the underground water from the land surface through the open hole.

This will mean that all open wells within the District must be completely filled from bottom to top, or else a packer set at least ten feet below the land surface and the hole filled from the packer to the surface.

The rule will further provide that wells within the District that are not abandoned but are not being used must be entirely covered at all times with a covering that is securely fastened and fixed in place. It will be required that the covering be capable of sustaining 200 pounds of weight.

The District Board is of the opinion that the new rule will also indirectly serve another purpose—the rule will perhaps be instrumental in preventing accidents from occuring that involve open wells.

* * * * *

Water is one of the most important factors controlling crop yields in Texas, according to Morris E. Bloodworth, associate professor, Department of Agronomy, Texas Agricultural Experiment Station.

Even though the present irrigated acreage is estimated to be near seven million, the water supplies have been taxed to the limit in some of the irrigated areas and nearly exhausted in other parts of the state. Although more available acreage is well adapted to this type of intensive agriculture, the expansion of irrigation will depend largely on water resources as yet undeveloped, Bloodworth pointed out.

"Some Principles and Practices in the Irrigation of Texas Soils," is a new Texas Agricultural Experiment Station bulletin written by Bloodworth designed to present some basic principles and practices of irrigation that will be helpful to farmers. It should serve as a guide and will require revision as dictated by experience and as additional field data becomes available.

Among the many topics discussed in the bulletin are: importance of the soil structure; salinity; furrow, border and sprinkler irrigation; and frequency of irrigation. Subjects from planning your irrigation system to applying the water are adequately covered.

Another interesting topic is a discussion on the different methods of conveying water to the crop. Unlined ditches, concrete lined ditches and the use of concrete pipe and aluminum pipe are discussed with the relative merits and faults of each given.

Copies can be obtained by writing the Agricultural Information Office, College Station. Ask for B-937

IN WHAT RESPECT IS A FARM SIMILAR TO A FACTORY?

By JIM BRASHEAR

Jim Brashear is shown as he speaks before present and past members of the Board of Directors of the High Plains Water District.

EDITOR'S NOTE—

Jim Brashear, the author, lives at Petersburg, Texas. He is 15 years old and a freshman in high school. He is the son of Mr. and Mrs. True Rosser.

Jim has been more than casually interested in soil and water conservation for about three years. In 1958, he and Butch Lyde, also of Petersburg, worked up a soil and water conservation demonstration as a 4-H Club project. They won first place with their demonstration in the 4-H district meet. Later they were able, through the financial assistance of Petersburg business men, Petersburg Co-op Gin, Petersburg Coop. Grain Co., and Mr. and Mrs. Tom Suits, to participate in the 4-H Round-Up held at College Station. There they placed fifth in the state. Marvin Shurbet of Petersburg, who is a member of the State Water Development Board and a former member of the Board of Directors of the High Plains Water District, also arranged to have Jim and Butch speak before the State Board of Water Engineers, the State Water Development Board, and the Veteran's Land Board.

Jim has now written a new speech and is presenting his soil and water conservation program alone. The new speech compares a farm with an industrial factory. Jim presented his new program at a recent gathering of present and former members of the Board of Directors of the High Plains Water District.

"The Cross Section" is pleased to reproduce Jim's talk below. The speech shows the thought and effort expended in compiling soil and water conservation material, and the interest our youth has in the problems involved in the economic life of the southern High Plains area.

* * *

"Ladies and Gentlemen — Some people make their living by working in a factory, while we make our living by working on a farm. In drawing a parallel between a farm and a factory, I have some suggestions for more successful farming.

"A farm really is a factory. It produces food, feed and fiber, and it's success depends upon good management as well as does any other kind of factory. Good management of the farm factory includes wise and profitable use of available facilities and equipment — soil and water.

"The farmer has the raw materials at hand — soil, water, tools, and seed with which he can economically produce quality crops. But to succeed, the farmer must know his crops and the requirements of his crops for nutrients and water. I would also add, that if the farmer is a good mechanic, financier, entomologist, general businessman, and weather - prophet, it helps a lot.

"The farmer must remember that plants which produce g o o d quality crops are in a measure like people. They must have food and water at the proper times and in the proper proportions.

"After observing a great number of farmers over a period of time, I find those are successful who:

1. Take care of their soil by adding organic matter as it is needed.
2. Save and utilize every possible drop of rainfall.
3. Provide uniform, deep penetration of pre-planting irrigation water.
4. Study crops for moisture—study soil for moisture needs, keeping the top two or three feet of soil moisture replenished according to needs.

"Let me repeat and emphasize the widely known but too little acknowledged truism that our supply of water is not inexhaustible. I also would remind encouragingly, however, that ways and means of using wisely and conserving precious underground supplies of water are being studied by more and more farmers in order to make the largest crop yields possible with the least amount of water.

"We have available to us practices and methods for making good productive use of High Plains water, and to help stretch the available supply of irrigation water, I suggest —

1. Supply plenty of organic matter to the soil—this will make for more pounds of cotton or grain per acre-inch of water used.
2. Use underground or portable irrigation pipe to avoid evaporation and seepage losses which occur where open irrigation ditches are used.
3. Supply an adequate and uniform application of preplanting irrigation water.
4. Level the land or arrange crop rows so that water distribution is uniform over every acre.
5. Start watering cotton after the first bloom appears and after cotton has set squares. And, by all means, avoid watering of cotton in September.
6. Plant grain sorghum on dates recommended by experiment stations and other research sources in order to avoid excessive use of water. (In our area, plant the first half of June). Early planting requires more water, and most years produces less yield.
7. If grain sorghum land is to have a pre-planting irrigation only, select a seed variety or hybrid adapted to produce well with little water.
8. Use an auger or sharp-shooter shovel to obtain soil samples to feel and determine moisture needs before starting your irrigation pump.
9. Know the amount of water your well yields and the approximate amount of moisture used daily by crop. Irrigation books for crop moisture requirements are available.

"In conclusion, let me add that your county agent welcomes your questions and probably has some good irrigation tips to pass on to you along with the latest bulletins and findings on irrigation research."

Board of Directors of the High Plains Underground Water Conservation District —1960 version. Standing left to right, John Gammon, Lazbuddie; J. R. Belt, Jr., Lockney; and Elmer Blankenship, Wilson. Seated is T. L. Sparkman, Jr., Hereford, left, and Roy Hickman, Morton. At a recent business meeting of the board, officers for 1960 were elected. Mr. Blankenship was re-elected President, Mr. Belt was elected Vice President, and Mr. Gammon was elected Secretary, Treasurer.

Personnel—

(Continued from Page 1)

Kansas and was reared on a wheat farm and cattle ranch. He is a graduate of Kansas State University where he majored in Agriculture and Geology. He is a veteran of service with the U. S. Army, and he has been in the farming and cattle raising business.

Mr. Fink and his wife, Kaylene, have two daughters, Lisa Kay, 2 years old, and Tanni Lynn, 4 months old. The family will reside in Hereford.

Mr. Fink's office in Hereford primarily serves the northern tier of Water District counties.

We are happy to have each of the new staff members working with us, and we would like to take this opportunity to invite all area residents to drop by the Lubbock and Hereford offices to become acquainted with all the staff members and the District's work in the field of water conservation.

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

Second Class Permit

THE Cross SECTION

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

Volume 6—No. 10 "THERE IS NO SUBSTITUTE FOR WATER" March 1960

Contaminated Well Is Serious Threat To Health

Many domestic wells in our High Plains' area are poorly constructed and poorly maintained. For this reason, many wells are possible sources of disease and sickness to those who drink water pumped from the wells.

W. R. Bradford of the Sanitation Division of the Lubbock City-County Health Department recommends that all rural families inspect their domestic water supplies and determine if wells are properly constructed to prevent contaminates from entering them.

Most contaminates enter a well in one of three ways, (1) during pump installation, or repair procedures, (2) by being carried directly into the well with rainfall or other surface water that is allowed to enter the well from ground level, or (3) by entering the well from below ground level after having seeped into the soil.

Mr. Bradford says, that coliform organisms that are present in contaminated water come from sewage or from domestic wells. If coliform organisms are found to be present, then remedial some other insanitary source. These organisms are associated with bacteria which are harmful to man. Because this is true, steps should be taken to ascertain whether or not coliform organisms are present in measures should be taken immediately.

In picture at left above, W. R. Bradford, Lubbock City-County Sanitation Officer points to probable source of trouble for this contaminated domestic well. Surface water from rainfall drains toward the well carrying debris and waste into the well. At right, is shown a well properly constructed—the casing is extended above the well platform and concrete run between the well wall and casing from the water level to the surface. No surface water can enter the well.

Some recommendations from the Health Department that should be followed in the construction and maintenance of a sanitary domestic water well are as follows:

1. Carefully select the well site, making certain that it is as far removed as possible from potential contamination sources such as cesspools, livestock pens, etc.

2. The well should be cased from top to bottom and concrete run between the well wall and the casing from about the water level to the land surface. This will insure against lateral movement below the surface of contaminates into the well.

3. The pump base should be so designed that surface water will drain away from the well rather than toward it. The well casing should extend above the well platform far enough to insure against any possible entrance of water from flash floods or unusually heavy rainfall.

4. The pump should be sealed in place where it contacts the top of the casing. This can be easily accomplished by using a rubber or lead gasket. All holes in the pump base should be plugged to prevent dirt or mice from entering the well.

5. After installation of pumping equipment or repairs, the well and entire water supply system should be disinfected with one of many chlorine solutions designed to sanitize wells.

6. All open abandoned wells in the vicinity should be completely plugged.

7. Cesspools are a constant threat to any domestic water well — they should be replaced by properly constructed septic-tank systems. Design and specification for such systems can be obtained from the Health Department.

8. A sample of water should be drawn from the well at least twice a year into a sterilized bottle and sent to the Health Department for bacteriological analysis. Mr. Bradford states, that the Lubbock City-County Health Department or the South Plains Health Department at Brownfield will supply sterile sample bottles and will run bacteriological analyses free of charge for anyone who resides in the southern High Plains of Texas.

Many serious diseases are contracted by drinking from contaminated water wells. Be on the safe side—check your water supply today.

Randall County Has New Secretary

Mrs. Louise Knox is the new secretary for the Randall County Committee of the High Plains Water District. She replaces Mrs. Eutha Hamblen, who resigned the first of January. The Randall County Committee office is located in Canyon at the Farm Bureau Office, 1710 - 5th Avenue.

MRS. LOUISE KNOX

(Continued on Page 4)

Hereford Field Office Secretary—Mrs. Morgan Cain

Deaf Smith County residents are now obtaining well drilling permit applications from the Water District field office in Hereford. The field office is located at 317 North Sampson Street, one-half block north of the Jim Hill hotel.

MRS. MORGAN CAIN

Mrs. Morgan Cain, office secretary, will be on hand at the Hereford office to assist in filling out permit applications for Deaf Smith County landowners and to serve Armstrong, Castro, Parmer, Potter and Randall County folks in all other matters that involve the conservation of underground water or the operation of the Water District.

Mrs. Cain is a transplanted Okie who lived in Shamrock, Texas from the time she was fourteen years old until she married B. F. Cain, who is also a Shamrock product.

While Mr. Cain was serving his country during World War II, Mrs. Cain moved to Hereford to reside with her parents. When the war ended, the Cains decided they enjoyed Hereford and the folks there so much that they would make the town their permanent home. Mr. Cain is in the farming and poultry business. The Cains' have two boys, Frank, age 13, and Phillip, age 11.

Mrs. Cain is a very nice lady to know, and the Water District encourages and invites you to go by the Hereford office and get acquainted.

MEASUREMENTS REVEAL CHANGES OF WATER LEVE

EDITOR'S NOTE

Official water-level measurements for a majority of the observation wells in the southern High Plains of Texas are shown below. These measurements were made by the U. S. Geological Survey in cooperation with the State Board of Water Engineers and the High Plains Underground Water Conservation District. The map on page 3 shows the location of the observation wells together with identifying well numbers.

You will note that for most of the counties listed, we have included water-level measurements for 1947, 1950, 1955 and 1960. The observation wells more recently included in the well-measuring program are at the bottom of the list for each county, and for these wells measurements are shown for 1957, 1958, 1959 and 1960. Armstrong County observation wells listed were established this year; consequently, only 1960 measurements are available.

Water-level measurements are made in January each year prior to the beginning of pumping for pre-planting irrigation. The figures are in feet below land surface.

Complete water-level measurement records are on file in the Austin offices of the State Board of Water Engineers and U. S. Geological Survey.

ARMSTRONG COUNTY

Well No.	1960
210-M9	110.85
212-M9	106.40
21-M10	106.71
23-M10	117.63
35-M10	95.04
46-M10	108.04
64-M10	116.20

BAILEY COUNTY

Well No.	1947	1950	1955	1960
1b	—	96.12	—	116.63
2a	—	98.32	99.95	110.59
3b	—	48.75	—	69.14
5b	63.48	67.42	—	98.22
9	41.30	48.88	63.61	79.02
11a	—	28.52	44.85	59.16
21b	26.20	33.42	47.47	—
25	24.74	30.60	45.79	62.29
31	—	24.54	36.90	49.92
33	34.21	41.55	54.85	76.09
34c	—	64.36	—	92.28
36	20.10	27.51	40.16	56.73
45	20.07	28.29	39.50	—
49	24.07	29.73	42.25	—
53	24.48	31.38	48.55	62.20
57a	—	50.90	63.68	81.12
62	25.16	38.43	58.60	71.38
63	25.90	36.35	55.31	—
66	23.49	37.13	58.60	68.65
67	22.36	37.45	58.40	66.48
69	18.58	29.93	47.05	—
95	23.30	26.75	46.52	61.59
116a	24.70	—	48.65	63.89
117	33.72	42.22	57.40	—
130a	—	26.60	44.80	59.48
131	20.26	26.66	45.45	59.89
132	20.15	26.96	45.60	61.40
135	—	20.38	36.90	56.37
137	12.40	20.46	31.80	—
141	—	16.01	28.48	45.67
205a	50.40	—	61.80	74.05
207	85.13	86.87	83.95	89.80
450	—	31.00	33.52	38.18

Well No.	1957	1958	1959	1960
495	—	87.13	98.84	—
572	98.40	101.99	104.13	105.03
573	25.55	27.32	27.57	27.72
573a	—	—	29.45	29.21
574	—	195.36	198.30	—
809	80.58	—	82.73	87.67
811	98.06	98.07	100.15	101.56

BRISCOE COUNTY

Well No.	1946	1950	1955	1960
18	95.70	—	—	104.92
107	85.90	86.93	88.57	—
119	77.90	83.99	110.40	123.40
122	76.00	77.80	94.25	111.88
134	102.00	—	*102.00	110.52
148	71.70	72.66	92.64	104.09
159	85.60	90.78	109.25	131.90
168	87.20	93.30	106.69	129.60
170	91.30	95.95	109.89	126.01
217	—	115.04	129.05	144.52
227	78.80	78.00	84.61	87.60
234	103.10	104.03	114.40	133.72
253	—	—	*90.19	109.36
254	—	—	*77.05	88.28
255	—	—	*104.03	121.00
256	—	—	*93.40	102.08
257	—	—	*175.41	186.04
258	—	—	**91.48	99.55

* Measured in 1956 instead of 1955.
** Measured in 1957 instead of 1955.

CASTRO COUNTY

Well No.	1947	1950	1955	1960
8	72.84	76.84	93.50	—
20	72.81	75.30	89.67	117.28
32	67.23	70.61	82.80	102.47
36	87.57	94.09	111.45	—
40	—	72.19	—	119.10
48	64.47	65.50	79.95	93.85
52	78.15	83.26	103.40	96.54
53	64.15	68.68	90.86	106.24
57a	81.78	84.23	109.47	124.15
58a	151.61	151.34	*165.64	178.62
201	151.60	154.04	163.50	191.96
202	102.40	104.45	109.90	—
202a	142.92	148.20	156.30	175.25
278a	—	164.22	170.35	198.34
394	92.37	96.29	110.83	127.82
410b	67.93	74.53	89.90	106.48
465	94.91	—	106.17	—
465a	—	98.32	—	122.92
465b	—	—	*117.58	124.58
508	78.40	83.15	94.22	114.29
524a	—	82.04	93.30	109.19
528a	91.35	93.12	108.10	126.56
529	91.58	94.28	104.63	120.20
544a	91.82	94.95	110.60	133.25
587	18.28	—	—	50.22
601	—	—	*125.60	138.24
602	—	—	*130.28	136.97
604	—	—	*169.85	198.73
605	—	—	*154.34	174.07
606	—	—	*175.92	188.39
608	—	—	*118.83	131.60

* Measurements made in 1956 instead of 1955.

Well No.	1957	1958	1959	1960
321a	—	172.70	174.13	175.59
610	141.65	151.62	—	159.03
611	101.98	—	—	110.97
612	102.23	105.46	108.17	113.88
613	141.00	143.84	146.73	150.30
614	—	187.67	187.99	191.08
C-42	—	148.65	150.10	149.92
C-60	—	154.05	151.48	160.77

COCHRAN COUNTY

Well No.	1957	1958	1959	1960
1	149.80	148.80	149.19	149.90
F-1	122.36	125.48	127.55	128.80
F-2	131.08	134.93	135.46	136.72
F-3	144.94	150.62	149.86	—
F-4	—	140.80	141.17	143.03
5	137.80	137.88	138.97	—
12	144.72	147.24	148.30	150.55
13	122.80	124.34	123.75	121.79
14	—	139.02	139.95	141.98
15	101.73	103.10	—	103.72
16	103.91	104.97	106.22	107.17
17	—	91.98	92.82	92.48
18	—	123.43	—	131.06
19	128.66	131.27	131.85	134.38
20	119.70	120.58	—	—
21	156.15	157.08	157.40	162.89
22	149.38	151.90	153.06	155.09
23	124.77	126.53	126.49	130.03
24	150.97	152.88	153.67	156.06
25	132.48	135.56	136.44	138.27
26	124.80	128.20	129.74	132.65
27	142.66	142.60	144.20	144.27
28	139.74	141.22	141.55	142.60
29	85.84	87.36	87.84	88.42
30	141.77	143.40	143.43	144.18
31	126.45	126.40	126.20	126.05
32	96.38	96.22	96.63	97.54
33	106.62	109.25	110.70	112.93
34	169.70	169.25	169.28	171.80
35	—	—	99.05	101.88
35a	—	104.31	103.55	105.93
36	90.54	91.73	92.89	94.18
37	131.12	133.73	135.00	137.56
38	177.12	179.79	180.20	181.70
39	160.35	163.21	162.35	163.43
40	119.10	119.22	118.60	117.45
41	109.91	113.63	115.25	117.33
42	127.75	131.04	131.98	134.48
43	—	112.56	114.73	115.94
44	103.97	110.93	112.82	114.36
45	137.90	140.25	140.85	142.90
46	145.13	147.15	147.58	151.18
47	120.63	121.09	120.89	121.36
48	123.53	127.25	125.85	127.81
49	168.40	169.51	169.10	170.48
50	175.73	176.08	176.05	176.96
51	—	93.87	94.10	94.37
52	—	87.35	87.54	87.90
53	—	57.50	57.94	57.68
54	—	183.48	181.63	181.33
55	—	136.74	135.91	136.17
56	—	150.60	144.02	144.00
57	—	125.28	130.40	130.54

CROSBY COUNTY

Well No.	1947	1950	1955	1960
1	112.80	117.95	138.57	161.07
4	—	145.30	198.29	—
7	95.41	109.77	141.38	—
7b	113.18	131.05	173.94	205.90
8	93.16	—	*122.33	147.56
10b	—	92.38	129.84	161.46
11b	84.82	90.46	121.13	144.67
11c	—	104.34	132.61	161.80
12b	92.14	108.38	138.48	174.27
13a	81.69	—	120.22	153.20
14	—	91.62	124.36	147.87
17a	98.08	110.30	130.79	153.18
21a	102.06	106.53	132.58	153.10
23b	120.15	123.93	144.08	161.95
340a	104.39	—	—	165.93
401b	78.10	80.99	98.42	131.87
412a	113.74	104.22	*134.33	—
415a	72.30	79.22	*94.62	102.48

* Measurements made in 1956 instead of 1955.

Well No.	1958	1959	1960
416	—	247.60	251.50
417	—	242.24	247.03
G-6	195.95	198.98	199.30
G-7	190.97	192.57	192.97
G-8	183.37	—	184.04
G-9	210.59	211.05	211.32

DEAF SMITH COUNTY

Well No.	1947	1950	1955	1960
44	—	180.70	181.37	190.25
113a	99.49	105.14	118.58	—
130a	129.67	130.63	—	159.93
134	—	141.05	155.88	—
140a	—	167.32	172.30	182.10
193	—	117.09	128.80	137.57
201	—	105.49	121.60	133.08
205	—	90.83	113.30	—
207	58.18	61.84	76.38	—
212	75.26	—	96.01	113.34
216	69.17	70.92	79.60	92.78
217	89.82	90.10	108.40	123.70
219	—	80.92	95.63	108.16
220	90.87	85.83	99.17	—
224	—	59.46	73.90	93.04
226	52.83	60.09	80.78	98.83
231a	47.12	51.08	71.73	—
234	51.56	51.38	55.50	—
235	52.61	53.81	63.09	70.86
241	51.47	55.24	—	69.42
245	51.65	55.01	—	65.88
247	25.61	28.36	43.67	50.58
258	62.44	67.01	—	98.63
261	61.30	64.23	78.18	97.08
272	76.75	81.29	102.62	116.82
281a	—	—	123.05	128.99
283	66.49	68.23	79.66	91.29
288	72.58	76.30	95.30	111.26
302	52.50	54.43	63.53	68.72
305	85.10	91.60	112.48	130.34
311	49.95	53.96	67.65	87.24
315	56.45	60.38	79.90	97.30
322	79.71	84.35	—	104.18
326	99.22	—	123.90	143.29
331	81.80	88.60	—	119.95
336	92.54	98.57	115.03	133.78
342	82.25	—	—	119.69
394	79.34	81.93	91.19	100.33
431b	—	59.71	—	101.80
459a	—	109.92	—	—
486	79.69	—	114.01	122.85
502	101.30	111.66	136.09	148.40
506a	79.14	86.85	94.32	107.16
513a	80.60	—	96.43	109.00
514	108.04	114.57	128.60	143.83
546	—	125.76	134.67	—
558	—	66.36	69.72	80.98
566	—	190.20	193.35	211.22
919	87.45	91.37	101.93	118.07
934	95.09	100.03	121.12	135.00

Well No.	1958	1959	1960
D-30	180.51	—	184.14
D-111	59.58	—	60.00
D-203	177.87	165.98	168.28
D-303	296.30	295.98	295.72
D-306	246.83	246.63	246.77
59	214.65	—	222.50
72a	245.92	—	247.24
121a	140.43	143.40	134.59
161	117.32	—	123.38
168	118.74	—	125.55

FLOYD COUNTY

Well No.	1947	1950	1955	1960
5	56.83	59.84	78.47	98.30
5a	—	57.91	71.36	91.80
20	87.28	91.17	110.15	128.60
21a	87.20	91.68	—	124.15
32	94.35	99.43	121.90	139.90
42	77.95	31.90	101.64	120.28
55	65.63	70.74	94.16	—
56	62.72	67.38	88.10	100.06
57	69.70	77.18	98.15	125.90
106	—	77.52	—	—
108	67.30	79.45	110.09	131.50
110	66.05	75.31	118.63	—
111	63.30	74.20	—	109.16
112	61.42	74.07	104.07	115.10
120	72.65	92.85	119.81	—
138	85.67	—	127.32	142.38
139	81.66	105.36	124.32	140.65
140	72.49	96.04	*116.14	131.49
143	77.09	95.00	120.45	144.23
157	62.58	80.81	110.35	—
161	76.53	94.52	120.57	140.75
185	68.02	81.43	112.71	136.43
216	192.37	193.40	215.03	—
263	77.92	83.78	107.63	135.29
264	58.82	64.31	89.99	105.88
265	81.56	86.80	*112.51	126.65
315a	—	235.96	235.41	—
326	147.49	149.34	151.52	152.58
410a	60.87	—	110.76	129.98
414	—	100.48	129.18	143.48
416	78.92	103.67	129.51	143.68
420	85.00	111.17	—	152.30
421	80.15	102.56	128.58	144.29
423	72.48	93.63	127.07	143.89
428	67.50	84.90	*120.24	—
435	82.95	102.20	132.55	153.45
448	70.65	89.49	125.39	146.20
463	60.50	—	116.44	133.55
467	49.35	—	92.63	117.80
472	59.30	80.34	108.51	132.52
478	63.71	93.29	116.19	140.95
486	34.70	37.92	37.66	42.09
493	83.20	—	137.90	148.99
502	57.50	70.17	99.47	133.65
510	52.41	59.30	94.54	116.25
511	60.95	—	109.52	133.19
519a	55.85	60.21	110.32	137.12
523	69.00	—	123.82	148.49
529	109.50	110.10	110.76	115.00
542	68.72	80.81	109.62	145.66
546	68.49	—	103.84	138.93
554	83.70	—	108.01	—
562	—	141.50	*160.13	178.70
610a	—	—	221.39	237.22
610b	—	214.16	217.94	239.36
612	147.38	—	*166.93	180.15
627	77.41	83.13	104.93	129.65
630	98.77	112.89	135.78	154.46
652	65.76	86.46	120.56	139.03
701	78.11	87.42	*123.35	139.58
704	90.03	—	127.04	150.79
720	63.86	—	*109.14	134.17
726	67.68	82.69	91.27	111.08
727	58.90	—	104.10	132.58
728	61.88	90.75	114.05	140.24
729	75.41	—	102.45	138.98
730	108.83	134.73	143.37	168.93

* Measurements made in 1956 instead of 1955.

Well No.	1958	1959	1960
732	255.83	259.81	259.10
733	247.00	253.80	252.25
734	142.99	147.01	146.14

HALE COUNTY

Well No.	1947	1950	1955	1960
31a	—	70.55	85.80	112.13
36	81.34	87.59	107.73	133.79
40a	—	—	102.60	128.70
81	61.35	68.11	86.68	105.65
86	80.76	87.42	108.30	—
93	85.95	93.27	114.50	139.13
103	50.20	55.31	70.40	86.52
105	—	63.05	80.37	102.00
124b	78.70	—	114.07	—
138	50.02	—	71.00	86.84
154	68.56	—	92.95	115.45
159	67.86	—	93.18	115.00
163	56.68	65.24	83.22	106.90
202	70.63	80.18	103.75	126.60
206	77.45	—	103.08	124.00
210	72.58	78.32	95.78	118.97
212	68.28	74.25	90.00	106.06
220	62.57	71.02	91.36	112.94
225	62.07	—	95.24	115.10
238	55.40	65.30	89.13	116.00
241	61.24	—	94.85	110.15
285	—	—	90.49	116.90
305	76.38	84.40	103.35	117.93
316	57.37	65.67	83.14	99.56
317a	58.92	65.46	82.10	98.28
323	70.40	76.10	94.55	114.40
330a	53.30	62.82	84.49	105.79
331	50.74	59.85	80.21	102.52
334	62.33	68.55	92.88	107.70
338	53.09	59.20	79.73	95.24
367	60.93	—	97.83	114.15
370	51.54	59.19	86.48	102.64
389	—	—	92.04	113.60
427	55.25	66.87	96.08	—
435	58.07	—	100.90	119.95
436	62.53	73.84	106.34	122.66
449	64.58	69.54	97.79	—
454	60.59	79.80	113.20	131.20
463	45.49	61.46	—	—
467	39.95	44.60	58.23	74.59
508a	52.88	60.94	84.47	119.50
511	28.12	—	66.33	85.70
539a	61.96	72.68	100.26	128.00
546	77.39	62.96	94.34	117.75
547a	53.12	68.37	96.09	121.34
553	57.34	62.45	86.13	122.10
562	61.92	67.96	87.72	110.85
564	60.68	66.89	93.24	121.80
569	57.93	61.86	71.33	89.35
641	72.52	76.90	94.18	119.80
661	70.83	76.84	98.20	120.86
704a	—	78.99	95.41	118.75
714	79.50	85.71	104.30	126.80
719c	—	—	101.38	116.65
724	92.12	—	120.63	138.90
798	80.66	86.00	109.87	131.05
816	55.78	58.53	72.04	—
824a	—	67.38	78.78	—
825	69.38	—	96.45	110.40
829	76.74	81.25	98.00	114.62
848	—	98.72	110.75	—
852a	117.23	121.06	141.38	160.47
859	77.96	87.22	105.21	129.45
906	41.98	44.58	62.31	75.47
923	50.76	54.21	71.91	96.45
929a	—	47.94	63.75	83.95
942	—	67.78	84.14	98.90
958	58.55	66.24	81.71	102.00
964	—	82.78	95.88	126.15
978	—	88.96	113.17	140.50
1223	—	69.63	93.78	—
1231	60.20	—	98.90	109.20
1336	54.08	—	88.05	105.36
1358	63.10	73.15	98.05	114.80
1403	52.27	61.08	83.18	100.00
1417	58.79	—	99.05	115.20
1430	46.80	51.95	73.63	103.65
1436	58.79	70.70	100.84	120.25
1529	48.53	—	94.93	127.18
1604	62.07	—	92.50	113.60
1811	—	—	114.63	136.05
1921	67.69	—	94.53	115.00
1957	70.11	—	105.09	125.60
C-14	—	—	*84.68	—
H-93	—	—	96.22	123.50
K-50	—	—	*85.64	105.20
N-27	—	—	*93.36	114.00
N-65	—	—	71.76	91.60
P-71	—	—	92.10	111.05
R-36	—	—	*115.33	133.20
V-25	—	—	*86.90	100.97
V-58	—	—	*96.86	119.00
Y-36	—	—	58.09	81.10
Y-38	—	—	60.55	75.35
CC-31	—	—	*121.40	140.45
DD-101	—	—	104.42	130.54
FF-78	—	—	*98.33	—
GG-76	—	—	96.24	109.54
HH-9	—	—	*128.58	136.60
HH-107	—	—	114.87	122.05
HH-118	—	—	71.98	92.67
JJ-50	—	—	118.03	137.87
LL-80	—	—	127.04	145.00
MM-104	—	—	121.07	138.50

* Measurements made in 1956 instead of 1955.

