THE Cross SECTION

Published monthly by High Plains Underground Water Conservation District No. 1, 2930 Avenue Q, Lubbock, Texas 79405

Volume 25—No. 1 Publication number USPS 564-920, Second Class Postage paid at Lubbock, Texas *January, 1979*

IRRIGATION SYMPOSIUM SCHEDULED FOR FEB. 22

Using irrigation and rain water wisely has always made the difference between success or failure for farmers in West Texas. Texas Agricultural Experiment Station and USDA Science and Education Administration Scientists at Amarillo and Bushland, Texas, have been studying water conservation for 30 years. Recently they have discovered new techniques that greatly improve efficiency of water use. Dr. G. B. Thompson, Research Director, invites interested people to a symposium to be held February 22 at the Texas A & M University Agricultural Research and Extension Center, 6500 Amarillo Blvd. West, Amarillo, beginning at 10:00 a.m.

The keynote speaker will be Mr. A. L. Black, Chairman, Texas Water Development Board. He will discuss the "Water Situation for Agriculture." Mr. Reggie Jones, USDA Soil Scientist, will follow with a 20-year evaluation of conservation bench terraces. The morning session will be completed by Drs. Nolan Clark and Paul Unger, USDA Scientists. Dr. Clark will discuss research on using dikes in lister furrows to conserve water. Dr. Unger will present his findings on managing crop residues for maximum water conservation.

Subjects to be covered in the afternoon session include weed control in conservation farming systems, low energy precision water application systems, and techniques for maximizing profits from irrigation water. These subjects, and others, will be covered by researchers and staff members from the Amarillo and Bushland Centers.

February 17 Set As Meeting Date For Water, Inc.

The 12th Annual Membership meeting of Water, Inc., has been set for Saturday, February 17, at the Lubbock Memorial Civic Center, according to Duncan Ellison, Executive Director of the organization.

Kent Hance, the U.S. Representative for the 19th Congressional District, and Harvey Davis, Executive Director of the Texas Department of Water Resources, will be the speakers for the morning's activities. Reagan Brown, the Texas Commissioner of Agriculture, will be the luncheon speaker.

Registration for the meeting, which is open to the public, will begin at 8:00 a.m. with the $7.50 registration fee covering all the activities, including the luncheon.

Results From 1979 District Election Announced

WEBB GOBER

★ ★ ★

Precinct Three Re-elects Gober

Webb Gober, of Farwell, was re-elected to the Board of Directors of the High Plains Underground Water Conservation District No. 1 in balloting conducted on January 20, according to complete but unofficial returns. Gober, who will be serving his fourth term on the Board, represents Director's Precinct Three, which includes Bailey, Castro and Parmer Counties.

In previous terms, he has served as Secretary-Treasurer, Vice-President and President of the District's Board of Directors. Gober and his wife, Irene, live nine miles northeast of Farwell where they farm 480 acres of irrigated crops.

He and his wife have four children; three sons, Jerald, Dale and Alan, and a daughter, Kathryn, all of whom have graduated from Texas Tech and live away from the Gober farm.

Gober believes the aims of the District in the water conservation area can best be accomplished through public education and he feels that the high schools are excellent training grounds for water conservation practices.

The District is pleased to have Gober back for another term as his past experience, on the Water District Board and as a member of the Board of Directors of the Texas Water Conservation Association, will be an invaluable asset for the Water District in the next two years.

JIM CONKWRIGHT

★ ★ ★

Conkwright Elected Precinct 4 Director

James C. (Jim) Conkwright is the newest member of the Board of Directors of the High Plains Underground Water Conservation District No. 1 according to unofficial, but complete, returns of the balloting conducted on January 20. Conkwright was elected from Director's Precinct Four, which includes the Water District areas of Armstrong, Deaf Smith, Potter and Randall Counties.

A lifelong resident of the Hereford area, Jim is currently engaged in the production of Registered Hereford cattle and farm crops. His home, the C Bar Ranch, is located approximately 15 miles north of the city of Hereford.

He was born March 10, 1942, and grew up in and around Hereford. His parents, Mr. and Mrs. Colby Conkwright of Hereford, and family have been involved in ranching and farming in the Hereford area since 1926. Jim graduated from Texas Tech University in 1964 with a degree in Animal Science, Business Option.

In 1963 he married Janice Berry, of Rosston. They have two daughters; Robin, who is 12 years old, and Leslie, who is nine.