HOCKLEY COUNTY

Well No.	1947	1950	1955	1960
F-2	—	108.61	125.27	137.78
F-7	—	—	87.30	95.64
24	22.51	25.33	40.58	39.83
25a	24.45	27.07	40.47	45.38
28	34.11	35.96	56.70	60.22
29	33.72	39.91	53.10	62.18
247a	105.13	105.57	118.05	132.59
263a	104.65	108.37	125.04	140.35
263b	—	112.08	129.52	150.37
429b	86.70	93.64	117.62	134.92
434	130.54	131.48	150.60	178.30
434a	119.13	123.94	149.63	170.90
434b	85.80	89.90	113.57	130.16
443a	76.22	76.27	98.33	101.09
443b	24.66	37.66	50.90	—
444	56.33	—	71.80	84.80
447a	—	—	73.25	79.56
452	70.15	67.70	86.15	97.69
453a	55.20	60.09	78.49	92.59
453b	64.89	69.42	85.65	99.92
458	80.98	—	101.05	117.93
458a	60.44	63.72	76.39	90.82
528a	—	134.40	153.45	173.64
576	88.04	89.92	102.60	118.98
662a	—	98.55	106.46	120.89
717	—	97.27	106.41	112.55

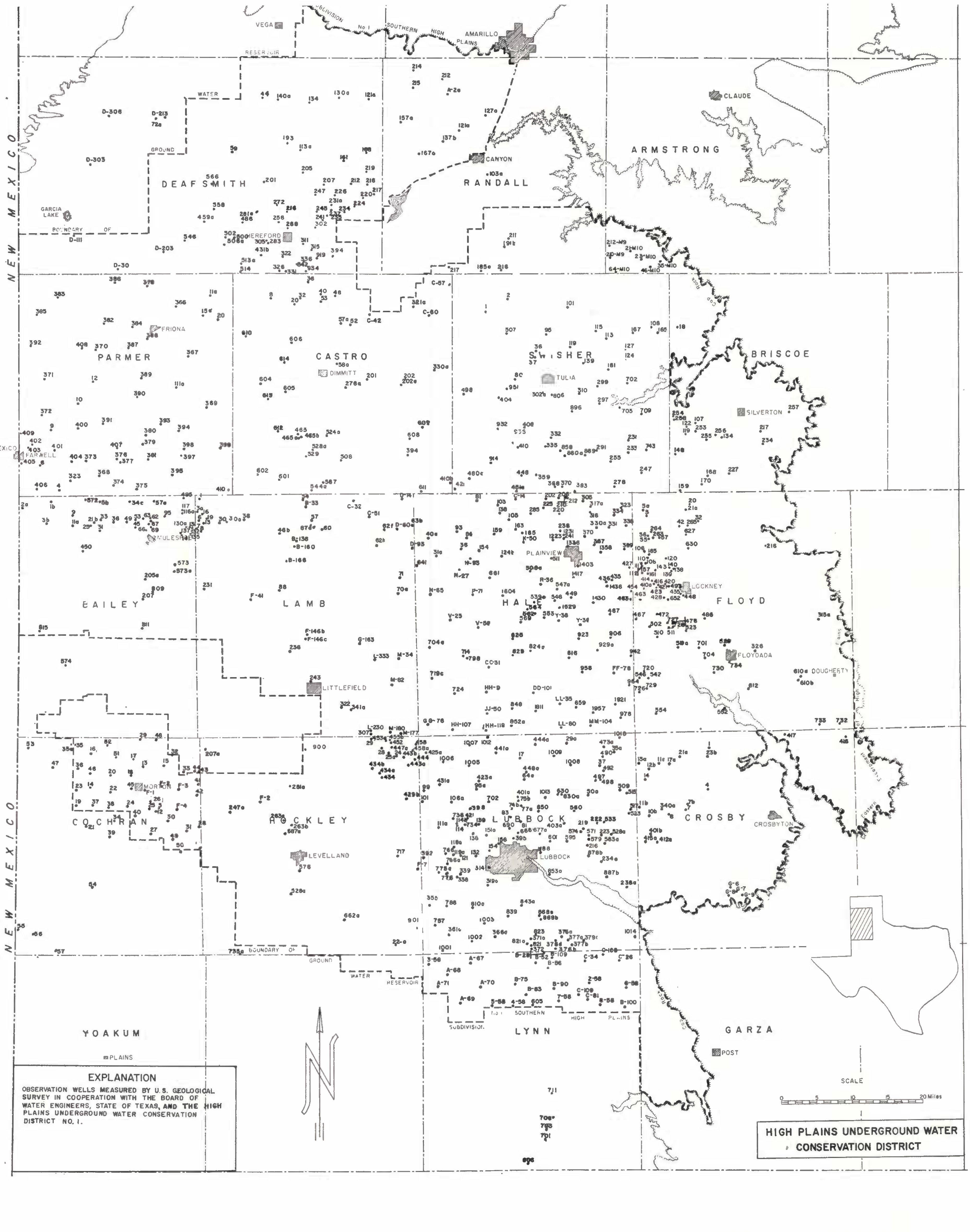
Well No.	1957	1958	1959	1960
22b	89.40	—	89.15	—
207a	78.30	—	77.53	77.71
281a	84.57	—	83.85	84.11
735a	152.10	—	150.80	151.34
900	—	60.99	55.05	55.69

LAMB COUNTY

Well No.	1947	1950	1955	1960
1	67.08	70.62	83.16	102.77
3a	28.58	34.61	50.60	—
6	22.41	27.36	*50.40	63.00
7	14.97	22.32	*43.91	58.20
8	14.68	20.12	36.01	57.27
12	19.09	27.69	48.26	65.26
16	34.31	41.40	58.35	76.80
19	19.64	27.60	46.30	—
30	24.03	29.15	45.66	63.44
30a	—	49.33	—	79.54
38	37.03	41.65	52.65	69.61
46b	36.42	39.84	49.45	60.60
54	89.14	95.77	107.70	—
57	89.44	97.80	107.40	—
57d	93.24	—	111.22	124.94
60	70.38	74.57	89.77	105.97
62f	93.37	101.80	121.78	141.10
62h	83.88	92.32	109.12	129.80
63b	94.22	—	122.08	—
70a	58.83	68.30	74.29	83.23
71	61.79	67.22	80.84	93.40
88	34.80	36.29	42.15	46.17
231	93.55	92.61	96.20	111.53
236	69.85	—	84.46	94.90
243	74.50	75.40	82.47	81.66
307	36.43	41.54	60.23	72.58
322	39.92	47.69	63.38	84.30

(Continued on Page 4)

LS IN SOUTHERN HIGH PLAINS' OBSERVATION WELLS



THE Cross SECTION

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ALLAN WHITE
Editor

WELL DRILLING STATISTICS FOR JANUARY AND FEBRUARY

During the month of January, 81 new wells were drilled and registered with the District office; 17 replacement wells were drilled; and 6 wells were drilled that were either dry or non-productive for other reasons. 128 permits were issued by the County Committees.

In February, 113 new wells were drilled; 10 replacement wells were drilled; 18 wells were drilled that were dry; and 184 permits were issued.

The permits issued and wells completed in January and February are listed below by Counties:

County	Permits Issued		New Wells Drilled		Replacement Wells		Dry Holes Drilled	
	Jan.	Feb.	Jan.	Feb.	Jan.	Feb.	Jan.	Feb.
Armstrong	0	0	0	0	0	0	0	0
Bailey	15	18	3	15	0	3	0	3
Castro	1	10	2	0	1	2	0	0
Cochran	3	5	7	1	1	0	0	0
Deaf Smith	7	1	7	0	6	0	0	0
Floyd	4	14	9	13	1	1	0	0
Hockley	26	48	15	26	1	1	3	2
Lamb	25	35	8	18	3	2	0	2
Lubbock	35	36	15	27	0	1	0	4
Lynn	12	17	5	11	0	0	1	5
Parmer	0	0	9	0	4	0	2	2
Potter	0	0	0	0	0	0	0	0
Randall	0	0	1	2	0	0	0	0
Total	128	184	81	113	17	10	6	18

WATER LEVELS—(Continued From Page 2)—

341a	41.21	47.46	72.39	———
B-33	98.30	96.48	110.95	131.72
B-138	———	47.48	60.80	71.43
B-160	46.08	49.20	59.40	69.33
C-32	———	87.28	99.25	———
C-51	———	98.35	119.20	138.45
D-14	———	80.12	100.34	120.98
D-60	———	89.87	103.90	122.30
D-93	85.81	98.10	117.00	142.67
F-41	34.94	39.90	45.70	———
G-163	———	89.71	104.30	121.25
L-230	36.54	40.85	58.32	———
L-333	———	105.73	117.00	130.70
M-34	———	85.46	103.02	114.40
M-82	———	———	120.15	137.10
M-177	71.38	———	113.50	———
M-180	71.38	———	102.50	113.24

* Measurements made in 1956 instead of 1955.

LUBBOCK COUNTY

Well No.	1947	1950	1955	1960
17	101.05	107.30	127.10	144.84
29a	———	93.09	120.90	149.55
35a	101.20	97.72	121.20	147.57
37	74.11	79.35	113.03	125.45
50a	73.50	80.95	107.50	134.83
64a	86.55	———	108.38	127.69
74b	———	———	*43.32	53.44
75b	58.68	72.57	93.61	112.05
77a	71.69	79.98	97.60	110.38
81	42.26	46.00	56.39	68.20
83	45.40	48.58	*64.66	73.49
95a	———	97.42	114.50	126.03
99	30.85	35.98	41.80	59.70
101	65.09	71.56	98.70	110.45
106a	36.40	41.46	*58.42	68.94
111a	81.32	87.32	*119.42	126.65
114	58.98	64.96	83.80	95.00
114b	53.24	60.85	80.10	86.65
118a	84.89	90.93	118.90	133.00
119a	78.41	85.68	106.50	129.94
121	80.13	82.64	112.50	129.47
132	46.69	53.48	85.35	———
138	36.95	46.12	66.70	75.81
139	25.66	30.41	49.25	56.23
151a	26.80	36.57	*71.90	75.20
154	42.49	48.71	66.60	76.38
156	51.48	59.24	74.39	76.88
188	75.98	77.64	94.90	95.01
216	47.90	51.90	72.80	80.45
219	41.87	46.12	67.30	78.37
222	51.05	54.34	78.00	108.74
223	42.24	39.74	50.02	55.37
234a	58.06	62.35	76.85	76.42
238a	———	52.32	———	61.87
314	47.10	52.92	58.00	59.40
319a	75.72	79.00	101.30	105.62
338	64.91	70.00	98.90	109.69
339	63.11	67.75	91.75	104.65
355	83.85	86.16	103.00	112.85
361a	———	85.70	98.10	100.30
366a	———	91.39	98.70	100.93
371a	86.32	90.68	114.50	123.45
372	91.26	95.25	117.40	129.20
376a	84.37	82.47	106.85	115.54
376b	75.89	———	———	120.50
377a	70.42	76.13	102.90	111.75
377b	71.82	80.35	*109.85	116.74
378d	———	———	*106.98	112.41
379c	62.37	68.23	94.80	103.68
392	90.02	94.40	106.70	112.55
395	———	54.73	65.80	73.50
398	14.66	18.96	43.44	54.05
401a	72.60	76.77	*101.80	121.20
403a	39.61	44.50	61.10	75.48
421	37.46	———	64.90	70.35
423a	99.55	———	115.30	129.20
425a	———	84.70	96.50	106.93
431a	———	97.16	112.48	127.05
441a	———	128.84	147.30	162.77
444a	———	114.85	140.20	156.56
448a	97.58	110.82	*133.40	142.71
473a	89.48	96.76	121.80	144.40
490	92.44	88.84	116.23	143.35
492	75.83	80.84	102.30	123.77
497	92.73	92.57	113.20	145.74
498	88.25	93.90	115.12	144.17
509	83.70	86.33	110.40	134.38
515	87.09	94.16	121.00	———
517	93.48	98.64	125.70	154.28
523	80.00	83.06	114.00	127.10
528a	64.00	68.88	79.70	93.95
533	62.50	65.98	99.25	122.88
560	52.75	56.88	95.30	107.00
571	40.16	43.26	64.70	74.89
574	48.09	52.86	*76.98	81.55
579	45.66	46.46	*70.50	76.87
583a	47.86	48.01	58.40	69.66
595	62.10	61.47	78.60	93.10
601	77.27	66.59	81.40	90.43
630	67.03	72.27	*105.96	125.57
630a	68.66	71.91	97.20	124.44
650	67.09	73.60	90.00	111.40
666	54.66	59.24	*74.10	80.25
677a	69.52	———	*85.08	89.70
690	44.70	49.70	65.90	77.75
702	80.23	83.24	98.20	116.05
734	44.01	52.76	*76.53	78.23
736	40.77	46.95	64.05	80.30
766	84.61	90.75	113.15	———
766a	86.69	88.45	114.30	126.10
775a	77.01	82.64	106.70	114.80
776	78.08	84.58	———	124.64
786	98.23	104.74	128.20	135.71
787	80.33	86.52	104.90	110.60
810a	———	98.37	*117.34	122.95
818a	92.05	98.04	*133.46	134.60
821	91.92	94.22	*119.90	126.03
821a	90.62	93.40	114.53	124.80
823	70.60	94.49	118.70	126.24
839	82.92	88.84	103.25	110.79
843a	74.37	77.31	96.30	104.48
853a	47.13	48.97	53.83	52.23
868a	72.75	75.27	100.13	108.92
868b	81.06	88.28	*113.91	120.10
878b	50.73	53.46	*72.95	85.88
887b	70.15	71.74	*83.46	85.70
1012	———	———	101.95	120.69
1013	———	———	*103.78	118.22
1014	———	———	*167.16	186.97

* Measurements made in 1956 instead of 1955.

Well No.	1958	1959	1960
1001	68.25	66.79	67.04
1002	95.85	94.94	95.43
1003	103.18	102.91	99.51
1005	132.12	132.54	134.17
1006	157.13	160.10	161.45
1007	131.51	134.05	140.90
1008	138.18	140.03	143.76
1009	136.50	136.96	140.87
1010	143.64	144.65	147.88

LYNN COUNTY

Well No.	1957	1958	1959	1960
701	63.86	65.74	66.80	65.59
703	61.33	61.00	61.17	61.39
706	13.32	8.72	10.94	———
711	17.53	13.40	16.24	17.10
806	———	36.88	37.80	———
2-58	———	69.35	69.19	———
3-58	———	91.58	93.27	92.07
4-58	———	92.29	93.05	———
5-58	———	121.13	120.17	121.86
6-58	———	59.65	58.77	61.53
7-58	———	46.55	46.50	46.88
8-58	———	65.84	64.02	65.50
A-67	90.72	93.17	92.56	96.06
A-68	108.16	107.78	108.67	105.20
A-69	82.41	85.86	83.36	86.47
A-70	81.30	70.45	71.80	70.68
A-71	83.25	84.93	86.64	87.65
B-28	137.25	134.25	132.54	134.60
B-52	117.34	118.65	119.50	119.94
B-56	———	102.52	104.12	104.30
B-75	104.15	106.55	106.94	109.24
B-83	90.15	90.10	92.80	———
B-90	77.62	78.04	77.40	79.05
B-100	66.77	72.55	77.04	67.50
B-109	117.66	119.77	118.07	122.23
C-26	———	63.16	63.15	64.40
C-34	39.07	35.51	33.17	34.38
C-81	77.22	78.67	80.24	79.42
C-108	84.26	85.47	86.09	86.57
C-109	74.53	75.00	74.38	75.48

PARMER COUNTY

Well No.	1947	1950	1956	1960
4	———	116.28	121.36	———
6	———	153.05	159.64	———
9	———	213.59	———	236.67
10	———	167.13	179.08	197.52
11a	———	118.82	131.85	142.05
12	———	161.93	173.31	180.60
15a	138.54	140.88	156.88	180.00
20	107.51	113.56	127.98	141.32
111a	———	165.46	185.45	207.25
323	———	102.16	106.05	119.30
366	———	———	173.21	188.90
367	———	———	225.18	245.83
368	———	———	123.17	135.35
369	———	———	153.70	167.92
370	———	———	266.84	284.50
371	———	———	188.90	206.90
372	———	———	225.13	236.74
373	———	———	146.30	160.83
374	———	———	110.70	122.14
375	———	———	94.80	107.98
376	———	———	157.70	170.27
377	———	———	150.63	161.43
378	———	———	221.50	225.66
380	———	———	184.60	200.54
381	———	———	163.10	179.99
382	———	———	188.56	203.46
383	———	———	205.14	225.77
384	———	———	198.14	203.60
385	———	———	229.09	238.34
386	———	———	286.30	296.77
387	———	———	243.53	261.90
388	———	———	201.68	220.60
389	———	———	217.13	237.40
390	———	———	162.01	179.30
391	———	———	212.27	229.21
392	———	———	279.68	304.90
393	———	———	173.64	189.94
394	———	———	157.52	168.47
398	———	———	179.84	190.31
399	———	———	139.12	152.30
400	———	———	214.76	236.25
401	———	———	175.09	190.99
402	———	———	209.26	221.10
403	———	———	184.28	195.73
404	———	———	150.91	162.66
405	———	———	194.76	202.90
406	———	———	170.70	———

Well No.	1957	1958	1959	1960
395	152.51	153.39	———	161.78
397	190.01	183.98	———	192.10
407	183.66	187.18	189.75	195.15
408	265.90	———	265.87	270.35
410	149.16	150.52	156.95	158.03

RANDALL COUNTY

Well No.	1947	1950	1955	1960
A-2a	———	114.34	*138.70	139.16
103a	9.38	9.11	*6.53	4.20
121a	124.68	132.40	142.71	150.80
127a	———	———	138.93	145.75
137b	———	———	*123.83	128.20
157a	———	———	115.26	120.97
167a	———	———	*136.44	130.40
191b	———	———	183.57	187.65
211	———	142.12	160.13	171.80
214	———	160.63	172.38	189.25
215	———	130.05	143.27	164.50

* Measurements made in 1956 instead of 1955.

Well No.	1958	1959	1960
185a	172.67	174.50	180.30
216	162.78	156.68	163.60
217	172.52	178.77	174.10

SWISHER COUNTY

Well No.	1947	1950	1955	1960
1	89.88	89.38	102.37	107.60
2	77.85	77.68	78.07	78.67
36	56.65	———	71.30	89.20
37	64.47	68.83	87.20	———
80	68.34	71.28	92.68	101.70
95	———	71.32	88.02	111.40
101	70.63	72.31	86.60	102.44
108	74.91	77.26	92.10	109.75
113	60.99	63.98	71.24	84.40
115	59.31	62.98	75.75	86.90
119	53.10	56.36	73.00	83.60
124	51.60	———	73.43	81.90
127	54.95	58.04	69.55	———
139	51.05	52.84	58.90	72.65
165	79.65	80.87	105.90	120.00
167	54.31	57.50	68.30	82.48
181	———	———	81.92	90.63
231	65.84	68.34	89.03	———
233	62.49	68.85	93.65	102.75
247	———	69.43	86.92	106.43
255	49.15	53.53	72.72	84.50
278	———	80.12	99.08	116.35
291	60.56	63.10	78.00	91.80
297	41.15	45.59	64.99	75.43
299	45.52	50.49	———	62.45
302a	63.61	67.18	———	105.37
310	69.73	75.42	87.35	———
332	73.62	75.74	93.56	106.19
333	79.37	86.57	98.50	109.45
359	81.84	89.75	113.35	132.40
368	86.70	90.79	114.67	138.34
370	84.26	———	113.56	126.34
383	81.04	88.58	106.20	123.50
404	———	107.81	122.50	134.70
408	———	96.28	133.90	132.80
410	100.04	101.36	129.18	120.00
421	64.42	69.70	84.35	101.35
448	85.67	90.25	113.55	138.80
498	94.84	97.19	108.97	129.10
507	82.30	82.97	98.80	117.45
702	40.34	46.15	49.75	51.55
705	48.80	55.55	77.01	81.20
709	82.92	93.86	106.60	109.80
743	53.53	60.57	76.75	———
806	61.31	63.90	78.38	94.97
858	60.62	67.50	88.35	107.73
860a	———	72.19	97.72	———
889	75.98	79.60	96.58	———
896	55.23	60.65	73.57	———
914	———	———	130.61	150.57
932	95.87	———	130.90	141.00
935	87.21	92.75	107.75	125.30
951	67.97	71.82	79.00	———

NEW SECRETARY—

(Continued from Page 1)

Mrs. Knox, the wife of Thomas L. Knox, Randall County farmer, is the daughter of the late Mr. and Mrs. Joseph J. Tucek. The Tuceks farmed west of Canyon.

Mrs. Knox attended grade school and high school in Canyon and the Amarillo Secretarial School in Amarillo.

Mr. and Mrs. Knox have one daughter, Roxie Lee, who is a first-grader in Canyon. They live at 1101 West 6th Avenue.

Second Class Permit

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

THE Cross SECTION

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

Volume 6--No. 11 "THERE IS NO SUBSTITUTE FOR WATER" April 1960

WATER DISTRICT VISITED BY HEAD OF BRITISH GEOLOGICAL SURVEY

The High Plains Water District was honored recently with a visit from the head of the water division of the Geological Survey of Great Britain.

Dr. Stevenson Buchan, in Lubbock to present a series of talks at Texas Tech College on ground water, is a guest in this country of the American Geological Institute.

Dr. Buchan visited with W. L. Broadhurst and other staff members in the headquarters office of the Water District at Lubbock and seemed very impressed with the tremendous amount of information that is available concerning the High Plains' area and with the work being carried on.

Dr. Buchan has been in the United States about eight weeks. He holds awards for his distinguished work from both American and European societies and institutions.

Dr. Stevenson Buchan, head of the water division of the Geological Survey of Great Britain is shown at center with Frank Rayner, Engineer with the State Board of Water Engineers, left, and W. L. Broadhurst, Water District Chief Hydrologist, as they examine a well-development map of the southern High Plains.

HYDROLOGIST WILL SPEAK DURING NATIONAL CONVENTION OF A.W.W.A.

W. L. Broadhurst, Chief Hydrologist for the High Plains Water District, has been invited to present a paper on the progress of groundwater recharge in the High Plains of Texas, before the annual convention of the American Water Works Association at Bal Harbour, Florida. The convention will be held during the week of May 15th.

Other members of the recharge panel besides Mr. Broadhurst will be, Richard T. Sniegocki, W. Fred Welsch, Robert J. Kleberg, Jr., Richard M. Kleberg, Jr. and Frank H. Dotterweich.

The abstract of Mr. Broadhurst's paper is given below. The entire paper will be published in "The Cross Section" at a later date.

PROGRESS OF GROUND-WATER RECHARGE, HIGH PLAINS OF TEXAS
By William L. Broadhurst

Abstract

The rapidly increasing uses of ground water for all municipal and industrial purposes and for large scale irrigation, together with the realization that the ground-water supply is being depleted, have emphasized the need for artificially recharging the underground reservoir in the High Plains of Texas. Although the practice of artificial recharge has become neither widespread nor generally accepted, significant progress has been made in the technique of salvaging muddy playa-lake water which heretofore was lost through evaporation.

Greatest progress in artificial recharge has occurred since 1950 through use of the multi-purpose well, which consists of a large-capacity production well constructed near a wet-weather lake to permit gravity flow of surface water through a pipeline into the well.

The suspended solids in the lake water tend to clog the aquifer. Although some of the mud can be dislodged and removed by periodic backwashing and pumping, it seems apparent that success of this method depends on clarification of the lake water before recharging. Recent experiments indicate that flocculation of the solids with new chemicals is economically practicable.

Water And Agriculture Tours Conducted

The West Texas Museum and the Lubbock Junior League are co-operating in presenting special emphasis tours through the museum on the Texas Tech College campus. The tours, entitled "Water and Agriculture," are presented to the seventh grades of the Lubbock public schools.

Sixty-four seventh-grade classes have requested the tour.

The tours are under the direction of the museum's Curator of Education and Mrs. Rufus Grisham, Lubbock, chairman of the Junior League's tour committee.

The "Water and Agriculture" tours are designed to give to the student basic information concerning these two important parts of our High Plains' economy.

Mrs. Robert Hurmence is shown above as she conducts one of the "Water and Agriculture" tours through the West Texas Museum in Lubbock. The tours are sponsored jointly by the museum and the Lubbock Junior League. Mrs. Hurmence is a member of the League. The Lubbock Carroll Thompson seventh-grade class is taught by Mrs. Otto Rea.

WELL DRILLING STATISTICS FOR MARCH

During the month of March, 88 new wells were drilled and registered with the District office; 22 replacement wells were drilled; and 18 wells were drilled that were either dry or non-productive for other reasons. 125 permits were issued by the County Committees.

The permits issued and wells completed in March are listed below by counties:

County	*Permits Issued*	*New Wells Drilled*	*Replacement Wells*	*Dry Holes Drilled*
Armstrong	0	0	0	0
Bailey	8	1	3	0
Castro	15	2	2	1
Cochran	2	3	0	1
Deaf Smith	3	1	1	0
Floyd	18	12	2	0
Hockley	19	22	3	8
Lamb	12	13	3	1
Lubbock	15	21	4	4
Lynn	13	8	1	1
Parmer	20	3	2	0
Potter	0	0	0	0
Randall	0	2	1	2
Total	125	88	22	18

THE Cross SECTION

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Editor

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Committeemen meet fourth Friday of each month at 2:30 p. m., Farm Bureau Office, Muleshoe, Texas.

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Committeemen meet first and third Fridays of each month at 1:30 p. m., 913 Houston, Levelland, Texas.

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Albert Lockwood ..... St. Rt. 2, Littlefield, Texas
Elmer McGill ..... Olton, Texas

Committeemen meet on the second Tuesday of each month at 7:30 p. m., Jerry's Cafe, Littlefield, Texas.

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Committeemen meet first and third Mondays of each month at 2:30 p. m., 1628-B 15th Street, Lubbock, Texas.

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Committeemen meet first and third Tuesdays of each month at 10 a. m., 1628-B 15th Street, Lubbock, Texas.

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Jackie Meeks ..... Rt. 2, Happy, Texas
W. A. (Bill) Patke - Rt. 4, Box 400, Amarillo, Tex.

Committeemen meet first Monday night each month at 7:30 p. m., 1710 5th Avenue, Canyon. Texas.

J. MANUEL CORRAL--HERO

The small farming community of Dell City, located in the desert country of West Texas, near the Guadalupe Mountain Range, recently has attempted to show it's appreciation to one of its newest and most beloved citizens, J. Manuel Corral.

Our readers will remember the bravery exhibited by Corral when he rescued three - year - old Randy Gene McKinley from an irrigation well into which he had fallen.

Corral was lowered head-first into a small-diameter well to the boy who was holding his head above water 68-feet below by clinging to the rock wall of the well.

Because Randy Gene was so young, his life would surely have been snuffed out had it not been for Corral's quick action and his self-denying mental attitude. Too much can not be said concerning this man.

At a recent community meeting in Dell City, Corral, a Mexican bracero, was made an honorary citizen of Texas by Governor Price Daniel. His family was brought from Mexico for the occasion—A visa has been given the family that will allow them to stay in this country until permanent citizenship is obtained.

James Jordan, president of the Hudspeth County Farm Bureau, presided over the meeting. He said, "We are all familiar with the story of the courage of Manuel Corral, a humble citizen of Mexico, and of how he rescued his employer's grandson from a deep, 16-inch well by having himself lowered head-first into its narrow black depths. We know of the terrible risks he ran of cave-in, falling rocks and of becoming stuck. This was unequaled cold courage."

No man in Dell City history ever received an ovation as did Corral that night.

Later in the month of March, a banquet was given in Corral's honor in Dallas by the Baptist Foundation of Texas. There he was presented the Texas Rural Farm and Ranch Safety Council Heroism Award and other honors.

According to Charles Thomas, president of the First State Bank in Dell City, the people of the community are also trying to obtain the Carnegie Hero Award for Corral. The Carnegie people are to soon send their representative to Dell City to inspect the site of the accident and to talk with eye-witnesses.

Several cash awards have been given Corral along with the many citations and commendations for bravery. Among these gifts, the Dell City community made donations amounting to hundreds of dollars. Corral would not accept the money so it was deposited in the local bank for him. The Baptist Award carried with it a cash gift of $500.

Others have recognized Corral's bravery, even those living a great distance from Texas. This is reflected in a letter the writer received recently from the Associated Drilling Contractors in California.

April 19, 1960

Allan H. White

THE CROSS SECTION

1628 B - 15th St.

Lubbock, Texas

Dear Mr. White:

The featured lead story appearing on the 1st page of the January issue of the Cross Section by Allan H. White was viewed with much interest by the Board or Directors of ADC of California setting in session on March 31, 1960 at Sacramento, California and they wish to commend you for recognizing one J. Manuel Corral for his heroic feat.

The Associated Drilling Contractors' Board unanimously agreed that Mr. J. Manuel Corral should receive recognition from the Carnegie Hero Fund Commission, 2307 Oliver Building, Pittsburg, Pennsylvania. As you probably know, this organization recognizes an individual who has saved a life which necessitates bravery beyond the call of duty. It is assumed that your newspaper has sent information about J. Manuel Corral to the Carnegie Hero Fund. In the event you have not, then we would like to have the opportunity of calling this matter to their attention.

As we are interested in showing our appreciation and recognition to Mr. Corral, we would thank you to kindly forward to the undersigned his official mailing address.

Incidentally, we are not aware of Corral's financial circumstances, but the ADC Board was of the opinion that he could use $100.00 and it was unanimously approved by the Board that he be in receipt of same. Mr. J. F. Guardino, past president of ADC, P.O. Box 47, San Jose, Calif., is arranging the presentation of the check via a friend of his in Lubbock, Texas.

Again, we commend you on the article about Mr. Corral and hope you can forward to us his address.

Yours very truly,

John O. Grote, Secty.

Mr. Corral's address has been sent to Mr. Grote.

PLEASE CLOSE THOSE ABANDONED WELLS

EDITOR
THE CROSS SECTION
1628-B 15th Street
Lubbock, Texas

Dear Sir:
I do not now receive THE CROSS SECTION but would like to have it sent to me each month, free of charge, at the address given below.

Name__________
Street Address__________
City and State__________

(Please cut out and mail to our address)

Waste---More Rigid Enforcement Of Rules

The Board of Directors of the High Plains Underground Water Conservation District has recently decided that a procedure would be adopted to strictly enforce the District's rules against waste of irrigation water.

The District has in the past approached the problem of waste from an educational standpoint, preferring to present facts about the underground water and its efficient use rather than invoking more harsh and drastic methods. However, the willful and habitual waste of water by a minority of irrigators has become increasingly more serious. With the continued decline of the underground water level in the southern High Plains' area coupled with increased public opinion against willful waste, the Water District has come to the conclusion that the time is now upon us to supplement education with strict enforcement.

In the future, violators of the District's rules concerning waste will be notified that they have 24 hours in which to correct the situation and stop the waste. This does not mean that the District would want any farmer to stop irrigating, but only to put a halt to continued waste.

The notice will be delivered to the farm operator by a deputy sheriff, constable or by some other official person in the county where the waste has been observed.

At the end of the 24-hour period, District personnel will check to see that the irrigation water is under control and is being retained and used on the land where it is produced.

Should the waste continue beyond the 24-hour period granted to the violator by the District, then legal action will be taken through the courts to stop any further waste.

By far the large majority of area irrigators recognize that their underground water is one of the most precious of all resources, and they care for it as best they can; however a minority continues to promiscously run water off their land into roadways, creating not only a situation described as waste in the rules of the Water District but also a definite public nuisance and hazard to human life.

The multitude of reasons why underground water should not be wasted have all been discussed in much detail through the newspapers and over the radio and television stations. All who are even remotely interested in conservation can explain why waste is detrimental to continued prosperity in our area. Even the school boy knows that waste is a bad practice. All are aware that water should not be wasted, but rather it should be put to beneficial uses.

Put an end to any waste that originates from your land—do it today.

Agricultural "tail-water" can be adequately controlled on many farms by drilling grain sorghum, or some other crop, perpendicular to rows that come down the slope. This provides a strip of land over which "tail-water" can be spread and thereby used for beneficial purposes. The farm shown above is located in southern Parmer County and belongs to R. Broadhurst.

Dave Willis of Floydada who farms south of town states that he can keep "tail-water" on his land by pulling up a border at the ends of his rows. He also mulches into the soil sorghum and wheat stubble to improve the soil's water intake rate. Mr. Willis keeps his irrigation runs short so that he can better control the amount and distribution of irrigation water.

Carlos Arellano is shown above inspecting listed land on which he will soon plant grain sorghum. The farm is located about 10 miles south of Floydada and is operated by Aaron Carthel. Mr. Arellano told "The Cross Section" that since he has contoured the ends of his rows he has been able to get much better water penetration. Penetration is improved because the velocity of the water coming down the rows is reduced when it reaches the contoured section.

This sump was dug on the Trautman farm west of Hereford, in Deaf Smith County, to catch irrigation "tail-water". The idea is to dig the sump at the lower corner of the farm and channel all "tail-water" into it. Then, by using a centrifugal pump, the water can be returned to a higher point on the farm where it can be used. The Trautmans are primarily vegetable farmers.

How Much Does Recharge Water Cost

By RAY BILLINGSLEY

Associate Professor of Agricultural Economics, Texas Technological College and Texas Agricultural Experiment Station

The extensiveness of playa lakes, or wet weather depressions as many people call them, are apparent to any one who has driven across the Texas High Plains. This is especially noticable after a rainy season. Although these playa lakes have long been considered a nuisance, the water that collects in them is potentially the High Plains' biggest source of added ground water. The natural rate of recharge is so small compared to the present rate of use that ultimately the ground-water yield for irrigation will become so small as to be uneconomic.

Water engineers and hydrologists have been working on the technical feasibility of artificial water recharge. Artificial water recharge experiments have been conducted in several areas of the United States and in this area several studies have been done concerning artificial water recharge into irrigation wells. Much of this information has been reported in this newspaper.

It is now evident that most of the technical problems associated with artificial water recharge have been solved and more of them are being solved all the time. The question that must now be answered, "Is it economically feasible to recharge playa lake water." In order to answer this question, the cost of the recharged water and the expected returns from the recharged water must be known. The income resulting from the use of the recharged water will vary, of course, depending on the specific crop on which the water is used. Several other factors are also related to the efficiency with which recharge water can be turned into income, such as area located, cropping practice followed, managerial skill of the operation as well as the price received for the crop grown. With all these factors in effect, the expected income value will be quite variable but the cost of recharged water can be estimated quite accurately if the following information is known; the cost of the recharge operation, the length of time that the stored water in the aquifer will last without recharge, and the cost of money or the interest rate.

Cost of equipping an irrigation well for recharge operation. The estimated additional cost to equip an irrigation well so that it may also be used for a recharge operation will vary from well to well depending primarily upon such factors as amount of pipe and excavation required to install the pipe line from the lake to the well. The additional cost of a typical operation to have a multi-purpose irrigation well that may be used both as a production well and as a recharge operation has been estimated on the basis of present prices to be approximately $2,000. This is the investment cost that should be considered in comparing costs with expected income to be derived from the recharged water.

Factors that affect the compounded cost associated with an investment in a recharge operation. In order for any venture to be economically feasible, the expected income must be equal to or greater than all of the costs involved. The investment cost of a recharge operation is not the last cost that must be considered. This investment cost will grow at the compound interest rate as long as the existing water in the aquifer lasts. When the existing ground water is depleted the recharge water will then be available for use to generate income to offset the compounded cost of the recharge facility. The amount of increase in cost depends directly upon the interest rate used and the length of time involved.

Effect of quantity of water available for recharge. It is obvious that the more water that is used for recharge each year the larger the quantity of ground water that will be available for future use. The total compounded costs associated with the recharge operation of a multi-purpose well depends upon the amount of the original cost of the recharge operation, the interest rate and the number of years involved. This simply means that for a given compound cost associated with a particular well, the more water recharged into this well, the less will be the cost per acre-foot of water recharged.

The cost of recharged water. In Table 1 is summarized the compounded costs per acre-foot of water recharged for various sized lakes and various time periods for a recharge installation costing $2,000. This table shows that for a given playa lake that the compounded cost of water per acre-foot decreases up to about 30 years and from that time on increases. The change in cost is slight, however, and using present returns from irrigated crops in this area as a guide, artificially recharged water can be the source of an attractive return on investment.

TABLE 1. Compounded Costs Per Acre-Foot of Water Recharged for Various Sized Lakes and Various Time Periods for a Recharge Installation Costing $2,000.

	Compounded Cost Per Acre-Foot of Water Recharged				
Years of Water Left in Aquifer	20 Acre-Foot per year	40 Acre-Foot per year	60 Acre-Foot per year	80 Acre-Foot per year	100 Acre-Foot per year
10	$14.80	$7.40	$4.94	$3.70	$2.96
20	10.96	5.48	3.65	2.74	2.19
30	10.81	5.41	3.60	2.70	2.16
40	12.00	6.00	4.00	3.00	2.40
50	14.21	7.11	4.74	3.55	2.84

EDITOR'S NOTE—For more detailed information on this subject, contact Dr. Billingsley at Texas Tech College and ask for a copy of a Texas Agricultural Experiment Station bulletin entitled, "The Economics of Artificial Ground-Water Recharge on the High Plains." Dr. Billingsley has prepared this bulletin and it will be ready for distribution in the very near future.

PRECIPITATION IN SOUTHERN HIGH PLAINS

Below is a table that shows, by months, the precipitation received at the official weather stations throughout the southern High Plains. The figures are for the entire year of 1959 and for the first two months of 1960. They reflect inches of moisture received at that particular station, and are gathered and compiled by the U. S. Weather Bureau.

	1959													1960	
STATION	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL	JAN.	FEB.
Abernathy	.11	.16	1.02	1.51	1.83	5.50	3.75	1.10	.36	1.04	.02	1.98	18.38	.73	1.12
Amarillo	.16	.06	.26	1.18	4.82	2.19	2.85	2.24	2.29	2.10	.14	4.52	22.81	1.30	.95
Brownfield, 2E	.00	.08	.00	1.50	2.00	2.95	4.25	.00	.87	2.19	.10	.89	14.83	.54	.87
Canyon	E.15*	.27	.39	1.42	4.11	3.55	6.58	1.01	.93	2.02	.01	4.30	E24.74*	1.51	.91
Claude	.25	.04	.09	1.42	6.33	2.58	4.89	6.43	1.58	2.72	.07	4.81	31.21	1.31	1.86
Crosbyton	.03	.33	T	1.33	4.36	6.12	3.00	.74	.92	2.48	.25	3.18	22.74	1.70	1.44
Dimmitt, 6E	.21	.14	.38	1.20	5.10	4.37	3.15	1.52	.64	1.85	.08	3.64	22.28	1.70	.74
Floydada, 2SW	.22	.04	.10	1.28	2.74	4.41	3.63	.03	.76	1.42	T	2.10	16.73	1.02	1.21
Friona	——	——	——	——	——	——	3.44	3.94	.64	1.99	.12	3.17	——	1.58	——
Hart	.04	.00	.10	.60	4.07	5.04	3.91	1.98	.32	3.13	.00	1.99	21.18	.90	1.10
Hereford	.06	.07	.43	1.43	2.31	3.83	1.95	3.43	1.17	1.98	.23	4.57	21.46	1.54	.80
Levelland	.07	.10	T	.78	2.15	9.31	1.73	3.15	2.98	1.86	.00	1.08	23.21	.76	1.18
Littlefield	T	.16	T	1.08	2.02	5.88	3.79	1.53	.03	2.43	.00	1.62	18.54	1.30	.69
Lorenzo	.00	.00	.00	1.35	3.64	7.02	2.18	.35	1.44	2.86	.00	3.03	21.87	.98	.80
Lubbock, AP	.08	.07	T	1.28	2.15	7.25	1.30	.72	.89	.98	.02	1.47	16.21	.66	.94
Morton	T	.07	.03	.65	4.62	3.13	4.96	1.66	2.10	2.24	T	1.28	20.74	.79	.36
Muleshoe	.02	.15	.08	2.33	3.63	2.73	2.81	1.97	.78	2.47	.06	1.53	18.56	1.15	.74
Plains	.07	.08	.03	.80	1.64	4.46	1.64	.91	.53	2.19	.02	1.16	13.53	.73	.32
Plainview	.06	.08	.04	1.20	2.09	3.72	4.94	.97	.39	2.26	T	2.52	18.27	1.10	1.23
Post	T	.21	.01	1.56	3.21	6.74	4.94	1.21	1.37	5.07	.46	1.77	26.55	1.08	.59
Silverton	.23	.09	.17	1.81	3.54	3.57	4.45	.94	.42	2.83	.19	5.20	23.44	1.26	1.41
Slaton, 5SE	.02	.05	T	1.88	3.28	5.35	2.43	1.05	1.04	3.12	.02	2.61	20.85	1.08	.98
Tahoka	.14	.13	T	1.31	3.26	7.14	3.76	.43	2.51	2.79	.29	1.78	23.54	.85	.96
Tulia	.10	.14	.24	1.18	5.22	4.80	2.15	.70	1.15	4.05	.02	3.15	22.90	1.18	.56
Umbarger	.16	.07	.19	1.05	3.52	3.05	2.59	1.84	2.31	1.67	.04	4.27	20.76	.81	.88
Vega	.12	.07	.26	.49	1.91	1.93	2.56	1.64	1.16	2.26	.05	4.04	16.49	1.05	.94

* E—Estimated.

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

Second Class Permit

THE Cross SECTION

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

Volume 6—No. 12 | "THERE IS NO SUBSTITUTE FOR WATER" | May 1960

MANUEL CORRAL RECEIVES CHECK FROM CALIFORNIA WELL DRILLERS

J. Manuel Corral, distinguished citizen of Dell City, Texas, who, on December 23, 1959, rescued a three-year-old boy from a deep abandoned irrigation well, has been given another much-deserved award.

The Board of Directors of the Associated Drilling Contractors of California has presented to Mr. Corral a check for $100. J. F. Guardino, past President of the ADC, stated, "We of the drilling industry can realize the courage required to affect the rescue described in the January issue of "The Cross Section." Such an act of heroism should not go unheeded. It would, of course, be impossible to bestow a fitting reward upon a man who has ignored his own safety to rescue a child; however, we would be pleased if this check could be presented to Mr. Corral as a token on behalf of the Associated Drilling Contractors."

Allan H. White, Director of Publicity for the High Plains Water District and editor of "The Cross Section" made the presentation to Mr. Corral in Dell City on behalf of the ADC.

The check was presented to Mr. Corral at the First State Bank of Dell City, where several plaques commemorating the heroic deed adorn the walls.

Because Mr. Corral does not speak English, translation was made to Spanish by Paul Rivera, local manager of the Farm Bureau Office.

Mr. Corral's lovely wife, Rosa, was present, even though the Corral's four children could not attend because of school classes. F. W. O'Bannion, the rescued boy's grandfather was also present.

Arrangements in Dell City for the presentation of the check were made by Charles Thomas, president of the local bank; Gene Lutrick, Dell City farmer, and others.

Manuel Corral, is shown second from left, as he receives a $100. check from Allan H. White, Director of Publicity for the High Plains Water District. The check was presented to Corral by the Associated Drilling Contractors of California for his bravery in rescuing a 3-year-old boy from an abandoned irrigation well. Corral's wife, Rosa watches with approval as does Charles Thomas, Dell City banker, who has been instrumental in obtaining proper recognition for Corral's dramatic deed. Plaques shown on the wall were presented to Corral by various groups.

"CHIEF RUNNING WATER," SAYS—

Above is shown the sixth-grade class of the George A. Rush school in Lubbock with their teacher, Mrs. Grant Tollifson. The class recently prepared and presented a television show on the subject of water conservation.

SIXTH-GRADERS PROBE PROBLEM OF VANISHING WATER SUPPLY

By MRS. GRANT TOLLIFSON
Faculty Member, George A. Rush School, Lubbock, Texas

Each year the Parent Teacher's Association of the George A. Rush elementary school in Lubbock is provided educational time on "Hospitality Time," a daily community public service show, by KCBD-TV in Lubbock.

This year the school's principal, Miss Dorothy Filgo, assigned the time to her sixth grade. The sixth-graders, under the direction of their teacher, Mrs. Grant Tollifson, had no difficulty in quickly deciding upon a topic for the TV panel discussion. They had been studying, in their Science classes, conservation of our natural resources, and they felt very strongly that this subject would be one of genuine value and much interest to the television audience.

The class, after deciding that they would title their discussion, "The Problem of Our Vanishing Water Supply," invited Tom McFarland, Manager of the High Plains Underground Water Conservation District to come to their school and be interviewed by the class.

Charles Nash, student narrator for the interview, presented to Mr. McFarland the following questions for discussion: (1) What can we do to conserve water? (2) What is being done to conserve water in our county? (3) How can school students and teachers prevent waste of water? (4) From where does our water come? (5) How is our water purified? (6) Is there any danger of our water supply being depleted?

Armed with the answer to these questions, the class went on to produce a dramatic show designed to challenge everyone's concern and interest in conserving our water supply.

Representatives of the class who appeared on the television panel were: Beth Clark, daughter of Mr. and Mrs. Dave Clark, 2202 Slide Road; Royce Lewis, son of Dr. and Mrs. Royce Lewis, Jr., 5233 W. 19th Street; Charles Nash, son of Dr. and Mrs. C. H. Nash, 4708 22nd Street.

Editor's Note — We congratulate Mrs. Tollifson and her class members for the fine job that they did on the television show in presenting a subject that is most vital to all—water conservation.

PLEASE CLOSE THOSE ABANDONED WELLS ! ! !

THE Cross SECTION

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ALLAN WHITE
Editor

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Committeemen meet fourth Friday of each month at 2:30 p. m., Farm Bureau Office, Muleshoe, Texas.

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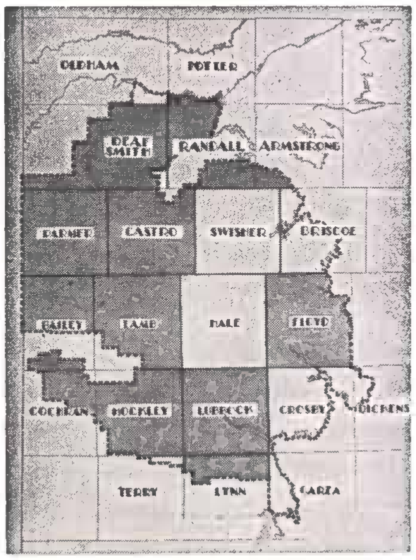

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Committeemen meet first and third Fridays of each month at 1:30 p. m., 913 Houston, Levelland, Texas.

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Elmer McGill .... Olton, Texas

Committeemen meet on the second Tuesday of each month at 7:30 p. m., Jerry's Cafe, Littlefield, Texas.

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Committeemen meet first and third Mondays of each month at 2:30 p. m., 1628-B 15th Street, Lubbock, Texas.

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Committeemen meet first and third Tuesdays of each month at 10 a. m., 1628-B 15th Street, Lubbock, Texas.

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A. C. Evers .... Rt. 4, Box 391, Amarillo, Texas
Jackie Meeks .... Rt. 2, Happy, Texas
W. A. (Bill) Patke - Rt. 4, Box 400, Amarillo, Tex.

Committeemen meet first Monday night each month at 7:30 p. m., 1710 5th Avenue, Canyon, Texas.

ROY HICKMAN

Roy Hickman of Morton in Cochran County is the newest member of the Board of Directors of the High Plains Underground Water Conservation District. He was elected in January 1960, by the people of District Precinct No. 2, to represent them on the Board. Precinct No. 2 consists of Cochran, Hockley and Lamb Counties.

Mr. Hickman is the eldest son of the late Mr. and Mrs. Roy Hickman, Sr. of Rising Star, Texas. He was born in 1902. His parents were ranchers.

Mr. Hickman attended a small two-teacher country elementary school and the Rising Star High School. He finished John Tarleton College in Stephenville, then a two-year college, and transferred to Texas A & M College where he took his B. S. degree in Agriculture with a major in Animal Husbandry in 1926.

Mr. Hickman moved to Kress, in Swisher County, where he started farming. He raised mostly wheat and maize on his 480-acre farm. He actively farmed until 1933 when the depression just about wiped him out.

That same year, Mr. Hickman moved to Tulia and took a job with the old AAA service of the government farm program. After awhile, he moved to Plainview, in Hale County, as the Assistant County Agent in charge of the AAA program. Then in June 1936, he became the County Agent of Cochran County and moved to Morton. He held this job until 1947 when he resigned to again devote all his time to farming. During all these years he never actually quit farming, but worked it in on a part-time basis.

Today, Mr. Hickman owns farmland in Castro and Cochran Counties. He operates four irrigation wells on his land.

Mr. Hickman was active in matters pertaining to underground water before being elected to the Board. He was the chairman of a committee of citizens in Cochran County who organized in an attempt to persuade the Texas Railroad Commission to take action to halt the practice of oil operators disposing of oil-field brine in open earthen pits. It was feared that disposal of salt water in this manner would cause pollution of the fresh underground water. Mr. Hickman was spokesman in Austin for the committee. The committee's efforts and the efforts of the High Plains Water District have resulted in closure of all the disposal pits in Cochran County that are in the District.

Mr. Hickman has kept himself abreast of water problems in the High Plains and the steps being taken to correct and solve these problems because of his personal and business interests in the development of the area.

Besides his farming interests, he also is in the grain elevator and ranching business at Rising Star and Brownwood along with two of his brothers.

Mr. Hickman has one son, Roy Don, who finished Texas A & M College in 1954 and who now is employed by the college system in their foreign student exchange program.

Mr. and Mrs. Hickman attend the Methodist Church in Morton. He does not play golf as much now as he did in the past, but still gets in a few rounds from time to time. He also enjoys fishing when the opportunity presents itself.

The people of Precinct No. 2 are fortunate to have a man of Mr. Roy Hickman's experience and ability representing them as a member of the Board of the Water District.

The four other members of the District Board are happy to welcome Mr. Hickman as its newest member.

EDITOR
THE CROSS SECTION
1628-B 15th Street
Lubbock, Texas

Dear Sir:
I do not now receive THE CROSS SECTION but would like to have it sent to me each month, free of charge, at the address given below.

Name ____________________
Street Address ____________________
City and State ____________________

(Please cut out and mail to our address)

WHAT ABOUT IRRIGATING GRAIN SORGHUMS?

By DAVE SHERRILL
Irrigation Agent District I and II
Texas Agricultural Extension Service
Lubbock, Texas

In 1959, two million acres of grain sorghum were irrigated on the High Plains.

Generally speaking, grain sorghum planted on the High Plains between June 10 and June 25 matures faster, requires less water and produces highest yields. This planting pattern seems to best fit our climate. However, there are conditions that exist on different farms that tend to alter the time when grain sorghum should be planted.

If a farmer has plenty of water for all cotton and grain, he may desire to fertilize grain sorghum and shoot for top yields. In this case, he should plant a late-maturing, high-yielding seed variety.

If the farmer has only enough irrigation water for cotton, and none for grain sorghum, he is wise to give preferential treatment to cotton because an acre-foot of irrigation water on cotton will return an average of $60 to $75. When applied to grain sorghum, an acre-foot of irrigation water will return only about $13 to $15.

In addition to the case where the farmer has an abundance of water and can irrigate all of his land, and the case where irrigation water is available for only cotton, there is a third situation where a medium supply of water will allow a possible once-over watering for grain sorghum while allowing adequate irrigation for cotton.

In the sandy-land area south of Lubbock, some grain sorghum is planted in April, especially on dry-land if natural moisture is available at that time. An April planting date of an early-maturing seed variety, might be good where only limited irrigation water is available. This planting date would put the sorghum plant in the "boot" stage of growth during June, before water is needed for irrigating cotton. However, in this case, stress would probably occur during the "bloom" stage, unless rainfall came to supplement irrigation water. Because the grain sorghum plant makes its greatest demand for water during the "boot" and "bloom" stages of growth, the farmer should plan his crop so that these stages come during a time when there is less competition from other crops for water.

On the other hand, with limited irrigation water, grain sorghum planted June 25 may stress for water in the "boot" stage, but can be watered in the "bloom" stage during the later part of August or early September and not conflict with cotton for irrigation water. Requirements of cotton for water are greatest during "first-bloom" stage of growth to August 20 or 25.

A demonstration conducted by Bill Taylor, County Agent of Hockley County, on the Haskell Grant farm, compared a dryland grain sorghum field that produced 2,650 pounds to an irrigated plot that received only one irrigation of 4.04 inches that produced 3,400 pounds, or 185 pounds of grain increase per acre-inch of irrigation water.

A good return for water, both rainfall and irrigation, is 200 pounds per acre-inch. With plenty of nutrients and good management, some farmers have produced as high as 300 pounds of grain sorghum per acre-inch of water. This however, is on the high side.

This spring, most farmers irrigated cotton land prior to planting, which was wise. However, many do not plan a preplant-irrigation on sorghum land. Ordinarily, it pays, to preplant-irrigate sorghum, because the root system of the plants will penetrate as deep as cotton in good soil, but this year sub-soil moisture is more plentiful, and also, if we can judge by past history, we stand a good chance to get rainfall by normal planting time. If we can save irrigation water, we may be wise to do so.

I do not propose to give cut and dried answers for watering grain sorghum, but only to cause each irrigator to think. Are we selling our underground exhaustible supply of water too cheaply? Should we sell it at a low price today, and be unable to irrigate higher-priced crops twenty-five to thirty-five years from now?

This article should not be interpreted as implying that we should not irrigate grain sorghum. As was pointed out earlier, farmers are selling their water up to $30 an acre-foot by irrigating grain. However, most of these are putting organic matter in their soil and they practice good water and soil management. Others feed their grain to livestock and thereby receive higher than loan prices for it. Irrigation of grain sorghum can thus be made more profitable.

Regardless of the individual's opinion about irrigation practices, I believe one cannot afford the luxury of waste. Water conservation simply means that we practice good common sense. Use irrigation pipe instead of open ditches and catch all irrigation "tail-water." Recover water from wet-weather lakes and use it for beneficial purposes. This practice will also eliminate the home of the disease-carrying mosquito. Of course, it is inexcusable to allow irrigation water to escape from our farmland to the bar-ditches.

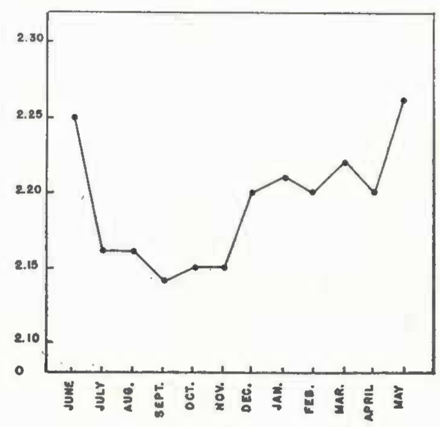
When the grain crop has been harvested, shred the stalks. If you don't, the stalks will continue to extract water from the soil until frost.

Every farmer should know the capacity of his well, the number of acre-inches of water applied to crops and the water-holding capacity of his soil.

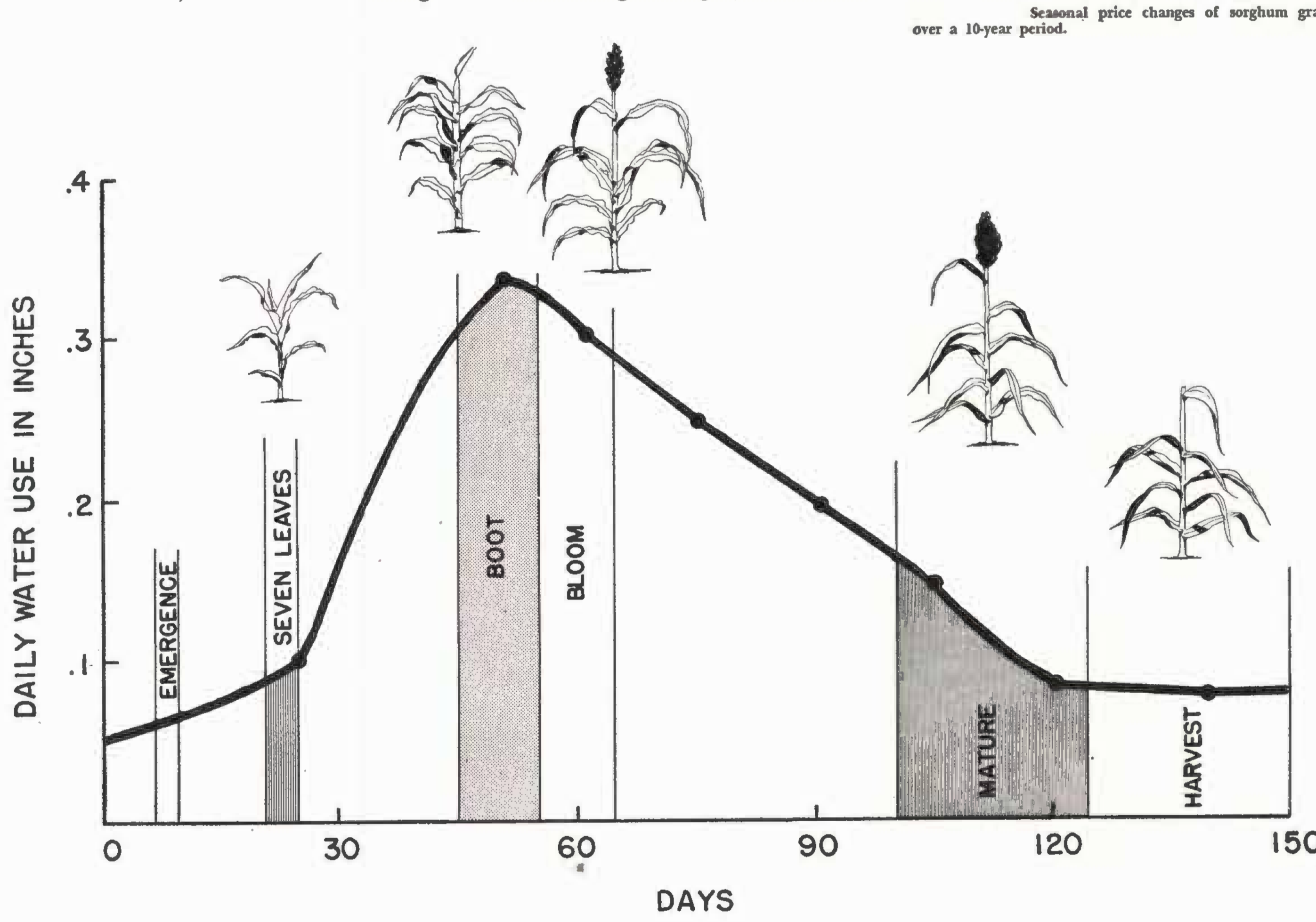
Although the sorghum plant may use as much as four-tenths (.4) of an inch of water per day, if thirty-three hundreths (.33) of an inch of water is made available to the grain sorghum plant during "boot", "bloom" and "soft dough" stages, this amount generally is sufficient. The consumptive-use of water by the plant during these periods is equivalent to 6.2 gallons per minute per acre. For ideal grain sorghum conditions, the top two to three feet of soil should be maintained at not less than 50 percent available moisture. The "feel" chart available from your County Agent will help you determine the amount of moisture in the soil.

When you pick up your "feel" chart, you might also ask for a copy of an Extension Service Bulletin, entitled "Growing Grain Sorghum." The bulletin is No. B-210. It contains helpful information concerning the raising of grain sorghum, such as planting dates, seed treatment, irrigation suggestions, and aids in harvesting and marketing.

Editor's Note—"The Cross Section" is indebted to Mr. Sherrill for this exclusive story and to the Texas Agricultural Extension Service for allowing us to reproduce the statistical tables that accompany the article.



Seasonal price changes of sorghum grain over a 10-year period.



Daily water use from planting to maturity.

WHEN YOU MOVE . . .

Please notify High Plains Water District, 1628 - 15th Street, 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."

Motion Picture Tells Story of Water

Water—this nation's most wanted and most wasted resource—and what we must do to assure a plentiful supply for the future is the subject of a brilliant new movie being released for showing to groups interested in this vital resource.

Narrated by Walter Cronkite, famous radio-TV personality, this 27-minute color movie illustrates the problems of water conservation, how some citizens have met their problems, and what others can do to meet theirs.

An average of 30-inches of precipitation falls annually on the total land area of the United States. Although it is not distributed evenly, this amount should be ample to meet demands. More and more, fast-growing cities are experiencing water shortages and drouth conditions often prevail where water has been in ample supply. The very abundance of water is proof of how it is wasted. Between 90 and 96 per cent of the water falling on the land yearly is lost, thus leaving less than 10 per cent which can be used to support a growing economy.

The need for water in this nation by 1975 will be tremendous, demanding better and greater water storage, conservation, and use, it is explained.

These and related topics are covered in this new film, "Water Bill . . . USA," just released by Caterpillar Tractor Company. Copies of this film will be available through Caterpillar dealers.

"The Cross Section" has been advised by Dick McDivitt with the West Texas Equipment Company, Caterpillar dealer in the southern High Plains, that a copy of the new film is available through their organization. Mr. McDivitt may be contacted in regards to the movie at the Lubbock office of the West Texas Equipment Company. In Amarillo, Don Deckard is the man to contact.

Governor Names District Officials Delegates

Elmer Blankenship, President of the Board of Directors of the High Plains Underground Water Conservation District, and Tom McFarland, Manager of the District, have just returned from Washington, D. C. where they attended the 47th annual convention of the National Rivers and Harbors Congress.

Mr. Blankenship and Mr. McFarland were representatives to the convention from the state of Texas, having been appointed by Governor Price Daniel. There were about ten others in the Texas delegation.

The convention was held May 24-27 in the Mayflower hotel.

WELL DRILLING STATISTICS FOR APRIL

During the month of April, 113 new wells were drilled and registered with the District office; 17 replacement wells were drilled; and 11 wells were drilled that were either dry or non-productive for other reasons. 133 permits were issued by the County Committees.

The permits issued and wells completed in April are listed below by counties.

County	*Permits Issued*	*New Wells Drilled*	*Replacement Wells*	*Dry Holes Drilled*
Armstrong	0	0	0	0
Bailey	1	7	0	1
Castro	14	2	1	0
Cochran	6	4	0	0
Deaf Smith	19	3	1	0
Floyd	9	7	1	0
Hockley	16	13	3	2
Lamb	8	14	2	2
Lubbock	45	39	8	5
Lynn	10	23	0	1
Parmer	4	1	1	0
Potter	0	0	0	0
Randall	1	0	0	0
Totals	133	113	17	11

Window Stickers Available From District

A new window sticker designed to make viewers conscious of water conservation has been prepared by the High Plains Water District. The sticker features "Chief Running Water."

You will want to get a sticker for each of your cars, or for display in other conspicuous places.

To obtain the stickers you need, free of charge, just simply send your name and address on the cut-out coupon to "Chief Running Water," c/o High Plains Water District, 1628 15th St., Lubbock, Texas.

Help "Chief Running Water" make everyone recognize that each plays an important role in the story of water conservation. Get your stickers today and display them in prominent places.

Stickers are also available at the county offices of the Water District and from County Committeemen and Board members.

CHIEF RUNNING WATER
HIGH PLAINS WATER DISTRICT
1628 FIFTEENTH STREET LUBBOCK, TEXAS
Dear Chief Running Water:
I am interested in helping to sell "Water Conservation" in the High Plains.
Please send me ________ window stickers. My name and address is:
Name ____________________
Address ____________________
City and State ____________________

WATER IS YOUR FUTURE

CONSERVE 'UM!

HIGH PLAINS UNDERGROUND WATER CONSERVATION DIST.

A LITTLE LIFE IS WORTH MORE THAN A LITTLE TIME, CLOSE THOSE ABANDONED WELLS!

Second Class Permit

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

THE Cross SECTION

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

Volume 7—No. 1 "THERE IS NO SUBSTITUTE FOR WATER" *June 1960*

INCOME - TAX DEDUCTION SOUGHT FOR DEPLETION OF GROUND WATER

In 1954, the High Plains Water District filed with the U. S. Internal Revenue Service a request for a ruling that would establish ground water in the southern High Plains of Texas as a depletable natural resource and allow a deduction on federal income-tax returns for its depletion.

The request for such an administrative ruling has been denied.

A lawsuit is now being planned to establish through litigation the District's contention that underground water in this area is a natural deposit and that it is being depleted; and that individuals and institutions using water to produce income should be allowed a federal income-tax deduction for the depletion of this resource. Such depletion shall be calculated under cost rather than percentage depletion methods.

The District is gathering information that will be used during the trial to establish facts pertaining to the underground water and to the reservoir. The facts will prove that the underground water in the southern High Plains is gradually and surely being depleted and that the use of underground water in the production of crop income has a definite economic value.

An individual irrigation farmer will be selected by the Water District and the Revenue Service for test case purposes.

The general understanding of the Water District and the Revenue Service is that the decision of the court will become the rule not only in this one case, but that it will apply to all southern High Plains' water users who have a like set of circumstances.

To prepare the case, the District has endeavored to obtain the best legal and engineering counsel available. The verdict of the court will be very important to taxpayers in the High Plains of Texas; consequently, no stone will be left unturned in preparing for the case. Individually, the income - tax deduction may not be sufficient to warrant each person filing such a lawsuit in his own behalf; however, as a collective effort through the Water District, a favorable decision by the court would amount to millions of dollars in tax savings for area landowners during the economic life of the underground water. Furthermore, recognition of ground-water depletion by the United States Courts and then by the Internal Revenue Service should have an important bearing on future ground-water conservation practices. When each land owner and water owner realizes the value of his water, when he computes the profit or loss from the use of his water, he is in the position of being able to use to greater advantage the water remaining in storage beneath his land.

The case will be filed in Federal Court by the Water District probably this fall and it is anticipated that it will be scheduled for trial in the Spring of 1961.

W. N. WHITE NATIONALLY - KNOWN WATER AUTHORITY PASSES AWAY

Walter N. White, one of the nation's leading ground-water experts, died May 28, 1960. At the time of his death he was 83 years old and lived in Morganton, North Carolina.

Mr. White was employed for more than 37 years by the U. S. Geological Survey. From 1935 until his retirement in 1947, he was hydraulic engineer in charge of the ground-water investigation in Texas, in cooperation with the State Board of Water Engineers. At the time of his retirement, he was awarded a gold medal by the Department of the Interior for his long and distinguished service to his country.

He was the author and co-author of many bulletins and water-supply papers. He was best known nationally for his work in Escalante Valley, Utah, which included "A Method of Estimating Ground-Water Supplies Based on Discharge of Plants and Evaporation from Soil."

He will be remembered by the people of the High Plains for his work on the source and supply of our ground water. In his report of 1938 he made the following statement. "Questions in the minds of many owners of irrigation wells in the High Plains are these: What are the limits of safe pumping in my neighborhood? How much water should be pumped and how closely should the wells be spaced? The investigation shows these are largely questions of economics. . . With their water supply, the farmers of the High Plains are in a position similar to that of a man who has a large capital but who uses a part of his capital each year.

"Obviously, the problem of the conservation of the stored ground water for future as well as present beneficial use deserves serious consideration."

The abandoned well shown above is located adjacent to a Floyd County home where children frequently play. The well is closed improperly. Surface water can enter the well making it a source of contamination. Also, curious children could easily fall into the well. If you have an abandoned well on your property make sure that it is not a source of pollution nor a death-trap.

Lawyer Who Worked With Water District Dies

Lloyd Croslin, 51, Lubbock attorney, died June 22, 1960 following a heart attack.

Mr. Croslin was a former District Attorney in Lubbock and was prominent in Democratic party circles. He was a graduate of Texas Technological College, and served as an aide to Congressman George Mahon in Washington. He was also associated with Senator Lyndon Johnson.

In 1954, Mr. Croslin represented the High Plains Water District when the District asked the U. S. Internal Revenue Service to recognize underground water in the southern High Plains as a natural deposit and allow taxpayers an income - tax deduction for its depletion.