Jim has long been an active civic leader in the Hereford area. He is a past President of the Deaf Smith County Chamber of Commerce (1973), past President of the Hereford Independent School District (1975, 76, 77), and past President of the Hereford Rotary Club (1977-78). Other past activities include having met with President Gerald Ford in 1974, at the White House, to discuss agricultural matters and in 1975 he was named one of the Five Outstanding Young Texans by the Texas Jaycees. In 1971-72 he served as the President of the Texas Hereford Association, the youngest president in that organization's 75 year history.

Jim is currently serving as the President of the Llano Estacado Council of the Boy Scouts of America; as Chairman of the Deaf Smith County Chamber of Commerce Governmental Affairs Committee; as a Trustee of the Kings Manor Methodist Home, Inc., and the First United Methodist Church of Hereford; as a member of the Hereford Rotary Club and the Deaf Smith County Livestock Committee; and as a Director of Arrowhead Mills, Inc., and the Texas Hereford Association.

The Water District welcomes Conkwright, who replaces outgoing member of the Board Ray Gerk of Hereford.

Webb Gober and James C. (Jim) Conkwright have been elected to the Board of Directors of the High Plains Underground Water Conservation District No. 1 according to complete but unofficial returns from the balloting conducted on Saturday, January 20. Also elected were fourteen (14) County Committeemen.

County Committeemen elected in the ballotting were as follows:

Armstrong County
James Bible, Wayside
James Stockett, Wayside

Bailey County
D. J. Cox, Enochs
Marshall Head, Muleshoe

Castro County
George Elder, Dimmitt
Floyd Schulte, Dimmitt

Deaf Smith County
Bill Cleavinger, Hereford
W. L. Davis, Jr., Wildorado

Parmer County
Floyd S. Reeve, Friona
Ralph Roming, Bovina

Potter County
Sam Line, Bushland
Mark Menke, Bushland

Randall County
Bill Dugan, Happy
Roger B. Gist, III, Happy

Official vote totals will be available after the District Directors canvass the votes at their Board meeting on February 5.

Armstrong And Potter County Approximate Saturated Thickness Maps Displayed

by Don McReynolds

The maps entitled "Approximate Saturated Thickness of the Ogallala Formation, 1976 — Armstrong County, Texas" and "Approximate Saturated Thickness of the Ogallala Formation, 1976 — Potter County, Texas," presented on page three of this issue of "The Cross Section" present an estimate of the quantity of water in storage in the Ogallala formation beneath the High Plains Underground Water Conservation District Number One service areas of Armstrong and Potter Counties. The definition of saturated thickness as portrayed on these maps refers to the vertical interval, in feet, from the static water level downward to the relatively impermeable layer of fine grained rock materials, primarily clays, which serve as the bottom or barrier to further downward percolation of water in the Ogallala formation. This layer of fine grained materials, commonly referred to as the "red beds" in the areas of this discussion, is generally believed to be a part of the erosional land surface of Triassic age rocks on which the Ogallala was deposited. Because this buried erosional land surface had relief consisting of hills and valleys, the covering Ogallala sediments were originally deposited and remain today of varying thickness. The variable saturated thicknesses portrayed on the maps are reflective of the varying thickness of the originally deposited Ogallala sediments.

The barrier effect of the "red beds" deserves further explanation. It is particularly important in that its effect is probably most directly responsible for the development and maintenance of the accumulated water in the Ogallala formation to produce this water table aquifer. Without this barrier, it is likely that the groundwater now capable of being economically recovered would have long ago been lost to deep percolation.

Grain size of contributing sediments to the Ogallala formation is generally quite variable both horizontally and vertically. Individual intervals of the formation also often lack continuity both horizontally and vertically. These variations of the aquifer structural framework and variable saturated thicknesses combine to influence the differing water yielding characteristics of the aquifer in different areas.

The saturated thickness of the Ogallala is not an unchanging feature. It is unfortunate that most areas served by this aquifer are characterized by a decrease of saturated thickness as water is pumped from the aquifer. The changes most notable and easily documented to verify this decrease or increase in saturated thickness are the measurement and recording of water level declines or rises in wells penetrating the aquifer. The usual change is a lowering of the water table. These changes in water levels are documented within the District service area by the changes in depths to water measurements which are recorded annually from the network of water level observation wells maintained and measured by District personnel.

Of the nine water level observation wells measured within the District service area of Armstrong County, the average water level decline from January 1977, to January 1978, was just under one and one-half feet. Within the Potter County District service area, in the four wells measured, the average decline for the same period was just under two feet.