"Plant X" is located in the sandhills of Lamb County and supplies electricity for many of our everyday tools and appliances. **Turn to pages 2 and 3 to find out more about this steam-turbine electric generating plant.**

THE Cross SECTION

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

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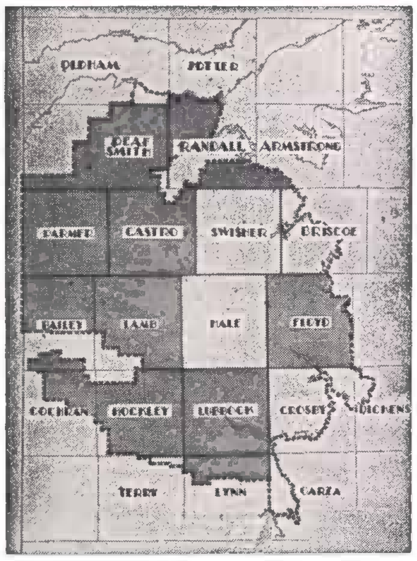
ALLAN WHITE
Editor

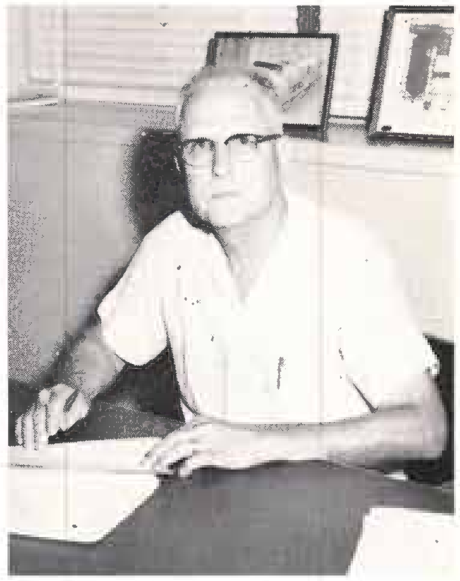


High Plains' Indu

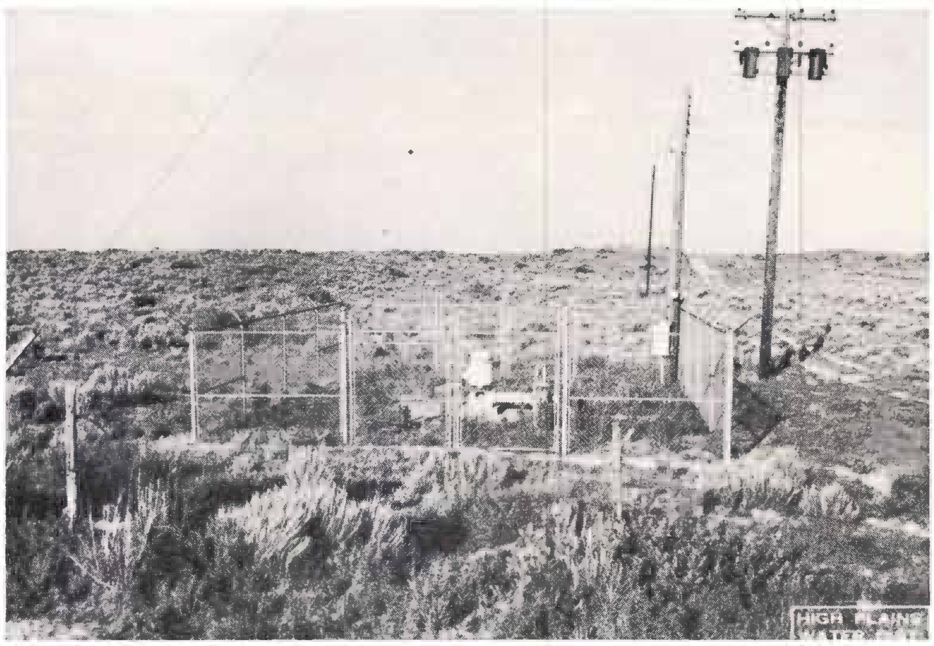
The largest of twelve Southwestern Public Service Company electric- generating stations is located within the bounds of the High Plains Water District in the sandhills area of Lamb County. The station is called "Plant X", and it has a generating capacity of 277,000 killowatt hours per hour. To grasp the immensity of this capacity, by comparison, the average southern High Plains' home-owner uses approximately 250 killowatt hours per month.

"Plant X" was constructed in the early part of the 1950 decade. The third steam-turbine generator went into service in 1955. This station is operated around the clock, day by day, to generate electric power which is delivered into the Southwestern Public Service Company's high-voltage transmission system that in turn supplies electricity for the operation of irrigation wells, furnishes power to Rural Electric Cooperatives, and supplies much of the energy necessary to operate the multitude of every day electrical appliances and tools that we use and enjoy.

"Plant X" is managed by Robert Drake, a Texas Technological College graduate, who has had some twenty-six years of experience in the electrical power generation and transmission field. The station employs a total of fifty-one men who work as operators, clerks, chemists, engineers and maintenance personnel.



ROBERT DRAKE
"Plant X" Manager



The station's eleven water wells are spaced about a mile apart over the 40,000 acres of water rights in the ranch country of the sandhills. The wells are equipped with pumps capable of producing about 500 gallons of water per minute.

"Plant X" represents a capital investment of approximately $30 million. This includes 354 acres of land that accomodates the station and its facilities, 40,000 acres of under-ground water rights in the sandhills, 11 water wells and the plant itself.

Generating electric power in the Texas High Plains is an involved business; one that requires substantial water reserves. Because "Plant X" has been equipped with very efficient generating equipment, the actual consumption of water is small when compared to the relatively large volume of water circulated throughout the station.

In its generating process, "Plant X" uses water for two purposes: (1) for steam, and (2) for condenser cooling. These two uses require different quantities and qualities of water; consequently, for the remainder of the story, when station generating water is referred to, we will call it either boiler or cooling water.

As was mentioned earlier, the station has 11 water wells. Each well is equipped with a deep-well turbine pump capable of producing approximately 500 gallons of water per minute. The wells are spaced about one mile apart and are located several miles from the nearest agricultural irrigation wells. Both boiler and cooling water is obtained from these water wells.

The station has three turbine generators. Two of them are capable of generating 112,500 kilowatts of electricity and the third is smaller, having a capacity of 52,000 kilowatts. The generators are driven by steam turbines. Each turbine is furnished steam by its own individual boiler and steam system.

The boiler water, from which steam is produced, must be maintained in almost distilled condition to prevent scale from forming in the boiler tubes or in the steam system. Through various processes of water treatment, the natural solids in solution in the well water are reduced to practically

strial Plant Practices Water Conservation

By ALLAN H. WHITE

nil while other chemicals that combat corrosion and scale are added back to the water before it is used in the boilers. Because the temperature of the boiler water may reach 1,000 degrees Fahrenheit and pressures of 1,500 pounds per square inch, it is absolutely imperative that no scale be permitted to collect on any of the tubes or pipes. The slightest buildup of scale in the boiler tubes could cause them to overheat and ultimately fail. Continuous chemical checks

The steam-turbine generator shown above is capable of producing 112,500 kilowatt hours of electricity per hour. The two operators are, left to right, Charles J. Mixon and Harold K. May.

of the boiler water are made in the station's laboratory to maintain proper quality at all times.

Water flows into the three boilers at a rate of about 5,000 gallons per minute at full load. There it is transformed into steam by furnace temperatures that run as high as 2,000 degrees Fahrenheit. The boilers are fired with natural gas. They burn about 2.5 million cubic feet per hour. The steam is then piped to the turbines where it is directed through small nozzles onto the turbine wheels which cause them to rotate. The turbine wheels are in turn coupled to the generators which produces or generates electricity.

When the steam is thus used, it continues to a huge condenser. It is cooled to a temperature that causes the steam to change to water. From there, the water moves back to the boiler and its form will again be changed to power-producing steam. This process is a never-ending cycle.

Because the boiler water is used over and over again, only small amounts of make-up water are needed to maintain the desired quality. The boiler and steam system requires the addition of about twenty gallons of water per minute.

The station's greatest water consumer is to be found in the condenser cooling process. Water is used to cool the steam in the condenser and cause the steam to revert from a gas back to a liquid. This job requires a large volume of relatively low temperature water.

Cooling water is pumped through the three condensers by six large centrifugal pumps. The cooling water flows through the condensers at a rate of approximately 200,000 gallons per minute. The largest centrifugal pump handles about 39,000 gallons of water per minute and is powered by a 900-horsepower electric motor.

As the cooling water passes through the steam condenser, naturally its job is to lower the temperature of the steam so that it changes to water. During this process, the temperature of the cooling water increases. This creates another problem that entails cooling the cooling water.

To lower the temperature of the cooling water so that it can be used in the condensing process requires

Water quality tests are continually run in the station's laboratory. Here Dale Hanna, station laboratory operator, prepares to check both the boiler water and the cooling-tower water.

six huge cooling towers consisting of forty-six cells. Each of the cooling tower cells is about thirty feet high and is made of redwood. To pull air through the cell, a large fan is mounted in the top of each cell. The fans

The station is equipped with 6 centrifugal pumps like the one shown above. They circulate 200,000 gallons of water per minute through three steam condensers. Mr. May and Mr. Mixon pose to show comparative size of pump.

are about fifteen feet in diameter and each is powered by a 50-horsepower electric motor.

After the cooling water passes through the condensers, it is carried to near the top of the cooling tower cells where it then is released and allowed to fall over wooden baffles that are irregularly spaced in the cell to break the falling water into

Water that circulates through the steam condencers is cooled by evaporation in the cooling towers shown above. The station has six cooling towers that consist of 46 cells. Each cell is equipped with a large fan that pulls air from the bottom to the top of the cell.

small droplets. As air is pulled from the bottom to the top of the cell and as the water droplets fall downward through the cell, evaporation occurs and lowers the water temperature. The cooling water then returns through a large flume to the station building and the condensers.

Sulphuric acid is added in a very small, but constant quantity, to the cooling water. The acid tends to neutralize the scale-causing calcium and bicarbonates that are present in the underground water in its natural state.

An average of 2,300 gallons of water per minute are added as make-up water to this large volume of cooling water. Even though some is drained off in order to maintain a specified quality, most of the water lost is to evaporation. Much of the water that is drained from the cooling tower system in order to maintain quality is used to irrigate the trees and grass that beautify the grounds surrounding the station.

Millions of gallons of water per day are saved by recirculating the station's boiler and cooling water. Also, to plan properly for future growth and expansion, the station has drilled three observation wells and the State Board of Water Engineers has equipped them with automatic water-level recorders. A continuous record is maintained by each recorder of changes in the water level at each observation well.

Yes, "Plant X" is practicing the principals of water conservation. The station management realizes that available water must be used wisely in order to continue to give the people of the High Plains' area the electric service that they want and deserve at the lowest cost.

Chemical Treatment Improves Pump Efficiency

By WILLIAM F. SCHWIESOW, Asst. Professor

Agricultural Engineering Dept., Texas Tech College, Lubbock, Texas

An irrigation well on the Texas Tech farm, which produced a small amount of water, was treated in the Spring of 1960 by the Agricultural Engineering Department of Texas Technological College. Records of performance of this well during previous years indicated that the well was capable of producing more water than it was producing at the time of treatment.

The suspected cause of this reduced flow was an organic growth, and the analyses of samples of water that were taken when the well was started at the beginning of the irrigation season substantiated this thought.

An experiment was made to determine the possibility of chemically removing some of this organic growth and thereby increase the flow of water from the well. To accomplish this experiment, 50 pounds of Welgicide Cleaner, a product of Cotey Chemical Company, was selected for the treatment. The chemical was placed in the pump column and in the well casing according to recommendations of the manufacturer. When the pump was started after the treatment, samples of the water contained a greater percentage of organic material than before the treatment. The pump was driven by a constant speed electric motor; however after the treatment, the flow of water increased approximately 17 percent. The drawdown of the water level was increased 2.8 feet. These results indicated that the chemical treatment was successful in removing a sufficient amount of organic material from the pump to allow the water to flow more freely and thereby increase the operating efficiency of the pump.

The following table is supplied so that the value of water under a particular set of conditions may be determined.

VALUE OF WATER PUMPED

Flow In gpm	Value of water per acre-foot $10.00*	$20.00	$30.00	$40.00	$50.00	$60.00**	$100.00
	(Productive value of water for 100 days pumping in dollars)						
1	4.40	8.80	13.20	17.60	22.00	26.40	44.00
5	22.00	44.00	66.00	88.00	110.00	132.00	220.00
10	44.00	88.00	132.00	176.00	220.00	264.00	440.00
15	66.00	132.00	198.00	264.00	330.00	396.00	660.00
20	88.00	176.00	264.00	352.00	440.00	528.00	880.00
25	110.00	220.00	330.00	440.00	550.00	660.00	1100.00
30	132.00	264.00	396.00	528.00	660.00	792.00	1320.00
35	154.00	308.00	462.00	616.00	770.00	924.00	1540.00
40	176.00	352.00	578.00	704.00	880.00	1056.00	1760.00
45	198.00	396.00	594.00	792.00	990.00	1188.00	1980.00
50	220.00	440.00	660.00	880.00	1100.00	1320.00	2200.00
60	264.00	528.00	792.00	1056.00	1320.00	1584.00	2640.00
70	308.00	616.00	924.00	1232.00	1540.00	1848.00	3080.00
80	352.00	704.00	1056.00	1408.00	1760.00	2112.00	3520.00
90	396.00	792.00	1188.00	1584.00	1980.00	2376.00	3960.00
100	440.00	880.00	1320.00	1760.00	2200.00	2640.00	4400.00

* Reported average value when irrigating grain sorghum.

** Reported average value when irrigating cotton.

Example: If we assume that water is used on both cotton and grain sorghum, the value of the water per acre-foot may average $30.00. If we further assume an increased yield of 10 gallons per minute from the well, then we would follow across the table opposite the 10 g.p.m. flow increase to the column directly under the $30.00 figure. There we find the amount $132.00. This is the expected monetary return if the well is pumped 100 days. Pumping 200 days would mean an increased productive value of $264.00.

FROM THE EDITOR'S INK WELL

The other day as I drove through Parmer County in search of a lake-pump installation to write a story about, I came upon an amazing irrigation operation.

When first noticing the two boys changing a set of syphon tubes in an open ditch near the road, nothing immediately seemed strange about the operation. However, after rapidly searching the field unsuccessfully for an irrigation well, the thought gradually came to mind, "What's going on here, anyway."

I could see from the road that the water in the open irrigation ditch was coming from the west; so I headed in that direction. When I arrived at the southwest corner of the farm, I discovered one of the most amazing of all the irrigation and conservation stories I've come across.

"Tailwater" that had escaped from the neighboring land into the road bar-ditches was being diverted onto this farm and the fellow working the land was irrigating with it. He didn't even own a well. He was simply growing irrigated crops by utilizing the water being wasted by others.

"Tailwater" from the bar-ditches was diverted to the farm through steel culverts that had been installed beneath the unpaved county road.

Further investigation showed that water could be diverted from the road either at the southwest corner of the farm or at the southeast corner.

Well, to make a long story short, I found out who worked the land and went to see him. He told me some very interesting facts about this unique operation.

He said that last year 120 acres of grain sorghum that was planted on this "dryland" farm produced a phenomenal 5,400 pounds of grain to the acre. Last year's cotton crop did not do nearly so well because hail damaged it; however, the year before, in 1958, cotton grown on the farm produced about 1¼ bales to the acre.

At this time, barley is planted on the farm and it is estimated that it will yield about 35 to 40 bushels of grain per acre. Not bad, huh, particularly for "dryland."

There is even more to the story—this farmer told me that his total outlay of cash was only $430.00 for culverts. He said that his average cost per year, for farming the 160-acre tract, runs about $2,000. To make a crop on a farm of this size, most irrigation farmers would have to spend closer to $5,000.

Under such circumstances, if "tailwater" can be used by this individual to produce 5,400 pounds of grain and 1¼ bales of cotton per acre, why then can't it be used even more efficiently by those from whose land the water escaped.

That's pretty much the story in a nut shell—a man using the good common sense that the Lord gave him, and it amounts to one of the best water conservation stories that I ever heard.

WELL DRILLING STATISTICS FOR MAY

During the month of May, 128 new wells were drilled and registered with the District office; 32 replacement wells were drilled; and 9 wells were drilled that were either dry or non-productive for other reasons. The County Committees issued 134 new permits.

The permits issued and wells completed in May are listed below by counties.

County	*Permits Issued*	*New Wells Drilled*	*Replacement Wells*	*Dry Holes Drilled*
Armstrong	0	0	0	0
Bailey	17	11	2	0
Castro	12	8	4	1
Cochran	5	10	0	0
Deaf Smith	8	8	12	0
Floyd	3	15	3	1
Hockley	9	25	0	3
Lamb	12	14	6	1
Lubbock	32	26	0	2
Lynn	10	4	0	1
Parmer	19	7	5	0
Potter	0	0	0	0
Randall	7	0	0	0
Totals	134	128	32	9

A LITTLE LIFE IS WORTH MORE THAN A LITTLE TIME, CLOSE THOSE ABANDONED WELLS!

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

Second Class Permit

THE Cross SECTION

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

Volume 7—No. 2 **"THERE IS NO SUBSTITUTE FOR WATER"** *July 1960*

RECHARGE WELL USED IN CONDUCTING FLOCCULATING CHEMICAL TEST

By W. L. BROADHURST

In February 1959, Earl Weaver installed a dual-purpose well (recharge and irrigation) in the Idalou community of eastern Lubbock County.

The well was constructed in the conventional manner with 16-inch slotted steel casing and a 6-inch deep-well turbine-type pump. Total depth of the well is 203 feet, static water level is 70 feet, and the yield is about 450 gallons a minute.

The well is near the high-water line of a playa lake. Water drains by gravity from the lake into the well and is delivered from the well to the farm through a system of underground concrete pipe.

A detailed contour map of the lake was prepared. From this map a depth-area curve and a depth-capacity curve were drawn. In other words, the curves show the acres under water and the acre-feet of water in storage for any given depth of water in the lake.

Several inches of rain fell on the farm between July 4 and July 13, 1960. When the lake reached its highest level, it contained 75 acre-feet of water and covered an area of 37.5 acres. The water was very muddy and only a moderate amount of artificial recharging was done. However, the water level in the lake declined rapidly indicating that natural recharge was occurring.

On July 15 the lake covered 20.4 acres and contained only 16 acre-feet of water. A liquid chemical was applied to the lake surface from an airplane in an attempt to flocculate the mud in the lake water. The air was exceptionally calm during the application and for more than 24 hours afterwards. A sample of water collected and agitated immediately after the chemical was added showed excellent flocculation. However, samples that were not agitated, and the lake proper, showed no signs of flocculation.

The intake valve to the well was opened on Saturday, July 16, and the well took water at the rate of 500 gallons a minute. On Monday, July 18, the well was still taking water at the rate of 345 gallons a minute. The total quantity recharged in 49 hours and 15 minutes was 1,153,000 or at the average rate of 390 gallons a minute.

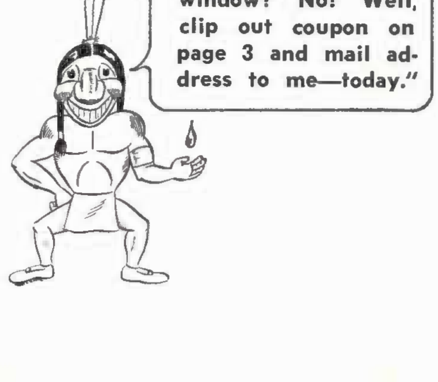
The intake valve was closed and the pump was started at 11 o'clock on July 18. It pumped muddy water and a large quantity of sand. Numerous samples were collected during the pumping period but analyses have not been made.

Visual inspections indicated that no appreciable benefits were obtained from use of the chemical. However, it is believed that the lack of agitation immediately after application was the reason for the failure.

Again, such tests tend to prove the importance of land management to store the rainfall in the soil or pump the lake water directly to the fields. Where neither can be done effectively, additional studies should be made to find the most practical and economical methods of salvaging the lake water because it is too valuable to lose through evaporation.

Picture at top shows airplane spraying the Weaver lake with a liquid flocculating chemical. The bottom picture was taken 4 days later after the lake water, except a small quantity that remained in the pit at the recharge well intake, was drained by gravity into the underground formations.

"CHIEF RUNNING WATER," SAYS—



SUMMER IRRIGATION OF COTTON PRESENTS PROVOKING PROBLEMS

There is one thing that perhaps all southern High Plains' farmers will agree upon—that is, that there is a wide variety of farming conditions this season. Most every crop condition imaginable can be seen somewhere in the area.

One question asked frequently by irrigators seems to be—"What are we going to do about irrigating and fertilizing cotton this summer."

This is a good question and one that is most difficult to answer; however, "The Cross Section" has asked three area specialists in this field to present some facts that should help the individual make up his own mind about what he needs to do.

Shelby Newman, Assistant Agronomist, in charge of irrigation research at the Lubbock Experiment Station; Dave Sherrill, Area Irrigation Specialist with the Texas Extension Service, Lubbock; and Harvey Walker, Assistant Agronomist in charge of fertilizer research for the Lubbock Experiment Station, are well versed in their fields and their opinions are respected by irrigators throughout the High Plains of Texas.

Late cotton not yet in the first-bloom stage of growth is using less than .2 inches of moisture per day as is shown in the accompanying water-use chart on page 4.

Past experience, according to both Mr. Newman and Mr. Sherrill, indicates that an irrigation before the appearance of first blooms in a majority of the plants generally delays maturity and decreases yields.

A practice that many farmers will use this season, according to Mr. Walker, is a sidedressing fertilizer application on late crops. Here the judgement of the individual farmer is extremely important. Mr. Walker states that the farmer is the one who knows when and where on his farm that crops in previous years have seemed to show plant food deficiency symptoms of color or slow growth. Disease, mechanical and hail damage, insects and other possible causes for slow crop growth have to be eliminated before fertilizer can be used successfully.

Sidedressing applications of fertilizer, where needed, do not cause excessive vegetative growth if irrigation water and insect control are properly applied. An extra or excess irrigation, just because fertilizer was applied, is not necessary and may upset the desired balance in vegetative and fruit growth.

Mr. Walker continues by saying that if no preplant fertilizer was used

(Continued on Page 4)

THE Cross SECTION

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Editor

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Committeemen meet first Monday night each month at 7:30 p. m., 1710 5th Avenue, Canyon. Texas.

Lake Water Represents

The large lake shown in the picture above is a typical High Plains wet-weather lake. It is estimated that there are approximately 35,000 such lakes in this area, and that in years of average rainfall they capture some 1¼ million acre-feet of runoff water. Most of the runoff water that collects in the many lakes is lost into the atmosphere through evaporation. In recent years, however, some of our more enterprising farmers have commenced to salvage water from the lakes and are using it to irrigate crops. Other pictures on these pages show pump installations designed to recover rainfall runoff from lakes. Individual testimony indicates large profits from such installations.

Hall Ferguson lives about 4 miles south of Lockney in Floyd County. He owns one farm that has a shallow lake on it. The lake when filled with water covers about 35 acres of land. Each year grain sorghum is planted in the lake. The picture above was made after the lake was pumped dry following the recent heavy rains. Mr. Ferguson had 35 acres of May-planted grain sorghum under about 10 inches of water before he started his 8-inch auger-type portable pump to pump the water off. He pumped the water into an underground concrete pipeline and ultimately to a field of grain sorghum growing on higher land. The grain sorghum in the lake, except perhaps 2 to 3 acres, was saved by getting the water off before it completely drowned the crop. Mr. Ferguson's home is near the lake and he says that because he is able to drain the lake he can control more effectively the mosquitoes that invariably breed in the lake water. Mr. Ferguson's investment in the pump and engine amount to about $1,200. He also has about 300 feet of 8-inch aluminum pipe that cost $1.15 per foot. He says that he believes that his total investment is returned every time he empties the lake. When irrigating with the lake water he runs as many as 120 two-inch tubes. Mr. Ferguson says that caution must be observed when starting the pump while pumping into standard underground concrete pipelines. He commences slowly and increases the speed of the pump gradually. By regulating initial water volume the danger of producing excessive air pressures in the line is minimized.

EDITOR
THE CROSS SECTION
1628-B 15th Street
Lubbock, Texas

Dear Sir:

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Name ____________________

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s Source Of Economic Wealth In High Plains

E. J. King lives east of the Becton community in northeast Lubbock County. He has a large lake located on his farm. He also has an 8-inch centrifugul pump mounted on a trailer chassis with which he pumps the water that collects in his lake. Last year Mr. King irrigated 75 acres of cotton and 120 acres of grain sorghum with lake water. This year, Mr. King's lake has again filled and almost covered his pump and engine, as shown in the above picture. He will probably be irrigating with lake water very soon if the rains do not continue. Mr. King has dug a pit near the pump so that all the lake water is channelled toward the pump. He did this so that the pump would not need to be moved each day during pumping in order to keep the suction pipe in the water.

Chester Mitchell resides 5 miles south and 1½ miles west of Lockney. There is a lake on one of his farms where he has 120 acres in cultivation. When it is full, the lake covers about 20-30 acres. The water is channelled toward a pit dug at one edge of the lake. Mr. Mitchell has a one-stage turbine pump mounted on a trailer chassis. The pump is powered by an automobile engine that operates on butane. When the lake fills with water, the pump is moved to the edge of the pit and the suction hose dropped into the water. The lake water is pumped into an underground concrete pipeline only a few feet from the pit and from there it can be channelled to any point on the farm for use. Mr. Mitchell says that there are many reasons why pumping lake water is a good practice. Among these are, (1) Mosquitoes are more readily controlled. (2) Storage is made available for additional rainfall runoff. (3) Grass that grows in the lake is made available to livestock and (4) Lake water can be used for irrigation practically free. The pump is normally operated to produce about 1,500-1,800 gallons per minute—Mr. Mitchell can run about 100 2-inch syphon tubes. The animal life that abounds in the lake water is pumped to the fields. Mr. Mitchell refers to it as "frogalizer." Mr. Mitchell says that the real advantage in pumping lake water is being able to add supplemental capacity to the farm's irrigation wells. With this extra "boost" he can water his crops faster and actually produce more cotton and grain than he could otherwise.

E. W. McFarling, who farms 5 miles west of downtown Lubbock, operates a combination recharge and production well. He has dug a large pit near the well at the low side of a wet-weather lake so water that collects in the lake will drain toward the pit. The recent rains filled the pit and lake, backing water up over about 5 acres of grain sorghum that was planted in early May. When the rains subsided, Mr. McFarling commenced to recharge the water into his combination well. In 5 days and nights all the water standing on the grain sorghum was gone and only a small amount of water still remained in the pit. The picture above shows Mr. McFarling surveying the grain sorghum that would probably have been lost had it not been for the recharge well. He also salvaged a considerable amount of water that largely would have been lost into the atmosphere through evaporation.

The lake and pump shown above are located on land owned by W. Leo Cooper. Mr. Cooper's farm is situated 5 miles north of Lockney in Floyd County. The pump on the right is a regular irrigation well while the one on the left is only used for pumping lake water. Both pumps are connected to an underground concrete pipeline. The lake pump is only about 10 feet long and has one 12-inch bowl. The water that collects in the large lake (about 65 acres under water at the time the picture was made) is pumped to cropland through the pipeline that spans beneath a section of land. Mr. Cooper usually starts pumping just as soon as he can after rains fill the lake so the loss to evaporation is minimized. Presently he plans to pump the water on wheat stubble land until his growing cotton and grain sorghum need to be irrigated. Last year, Mr. Cooper watered 25 acres of cotton, 65 acres of grain sorghum and 25 acres of soybeans that could not have been irrigated with water from his weakening wells. The yields from these acres would have been sharply reduced had the lake water not been made available. Mr. Cooper states that the soil does not compact so readily where the lake water is used. He says that the lake pump installation more than pays for itself each time the lake is emptied.

C. W. Jones, shown above with Floyd County Agricultural Agent Cecil Lewis, looks over a large lake that has filled with water from recent rains. Mr. Jones lives about 3 miles east of Floydada. The lake covers about 30-35 acres of land. Mr. Jones has a portable centrifugal pump. Soon he will locate the pump near the lake's edge and irrigate grain sorghum with the water. The pump and engine cost approximately $600. Mr. Jones bought 1,500 feet of 6-inch aluminum pipe at a cost of $1 per foot. He pumps the lake water to the crops through the aluminum pipe. Mr. Jones states that last year he pumped enough lake water from three lakes on his farms with just the one pump to water a 33-acre tract of cotton twice and a 55-acre tract of grain sorghum and another 40-acre tract of cotton once. Because he does not have enough well water to irrigate grain sorghum, he estimates that by using lake water he was able to increase his grain yield from a dryland average of 1,400 pounds per acre to 3,000 pounds per acre. Figuring grain at $1.50 per hundred pounds, this increase alone would gross $1,320 in additional income. Mr. Jones says that he has used his lake pump four of the six years he has owned it.

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Cotton Irrigation—

(Continued from Page 1)

on the sandy soils, the application of an excessively heavy amount "to make up for the lost time" could not be encouraged. On these soils, nitrogen should be limited to 60 pounds with 40 pounds of phosphorus for a sidedressing application, especially on cotton that is late. Forty pounds of nitrogen for the heavy soils or the northern part of the area is a practical limit for late sidedressing of cotton. Thirty to 40 pounds of phosphorus per acre may be tried in the sidedressing program on the heavy soils, although experimental data have not shown consistent benefits from phosphorus applications.

Recent heavy rainfall has brought soils to "field capacity" to a depth of 4 to 6 feet, or through the effective root zone; consequently, cotton that is in late square to early bloom stages of growth will probably not require an irrigation before the first week in August, according to Mr. Newman and Mr. Sherrill. Excessive moisture in the top two feet of soil has encouraged lush vegetative growth thereby increasing daily moisture requirements. Some wilting due to these circumstances may occur during the hot part of the day; however, the farmer should not be rushed into an untimely irrigation because this fact alone is evident.

On the other hand, Mr. Newman made checks of moisture conditions on July 18th at experimental locations in areas of sandy, medium and heavy soils. His checks indicated that in all cases moisture levels were at "field capacity" to a depth of 4 feet, which was the maximum depth observed. As is indicated on the "Water-use chart" daily moisture consumption during square and pre-bloom stages of growth is approximately .2 inches per day. According to the Soil Conservation Service, the three major soil types in the cotton producing area range in moisture-holding capacity from 1.5 to 2.4 inches per foot of soil.

Assuming that the soil holds 2 inches of moisture per foot of depth and that cotton uses moisture to a depth of 4 feet, then we would have 8 inches of moisture available for use by the cotton plant. If the plant is using .2 inches of moisture per day and if an irrigation will be required before 50 percent of the total 8 inches is depleted, we should then plan to commence irrigating in 14 to 20 days after July 18. Based on these assumptions, the first irrigation would be required the first week in August.

Mr. Newman says that assuming we receive only an average amount of rainfall during the remaining part of the growing season, farmers should be able to revert back to normal irrigation frequency following the first summer irrigation.

Mr. Sherrill states that because we probably have had an excessive amount of vegetative growth in early cotton, careful plans for last irrigations should adhere strictly to recommended cut-off dates, which is on or before August 25.

For the farmer who has only enough water for one summer irrigation, Mr. Newman states that research has shown that water applied during peak-bloom stages of growth, which generally comes 20-30 days after initial blooms appear, is the most efficient practice to follow.

If a farmer knows how much water his wells yield, the moisture-holding capacity of his soil, and if he observes the daily-use requirements of moisture by the crops then each of our experts conclude that this information together with a knowledge of the individual characteristics of the farm, an irrigator should be equipped to use his available water wisely for producing an efficient cotton crop.

To sum it all up, Mr. Walker states that even though helpful suggestions and guides can be obtained, the decision to act belongs to the producer who will eventually harvest the results of his decisions.

Dave Sherrill, Shelby Newman and Harvey Walker are shown above, left to right respectively, as they inspect a field of cotton growing in the southern High Plains. Irrigation and fertilizer applications this summer will require closer scrutiny than usual because of recent heavy rains.

Rate of Water Use in Relation to Plant Development

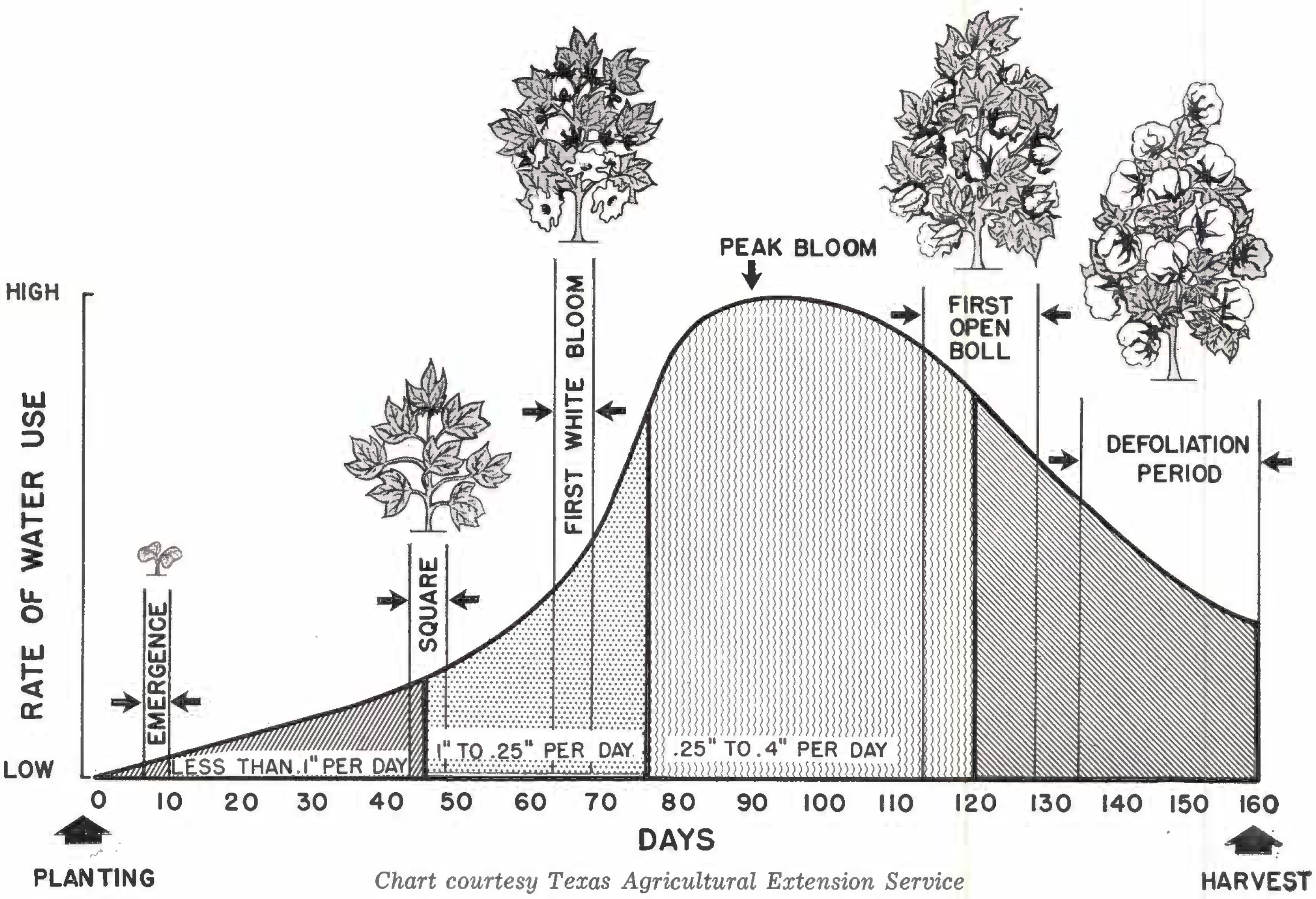

Chart courtesy Texas Agricultural Extension Service

High Plains Underground Water
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1628 Fifteenth Street
Lubbock, Texas

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THE Cross SECTION

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

Volume 7—No. 3 "THERE IS NO SUBSTITUTE FOR WATER" August 1960

"WATER FOR TEXAS" CONFERENCE WILL BE HELD AT A & M COLLEGE

The sixth annual "Water for Texas" conference will be held September 7-9 at Texas A & M College in the Memorial Student Center.

This year's theme is "Meeting Future Water Needs." The program is divided into three sessions, beginning at 9:30 a. m. September 8 and ending at 11:45 a. m. September 9.

Session I

Estimating Future Requirements

9:30-10:00 A.M.—Present and Potential Water Requirements for the State of Texas—Mr. John J. Vandertulip, Chief Engineer, Board of Water Engineers.

10:00-10:30 A.M.—Municipal and Industrial Water Requirements—Mr. Uel Stephens, Director, Fort Worth Water Department.

10:45-11:15 A.M. — Agricultural Requirements for Water—Mr. W. F. Hughes, Department of Agricultural Economics and Sociology, A. & M. College of Texas.

11:15-11:45 A.M. — Recreational Water Requirements—Mr. Fred B. Lifton, Legislative Coordinator, Outboard Boating Club of America.

12:15-1:30 P.M.—Luncheon—Dr. R. E. Patterson, Chairman. Invocation—Reverend William H. Andrews, First Baptist Church of Bryan. Speaker—Dr. A. L. Miller, Director, Office of Saline Water, U. S. Department of the Interior, Water for the Future.

Session II

Providing for the Future

2:00-2:30 P.M.—Storage of Water in Reservoirs—Mr. Forrest O. Swiggart, Chief, Water Control Section, Southwestern Division of the Corps of Engineers.

2:30-3:00 P.M. — Chemical Pollution of Groundwater—Mr. Ed. L. Reed, Consulting Hydrologist.

3:15-3:45 P.M. — Bays and Estuaries —Dr. Howard T. Odum, Director, Institute of Marine Science, University of Texas.

3:45-4:15 P.M. — Conservation as a Means of Providing Water for the Future—Dr. William O. Trogdon, Head, Department of Agronomy, A. & M. College of Texas.

4:15-4:45 P.M.—Evaporation Loss Reduction—Dr. W. D. Harris, Chemical Engineering Department, A. & M. College of Texas.

4:45-5:15 P.M.—How Can We Meet Our Water Needs? — Mr. C. R. Marks, Engineer, Lockwood, Andrews and Newman.

Friday, September 9, 1960

Session III

Resolving Water Conflicts

9:00-9:30 A.M.—The Edwards Underground Water District — Mr. McDonald D. Weinert, Engineer and General Manager, Edwards Underground Water District.

9:30-10:00 A.M.—Resolving Conflicts in Recreational Use of Water—Mr. Louis S. Clapper, Acting Conservation Director, National Wildlife Federation, Washington, D. C.

10:00-10:30 A.M.—Resolving Conflicts Apparent to the Board of Water Engineers—Mr. Durwood Manford, Chairman, Board of Water Engineers.

10:45-11:15 A.M.—Resolving Conflicts Apparent to the U. S. Study Commission-Texas—Mr. Charles D. Curran, U. S. Study Commission, Texas.

11:15-11:45 A.M. — Resolving Water Conflicts in General—Judge J. E. Sturrock, Texas Water Conservation Association.

The registration fee for the Conference is $5. Advance registration and hotel or motel accommodations may be made by writing Richard G. Bader, Chairman 1960 Water for Texas Conference, Department of Oceanography and Meteorology, A. & M. College of Texas, College Station, Texas.

WATERGRAM

In the near future, soluble chemicals in irrigation water will regulate plant growth, exterminate insects, destroy plant fungi, kill weeds, and suppress plant diseases, according to Dragon Engineering Co., Oakland, Calif..—Water Newsletter.

PUMP EFFICIENCY IMPROVED BY MECHANICAL ADJUSTMENT

By WILLIAM F. SCHWIESOW, Asst. Professor
Agricultural Engineering Dept., Texas Tech College, Lubbock, Texas

Have you ever thought about how efficiently your pump is operating, or whether there is anything that an individual can do to improve pump efficiency?

In a recent study at Texas Technological College, the flow rate of one well was determined to be extremely low. Both the flow rate of the well and the drawdown were less than measurements recorded in previous years of production. This raised the question of how to improve the efficiency of the unit and thereby obtain a greater supply of water.

Mr. Schwiesow is shown above as he adjusts the impellers on one of the irrigation wells on the Texas Tech farms.

It was determined that an organic growth had occurred in the well. This prompted the conclusion that a chemical treatment might be the solution to the problem. The chemical treatment increased the flow rate of the well from 49 to 57 G.P.M., or by 8 gallons. However, this increased total amount was not sufficient to equal the production capacity obtained from the well only two years ago.

The next step was to determine if anything further could be done that might increase the flow rate of the well. It was decided that the pump's impellers might be out of adjustment. The distributor of the pump was contacted and specifications were obtained for properly checking the adjustment of the pump. The impellers of the pump were determined to be of a semi-enclosed type; therefore, it was possible to adjust the impellers in hopes of obtaining an increase in pump capacity. The adjustment of the impellers was made in accordance with the pump manufacturer's recommendation. The well was then pumped for a sufficient length of time to establish a stable water pumping level. Measurements of flow from the well were again recorded and were found to have increased about 43 gallons per minute.

About 45 minutes was required to make the adjustment after determining from the pump company what the proper impeller adjustment should be. Considering the value of the agricultural product that will be produced with this additional 43 gallons of water, there is no question but that the slight mechanical adjustment will pay for itself many times even in one irrigation season.

Adjusting pump impellers is not something that should be done on a hit or miss basis, and certainly it should not be done by a person without some experience in the principles of pump operation. Before any adjustment of the pump is made, the operator should contact the manufacturer of the pump to determine the proper procedure to follow. All reliable pump manufacturers will have this information available. There is no standard adjustment or rule of thumb that can be applied to all pumps.

DRILLING STATISTICS FOR JUNE AND JULY

During the month of June, 91 new wells were drilled and registered with the District office; 16 replacement wells were drilled; and 10 wells were drilled that were either dry or non-productive for other reasons. The County Committees issued 75 new drilling permits. In July, 59 new wells were drilled; 9 replacement wells were drilled; and 1 well was drilled that was considered to be dry. The County Committees issued 50 permits. The permits issued and wells completed are listed below by counties.

County	*Permits Issued*		*New Wells Drilled*		*Replacement Wells*		*Dry Holes Drilled*	
	June	*July*	*June*	*July*	*June*	*July*	*June*	*July*
Armstrong	0	0	0	0	0	0	0	0
Bailey	0	6	0	3	0	1	0	1
Castro	14	4	8	7	4	1	0	0
Cochran	6	0	4	0	0	0	1	0
Deaf Smith	11	4	8	4	5	0	0	0
Floyd	3	6	5	2	0	1	0	0
Hockley	13	4	18	8	0	0	1	0
Lamb	2	8	13	8	2	0	2	0
Lubbock	18	5	19	15	3	1	4	0
Lynn	5	0	8	2	0	0	1	0
Parmer	1	8	6	7	2	4	0	0
Potter	0	0	0	0	0	0	0	0
Randall	2	5	2	3	0	1	1	0
Totals	75	50	91	59	16	9	10	1

THE Cross SECTION

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

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Editor

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TEXAS AGRICULTURAL EXTENSION SERVICE COMPILES 1960 IRRIGATION SURVEY

The High Plains Irrigation Survey for June 1960 has been published and released by D. W. Sherrill, Area Irrigation Specialist, Texas Agricultural Extension Service, Lubbock, Texas.

This survey is a compilation of estimates by the County Agricultural Agents in the 42 High Plains counties.

The June 1960 survey reveals that during the past year there has been an increase of only 291 irrigation wells. This is fewer than the actual increase, but because of revised estimates, overall results do not reflect a true picture of well development during the past year.

During the last 12 months, an additional 1,113 miles of underground pipe was installed in the 42-county area, bringing the total to 7,517 miles.

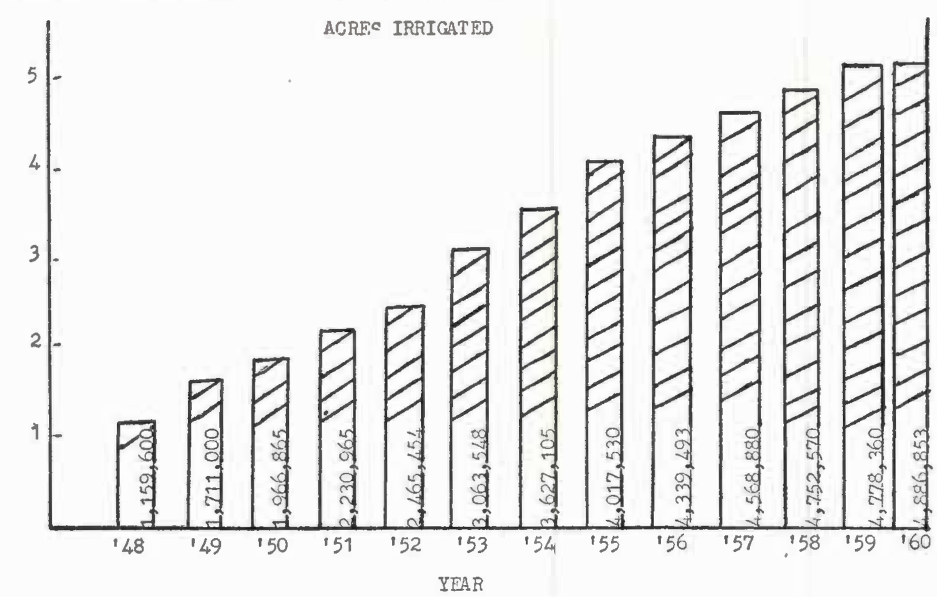
Total number of irrigated acres increased by 108,493 which brought the total to 4,886,853. The survey shows an increase in the number of recharge wells of 46. These new wells increase the total to 170.

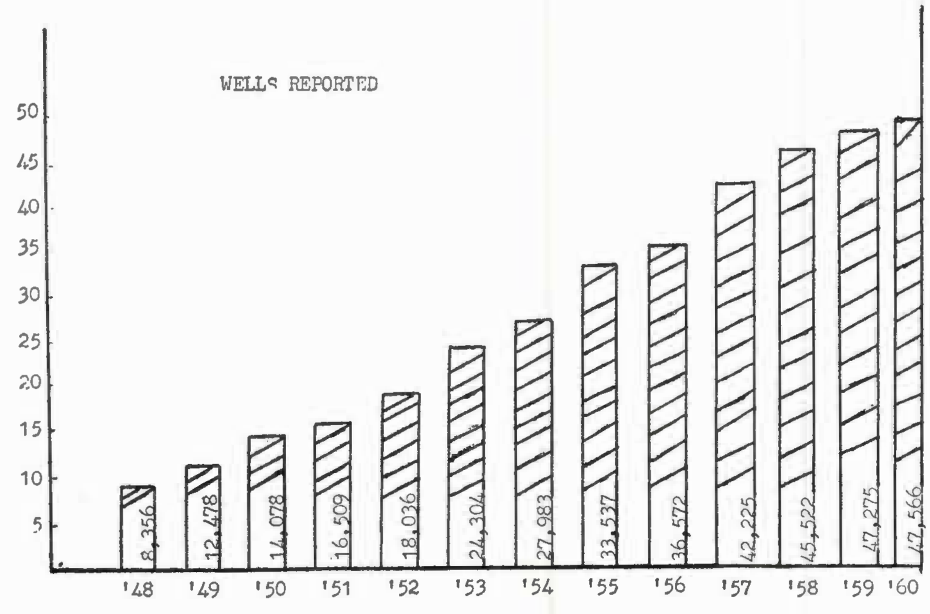
It is interesting to note that the 13 counties within the High Plains Water District have two-thirds of the total number of irrigation wells shown in the survey for the entire 42-county area. Even though the 13 counties in the Water District have only two-thirds of the wells they have more than 87 percent of the underground pipe.

Below is shown a table that breaks the survey figures down by Water District counties. The two bar graphs below show the irrigation development for the entire area during the past 13 years.

COUNTY	Irrigation Wells	Total Acres Irrigated	Re-charge Wells	Mi. of Under-ground Pipe	Cotton	Grain Sorghum	Wheat	Vegetables	Others
Armstrong	160	26,050		25	300	19,850	4,000		2,000
Bailey	1,650	180,000	1	180	80,000	70,000	5,000	2,300	19,400
Castro	3,910	407,500	9	505	58,640	200,000	81,000	2,800	65,060
Cochran	1,160	71,000		160	5,500	15,000	2,000	95	
Deaf Smith	2,300	365,000		230	11,632	125,500	80,000	21,000	51,868
Floyd	2,695	305,500	29	357	82,735	132,717	40,000	1,580	48,218
Hockley	4,725	250,000	5	500	165,000	77,950	150	150	6,850
Lamb	5,110	370,000	8	1021	153,000	120,000	4,000	1,100	81,600
Lubbock	5,302	350,000	18	1380	200,000	136,200	1,000	1,250	11,550
Lynn	1,500	80,000	8	150	75,000	3,000		100	1,900
Parmer	2,425	400,000	5	600	49,070	230,000	80,000	2,135	40,243
Potter	34	14,500		12	38	7,500	5,000		1,025
Randall	765	100,000		65	1,500	65,000	20,000		13,500
Total	31,736	2,919,550*	83	5,185	882,415	1,202,717	322,150	32,510	343,214

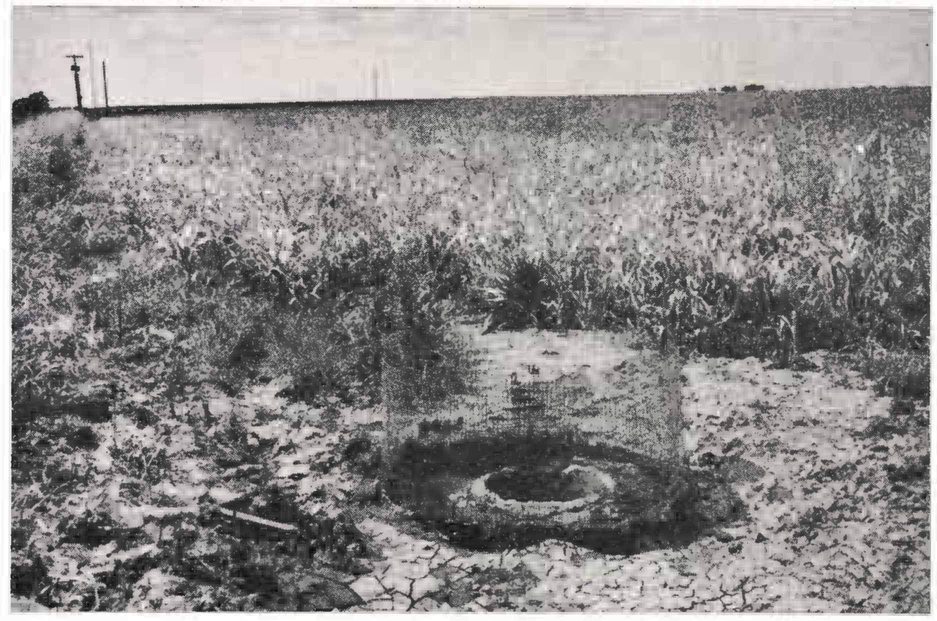
*Difference in acres irrigated and total in acres of various crops accounted for by soil bank acreage and acres that are double cropped.





PUMP INSTALLATION RECLAIMS IRRIGATION "TAILWATER"

Mr. Belt checks the automatic float control that turns his recirculating pump on and off. When the sump fills with "tailwater" the pump starts automatically, returning the water to the high side of the field where it can again be used.



The picture above shows the intake of the recirculating system. It is located at the low end of the field so that all "tailwater" flows to it by gravity. The wire around the intake keeps out trash and stalks.

J. R. Belt, Jr., Floyd County farmer and Vice President of the Board of Directors of the High Plains Underground Water Conservation District, has recently installed a pump on one tract of his land for the purpose of recirculating irrigation "tailwater."

Until the pump was installed, it was difficult to irrigate the land adequately without some waste because the surface of the land slopes sharply near the end of the rows. However, since installing the recirculating pump, it is now possible to run irrigation water down the slope long enough to facilitate proper penetration into the soil.

A permanent border is constructed at the low end of the field. It is used to retain "tailwater" on the farm. When water runs through the field to the border it then gravity feeds along the surface to the intake of the recirculating pump system.

The pump itself is located about 200 yards from the intake which is situated at the lowest point on the farm. The intake was made by placing a section of concrete pipe in the ground in a vertical position. The pipe section is 3 feet in diameter and 4 feet long. A standard 12-inch concrete pipeline was then laid beneath the surface to connect the intake with the recirculating pump. The pipeline is gradually sloped toward the pump so water entering the intake will flow by gravity to the pump. It was necessary to locate the pump away from the intake to keep the pump on high ground and out of water.

The sump, in which the pump is installed, is constructed in the same manner as the intake except that, instead of using only one length of 3 foot by 4 foot concrete pipe, three pieces were used. When joined together vertically they made a sump twelve feet deep.

The pump consists of a one-stage 10-inch bowl assembly and 10 feet of 6-inch column pipe. It is powered by a 5-horsepower electric motor that starts and stops automatically through the use of a switch controlled by a float in the sump. When the sump fills, the float cuts the motor on—when the pump empties the sump, the float cuts the motor off.

The discharge of the pump is connected to a steel riser that in turn is connected to 8-inch plastic pipe buried beneath the land surface. The plastic pipeline extends approximately 600 yards to one of the two irrigation wells on the farm. There it joins a previously-installed concrete pipeline system.

Irrigation water from the two wells is distributed to the crop through the older underground pipeline and surface gated-pipe. The recirculating pump coming on and going off does not interfere in any way with the normal irrigation process, and no labor is required to operate it because of the automatic controls.

Mr. Belt states that the overall cost of installing the recirculating pump system was approximately $2500. However, he says that under ordinary circumstances this cost could be reduced by decreasing the size of the plastic pipe. He installed pipe of this size because he has future plans for utilizing it that have nothing to do with the recirculating pump.

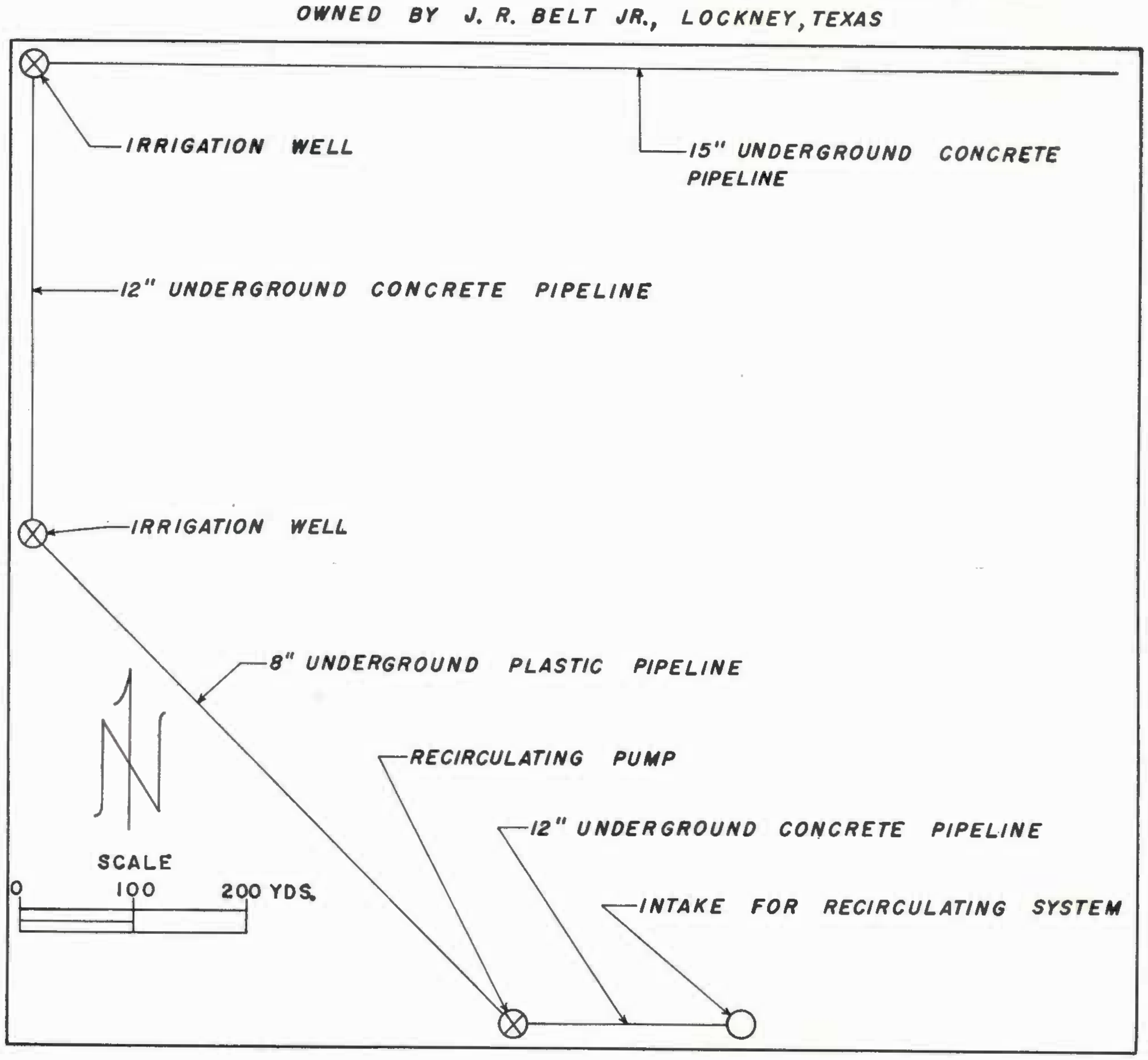
Mr. Belt has only used the recirculating system on one occasion so he is not fully aware of its benefits; however, he states that he can now run irrigation water through his field until he has the desired moisture penetration without fear of wasting water. Also, he states that now he does not need to tie up a man's time in maintaining the border at the bottom of the field because water does not build up on it.

The High Plains Water District has installed a flow-meter on the discharge of the recirculating pump to calculate the amount of "tailwater" being pumped.

IRRIGATION AND RECIRCULATING SYSTEM

W. 180-ACRES OF N½, SECTION 48, BLOCK D-6, FLOYD COUNTY, TEXAS

OWNED BY J. R. BELT JR., LOCKNEY, TEXAS



WINTER WHEAT

WATER - USE EFFICIENCY DEPENDS ON MANAGEMENT AND FERTILIZER

The time to plant winter wheat is upon us. No doubt many irrigation farmers have already planted their wheat while others will be planting within the next few weeks. Two experts in the field of irrigated wheat have been interviewed by "The Cross Section" in order that their ideas concerning seed varieties, fertilizer levels, irrigation and management practices might be made available to our readers. Our experts are Dr. K. N. Porter, Agronomist with the Texas Experiment Station, and Willis Sletten, Agricultural Engineer with the Soil and Water Conservation Research Branch of the Department of Agriculture. Both are stationed at the Southwestern Great Plains Experiment Station at Bushland, in Potter County.

Our experts agree that wheat should have an application of nitrogen fertilizer either before planting or as a top-dressing in the Spring. Fertilizer applied in the Spring should not be put on too late. According to results of research conducted by Dr. Alex Pope on the experiment station at Bushland and off the station in 12 High Plains' counties, on wheat that is to be grazed, at least part of the total amount of fertilizer should be applied before planting to stimulate vegetative growth and increase the amount of forage.

Dr. Pope's work also indicated that grazing wheat as late as March 15 had no detrimental effects on grain yield providing adequate nitrogen was applied. On unfertilized test plots grain yields were reduced sharply even when grazing was terminated by March 1.

A small percentage of our southern High Plains' wheat land is sandy to medium-textured soil. According to Dr. Pope, on these soils applications of phosphorus along with nitrogen fertilizer have produced increased grain yields.

Dr. Porter states that the rate of seeding wheat is not particularly significant under heavy irrigation. Grain yields are not appreciably changed by slightly under-seeding or over-seeding. He does recommend a dry-land planting rate in instances where irrigation water is limited. Dr. Porter also recommends an early-maturing seed variety if planting is to take place October 15 or later. Probably early-planted wheat is more susceptible to root rot and wheat streak mosaic.

Dr. Porter's research studies have also indicated that Tascosa and Concho seed varieties should yield well under irrigation in this area, and that Tascosa is probably the least susceptible to lodging (falling).

Many seed varieties are acceptable for planting in this area; however Tascosa, Concho, Crockett, Bison, and Westar are recommended.

Mr. Sletten states that the pre-plant irrigation alone is probably the most economical from the standpoint of grain produced per inch of water applied. He states that in cases where irrigation water is limited, or can be used to better advantage on other crops in the Spring, a pre-plant irrigation would probably sustain the wheat until a period during the Spring when we normally can expect rainfall that will supplement the pre-plant irrigation. On the other hand, if only limited irrigation water is available, and if good conservation of moisture from summer rains is practiced, then perhaps it might work better to irrigate in the Spring when the moisture requirements increase rather than at pre-plant time.

About 25-30 inches of total moisture are necessary to produce a wheat crop that will yield 50 bushels of grain per acre. Mr. Sletten states that in order to obtain the maximum efficiency from irrigation water, nitrogen fertilizer must be utilized. If adequate moisture can be made available to wheat, either by rainfall or irrigation, nitrogen should be applied at a rate of approximately 120 pounds per acre. This fertilizer rate results in high grain yields and minimizes lodging. The accompanying pictures show the effects of fertilizer on wheat. At left in the panel, the wheat shown received no fertilizer but a relatively high moisture treatment. The result of this treatment is apparent. The center picture shows wheat that received 120 pounds of nitrogen per acre and the same amount of water that the plot on the left received. Here again, the result of the treatment is apparent. Grain yield per inch of water applied was increased considerably over the plot that received no fertilizer. The last picture shows a wheat plot that received 180 pounds of nitrogen per acre and the same amount of moisture that was applied to the previous two plots. Here you can see that severe lodging resulted. Mr. Sletten explains that lodging occurred in this instance due to the combination of relatively heavy applications of moisture and fertilizer.

To add the right amount of nitrogen to wheat, it is necessary to know the cropping history and past yields of the particular farm and use this information together with analyses of soil samples to determine soil needs.

After harvest, all straw should be decomposed as fast as is possible, according to Dr. Porter, to aid in the control of various root rots. Nitrogen fertilizer will speed up the natural decomposition process.

Each of the wheat plots shown above received relatively heavy applications of irrigation water. They each received like amounts of moisture. However, each received a different nitrogen fertilizer treatment. The plot on the left received no fertilizer. It is readily evident that the wheat grown on this test plot did not develop as it would have had nitrogen been added. Grain yield per inch of total water applied was low. The picture in the center shows wheat that receved the identical moisture treatment as did the plot on the left. It also received 120 pounds of nitrogen per acre. This wheat test showed good water-use efficiency. The picture at right shows wheat that recieved the same amount of water that was applied to the first two plots. This plot also received 180 pounds of nitrogen per acre. The wheat grown on the plot lodged severely. Lodging was probably the result of the combination of relatively high levels of fertilizer and moisture.

—(Pictures by Willis Sletten)

A LITTLE LIFE IS WORTH MORE THAN A LITTLE TIME, CLOSE THOSE ABANDONED WELLS!

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

Second Class Permit

THE Cross SECTION

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

Volume 7—No. 4 "THERE IS NO SUBSTITUTE FOR WATER" September 1960

HEREFORD SENIOR AGRICULTURE CLASS SHOWS WINNING FAIR EXHIBIT

The senior vocational agriculture class of the Hereford High School in Hereford was awarded first place in the agricultural exhibits of the Tri-States Fair recently held in Amarillo.

The winning exhibit depicted a water conservation theme by showing several basic conservation practices.

Mr. Jess L. Robinson, teacher of the Hereford class, revealed that his boys picked the theme of the exhibit and did most of the work in preparing it. To pick the subject, his class members suggested various exhibit topics and then commenced to boil down the list. Finally only the subject of water conservation remained.

Bruce Fink, High Plains Water District geologist at Hereford, assisted the class by furnishing literature and technical advice.

The members of class VA-4 and their instructors, Mr. Robinson and Wade Thompson, are to be congratulated for the excellent contribution that they have made in water conservation and the honor they have brought to their community.

Members of the class are: Roy Campbell, Jimmy Collier, Don Dutton, H. S. Fuller, Joe Frank Huckert, Jerry Johnson, Lee Kimbell, Lee Myers, Bill Noland, Donald Paetzold, Don Scott, Tommy Sparkman, Charles Vasek, Leon Vogler, and Ken Walser.

Bulletin Shows 1959-60 Water Levels

The State Board of Water Engineers has published the 1959-1960 water-level measurements made in observation wells in 23 southern High Plains counties.

These measurements are compiled in Bulletin 6011 entitled, "Water Levels in Observation Wells, Southern High Plains, Texas, 1959 and 1960," by Jack Stearman, Geologist, under the direction of L. G. McMillion, Chief of Ground Water Division, State Board of Water Engineers.

Water level measurements made in 822 wells are presented in the bulletin. Of this number, approximately 430 wells are located within the bounds of the High Plains Underground Water Conservation District.

A table showing the water-level measurements for 1959 and 1960 together with the annual static fluctuations accompanies an observation well location map for each of the 23 counties.

The water-level measurements contained in the bulletin were made cooperatively by the State Board of Water Engineers, U. S. Geological Survey, High Plains Underground Water Conservation District and the Panhandle Ground Water Conservation District.

Free copies of Bulletin 6011 can be obtained from the offices of the High Plains Water District in Lubbock or Hereford, or by contacting the State Board of Water Engineers, P. O. Box 2311, Capitol Station, Austin, Texas.

Above is pictured the water conservation exhibit prepared by the Vocational Agriculture class VA-4 of Hereford. The exhibit was shown at the Tri-States Fair held recently in Amarillo, where it won a first-place ribbon.

DRILLING STATISTICS FOR AUGUST

During the month of August, 47 new wells were drilled and registered with the District office; 23 replacement wells were drilled; and 5 wells were drilled that were either dry or non-productive for other reasons. The County Committees issued 56 new drilling permits. The permits issued and wells completed are listed below by counties.

County	Permits Issued	New Wells Drilled	Replacement Wells	Dry Holes Drilled
Armstrong	0	0	0	0
Bailey	1	2	5	0
Castro	2	3	3	1
Cochran	0	2	0	0
Deaf Smith	6	5	1	0
Floyd	5	2	1	0
Hockley	5	1	0	0
Lamb	2	1	0	0
Lubbock	17	15	4	2
Lynn	3	4	0	2
Parmer	10	5	8	0
Potter	0	0	0	0
Randall	5	7	1	0
Totals	56	47	23	5

WATER FOR THE FUTURE

Remarks by A. L. Miller, M. D., Director of the Office of Saline Water, Department of the Interior, at the 1960 Water For Texas Conference, A & M College of Texas, College Station, Texas, September 8, 1960.

It is a pleasure to be in Texas to talk about the intriguing subject of water. Texas has felt the pinch of water shortages many times, but Texas is not unique in that regard. In 1957 more than a thousand towns in the United States were forced to restrict the use of water simply because supplies had dwindled to a point where there wasn't enough to meet all the demands. Water problems have plagued nations of the world since the beginning of civilization. Even though water is the most common commodity, so important and so vital that it has effected the rise and fall of more nations than all the wars of recorded history.

While Texas has suffered recurring droughts, especially in the western section of the State, it is ironic that that area overlies an actual ocean of water, but unfortunately that water contains so much dissolved salt that it is useless for human consumption or agriculture. The Gulf Coast has endured many water shortages while it has had access to unlimited amounts of presently unusable sea water.

One of the most serious political and social problems of the next 20 years may be the universal concern of how to get good fresh water to meet our growing demands. Great dams are being built to create vast new reservoirs. Efforts are being made to control pollution, conservation measures are being stressed, and there are experiments under way to increase the natural rainfall.

History may yet repeat itself! A few nights ago, I was reading about Marco Polo and his travels to Italy and Peking in 1254 through 1324. At that time, between Italy and Peking, China, there were many rich areas with gardens and farm-lands. Some of these areas are deserts today. They are deserts because the water upon which their richness depended has disappeared. Without water no community can grow.

It is estimated that the (total) average fresh water supply that is usable in the U. S. is about 515 billion gallons per day. We are now using about 290 billion gallons a day for all purposes, or about 55 percent of the total water available. This rate of use, as you well know, has created water problems in varying degrees of intensity in several areas of the United States. Picture, if you will, the problems we will face in 1980, which is just 20 years hence and 20 years is a relatively short span of time in the water development picture, for by that time it is estimated we will be using about 600 billion gallons per day. It doesn't take much of a mathematician to figure out that we will be short about 85 billion gallons of water unless totally new sources of supply can be developed. The most likely sources, obviously, are the great oceans and vast reserves of brackish inland water.

Converting sea and brackish water

(Continued on Page 4)

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Precinct 2
(COCHRAN, HOCKLEY AND LAMB COUNTIES)
Roy Hickman .... Morton, Texas

Precinct 3
(BAILEY, CASTRO AND PARMER COUNTIES)
John Gammon, Sec.-Treas. .... Rt. 1, Friona, Texas

Precinct 4
(ARMSTRONG, DEAF SMITH, POTTER AND RANDALL COUNTIES)
T. L. Sparkman, Jr. .... Rt. 1, Hereford, Texas

Precinct 5
(FLOYD COUNTY)
J. R. Belt, Jr., Vice.-Pres. .... Lockney, Texas

District Office, Lubbock

Tom McFarland .... General Manager
W. L. Broadhurst .... Chief Hydrologist
Allan White .... Publicity-Public Relations
Y. F. Snodgrass .... Field Representative
Donald L. Reddell .... Junior Engineer
Mrs. M. McVay .... Secretary-Bookkeeper
Mrs. Jean Lancaster .... Secretary
Wynona Reynolds .... Secretary

Field Office, Hereford

Bruce E. Fink .... Junior Geologist
Mrs. Mattie K. Robinson .... Secretary

COUNTY COMMITTEEMEN

Armstrong County

Robert Adams .... Wayside, Texas
Dewitt McGehee .... Wayside, Texas
Cordell Mahler .... Wayside, Texas
Willie Modisette .... Wayside, Texas
John Patterson .... Rt. 1, Happy, Texas

Bailey County

Billie Downing
Farm Bureau Office, Muleshoe

Robert Blackwood .... Rt. 1, Muleshoe, Texas
Doyle Davis .... Maple, Texas
R. E. Ethridge .... Rt. 5, Muleshoe, Texas
Ross Goodwin .... Rt. 4, Muleshoe, Texas
Leldon Phillips .... Rt. 2, Muleshoe, Texas
Committeemen meet fourth Friday of each month at 2:30 p. m., Farm Bureau Office, Muleshoe, Texas.

Castro County

Eugene Ivey, Dimmitt

Fred Annen .... Dimmitt, Texas
George Bradford .... Dimmitt, Texas
E. H. Youts .... Dimmitt, Texas
Tom Lewis .... Rt. 4, Dimmitt, Texas
E. E. Foster .... Box 193, Hart, Texas
Committeemen meet on the last Saturday of each month at 10:00 a. m., Farm Bureau Office, Dimmitt, Texas.

Cochran County

W. M. Butler, Jr., Western Abstract Co., Morton

Earl Crum .... Rt. 2, Morton, Texas
D. A. Ramsey .... Star Rt. 2, Morton, Texas
Pat Hatcher .... Morton, Texas
Lloyd Miller .... Box 246, Morton, Texas
L. L. Taylor .... Rt. 1, Morton, Texas

Deaf Smith County

Mrs. Mattie K. Robinson
317 N. Sampson, Hereford

Raymond Higginbotham .. Rt. 1, Hereford, Texas
Jack Higgins .... Rt. 1, Wildorado, Texas
Earl Holt .... Rt. 3, Hereford, Texas
Clinton Jackson .... Rt. 5, Hereford, Texas
L. E. Ballard .... 120 Beach St., Hereford, Texas

Floyd County

Mrs. Katherine King, 319 South Main
Floydada

G. L. Fawver .... Rt. 5, Floydada, Texas
V. H. Kellison .... Rt. 2, Lockney, Texas
Chester W. Mitchell .... Lockney, Texas
Don Probasco .... Silverton St. Rt., Floydada, Tex.
Ernest Lee Thomas .... Rt. 1, Floydada, Texas

Hockley County

Z. O. Lincoln, 913 Houston, Levelland

Joe W. Cook, Jr. .... Rt. 1, Ropesville, Texas
Earl G. Miller .... Rt. 5, Levelland, Texas
Madison Newton .... Anton, Texas
Cecil Pace .... Levelland, Texas
Henry Schmidley .... Rt. 2, Levelland, Texas

Committeemen meet first and third Fridays of each month at 1:30 p. m., 913 Houston. Levelland, Texas.

Lamb County

Curtis Chisholm
600 E. 4th Street, Littlefield

J. B. Davis .... Rt. 1, Amherst, Texas
Henry Gilbert .... Sudan, Texas
Price Hamilton .... Earth, Texas
Albert Lockwood .... St. Rt. 2, Littlefield, Texas
Elmer McGill .... Olton, Texas

Committeemen meet on the second Tuesday of each month at 7:30 p. m., Jerry's Cafe, Littlefield, Texas.

Lubbock County

District Office. 1628 15th
Lubbock, Texas

W. W. Allen .... Rt. 4. Lubbock, Texas
Bill Alspaugh .... Box 555, Slaton, Texas
Vernice Ford .... 3013-20th St., Lubbock, Texas
Jack Noblett .... Rt. 1, Shallowater, Texas
Earl Weaver .... Idalou, Texas

Committeemen meet first and third Mondays of each month at 2:30 p. m., 1628-B 15th Street, Lubbock, Texas.

Lynn County

District Office, 1628 15th
Lubbock, Texas

Weldon Bailey .... Rt. 1, Wilson, Texas
Earl Cummings .... Wilson. Texas
Robbie Gill .... Rt. 1, Wilson, Texas
Frank P. Lisemby, Jr. .... Rt. 1, Wilson Texas
Erwin Sander .... Wilson, Texas

Committeemen meet first and third Tuesdays of each month at 10 a. m., 1628-B 15th Street, Lubbock, Texas.

Parmer County

Aubrey Brock, Bovina

D. B. Ivey .... Rt. 1, Friona, Texas
Lee Jones .... Rt. 1, Farwell, Texas
Dick Rockey .... R.F.D., Friona, Texas
Carl Schlenker .... Rt. 2, Friona, Texas
A. B. Wilkinson .... Bovina, Texas

Potter County

T. G. Baldwin .... Bushland, Texas
James S. Line .... Bushland, Texas
E. L. Milhoan .... Bushland, Texas
W. J. Hill, Sr. .... Bushland, Texas
R. C. Sampson, Jr. .... Bushland, Texas

Randall County

Mrs. Louise Knox
Farm Bureau Office, Canyon, Texas

J. R. Parker .... Canyon, Texas
James B. Dietz .... Rt. 2, Happy, Texas
A. C. Evers .... Rt. 4, Box 391, Amarillo, Texas
Jackie Meeks .... Rt. 2, Happy, Texas

W. A. (Bill) Patke - Rt. 4, Box 400, Amarillo, Tex.
Committeemen meet first Monday night each month at 7:30 p. m., 1710 5th Avenue, Canyon. Texas.

"WATER CONSERVATION" IS

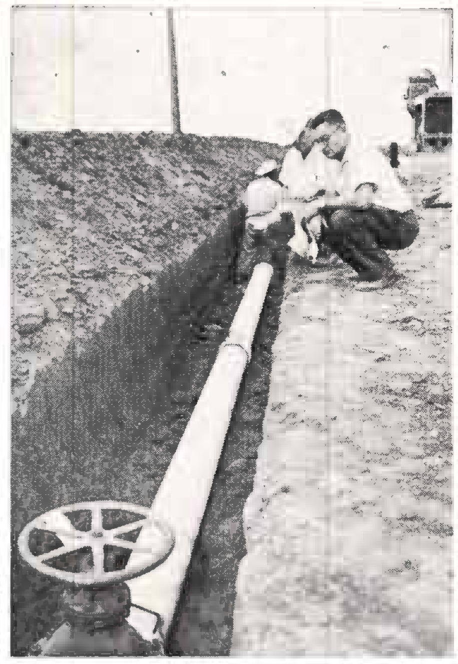
The Texas Agricultural Experiment Station, Substation No. 8, located at Lubbock, has been moved from the eastern part of the city to a new location approximately 5 miles north of downtown Lubbock on the Amarillo highway. The Experiment Station is a part of the Texas A & M College System and serves the southern High Plains.

The new experimental farm, consisting of 320 acres of land, is 160 acres larger than the old farm.

The objective of the new station will be to conduct studies with crops, cultural practices, fertilization and management to realize maximum utilization of rainfall supplemented with underground water.

There are 4 irrigation wells on the new station. Three of the wells produce about 300 gallons of water per minute each, and the fourth well yields approximately 750 gallons per minute.

A crew prepares to install a joint of rubber-gasket concrete pipe. This pipe is designed for medium water pressures—in the 20 pounds per square inch range.
Photo courtesy Gifford-Hill-Western by Jack Creel



Charles Fisher, Experiment Station Superintendent, watches as the asbestos cement pipeline is installed. This pipe is in the high-pressure class—about 70 pounds per square inch. Note the Well No. 3 in the background with its combination power plant—electric motor and internal combustion engine.
Photo courtesy Brown Supply by I. G. Holmes

All four irrigation wells on the farm are powered by electric motors. One of the wells (well No. 3 as shown on the accompanying farm plan) is also equipped with a natural gas-powered internal-combustion engine. The engine will be used mostly as a standby unit. In order to operate the sprinkler system, this well is also designed to produce water at 50 pounds per square inch.

The new station will utilize all the various types of irrigation pipe that are normally used in our area as well as other types that have been used

The ditch has been dug and the rubber-gasket concrete pipe is lined up awaiting installation. This pipe is also in the medium-pressure class—about 20 pounds per square inch.
Photo courtesy Brown Supply by I. G. Holmes.

TO BE THEME OF NEW EXPERIMENT STATION IN LUBBOCK

By ALLAN H. WHITE

The picture above shows the installation crew putting the finishing touches on the standard mortar-joint concrete pipeline before back-filling with soil. This pipe is in the low-pressure range—about 12 pounds per square inch. Mortar-joint pipelines are the most commonly used in the southern High Plains of Texas.
Photo courtesy Brown Supply by I. G. Holmes

This photograph shows plastic pipe laying near the ditch into which it is to be installed. The pipe comes in 30-foot lengths and it put together by using plastic couplings secured with steel clamps. This pipe is in the medium-pressure class —about 20 pounds per square inch. An underground steel pipeline and an underground aluminum pipeline have also been installed on the new experiment station.
Photo courtesy Southwestern Plastic Pipe Co. by Davis-Hester Productions.

only rarely. There will be two brands of 10-inch plastic pipe used, three brands of 12-inch rubber-gasket concrete pipe, 8-inch cement asbestos pipe, 8-inch galvanized steel pipe, 8-inch aluminum pipe and standard 12-inch mortar-joint concrete pipe. There will be a total of 14,190 feet of underground pipe initially installed on the farm.

These various types of underground pipe are being installed in order that the suitability of each may be weighed against that of the others.

Irrigation water will be distributed to the land by employing three basic methods—sprinkler, down the furrow, and flooding. Irrigation tests of all kinds are planned for the new station —watering down the furrow on level land, watering down the furrow on relatively steep slopes, watering contoured furrows and flooding bench-levelled land. Tests to determine practicability of sprinkler irrigation on mixed to heavy soils will be conducted. It is an accepted fact that sprinkler distribution is excellent on sandy soils. Preliminary investigations have shown that the soil on the new station has a water penetration rate of approximately 1/2-inch per hour. This rate is compared to about 1 1/2-inches per hour on the sandier soils lying south of the Lubbock area where sprinkler systems are normally used.

In conjunction with the normal irrigation tests, there are 80 acres of land that will be used for conducting tests involving dryland plus limited irrigation. Tests where strict dryland conditions are maintained will also be conducted.

It is planned that the effect of land leveling, bench leveling and level terracing on dryland will be studied to determine recommendations for making maximum use of rainfall. By having both irrigation and dry test plots in operation, soil and water management practices on each can be observed and evaluated.

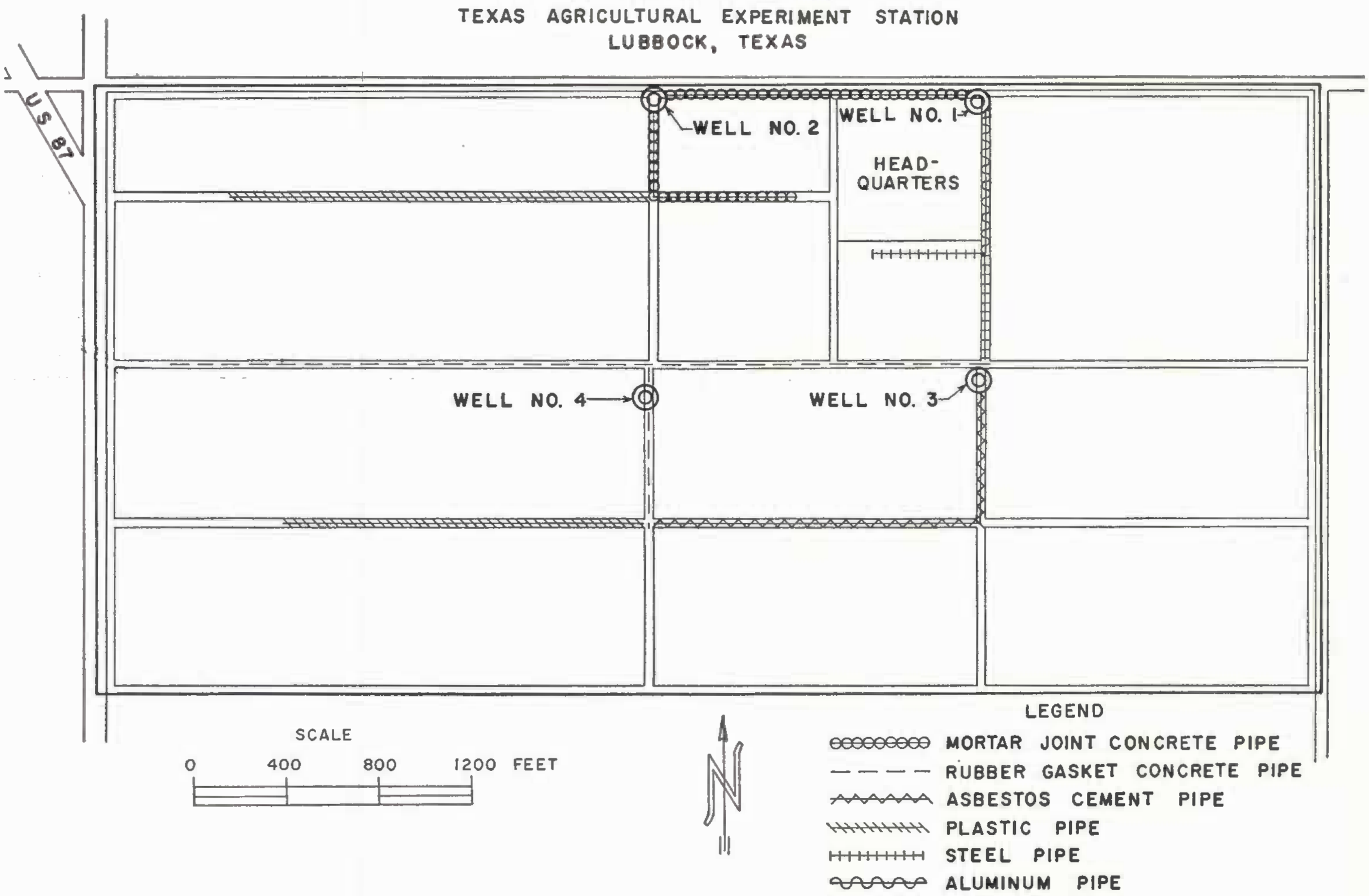
The experiment station has always done a magnificent job in working for more efficient and profitable agriculture for the southern High Plains. With the cooperation of the citizens in our area, the station will continue its excellent leadership under the direction of the sub-station's superintendent, Charles Fisher.

Many individuals and firms have assisted in making the new experiment station and its facilities available. All are to be commended for their contributions, whether the contributions involve time, money, materials, or a combination of the three.

Individuals and firms who have made contributions to the new experiment station are:

Gifford - Hill - Western, Lubbock; Keasbey-Mattison, Ambler, Pennsylvania; Southwestern Plastic Pipe Co., Mineral Wells; Brown Supply Co., Lubbock; Panhandle Plastics Incorporated, Amarillo; Kaiser Aluminum & Chemical Sales, Oakland, California; Waterman Industries of Texas, Lubbock; Peerless Pump Co., Lubbock; J. B. Knight Distribution Co., Brownfield; Carlon Plastic Pipe Co., Cleveland, Ohio; High Plains Underground Water Conservation District, Lubbock; Aluminum Metal Products Co., Lubbock; Irrigation Pipe Service, Lubbock; Walton - Newton Appliances, Lubbock; Beall Pipe & Tank Co., Portland, Oregon; American Marietta Co., Marietta, Ohio.

FARM LAYOUT
SUBSTATION NO. 8
TEXAS AGRICULTURAL EXPERIMENT STATION
LUBBOCK, TEXAS



Future—

(Continued from Page 1)

to fresh is nothing new. Aristotle wrote about taking the salt out of the sea. Caesar found a way to do it in Alexandria. Francis Bacon discussed the problem in some detail in 1561. Queen Elizabeth I—made a standing offer of 28 thousand dollars (I believe it was tax free then) to the inventor of a machine that would make ocean water potable at a low cost. She wanted her sailors to stay at sea for a longer period. In 1791, Thomas Jefferson conducted some experiments on the desalting of water. It has been successfully practiced for centuries, especially to provide fresh water for ships at sea.

The Office of Saline Water was established in 1952 to develop a new concept. To develop processes for the production of an abundant supply of fresh water for human needs, industrial and agricultural uses—at low cost. Research has constantly reduced the cost of converted water. When the Office of Saline Water was established in 1952 it cost between $5.00 and $6.00 per thousand gallons. Today, we feel the plant at Freeport will make drinking water from the ocean at about $1.00 per thousand gallons and in 15 to 30 million gallons per day this price would be 43 or 44 cents per thousand gallons. Brackish water will be less than this.

The rise and fall of civilization has been governed by the natural supply of fresh water. It has more control upon the economics of the country than war, pestilence or disease. The exploding population of the world is rapidly reaching the point where, in some areas, the demand for fresh water is far greater than can be obtained from the natural sources of supply.

In 1958, Congress passed some trail blazing legislation that set the stage for a new pioneering effort. The legislation authorized the Department of the Interior and the Office of Saline Water to select five of the most promising processes, each to be different, and then to build five demonstration plants to show how the processes work. All of these processes have been selected. Four of the sites have been selected. For these five demonstration plants, the Office of Saline Water received more than 200 site applications. They came from the 12 inland States who were interested in a brackish water plant and the 24 States, including Hawaii and Alaska, that touched the ocean who were interested in a sea water plant. The office appointed a board of outstanding engineers, not connected with the government, to evaluate these sites.

On August 30, I had a most rewarding experience right here in the State of Texas. I joined with Secretary of the Interior Fred A. Seaton in groundbreaking ceremonies for the first of five saline water conversion demonstration plants which the Office of Saline Water is authorized to build and operate. In the busy little town of Freeport, the construction of this Nation's first major sea water conversion plant is well underway. Utilizing a new process developed wholly under the sponsorship of the Office of Saline Water, this plant will produce fresh water at the rate of one million gallons per day. With this plant we expect to take a giant stride down the path to lower cost conversion. Our engineering estimates place the cost of water produced by this plant to be less than $1 per thousand gallons. A figure we hope to certify shortly after the plant is completed next spring.

Two other demonstration plants will be under construction in a short time. On October 4, we will open bids for a 250,000 gallons per day plant at Webster, South Dakota. This plant will utilize an electrodialysis process to convert the salty well-water of that area to fresh potable supplies. On October 18, we will open bids for a second one million gallons per day sea water conversion plant to be located at San Diego, California. The San Diego plant will utilize a multi-stage flash process.

We are in the final phases of selecting an architect and engineering firm for the design of a second brackish water conversion plant to be located at Roswell, New Mexico. This plant will use a forced circulation vapor compression process and will be designed to produce at least 250,000 gallons of fresh water per day—perhaps more. We have a pretty accurate measure of the interest of West Texas cities and communities in the potential of brackish water conversion. Over 40 cities in that area were interested in getting a brackish water plant. Bids were also received from New Mexico, Arizona, Nevada, Utah, Oklahoma, Kansas, and Colorado. A third sea water conversion plant will be built at a yet to be selected site on the east coast. It will utilize a process that is a relatively new concept in desalinization, freezing.

We have separate and distinct types of freezing processes under development. Since freezing is new it is sometimes considered to be the glamour-boy in the field. Theoretically, it has several inherent advantages over other types of conversion, but its full potential is yet to be developed and proven.

In the past six months considerable progress has been made on small individual units. There are now three companies ready to place on the market individual units capable of producing from 20 to 600 gallons of fresh water per day. They will be simple in operation and easily serviced. It is my understanding that the Housing and Home Finance Agency is interested in considering loans on this type of equipment.

The Office of Saline Water, since 1952, has received more than 600 suggestions on how to desalt water. We have examined rather critically more than 100 of these methods. Last year, we had in the laboratories, either in the universities, private institutions or under private enterprise, 54 different projects. One of those projects is being carried out in College Station with the Texas A & M Research Foundation. Dr. Donald W. Hood is heading these tests. We have a total of eight research projects being carried on in Texas. There are a number of these processes that show great promise.

It is sometimes difficult to determine what processes should have further examination in the laboratory. New suggestions are given a critical examination by one or more of our consultants, or experts in that particular field. If the process seems feasable it will be recommended for further examination in the laboratory, if funds permit. If it works out well in the laboratory it is ready then for the pilot plant stage, which are units producing from 5 thousand to 25 thousand gallons of fresh water per day. It can then be determined if it is suitable for larger production. Progress is being made. The plants of today may be outmoded 15 years from now.

In computing the cost of water we include all costs at today's prices. This includes the cost of the land for the plant, all capital investment, operating costs which of course includes fuel, maintenance, and employees, taxes, interest, and insurance. This whole package is amortized on a rather severe 20 year schedule. This method of computing costs, we believe, includes all costs—at today's prices. To the best of our knowledge, water obtained from natural sources of supply is not computed in such a comprehensive manner. In many cases, through direct taxation or general obligation bond issues the cost of water is heavily subsidized.

Water is worth what it costs when you are thirsty. In 1957 the cost of water in Dallas rose to 50 cents a gallon and until last year the people of Coalinga, California, were paying $9.35 a thousand gallons for their fresh water supplies. That little city became the first in the Nation to obtain its drinking water supplies from converted brackish well-water. They cut their cost to $1.45 a thousand gallons. While this is still expensive water, the people of Coalinga don't think so. There are many areas in the United States that are approaching the time when people may turn on the water faucets and no water will come out. While I am not posing as a prophet, it is my firm belief that before 1980 there will be more than a thousand cities who will obtain all or part of this necessary life-giving fluid from the ocean or brackish water sources. The Office of Saline Water is dedicated to finding a cheaper way of making a good supply of water available to individuals, cities, and industries. In the earlier years of the program, we were working principally on literature searches and doing research in the laboratory. Some of the processes have now moved from the glassiness of the laboratory into the hardware of the pilot and demonstration plants. This has increased the cost of our operation considerably. At the present time, we are operating 11 pilot plants. We will need to double that number in the next two years if we are to continue to maintain an orderly development of new technology. These pilot plants will help find new answers for some of the unsolved problems that still must be overcome if we are to produce truly low-cost converted water.

I am convinced that there is no limit to what science can accomplish when free men and women are able to apply their scientific and technical knowledge to the problems involved. Research and education are shortening the time and increasing the span of progress. There are new roads to be traveled, new questions to be answered, and new problems to be solved.

I have great faith in what you men and women (gathered here) in the A & M College are trying to do. Your Research Foundation, while working with but a small segment of the entire problem is an important link in our efforts to make saline and brackish water fit for human use. The program may not seem important to you today, but it will be important to generations yet unborn.

In the search for a key to unlock a new source of water, we will find discouragement and we will find hopeful signs. I think our efforts can be expressed in the words I have often read which are carved in stone over the Speaker's chair in the House of Representatives. They are the words of Daniel Webster: "Let us develop the resources of our land, call forth its power and build its institutions, promote all its great interests and see whether we also in our day and generation may not perform something worthy to be remembered."

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

Second Class Permit

THE Cross SECTION

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

Volume 7—No. 5 **"THERE IS NO SUBSTITUTE FOR WATER"** *October 1960*

WHAT IS THE REAL STORY CONCERNING THE NATION'S FARMERS

The Smith - Douglass Company has mailed to its sales managers and supervisors an information sheet that presents the importance of agriculture to our national economy. It gives answers to pertinent questions that have been asked many times primarily by those outside the realm of direct contact with agriculture. The answers are revealing and informative. Here are a few samples:

Q. "If farmers are so efficient today, why are food prices so high? And why does the government have to spend so much on subsidies to farmers?

A. "These are fair questions. First, about food prices—Isn't it true that *all* prices have gone up sharply in the past 10 years or so? Don't automobiles and houses and everything else cost more dollars now? As a result of inflation, the dollar today won't buy as much as in the past—no matter what you spend it for. Could you or any other fair-minded American honestly expect food prices to remain the same, or drop, at a

(Continued on Page 4)

Post Vocational Agriculture Class Wins First Place At Panhandle South Plains Fair

Pictured above is the Post High School Vocational Agriculture exhibit that was shown during the 1960 Panhandle South Plains Fair. The exhibit won a first place ribbon. Depicted is the result of late irrigation on cotton. Note that even though additional lint was produced with the late watering, net profit was reduced because of lowered quality.

The Post High School chapter of the Future Farmers of America won first place in the agricultural exhibits section of the Panhandle South Plains Fair, recently held in Lubbock. The winning booth depicted the economic results of late irrigation applications on cotton in the southern High Plains area.

D. H. Koeninger, Vocational Agriculture teacher at Post gathered the information used in the fair display from the Lubbock Agricultural Experiment Station.

Members of the Post F. F. A. Chapter are: John Bland, Tony Carlton, Steve Castell, Buddy Green, Richard Hart, Tommy Hill, Curtis Hudmon, Richard Little, Wayne Masters, Delroy Odom, Ronnie Parrish, Danny Richardson, Danny Stone, Doyle Williams, Butch Bowen, Melvin Byrd, Jerry Hill, Jerry Stone, Jerry Thuett, Joe Bob Trammell, Robert Bevers, Jerry Bush, Edward Byrd, Neal Francis, Jerry Gerner, Jerry Kuykendall, David Lee, Wayne McFaddin, Larry Williams, Royce Hart, Jimmy Hodges, Gary Howell, Benny Stanley, Jimmy Ivie, Clarence Ivie, and Jerry Ligon.

COMMITTEES HAVE NEW SECRETARIES

Two County Committees of the High Plains Water District have new secretaries.

Mrs. Katherine King is the new secretary for the Floyd County Committee. Mrs. King is the wife of Russell King, who owns and operates a dry-cleaning establishment in Floydada. They have one son, Denny, who is fifteen years old and a sophomore at the Floydada High School.

Mrs. King was raised in Abilene, Texas, where her parents, Mr. and Mrs. H. H. Copeland reside. She attended high school in Abilene for three years and graduated at Matador, Texas. She attended Hardin-Simmons University for two years.

Before coming to work for the Floyd County Committee, Mrs. King worked as display and decoration manager for a Floydada department store. Her hobbies include sketching, drawing, painting and playing golf. She collects antiques and plays bridge.

The Kings are active members of the First Methodist Church of Floydada.

In Deaf Smith County, Mrs. Mattie K. Robinson is the new secretary. She was born in Canton, Georgia where her family resided until she was a young lady of two years. They then moved to Vernon, Texas and lived there until Mattie K. was twelve years old. Her family then moved to the High Plains area and settled in Hereford where she finished high school. In 1934, she married Tom Robinson, also of Hereford, and they now have a lovely daughter, Tommy Kay, 17, who is a senior student at Hereford High School, and a son, Mike, 14, a 9th grader at the Stanton Junior High School in Hereford. The family attends the First Christian Church and resides at 237 Avenue B. Mr. Robinson farms in the Hereford area.

You folks who live in Floyd or Deaf Smith counties go by the Water District office in your county and get acquainted with your new secretary. We think you'll like her.

At left is Mrs. Katherine King, new secretary for the Floyd County Committee. She is shown filling in an application for a water well drilling permit. At right is Mrs. Mattie K. Robinson, new secretary for the Deaf Smith County Committee. As the picture was made Mrs. Robinson was preparing to locate a new well on her county map.

LAND INVESTMENTS

Returns from an investment in land in Texas come from two sources; from the productivity of the land which usually is reflected in the annual rental paid for its use and from the appreciation of the land value. This appreciation in value is due primarily to economic forces not directly connected with the land, but those that are at work in the general economy and in the local region. Most of the returns on investment due to appreciation can be recovered only upon sale of the land. For the past 20 years, in many areas of Texas, the annual appreciation in land values has been equal to the annual return from production (rent). To put it another way, the appreciation was equivalent to the interest paid on the money borrowed to buy the land.

Texas' agricultural land is not a good investment if the only consideration is the annual rental received for agricultural production. However, in many areas of the State, the annual appreciation in land values will continue to be equal to or greater than the returns from agricultural production for many years to come.

—A. B. Wooten

From the "Texas Agricultural Progress."

Editor's Note—A large percent of

(Continued on Page 4)

THE Cross SECTION

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

Published monthly by the High Plains Underground Water Conservation District No. 1
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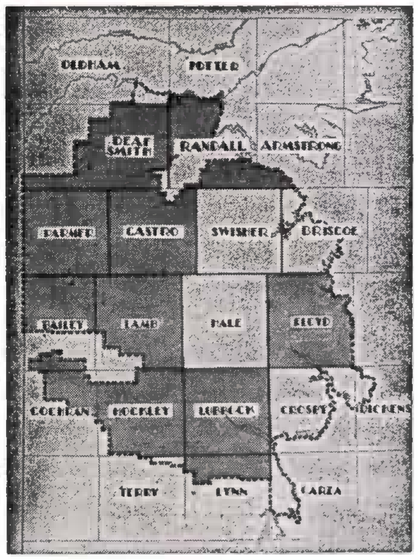
ALLAN WHITE
Editor



BOARD OF WATER ENGINEERS PU

The State Board of Water Engineers has recently published a bulletin entitled, "Underground Water Conservation Districts in Texas." The bulletin was prepared by Frank A. Rayner and Leslie G. McMillion.

The bulletin is a general information booklet that discusses the seven groundwater conservation districts of the state, including the High Plains Underground Water Conservation District.

Figure 1, taken from the bulletin, shows the location of seven groundwater districts that have been created, and the location of five other groundwater reservoir subdivisions that have been delineated by the State Water Board wherein districts have not been created.

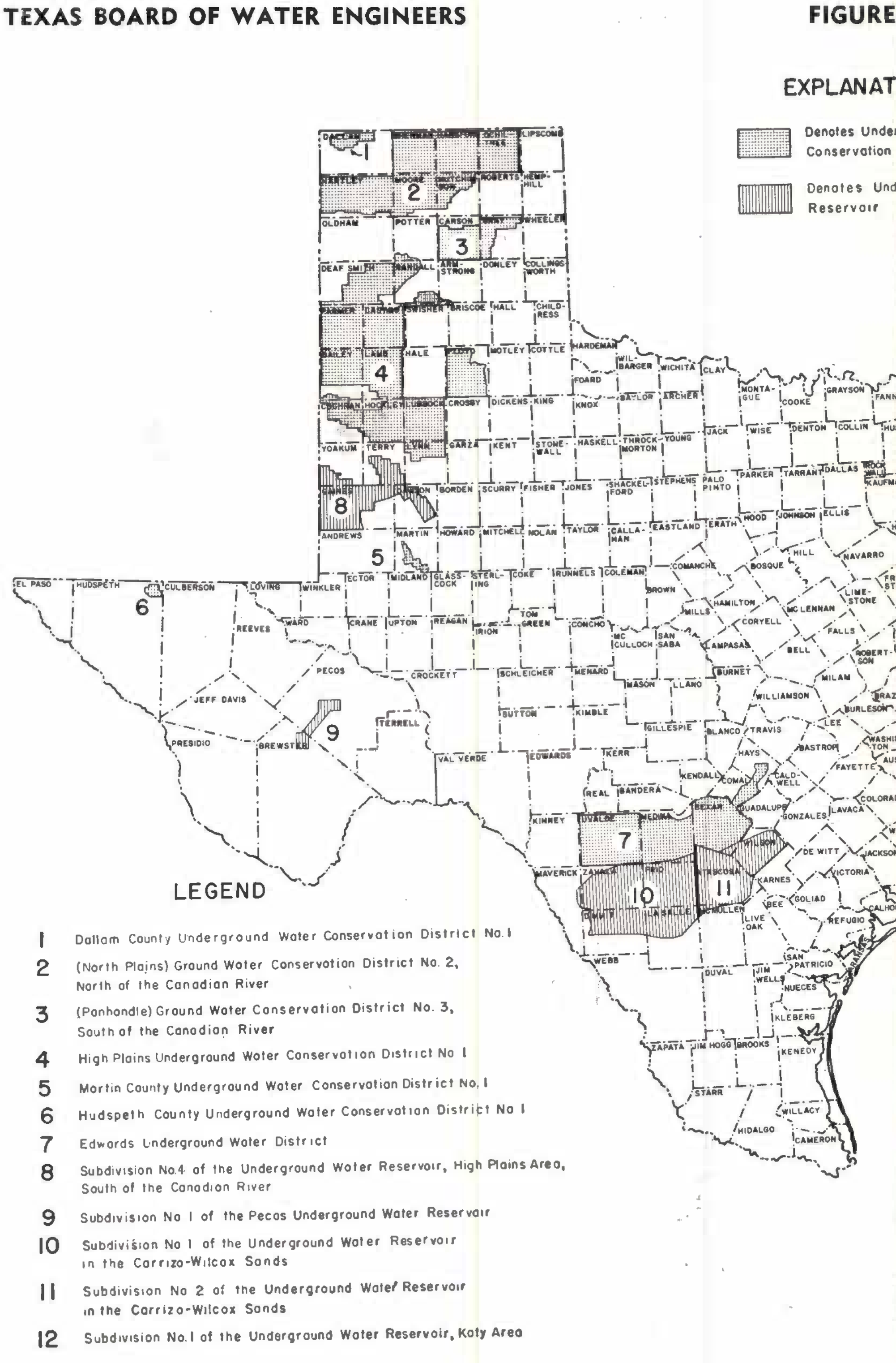
The new bulletin contains two appendixes. One presents the state laws under which districts have been created, the other presents the rules of districts that have published regulations.

The bulletin presents a brief historical resume of the High Plains Water District. It lists the counties that are included in the district and some statistical data concerning the irrigation area. The bulletin also presents a table listing the various local men who have served, and who are serving, on the District's Board of Directors.

The following are excerpts from the new bulletin:

"The High Plains Water Conservation and Users Association (association no longer operative) was instrumental in creating some of the inter-

TEXAS BOARD OF WATER ENGINEERS FIGURE



Ground Water Conservation Districts and Reservoir Delineations in Tex

BLISHES BULLETIN ON TEXAS GROUND-WATER CONSERVATION DISTRICTS

est that resulted in petitions to the State Board of Water Engineers for the delineation of the underground water reservoir, or subdivision thereof, in several counties in the Southern High Plains of West Texas.

"In response to these petitions, the Board met in special session at its Austin offices on July 17, 1950, and ordered that a public hearing be held in Plainview, Hale County, on August 29, 1950, to hear evidence for or against the delineation of an underground water reservoir, encompassing all or parts of 21 Southern High Plains counties.

"On March 26, 1951, the Members of the Board met to consider testimony presented at the public hearing of August 29, 1950, and to review records, maps, plats and other information. At this meeting the Board Members determined that an underground reservoir did exist, underlying all or parts of Armstrong, Bailey, Briscoe, Castro, Cochran, Crosby, Deaf Smith, Dickens, Floyd, Garza, Hale, Hockley, Lamb, Lubbock, Lynn, Oldham, Parmer, Potter, Randall, Swisher, and Terry Counties, and designated same as, Subdivision Number One of the Underground Water Reservoir, High Plains Area, Ogallala Formation, South of the Canadian River in Texas, and further ordered that a public hearing be held at Plainview, Hale County, on August 9, 1951, to hear evidence for or against the creation of an underground water conservation district. On the basis of evidence presented at this hearing the Board determined that a need for the subject district did exist. The boundaries were described by metes and bounds, and the district was designated as the High Plains Underground Water Conservation District Number One. The Board divided the District into five precincts, and appointed the first Director from each precinct.

"As a result of a confirmation election, on September 29, 1951, called by the newly appointed Directors, the qualified voters owning property in all or parts of Armstrong, Bailey, Castro, Cochran, Deaf Smith, Floyd, Hockley, Lamb, Lubbock, Lynn, Parmer, Potter, and Randall counties, elected to participate in the District, and confirmed the Directors of the District as appointed by the State Board of Water Engineers.

"The boundaries of this reservoir subdivision, as delineated by the State Board of Water Engineers, and the boundaries of the High Plains Underground Water Conservation District No. 1, as determined by the confirmation election and as altered by the District Directors are illustrated by Figure 5 (taken from the bulletin).

"This District was validated by the 53rd Legislature in 1953.

"The reservoir area, as delineated by the State Board of Water Engineers, encompassed 10,625 square miles, while the District, as confirmed by vote and as altered by the District Directors consists of 7,812 square miles or about five million acres.

"This District issued 18,860 water well permits from 1953 to January 1, 1960, and there are an estimated 29,000 large capacity wells within the District.

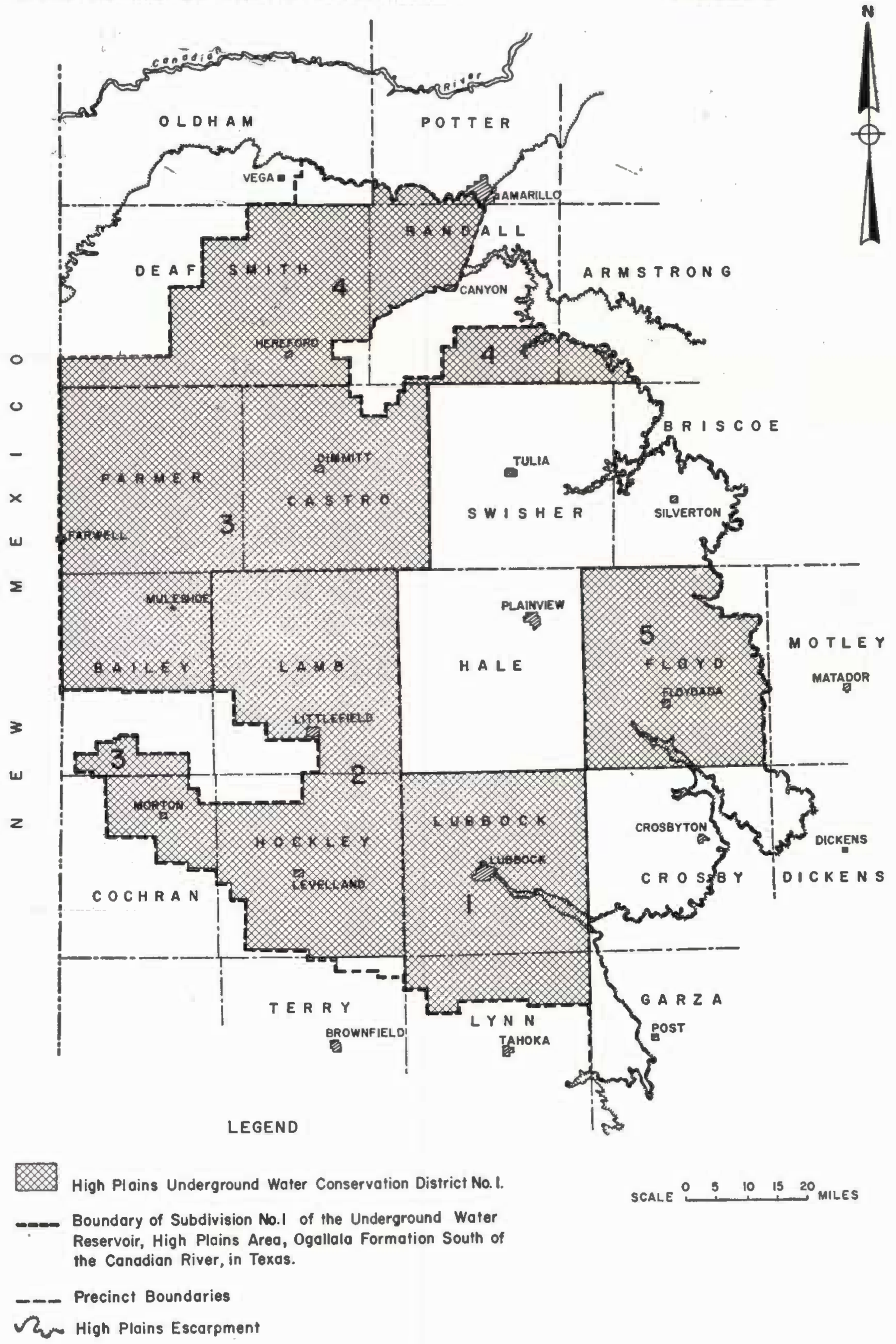
"The District's activities are financed by a five cents per $100.00 valuation (based on county and state property valuation) ad valorem tax on all property within the District.

1

ON

s, January 1960.

TEXAS BOARD OF WATER ENGINEERS FIGURE 5



High Plains Underground Water Conservation District No. 1.

DIRECTORS

"The Current Directors, their addresses, and term expiration dates are listed below:

Director	Address	Term Expiration Date
	Precinct 1	
Elmer Blankenship (Pres.)	Rt. 2, Wilson	Jan. 1961
	Precinct 2	
Roy Hickman,	Morton,	Jan. 1962
	Precinct 3	
John Gammon,	Rt. 1, Friona,	Jan. 1961
	Precinct 4	
T. L. Sparkman, Jr., (Secretary-Treasurer)	Hereford,	Jan. 1961
	Precinct 5	
J. R. Belt, Jr. (Vice-Pres.)	Lockney,	Jan. 1962

"Former Members of the Board of Directors, including those appointed by the Board of Water Engineers, are listed below:

Director	Term of Office From	To
Precinct 1		
E. C. Hatton*	Aug. 1951	Jan. 1953
W. O. Fortenberry	Jan. 1953	Jan. 1955
W. O. Fortenberry	Jan. 1955	Jan. 1957
Elmer Blankenship	Jan. 1957	Jan. 1959
Elmer Blankenship**	Jan. 1959	Jan. 1961
Precinct 2		
A. C. Chesher*	Aug. 1951	Jan. 1952
George Broome	Jan. 1952	Jan. 1954
Gus Parish	Jan. 1954	Jan. 1956
Gus Parish	Jan. 1956	Jan. 1958
Roy B. McQuatters	Jan. 1958	Jan. 1960
Precinct 3		
J. M. Osborne*	Aug. 1951	Jan. 1953
Willis Hawkins	Jan. 1953	Jan. 1955
W. M. Sherley	Jan. 1955	Jan. 1957
A H. Daricek	Jan. 1957	Jan. 1959
John Gammon**	Jan. 1959	Jan. 1961
Precinct 4		
Tom McFarland*	Aug. 1951	Jan. 1953
V. E. Dodson	Jan. 1953	Jan. 1955
V. E. Dodson	Jan. 1955	Jan. 1957
V. E. Dodson	Jan. 1957	Jan. 1959
T. L. Sparkman, Jr.**	Jan. 1959	Jan. 1961
Precinct 5		
Tom Bostic***	Aug. 1951	Sept. 1951
L. L. Jones****	Sept. 1951	Jan. 1952
C. J. Taylor	Jan. 1952	Jan. 1954
Marvin Shurbet	Jan. 1954	Jan. 1956
Marvin Shurbet	Jan. 1956	Jan. 1958
Marvin Shurbet *****	Jan. 1958	Jan. 1960

* Appointed by the State Board of Water Engineers and confirmed by election on September 29, 1951.

** Currently a member of the Board of Directors.

*** Confirmed by the election of September 29, 1951 but not eligible to serve because of residency in Hale County.

**** Appointed by the District Director to fill Mr. Bostic's unexpired term.

***** Resigned in order to accept an appointment to the Board of Directors of the State Water Development Board. Mr. Belt was appointed by the Directors of the District to fill Mr. Shurbet's unexpired term.

"In addition to the Board of Directors, each county within the District has five elected county committeemen."

The new bulletin is available to the public free of charge. Requests should be mailed to State Board of Water Engineers, P. O. Box 2311, Capitol Station, Austin, Texas.

Nation's Farmers —

(Continued from Page 1)

time when all other prices were rising?

"Also, isn't your family eating a little 'higher on the hog' than it was 10 years ago? Chicken, perhaps, instead of beans—eggs instead of oatmeal—and meat 10 times a week instead of seven? And isn't a great deal of your food already cut up or mixed or sliced, and in some cases even cooked? Don't you get a lot of built-in maid services which weren't available a few years ago?

"We get the cheapest food in terms of human effort of any major country in the world. It takes six minutes of the average worker's time to buy a loaf of bread in the United States. In France it takes nine minutes; in Germany, 12; in Russia, 14. Working time required to earn a quart of milk is eight minutes in the United States, but it's 16 in France, 20 in Italy, and 42 in Russia.

"Even with inflation, food prices in the U. S. remained fairly stable from 1952 to 1957. Why? Because the prices received by farmers actually dropped 20 percent during this period. If farm prices had gone up at the same rate as other cost-of-living items, all of us would have paid 25 percent more for food and clothing. A 20-cent loaf of bread would have cost 25 cents. A $4.00 shirt would have sold for $5.00. And so on. Altogether, American consumers, that means all of us, would have paid an extra 70 *billion* dollars for food and clothing during this period. This means that farmers, by receiving lower prices for their commodities, *subsidized* consumers to the tune of 70 billion dollars from 1952 to 1957.

"Subsidy? That sounds like a dirty word, doesn't it? If so, then we have been dirty for a long, long time. Subsidies have been a part of the American political system for many years.

"Airlines get subsidies. So do shipping interests, the petroleum industry, the housing industry—and many, many others. In the last quarter of 1952, Life Magazine paid $1,273,000 postage, while the cost to the government for sending this magazine through the mails was $3,424,000—a loss to Uncle Sam of more than two million dollars on this one publication in just three months. This is only one of many examples that could be cited.

Q. "But haven't price support programs caused a big increase in food and clothing prices?" "Isn't it true that I'm paying both high prices and high taxes—all for the benefit of the farmer?"

A. "This is a widespread opinion. Let's take a look at it. Of every $1 spent for food, about 64 cents goes to people who buy, handle, process, package, store, transport, and sell farm products. Only about 36 cents goes to the farmer.

"If the farmer in Kansas *gave away* his wheat, you'd still pay 19 1/2 cents for a 25-cent loaf of bread. If the cotton producer gave away his crop, you would still pay $2.75 for a $3 shirt. And if the tobacco farmers gave away the tobacco they raised, you'd still have to pay 19 1/2 cents for a 25 cent pack of cigarettes.

"Price support programs have not brought about a big increase in the cost of food and clothing—despite what farm program critics may say."

Investments—

the total cost of an irrigated farm in the southern High Plains of Texas can be earmarked as cost of the underground water in storage beneath the farm. This underground water is being depleted through the production of agricultural crops; consequently, one cannot argue with the slogan—"Water Is Your Future—Conserve It."

WELL DRILLING STATISTICS FOR SEPTEMBER

During the month of September, 61 new wells were drilled and registered with the District office; 10 replacement wells were drilled; and 6 wells were drilled that were either dry or non-productive for other reasons. The County Committees issued 55 new drilling permits. The permits issued and wells completed are listed below by counties.

County	Permits Issued	New Wells Drilled	Replacement Wells	Dry Holes Drilled
Armstrong	5	3	0	0
Bailey	0	1	0	0
Castro	10	8	2	1
Cochran	0	1	0	0
Deaf Smith	7	12	3	0
Floyd	14	7	1	0
Hockley	2	5	0	0
Lamb	2	5	0	0
Lubbock	6	8	3	5
Lynn	2	3	0	0
Parmer	6	5	1	0
Potter	0	0	0	0
Randall	1	3	0	0
Totals	55	61	10	6

FROM THE EDITOR'S INK WELL

We who make our homes in the southern High Plains of Texas, recognize that God endowed our land richly when he provided us with an abundance of good soil and water.

In overall conservation programing, to try and separate the two resources, soil and water, is impossible. They go together. They are both necessary to sustain plant and animal life.

Because of the tremendous growth taking place within our nation and around the world, a proper attitude by our people toward the conservation of soil and water is becoming increasingly important. This ever-increasing number of people requires food and fiber to exist. They also require land for schools, churches and other facilities.

The resulting urban expansion will take more and more farm land out of production, thereby placing an even greater requirement to produce larger yields from the cropland that remains. If we are to continue to increase total crop production from a decreased number of acres, it will be absolutely imperative that our soil be maintained in a fertile condition and that good water be available in adequate supply.

In the High Plains of Texas, if we are to maintain our intensive and extensive irrigated-agriculture economy we must commence to make better use of rainfall.

The High Plains area receives about 70 percent of its annual 19 inches of rainfall during the growing season months May through September. Much of this amount falls in brief but heavy downpours.

Most of our cropland slopes only slightly; however, some of our land slopes excessively and thereby allows such rapid runoff during heavy downpours that proper penetration into the soil is impossible. To make the best use of rainfall, the need for leveling some farmland is thereby apparent.

The addition of organic material to the soil is to be encouraged. This practice improves the texture of the soil and increases its water-intake rate. Organic matter can be supplied to the soil in many ways. When shredded and plowed into the soil, grain sorghum stubble is an excellent source of organic matter. It makes an excellent mulch. Also, wheat stubble makes a good mulch. Cotton, our area's number one money crop, grows in a bur. These burs are excellent for the soil as organic matter and they also supply potassium to the land.

Regardless of the provisions made by individual farmers for holding rainfall on their land, at certain times rains will fall with such intensity that some water will inevitably run into depressions and lakes. When this occurs, the rain water can still be salvaged and put to beneficial uses. Recognizing this fact, many individuals are installing centrifugal pumps at the edge of lakes and are pumping water back to farmland and using it for irrigation. Others should commence to utilize lake water. In instances where cropland does not need additional water but the lakes are filled with runoff, the water can still be salvaged before it evaporates by using it to artificially recharge the underground water reservoir.

To prolong the supply of stored underground water, water produced for irrigation should be transported from the well to the crop through closed distribution systems rather than by open surface ditches. Tests have shown that as much as 40 percent of water transported in open ditches can be lost through evaporation and seepage. More pipelines should be installed on our farms in order that all the water pumped from the wells can be used to produce crops.

If the present economy of the Texas High Plains is to be maintained an adequate supply of good quality water is absolutely essential. If we are to facilitate increases in our agricultural and industrial production, water users must commence to obtain the absolute maximum from both rainfall and available underground water. Improved seed varieties must be developed that will produce larger crop yields per inch of water required. Willful and habitual waste of water during the irrigation of crops should also be minimized. Water that is pumped from the underground reservoir should be used in as efficient manner as possible. Water and soil conservation must become a way of life for each of us.

The result of water and soil conservation will be continued prosperity today as well as prosperity for future generations that must look to us for the resources which will be in even greater demand tomorrow.

We have said that the future of this area and of our nation depends to a large extent on an adequate supply of good quality water and on fertile soil—this is true. So what about it, "Mr. and Mrs. High Plains?" Are you going to do your part to assure a prosperous future for yourself, your children and your fellow man?

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

Second Class Permit

THE Cross SECTION

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

Volume 7—No. 6 "THERE IS NO SUBSTITUTE FOR WATER" November 1960

T.W.C.A. Holds 16th Annual Convention

On October 30-31, the Texas Water Conservation Association held its sixteenth annual convention. During the convention, Tom McFarland, General Manager of the High Plains Underground Water Conservation District, was re-elected First Vice-President of the association.

Max Starcke, Austin, was re-elected President, and J. E. Sturrock, Austin, was re-elected Secretary - Treasurer and General Manager. Since its inception sixteen years ago, Mr. Sturrock has been the Manager of T.W.C.A.

President Starcke appointed J. R. Belt, Jr., Lockney irrigation farmer and Director on the Board of the High Plains Water District, to serve on the Resolutions Committee for the convention.

The T.W.C.A. is an organization whose membership consists of men from throughout the state who are interested in the sound and orderly development of water and land resources of Texas.

Resolution Passed To Increase Sugar Beet Allotment

Irrigation farmers in the High Plains who are interested in an increased sugar beet allotment for Texas were given a boost recently by the Texas Water Conservation Association and the High Plains Underground Water Conservation District.

The association passed a resolution calling for the Congress to enact legislation that would increase the sugar beet allotment in Texas and other suitable irrigated areas in the United States. The resolution was introduced by J. R. Belt, Jr., Lockney, member of the Board of Directors of the Water District.

The resolution will be presented by the T.W.C.A. to the National Reclamation Association during its annual convention being held the latter part of November in Bakersfield, California.

GOD EXPECTS MAN TO BE A GOOD STEWARD OF HIS WATER RESOURCES

By HERSCHEL L. THURSTON
Minister, First Methodist Church
Hereford, Texas

REV. H. L. THURSTON

Water is always important—from the time of the first cry of a newborn infant to the last request of dying old men.

Having lived in a rural area where our only water supply was from a cistern supplied by rain that ran from our house roof, our young family learned not to waste water. We were told not to take more water in the dipper than we intended to drink, and to pour any remainder in the wash pan. Being a young preacher, the matter of stewardship of water became a subject of importance.

Conducting a funeral service for an old "wind-miller" led to the thinking of the importance of the man who came at the urgent call of West Texans, "We're out of water." Cattle stomping and fighting around a dry stock tank, early settlers driving miles for a barrel of drinking water are experiences of my youth.

The Bible begins with the account of God's creating the earth, and separating the water from the dry land. God did not make man, until He had made provision for watering the earth. When a river flowed out of Eden to water the garden, the Lord God took the man and put him in the garden of Eden to till it and keep it. (Gen. 2).

Scarcity of water has been from the beginning the cause of trouble between men. Isaac's servants who had to dig the third well before the herdsmen of Garrar would cease quarrelling over the water is an early example. (Gen. 26).

Conservation of water for the greatest use for the most people for the longest time becomes more and more apparent out on these great high plains, as our little towns of fifty years ago become cities of large populations, and as modern irrigation methods rapidly drop our underground-water levels.

Man has had to be restrained from killing off the buffalo, prairie chicken, and wild life in general. We have had to be drastic to save the species.

The benefits of every effort to save the soil, wild life, the beauty of our country-side are well known to most of us. Surely, we shall accept God's blessing of water as a stewardship and rightfully avoid waste for the sake of ourselves and posterity.

Editor's note—"The Cross Section" is indebted to the reverend Mr. Thurston for the foregoing article prepared especially for publication in this edition.

Water

Grain

Cotton

Without an adequate supply of water, our southern High Plains area would be unable to harvest such bountiful crops as these shown above. We indeed, are fortunate to have a vast quantity of underground water available to us in storage beneath our land. However,even though our supply is large, it is none the less limited; consequently, to prolong the supply, each of us has a responsibility to use the water we pump in the most efficient manner possible. Will you assume your share of this responsibility by resolving to use water during the coming year as prudently as practical—both rainfall and underground water?

THE Cross SECTION

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

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ALLAN WHITE
Editor

CONCEPTS OF UNDERGROUND WATER I

By ALLAN H. WHITE, Jr.

In our neighboring state of New Mexico, the legal approach to underground-water development and conservation is quite different from our expressed concepts in Texas.

First, in New Mexico, underground water is property of the State. An individual or group may produce underground water only after having been appropriated a right to use a given amount of water by the State Engineer.

Second, "prior appropriation" is the rule in the development of underground water. This simply means that the first to be appropriated a water right has a paramount right over the second. The second has a paramount right over the third and so forth. If an appropriator with a prior right can prove that later appropriators are detering him from taking his maximum quantity of water, he can demand that they be required to cease taking water.

Third, the doctrine of "most beneficial use" is practiced. In other words, if unappropriated water exists in a basin and more than one applicant seeks a right to use the water, the State Engineer must determine the applicant who will put the water to the most beneficial use and appropriate the water according to his decision.

Parts of Lea County, in eastern New Mexico, overlay the same fresh-water-bearing Ogallala formation from which we in the southern High Plains of Texas obtain our principal supply of undeground water.

Lovington is the seat of the county government and is located in the center of the underground-water basin. Hobbs is near the southern extremity of the basin and Tatum is near the northern edge. Most of the irrigated land in the basin is north and east of Lovington.

As designated by the State Engineer, the Lea County Underground Water Basin covers 2,180 square miles, or almost 1,400,000 acres of land. The basin was declared closed to any further water appropriatons on February 2, 1953. The water underlying each township in the basin is now fully appropriated. When the State Engineer determined that there were sufficient wells in operation to deplete the available underground water supply in 40 years, the Lea County Basin was closed to further development.

Today the principal use of underground water in the basin is for irrigation. According to J. W. Gilstrap, Lea County Extension Agent, there are approximately 85,000 acres of land under irrigation in the basin. Most of the remaining 1,315,000 acres of land are still in grass and are used for livestock grazing purposes. There are about 1000 irrigation wells in the county and the principal crops grown are cotton, grain sorghums and forage crops. Barley, oats, vegetables and alfalfa are also grown in Lea County.

John Havens, U.S.G.S. geologist at Lovington, inspects a recharge well at the edge of a wet-weather lake in the Lea County Underground Water Basin. The large metal tank in the water, shown at left, is a filter made of a 6-foot diameter cylinder inside an 8-foot diameter cylinder. The space between the two cylinders is filled with pea-size gravel. The lake water gravity flows through the filter into the recharge well and ultimately out into the underground formation.

Permits issued for irrigation water in the Lea County Basin stipulate a maximum of 3 feet of underground water be used on each acre of land for which the license applies. At this time, no meters are used to calculate the yields of the wells. Some irrigators perhaps use more water than they have a permit to use, but most are probably using only about half the maximum quantity. As is the case in any irrigated area, the amount of water used by irrigators fluctuates with precipitation.

In 1956, Lea County Commissioners and others became interested in the possibility of prolonging the life of the underground water supply through a program of artificial recharge. The county appropriated money for recharge experiment equipment and wells. John T. Easley, County Commissioner, donated the use of three sections of grassland on which several small wet-weather depressions or lakes are situated. Five recharge wells were drilled at the edge of five different lakes. Three of the wells proved to be operative. Filter systems were installed at each well and recharging was commenced. The filters unexpectedly proved to be rather inefficient. The big problem, however, seemed to be that some folks thought that the depressions within the basin were not large enough to ever retain

EVELOPMENT IN NEW MEXICO ENTIRELY DIFFERENT FROM THOSE IN TEXAS

sufficient run-off water to do much real good. The cost of installing the recharge wells and maintaining them was running above expectations; so the County Commissioners entered into an agreement with the Lea County Soil Conservation District to take over and operate the project. In turn, the District entered into a cooperative research program with the Ground-Water Branch of the U. S. Geological

The picture above was made while standing in a field of irrigated cotton in the Lea County Underground Water Basin. In the background is adjoining grassland owned by Mrs. Nola Wells, long-time Lovington resident. Mrs. Wells has no irrigation water rights on her land even though she has owned the land since 1909 and it undoubtedly overlies underground water. Her land today is valued at about $50. per acre while the cotton land shown is valued at about $300. to $400. per acre.

Survey and the office of the New Mexico State Engineer. This program of research is now under the direct supervision of John Havens, Geologist with the USGS. Mr. Havens states that the program now has two major objectives, (1) to determine the amount of water that is available for artificial recharge, and (2) to determine various methods that can be satisfactorily used in recharge projects.

We ask several individuals who reside within the Lea County Basin for their opinions of the ground-water laws in New Mexico. Many answers were forthcoming. Most answers were probably influenced by the relative position of the person to whom the questions were asked.

EMERY YADEN

Robert W. Ward, Lovington attorney, has a great interest in the underground water of the basin and in the general economy of the county. Mr. Ward feels that the laws of the state give dictatorial powers to the State Engineer. He believes that in certain instances this power could be used without adequate knowledge concerning the reservoir and the underground water. He also states that the underground water laws were written with an artesian reservoir in mind without giving much consideration to water-table reservoirs. The underground water in the Lea County basin occurs under water-table conditions.

Mr. Ward further states that in his opinion speculation in water should not be tolerated. He cited instances where groups and individuals filed for unappropriated water strictly for resale purposes without any intention of actually using the water.

Emery Yaden, irrigation farmer who lives 8 miles east of Lovington, drilled his first well in 1938 and now operates four others. He irrigates 500 acres of land and owns 500 more for which he has no irrigation rights. The 500 acres on which no water rights exist are in native grass and are used for grazing livestock. He applied for a permit to irrigate part of the grassland; however, because there was no unappropriated water in the township, the application was denied. He states that the irrigated land in his area sells for up to $395 per acre.

We contacted Mrs. Nola Wells, a widow who owns 1000 acres of land 9 miles east and 1 mile south of Lovington. She and her husband homesteaded one-half section of the land in 1909. Mrs. Wells remembered that they did not even have money enough to pay the small homestead filing fee; so they picked cotton that fall in north Texas to make enough to pay the fee.

Mrs. Wells and her husband were livestock people and had no desire to put down irrigation wells with which to water farm crops. Consequently, she has no rights today to produce irrigation water from beneath her land even though she is surrounded by land that is irrigated. She

MRS. NOLA WELLS

waited too long to apply for water rights.

If Mrs. Wells had a desire to sell part of her land as irrigated farming units, she could not do so because she does not have a right under the law to produce any water of a commercial quantity, even though there is water beneath her land.

Mrs. Wells' land would sell today for approximately $50 per acre. If she had a water right, it would probably be valued at about $300 per acre.

Mrs. Wells is of the opinion that an individual should not lose his right to water merely because he does not have a desire to produce it at the time the basin is open for appropriations. She says that circumstances beyond one's ability to control might tend to change present plans for using underground water.

Mr. H. W. Wilks lives 8 miles east

H. W. WILKS

of Lovington and owns 812 acres of irrigated land. He has six irrigation wells. The first of these wells was drilled in 1948. Mr. Wilks moved to Lea County with his family in 1907.

Mr. Wilks believes in conservation of water and states that in his opinion there is entirely too much irrigation "tailwater" going to waste each year in the basin. He states that when the underground water is gone, the county will not be nearly so prosperous.

Mr. Wilks says that he agrees with the intent of the underground water laws and rules, if not with every specific aspect of them. He did, however, express doubt as to whether irrigation farmers in the area were using the quantity of water for which their permits called.

He also stated that he knew of farmers who had been relegated to dryland farming because they did not file for a water right before the State Engineer closed the basin.

Mr. P. H. Harris who lives 3 miles southwest of Bronco, Texas, just over the line in New Mexico, farms some irrigated land. He predominately is a sheep and cattle rancher.

Mr. Harris was born and raised at Bronco. Before he commenced farming and ranching, he taught school and was county agent of Torrance County, New Mexico.

Mr. Harris told of an incident that happened to his family—they had filed for a permit to irrigate 240 acres of land and had been granted the right to do so. They surveyed the tract and

P. H. HARRIS

found the most desirable location for a well. Then a well was drilled that proved to be a dry hole. They should have filed for a replacement well permit but failed to do so. When they decided upon another location for a well they discovered that they no longer had a valid permit and that the 240 acres of water rights had been given to someone else. Only after legal action was taken, at a considerable expense to the Harris family, the water right was finally returned to them.

The main objection he has to the underground water laws of New Mexico is that "the biggest pigs get the most water." He explains that in townships where there is unappropriated water, persons with large amounts of money can file for the water with little thought about the capital investment necessary to develop the water and irrigate the land. On the other hand, a person with moderate means might not be in a financial position to make an outlay of capital at the moment the unappropriated water becomes available. Mr. Harris explained that when a permit is granted the water must be developed within a given length of time or else the right reverts back to the State.

The "pros and cons" of the New Mexico regulations concerning underground water in the Lea County Underground Water Basin are of interest to us in Texas largely from an academic standpoint. We can always learn from the experiences of others, and our neighbors to the west have many problems in common with us who live in the southern High Plains of Texas.

"A Primer on Water" – U.S.G.S. Publication

Editor's Note—"A Primer on Water" is the title of a new brochure prepared and published by the U. S. Geological Survey. Authors, Luna B. Leopold and Walter B. Langbein, have done an excellent job in presenting basic information on water. The booklet is available from the Superintendent of Documents, U. S. Printing Office, Washington 25, D. C., at 35c a copy. "The Cross Section" plans to reproduce excerpts from the booklet.

PART I HYDROLOGY

Water Circulates from Earth to Atmosphere to Earth

In the Middle Ages people believed that the water in rivers flowed magically from the center of the earth. Late in the 17th century Halley, the famous English astronomer, added up the amount of water flowing in rivers to the Mediterranean Sea and found that their flow is about equal to the water falling as rain and snow on the area drained by the rivers. At nearly the same time, two Frenchmen, Perrault and Marriotte, made measurements of the flow of rivers and also found their flow about equal to the amount of water falling as rain and snow. These are the earliest known instances of anyone having correctly reasoned that precipitation feeds lakes, rivers, and springs. This idea was very much advanced for the time. Now there are enough river-measuring stations to permit that kind of comparison accurately for many parts of the world.

Water is being exchanged between the earth and the atmosphere all the time. This exchange is accomplished by the heat from the sun and the pull of gravity. Water evaporates from wet ground, from the leaves of growing plants, and from lakes and reservoirs. It is carried in the air as water vapor, a gas. When water vapor condenses it changes from a gas to a liquid and falls as rain. The rain feeds the rivers and lakes. Rivers carry water to the ocean. Evaporation from land and ocean puts water back in the atmosphere, and this exchange goes on continually. Water goes from earth to atmosphere to earth, around and around. For this reason the exchange of water between earth and atmosphere is called the hydrologic cycle—*hydro* means having to do with water, *loge* is a Greek word meaning knowledge of. Hydrology is the study of knowledge of water.

The Causes of Rain and Snow

When you sit on your porch on a hot summer day sipping an iced drink, the outside of your glass gets wet. You put the glass on a coaster to protect the table top. The glass does not leak, so the droplets of water on its outside must have come from the air. The water condenses on the glass from water vapor in the air. When water vapor is a gas mixed with air, it is invisible. Our skin can sense the presence of large amounts of water vapor, and when this is so we say the day is "muggy."

The amount of water vapor which the air can carry without loss by condensation depends on the air temperature. The higher the temperature the more vapor the air can carry. When moist air cools sufficiently there is too much water for the air to hold as vapor. Some vapor changes to liquid water, forming droplets which fall of their weight. So the ice in our cold drink cooled the air and condensed the vapor on the outside of the glass. This is the basic process by which rain forms in the atmosphere.

Snow forms by a similar process, but the temperature is so low that the water freezes to make snow when the vapor condenses. An analogy is the hoarfrost or Jack Frost paintings on the inside of a windowpane on a cold winter day. The water vapor in the room condenses as ice on the cold windowpane.

What causes the atmosphere to cool so that vapor condenses as rain or snow? The principal cause is the lifting of warm air to higher and cooler altitudes, for reasons that will soon be explained. Around the earth is a layer of air, or atmosphere, that thins from the ground upward. Its pressure on us is greater at ground level than 5 miles up because the layer is miles thicker. Now, when air is lifted up to a level where the layer of atmosphere above it is thinner, it expands because the pressure on it is less. Expansion cools the air by allowing its molecules to spread farther apart, thus reducing the frequency of their collision. Most of us have used bug bombs and other kinds of metal cans containing compressed gas and have noticed that the can gets cold when the pressure is released and the gas is allowed to escape. The principle is the same with rising water vapor: as it expands upward, it cools.

If cooling is sufficient, the vapor condenses as droplets of water and these droplets form rain. The condensation is helped by the presence of small particles of dust or of salt that are ever-present in the air.

The lifting itself comes about in two principal ways. First, winds that blow toward hills or mountains are forced to rise over the obstacle. The rising air cools, as explained above. This is a common cause of rain and snow in mountainous country. Second, when a mass of warm or light air meets a cold and heavy mass, the lighter air rises over the heavier air. In this case the cold heavy air acts like the mountain; it is an obstacle over which the warmer air must rise.

There is a third way in which air rises to levels where condensation of moisture may occur. Air close to a warm ground surface is heated from below just as water in a tea-kettle is heated by the burner on the stove. The heated air expands, becomes lighter, and therefore rises. This is the method by which most late afternoon thunderstorms occur on hot midsummer days.

What are clouds? Clouds are composed of many droplets of ice or condensed water. The whispy clouds at high levels are composed of small crystals of ice, but dark threatening storm clouds and fleecy, woolly-looking ones are made up of water droplets. Why are clouds usually white if they are composed of water droplets? The color depends on how much and what kind of light is reflected from the cloud, and it happens that the light reflected from clouds generally is white.

Clouds and rain are closely related to hydrology, and for that reason we have included a brief description of weather processes. Meterology, the study of weather, is an earth science, and all the science that deal with the earth are closely related to one another.

(To Be Continued)

WELL DRILLING STATISTICS FOR OCTOBER

During the month of October, 26 new wells were drilled and registered with the District office; 5 replacement wells were drilled; and one well was drilled that was either dry or non-productive for other reasons. The County Committees issued 48 new drilling permits. The permits issued and wells completed are listed below by counties.

County	Permits Issued	New Wells Drilled	Replacement Wells	Dry Holes Drilled
Armstrong	0	0	0	0
Bailey	5	2	1	0
Castro	2	0	2	0
Cochran	1	2	0	0
Deaf Smith	9	3	1	0
Floyd	1	2	0	0
Hockley	10	7	0	1
Lamb	1	1	0	0
Lubbock	9	3	0	0
Lynn	1	4	0	0
Parmer	9	1	1	0
Potter	0	0	0	0
Randall	0	1	0	0
Total	48	26	5	1

CORRECTION

Two errors were made in an article that appeared in last month's edition of "The Cross Section," entitled "Board of Water Engineers Publishes Bulletin on Texas Ground-Water Conservation Districts."

First, according to a letter received from John J. Vandertulip, Chief Engineer for the State Board of Water Engineers, the bulletin is not yet available for distribution to the public as was reported. It is still in the reviewing stages. Requests for the bulletin will be acknowledged and held until final publication and then filled.

Second, the article reported that the bulletin could be obtained upon request, free of charge. Again, according to Mr. Vandertulip, the State Board has as yet made no decision as to whether a charge will be made for the publication.

Buchan Promoted In Great Britain

"Geo Times," news magazine of the geological sciences, reports that Dr. Stevenson Buchan has been appointed assistant director of the Geological Survey of Great Britain.

Dr. Buchan toured the United States during this year and lectured at Texas Technological College. While in Lubbock, he visited the High Plains Water District to become acquainted with the conservation work being undertaken in this area. He also participated in a field trip to the eastern caprock to study the geology of the southern High Plains in Texas.

Dr. C. J. Stubblefield became the new director of the Survey in Great Britain. He succeeds Sir William Pugh who recently retired.

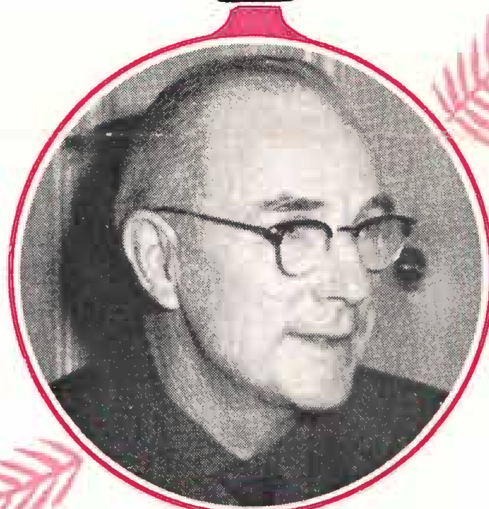
THE Cross SECTION

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

Volume 7—No. 7 "THERE IS NO SUBSTITUTE FOR WATER" December 1960

DIRECTORS OF THE HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT EXTEND

ELMER BLANKENSHIP



ROY HICKMAN

J.R BELT, JR

T.L SPARKMAN, JR

JOHN GAMMON

Season's Greetings

THE Cross SECTION

A MONTHLY PUBLICATION IF 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.

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ALLAN WHITE
Editor

BOARD OF DIRECTORS

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Dewitt McGehee ... Wayside, Texas
Cordell Mahler ... Wayside, Texas
Willie Modisette ... Wayside, Texas
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Bailey County

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Farm Bureau Office, Muleshoe

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Doyle Davis ... Maple, Texas
R. E. Ethridge ... Rt. 5, Muleshoe, Texas
Ross Goodwin ... Rt. 2, Muleshoe, Texas
Leldon Phillips ... Rt. 2, Muleshoe, Texas
Committeemen meet fourth Friday of each month at 2:30 p. m., Farm Bureau Office, Muleshoe, Texas.

Castro County

Eugene Ivey, Dimmitt

Fred Annen ... Dimmitt, Texas
George Bradford ... Dimmitt, Texas
E. H. Youts ... Dimmitt, Texas
Tom Lewis ... Rt. 4, Dimmitt, Texas
E. E. Foster ... Box 193, Hart, Texas

Committeemen meet on the last Saturday of each month at 10:00 a. m., Farm Bureau Office, Dimmitt, Texas.

Cochran County

W. M. Butler, Jr., Western Abstract Co., Morton

Earl Crum ... Rt. 2, Morton, Texas
D. A. Ramsey ... Star Rt. 2, Morton, Texas
Pat Hatcher ... Morton, Texas
Lloyd Miller ... Box 246, Morton, Texas
L. L. Taylor ... Rt. 1, Morton, Texas

Deaf Smith County

Mrs. Mattie K. Robinson
317 N. Sampson, Hereford

Raymond Higginbotham ... Rt. 1, Hereford, Texas
Jack Higgins ... Rt. 1, Wildorado, Texas
Earl Holt ... Rt. 3, Hereford, Texas
Clinton Jackson ... Rt. 5, Hereford, Texas
L. E. Ballard ... 120 Beach St., Hereford, Texas

Floyd County

Mrs. Katherine King, 319 South Main
Floydada

G. L. Fawver ... Rt. 5, Floydada, Texas
V. H. Kellison ... Rt. 2, Lockney, Texas
Chester W. Mitchell ... Lockney, Texas
Don Probasco ... Silverton St. Rt., Floydada, Tex.
Ernest Lee Thomas ... Rt. 1, Floydada, Texas

Hockley County

Z. O. Lincoln, 913 Houston, Levelland

Joe W. Cook, Jr. ... Rt. 1, Ropesville, Texas
Earl G. Miller ... Rt. 5, Levelland, Texas
Madison Newton ... Anton, Texas
Cecil Pace ... Levelland, Texas
Henry Schmidley ... Rt. 2, Levelland, Texas

Committeemen meet first and third Fridays of each month at 1:30 p. m., 913 Houston. Levelland, Texas.

Lamb County

Curtis Chisholm
600 E. 4th Street, Littlefield

J. B. Davis ... Rt. 1, Amherst, Texas
Henry Gilbert ... Sudan, Texas
Price Hamilton ... Earth, Texas
Albert Lockwood ... St. Rt. 2, Littlefield, Texas
Elmer McGill ... Olton, Texas

Committeemen meet on the second Tuesday of each month at 7:30 p. m., Jerry's Cafe, Littlefield, Texas.

Lubbock County

District Office, 1628 15th
Lubbock, Texas

W. W. Allen ... Rt. 4, Lubbock, Texas
Bill Alspaugh ... Box 555, Slaton, Texas
Vernice Ford ... 3013-20th St., Lubbock, Texas
Jack Noblett ... Rt. 1, Shallowater, Texas
Earl Weaver ... Idalou, Texas

Committeemen meet first and third Mondays of each month at 2:30 p. m., 1628-B 15th Street, Lubbock, Texas.

Lynn County

District Office, 1628 15th
Lubbock, Texas

Weldon Bailey ... Rt. 1, Wilson, Texas
Earl Cummings ... Wilson, Texas
Robbie Gill ... Rt. 1, Wilson, Texas
Frank P. Lisemby, Jr. ... Rt. 1, Wilson Texas
Erwin Sander ... Wilson, Texas

Committeemen meet first and third Tuesdays of each month at 10 a. m., 1628-B 15th Street, Lubbock, Texas.

Parmer County

Aubrey Brock, Bovina

D. B. Ivey ... Rt. 1, Friona, Texas
Lee Jones ... Rt. 1, Farwell, Texas
Dick Rockey ... R.F.D., Friona, Texas
Carl Schlenker ... Rt. 2, Friona, Texas
A. B. Wilkinson ... Bovina, Texas

Potter County

T. G. Baldwin ... Bushland, Texas
James S. Line ... Bushland, Texas
E. L. Milhoan ... Bushland, Texas
W. J. Hill, Sr. ... Bushland, Texas
R. C. Sampson, Jr. ... Bushland, Texas

Randall County

Mrs. Louise Knox
Farm Bureau Office, Canyon, Texas

J. R. Parker ... Canyon, Texas
James B. Dietz ... Rt. 2, Happy, Texas
A. C. Evers ... Rt. 4, Box 391, Amarillo, Texas
Jackie Meeks ... Rt. 2, Happy, Texas
W. A. (Bill) Patke - Rt. 4, Box 400, Amarillo, Tex.

Committeemen meet first Monday night each month at 7:30 p. m., 1710 5th Avenue, Canyon. Texas.

ANNUAL REPORT

Open Letter To District Residents

As the year 1960 draws to a close, we would like to briefly outline a few of the accomplishments that were made during the past twelve months by the High Plains Underground Water Conservation District.

Many of the things we point to with pride are of a tangible nature, while others are more elusive. For example, efforts made in the field of salt-water pollution have been rewarded by the physical closure of all earthen brine disposal pits within the bounds of the water district. This is a fact and one that is quite evident. On the other hand, efforts made in the legislative and educational fields are not so immediately evident. It sometimes takes many years to ultimately reach certain objectives.

Much work has been done during 1960 to assure that state laws which deal with the development and conservation of underground water are continued basically unchanged so that private ownership will be maintained.

Primarily for this reason, the water district maintains membership and close contact with organizations and associations throughout the state that are active in the field of water.

We have contemplated for several years presenting the legislature with a draft for a new state law. One that would give the water district power to close open abandoned wells. Wells in this category can be found throughout our district. They represent a real threat to the youth of our area. To obtain reactions and recommendations concerning such a bill, we are presently holding meetings with the County Committees in each county throughout the water district. Some such draft will be submitted to the legislature this coming session.

Efforts have been continually exerted by the water district to educate our people concerning the practicability of using surface-runoff water for irrigating crops. Many wet-weather lakes exist in this high plains country. Rainfall that runs off the land on which it falls drains into these depressions. By far the greatest percentage of the water that collects in the depressions is lost into the atmosphere through evaporation. During the year many portable pumping units were placed at the edges of lakes and were used to pump lake water back to the crop land where it was used for irrigation. By utilizing lake water that would have otherwise been lost, irrigators required less underground water for agricultural irrigation. Hundreds of lakes are being utilized; however, thousands remain untouched.

We will continue to promote practices designed to retain rainfall on the land where it falls. These include, among others, the addition of organic matter to the soil for the reduction of compaction and levelling land to reduce surface runoff.

We have been able to convey to the people, happenings in the water conservation field on the local, state and national levels, through the splendid cooperation of our area newspapers, radio and television stations. Because of their generosity, much general information concerning the district's activities and technical data has been disseminated to area residents. Without these news media, we would certainly not have been able to accomplish this job.

For many years we have sought a federal income-tax deduction for the people who can show a cost in the underground water beneath their land and who are using the water to produce income. More work has been done to foster this project than perhaps any other undertaking originated by the water district.

All approaches to favorable administrative rulings under existing tax laws have failed, leaving the only accessible avenue through the courts. At present, we are continuing in the preparation of the legal suit to be filed in the federal courts during the coming year. We sincerely hope that the outcome of the court proceedings will gain the long-sought income-tax deduction for water-users throughout the area. We believe that our claim for the deduction is right and just.

It is our earnest desire to serve each individual in our elected capacity as members of the Board of Directors of the High Plains Underground Water Conservation District. We always appreciate and invite the constructive suggestions of residents in the area that we represent.

We wish for each of you a very Merry Christmas and a prosperous New Year.

Sincerely, your Board of Directors,

High Plains Underground Water Conservation District

Elmer Blankenship, President
J. R. Belt, Jr., Vice President
John Gammon, Secretary-Treasurer
Roy Hickman, Member
T. L. Sparkman, Jr., Member

Annual Water District Election January 10

On January 10, 1961, the High Plains Underground Water Conservation District will again conduct its annual election of Directors and County Committeemen.

A total of five men serve on the board of directors of the water district. Also, each county within the district has a county committee that consists of five members.

The terms of office of three members of the board of directors expire this year, and the terms of office of two committeemen in each county also expire. Board members are elected for two years, and committeemen are elected for three years.

All qualified voters who reside within the bounds of the water district may vote in this election. The poll-tax receipt used for voting in the recently-held general election is the one that will be used for the water district election.

Voters who reside within District Director's Precinct No. 1 (Lubbock and Lynn counties), No. 3 (Bailey, Castro and Parmer counties), and No. 4 (Armstrong, Deaf Smith, Potter and Randall counties) will elect one member to the board of directors from each precinct.

Voters will also elect two committeemen in each county. In Floyd County, only the voters who reside within County Commissioner's Precincts No. 2 and No. 4 will be eligible to vote in the coming election. In Lamb County, only the voters who reside within County Commissioner's Precincts No. 1 and No. 4 will be eligible to vote. Qualified voters who reside within the district in any one of the other eleven counties that make up the High Plains Water District are eligible to cast a ballot.

Voting places in each county and nominees are shown below.

VOTING PLACES

ARMSTRONG COUNTY

1. Schoolhouse, Wayside

BAILEY COUNTY

1. Enochs' Gin Office, Enochs
2. Community House, Muleshoe

CASTRO COUNTY

1. County Courthouse, Dimmitt
2. Schoolhouse, Hart
3. Community Hall, Jumbo
4. Community Hall, Nazareth

COCHRAN COUNTY

1. County Activities Building, Morton
2. Star Route Coop. Gin, Morton

DEAF SMITH COUNTY

1. County Courthouse, Hereford

FLOYD COUNTY

1. County Courthouse, Floydada
2. City Hall, Lockney

HOCKLEY COUNTY

1. City Hall, Anton
2. County Courthouse, Levelland
3. Farm Center Gin, Ropesville
4. City Hall, Sundown
5. Farmer's Coop. Gin, Whitharral

LAMB COUNTY

1. City Hall, Olton
2. City Hall, Sudan

LUBBOCK COUNTY

1. City Hall, Idalou
2. Old County Courthouse, Lubbock
3. Community Clubhouse, Shallowater
4. City Hall, Slaton
5. Frenship Schoolhouse, Wolfforth

LYNN COUNTY

1. Community Center, New Home
2. City Judge's Office, Wilson State Bank, Wilson

PARMER COUNTY

1. Wilson & Brock Real Estate Office, Bovina
2. County Courthouse, Farwell
3. American Legion Hall, Friona
4. Schoolhouse, Lazbuddie

POTTER COUNTY

1. Schoolhouse, Bushland

RANDALL COUNTY

1. V.F.W. Hall, Canyon
2. Ralph Switch Grain Co., Ralph Switch
3. Schoolhouse, Umbarger

NOMINEES FOR DISTRICT DIRECTOR

DIRECTOR'S PRECINCT NO. 1
(Lubbock and Lynn Counties)
(Vote for One)

1. Elmer Blankenship, Rt. 2, Wilson
2. Earl Weaver, Idalou
3. ________

DIRECTOR'S PRECINCT NO. 3
(Bailey, Castro & Parmer Counties)
(Vote for One)

1. John Gammon, Lazbuddie
2. ________

DIRECTOR'S PRECINCT NO. 4
(Armstrong, Deaf Smith, Potter and Randall Counties)
(Vote for One)

1. T. L. Sparkman, Jr., Hereford
2. ________

NOMINEES FOR COUNTY COMMITTEEMEN

ARMSTRONG COUNTY

(Residents of Commissioner's Precinct No. 3, Vote for Two)

1. James Bible, Wayside
2. George A. Denny, Happy
3. Charles Kennedy, Happy
4. Carroll D. Rogers, Wayside
5. ________

BAILEY COUNTY

(Residents of Commissioner's Precinct No. 2, Vote for One)

1. Ralph E. Ethridge, Rt. 5, Muleshoe
2. Leldon Phillips, Rt. 2, Muleshoe
3. ________

(Residents of Commissioner's Precinct No. 4, Vote for One)

1. Lester Howard, Rt. 5, Muleshoe
2. L. H. Lewis, Rt. 5, Muleshoe
3. ________

CASTRO COUNTY

(Residents Vote for One Committeeman-At-Large)

1. George Bradford, Box 732, Dimmitt
2. Ulys Davis, Dimmitt
3. ________

(Residents of Commissioner's Precinct No. 2, Vote for One)

1. C. W. Anthony, Rt. 4, Dimmitt
2. Tom Lewis, Rt. 4, Dimmitt
3. ________

COCHRAN COUNTY

(Residents Vote for One Committeeman-At-Large)

1. Woody Dickson, Rt. 2, Morton
2. Floyd Lightner, Star Route 2, Morton
3. Weldon Newsom, Rt. 2, Morton
4. ________

(Residents of Commissioner's Precinct No. 1, Vote for One)

1. H. B. Barker, Morton
2. Earl Crum, Morton
3. ________

DEAF SMITH COUNTY

(Residents Vote for One Committeeman-At-Large)

1. J. E. McCathern, Jr., Rt. 5, Hereford
2. R. W. Mitchell, Rt. 5, Hereford
3. ________

(Residents of Commissioner's Precinct No. 1, Vote for One)

1. Charles Packard, Rt. 3, Hereford
2. Stanley Slagle, Rt. 3, Hereford
3. ________

FLOYD COUNTY

(Residents of Commissioner's Precinct No. 2, Vote for One)

1. V. H. Kellison, Box 846, Lockney
2. Forrest Micky, Rt. M, Lockney
3. ________

(Residents of Commissioner's Precinct No. 4, Vote for One)

1. G. L. Fawver, Rt. 5, Floydada
2. R. L. Neil, Rt. 5, Floydada
3. ________

HOCKLEY COUNTY

(Residents Vote for One Committeeman-At-Large)

1. Bryan Daniel, Rt. 2, Levelland
2. P. G. Marcom, Levelland
3. L. F. Schoenrock, Rt. 4, Levelland
4. Jack Sherrod, Rt. 3, Levelland
5. ________

(Residents of Commissioner's Precinct No. 3, Vote for One)

1. Robert Hill, Jr., Rt. 3, Levelland
2. Hugh Savage, Rt. 3, Levelland
3. ________

LAMB COUNTY

(Residents of Commissioner's Precinct No. 1, Vote for One)

1. Willie Gene Green, Olton
2. Bill Langford, Olton
3. ________

(Residents of Commissioner's Precinct No. 4, Vote for One)

1. Lewis Fields, Sudan
2. Henry Gilbert, Sudan
3. ________

LUBBOCK COUNTY

(Residents Vote for One Committman-At-Large)

1. W. J. Bryant, 1902 Ave. C, Lubbock
2. Dan Young, 402 19th St., Lubbock
3. ________

(Residents of Commissioner's Precinct No. 3, Vote for One)

1. Virgil Isom, Idalou
2. Carlos May, Rt. 1, Idalou
3. ________

LYNN COUNTY

(Residents of Commissioner's Precinct No. 1, Vote for One)

1. Earl Cummings, Wilson
2. Lloyd Mears, Rt. 1, Wilson
3. ________

(Residents of Commissioner's Precinct No. 4, Vote for One)

1. Frank P. Lisemby, Jr., Rt. 1, Wilson
2. E. M. Rudd, Rt. 1, Wilson
3. ________

PARMER COUNTY

(Residents Vote for One Committeeman-At-Large)

1. Wayne Garth, RFD, Friona
2. Walter Kaltwasser, RFD, Farwell
3. Raymond Schueler, RFD, Friona
4. Gene Smith, RFD, Muleshoe
5. A. B. Wilkinson, Bovina
6. ________

(Residents of Commissioner's Precinct No. 4, Vote for One)

1. D. B. Ivy, RFD, Friona
2. Joe B. Jennings, RFD, Muleshoe
3. ________

POTTER COUNTY

(Residents of Commissioner's Precinct No. 4, Vote for Two)

1. T. G. Baldwin, Bushland
2. Eldon Plunk, Rt. 1, Amarillo
3. R. C. Sampson, Jr., Bushland
4. ________

RANDALL COUNTY

(Residents of Commissioner's Precinct No. 2, Vote for One)

1. Leonard Batenhorst, Rt. 1, Canyon
2. Ed Wieck, Rt. 1, Canyon
3. ________

(Residents of Commissioner's Precinct No. 4, Vote for One)

1. Lewis A. Tucek, Rt. 1, Canyon
2. Bruce Winn, Rt. 1, Canyon
3. ________

WELL DRILLING STATISTICS FOR NOVEMBER

During the month of November, 29 new wells were drilled and registered with the District office; 5 replacement wells were drilled; and 1 well was drilled that was either dry or non-productive for other reasons. The County Committees issued 42 new drilling permits. The permits issued and wells completed are listed below by counties.

County	*Permits Issued*	*New Wells Drilled*	*Replacement Wells*	*Dry Holes Drilled*
Armstrong	0	0	0	0
Bailey	2	3	0	0
Castro	0	2	1	0
Cochran	2	0	0	0
Deaf Smith	4	3	1	0
Floyd	1	5	1	0
Hockley	6	7	0	0
Lamb	0	0	0	0
Lubbock	17	1	1	1
Lynn	9	0	1	0
Parmer	1	3	0	0
Potter	0	0	0	0
Randall	0	5	0	0
TOTALS	42	29	5	1

Water Committee's Recommendations

The Texas Water Conservation Association has more-or-less "sponsored" the organization of a group to study Texas water problems called, "Texas Coordinating Water Committee."

The committee was organized at the request of the Texas Society of Professional Engineers, the Texas Section of the American Society of Civil Engineers, and the East and South Texas Chambers of Commerce. It consists of one member representing each of these organizations, plus one member representing each of the following organizations:

The West Texas Chamber of Commerce

State Bar Association

Texas Agricultural Water Committee

Texas League of Municipalities

Texas Manufacturers Association

Lower Rio Grand Valley Chamber of Commerce.

The Texas Water Conservation Association.

At Governor Price Daniels' request the committee has made certain recommendations. One recommendation involves the reorganization of the State Board of Water Engineers. The recommendation states, ". . . that the necessary laws be passed so as to reorganize the Texas State Board of Water Engineers to the end that there will be created a six (6) member, part-time Texas Water Commission which shall employ and act through an Executive Director for the administration of all water resource matters; and further, that there be complete separation of the engineering functions and the quasi-judicial and quasi-legislative functions under this Commission; and further, that it be mandatory that the Texas Water Commission use hearing examiners; and further, that the members of the Texas Water Commission be selected from geographical areas reflecting the entire State of Texas."

Another very important recommendation made by the Texas Coordinating Water Committee to the governor is, ". . . that the administrative cost of the State Board of Water Engineers or its successor be financed by the levying of water-use fees; such fees to be determined on the basis of all surface water whether fresh, brackish or sea water requiring a permit (from the Board of Water Engineers) and on all ground water used for municipal, industrial and other purposes (except irrigation) in excess of 70,000 gallons per day installed pumping capacity and for irrigation use in excess of five (5) acres irrigated."

Letter From Tel-Aviv, Israel

A very interesting letter was received in the mail a few days ago. It read:

High Plains Underground Water
Conservation District No. 1
1628 15th Street
Lubbock, Texas
U. S. A.

Gentlemen:

We are interested in your publication "The Cross Section," some copies of which have come to our attention. We would be obliged if you could put us on your mailing list.

Please send us your pro-forma invoice for the amount due, in order to enable us to apply for the necessary foreign currency allocation.

Yours very truly,
H. Wellisch
Librarian
Water Planning for Israel, Ltd.
P. O. Box 11170
Tel-Aviv, Israel

We have placed the water planning organization on our permanent mailing list to receive "The Cross Section" each month. We hope that information contained in our newspaper will help the people of Israel in formulating plans for water development and conservation.

WATER - LEVEL MEASUREMENTS TO BE MADE IN JANUARY

Don't be unduly alarmed if you see a pickup truck driving across your farm and a total stranger get out and appear to be snooping around your irrigation well. Chances are it will only be a fellow there to measure the water-level in your well.

Very soon the U. S. Geological Survey and the State Board of Water Engineers will commence making annual water-level measurements in established observation wells throughout the water district and the entire High Plains. This program is a cooperative effort between the two agencies. The High Plains Water District also assists in making the measurements.

Checking the water levels in area wells indicate the amount of depletion since the last measurement, a year ago, and the amount of water that remains in storage. This same reasoning is used when you check the oil level in the crankcase of your automobile engine.

Approximately two months will be required to make the measurements in the field and process them in the offices. The water district will publish the measurements as soon as they can be released.

"A Primer on Water" – U.S.G.S. Publication

Editor's Note—The following is an excerpt from the new U.S.G.S. booklet, entitled "A Primer on Water." This is the second in a continued series.

PART I HYDROLOGY

Sources of Moisture in the Air

Rainfall, snowfall, sleet, and hail are collectively known as *precipitation*, a word derived from the Latin—to fall headlong. The word *rainfall* is also sometimes used in the general sense to mean precipitation.

One might ask where most of the moisture comes from that falls from the clouds as rain. Water evaporates from the ground surface, from all open bodies of water, such as lakes and rivers, and, of course, from the ocean.

Plants give up moisture through their leaves. This process is called *transpiration*. For example, an acre of corn gives off to the air about 3,000 to 4,000 gallons of water each day. A big oak tree gives off about 40,000 gallons per year. This water is first taken up by the roots from the soil, moves up the trunk as sap, and emerges from the plant through thousands of small holes on the under side of every leaf.

Transpiration from plants is one of the important sources of water vapor in the air and often produces more vapor than does evaporation from land surface, lakes, and streams. However, by far the most important source of moisture in the air is evaporation from the oceans, particularly those parts of the ocean which lie in the warm parts of the earth.

For this reason, if you live in central United States, the rain which falls on your city is probably largely composed of particles of water which were evaporated from the ocean near the equator or Gulf of Mexico. Only a relatively small part was evaporated or transpired from rivers, lakes, and plants near your home. The winds in the upper air carry moisture long distances from the oceans where evaporation is great.

We spoke of the heat required to change the water from liquid to vapor in the familiar process we know as evaporation. The air carries away the heat with the vapor, and the heat is given up when the vapor condenses to form clouds. Thus the earth's atmosphere is a vast heat engine powered by the sun. Now the nature of the hydrologic cycle becomes evident: Through the energy provided by the sun, water evaporates from the land and ocean, is carried as vapor in the air, somewhere to fall as rain or snow, returning to the ocean or to the land again to go through the same process, around and around.

This universal truth was forgotten in the Dark Ages. The ancients had some appreciation of it for we can read in the Bible, "All the rivers run into the sea, yet the sea is never full; unto the place from whence the rivers come thither they return again."

As the water circulates over the earth through this grand cycle, we have access to usable water only while it is on the land surface or in the ground.

Surface Water and Ground Water

A discussion of water in the air and its precipitation as rain or snow leads logically to that part of the hydrologic cycle that concerns us most—water on the land. Water on the land surface is visible in lakes, ponds, rivers, and creeks. This is what is called surface water. What you do not see is the important water that is out of sight—called ground water because it is in the ground. Separate names for surface and ground water are useful to describe where the water is, not because they are different kinds of water. Both come from precipitation.

Precipitation Becomes Surface Water And Ground Water

When it rains everything out of doors is wet: grass, trees, the pavements, and houses. Some water gathers in puddles. When it rains hard you can see water running over the surface of the ground between blades of grass, between the tilled rows in a cultivated field, or even below the leaf and twig layer of the forest floor. On a steep pavement in a hard rain you often can see a sheet of water flowing downhill. This "sheet flow" is best seen at night by using a flashlight or in the light of passing automobiles. The sheet flow makes a glimmering reflection. Such surface flow runs downhill to the nearest rill, creek, or gutter drain; and if you can see sheet flow, you can be sure that the headwater creeks are carrying storm water down to the bigger creeks and rivers.

This is the visible part of the hydrologic or water cycle. While it is raining and the ground is wet, some water is absorbed by the soil. Let us see what happens to it.

(To Be Continued)

WHEN YOU MOVE . . .

Please notify High Plains Water District, 1628 - 15th Street, 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."

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

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