In the District area of Armstrong County the range of the changes in depths to water from January 1977, to January 1978, ranged from a small net rise in two of the measured wells to a maximum of just under three and one-half feet. The range of change during the same time period for the Potter County water level observation wells ranged from just under one foot to over four feet in one measured well.

It has generally been observed that areas of relatively thicker saturated thicknesses exhibit larger rates of water level decline while the reverse is usually the case for those areas exhibiting relatively thinner saturated thicknesses.

The saturated thicknesses presented on the map for the District service area of Armstrong County ranged from less than 25 feet to over 50 feet with the greater thicknesses located south and southwest of the community of Wayside. The saturated thicknesses for the District service area of Potter County ranged from less than 25 feet to over 125 feet with the greater thicknesses to be found to the west of the community of Bushland.

Armstrong And Potter Committeemen Listed

Armstrong and Potter Counties, though they are the smallest individual county portions within the High Plains Underground Water Conservation District No. 1 service area, have consistently provided the District with excellent leaders who have given freely of their time and talents in promoting the District and its activities.

In promoting the Water District they have spent many hours of their time which could have been spent on their own businesses and families. Listed below are the people who have served in the capacity of County Committeeman from Armstrong and Potter Counties.

Neither of the counties have had secretaries because of the small number of permits issued; therefore, the function of the secretary has been handled by one of the County Committeemen.

ARMSTRONG COUNTY COMMITTEEMEN

H. T. Duke
Bill Heisler
Melton McGehee
John Patterson
W. R. Stockett
Floyd B. Adams
James Bible
Guy Watson
Clifford Stevens
H. C. Newsome
Jack McGehee
Willie Modisette
Cordell Mahler
Robert Adams
Dewitt McGehee
Carroll D. Rogers
Foster Parker
George Denny
Charles Kennedy
Leslie Adams

POTTER COUNTY COMMITTEEMEN

Eldon Plunk
T. B. Baldwin
Earl Barclay
W. J. Hill, Sr.
R. C. Sampson, Jr.
Jim Line
E. L. Milhoan
James W. Walton
L. C. Moore
Temple Rogers
Fritz Meneke
Vic Plunk
W. J. Hill, Jr.
F. G. Collard
Henry W. Gerber
F. G. Collard, III
Albert Nichols
Weldon Rea

Important Studies, Research, Experiments Underway At Bushland Research Facility

The Southwestern Great Plains Research Center of the U.S. Department of Agriculture is located at Bushland, Texas, approximately 12 miles west of Amarillo on Interstate Highway 40. Scientists and engineers of the Soil and Water Conservation Research Division of the Agricultural Research Service and the Texas Agricultural Experiment Station use the location's fine facilities to conduct research to meet current and future needs.

The Center emphasizes research and study of conservation and management of soil, water, plant and livestock resources. The Center has grown continuously since its start in the early 1900's. Today the approximately 2000 acre facility houses research space for about seventy people.

Because of its location in the semi-arid lands of West Texas it seems logical that a large portion of the work done at the Center would involve water management. Irrigation research is important at the Center as irrigation has been the major basis for the unparalleled growth of agricultural production on the High Plains of Texas.

The water used for irrigation of the area crops comes from the Ogallala formation, which is being depleted faster than it is being recharged. This "mining" of the area's major water supply will eventually lead to insufficient groundwater supplies for optimum irrigation rates. Research and experiments are underway at the Center to try and find the most efficient means of utilizing irrigation water in conjunction with the approximately 18 inches of annual rainfall received in the area. These efforts are aimed at trying to maintain high levels of production and extend the usable life of the Ogallala Aquifer.

Some of the experiments and studies underway are those involving different application methods such as spraying, furrow application, and low-pressure drip irrigation systems. Other studies underway are rate of advance, water intake, storage, tailwater runoff from graded furrows, and limited irrigation of wheat and sorghum in alternate drill strips by irrigating only two inside rows of the growing crop and letting the outside rows benefit from any natural precipitation that falls on the idle land.

Also under study is the effort to recharge the Ogallala Aquifer using playa water injected through wells into the water-bearing formation. The feasibility of recharging the aquifer by spreading playa water over modified soil or substrata is also being explored. Related studies are being conducted on the water intake rates of the different soil types on the High Plains and how they can be modified to increase their intake rates and maintain the soil moisture necessary for producing good crops.

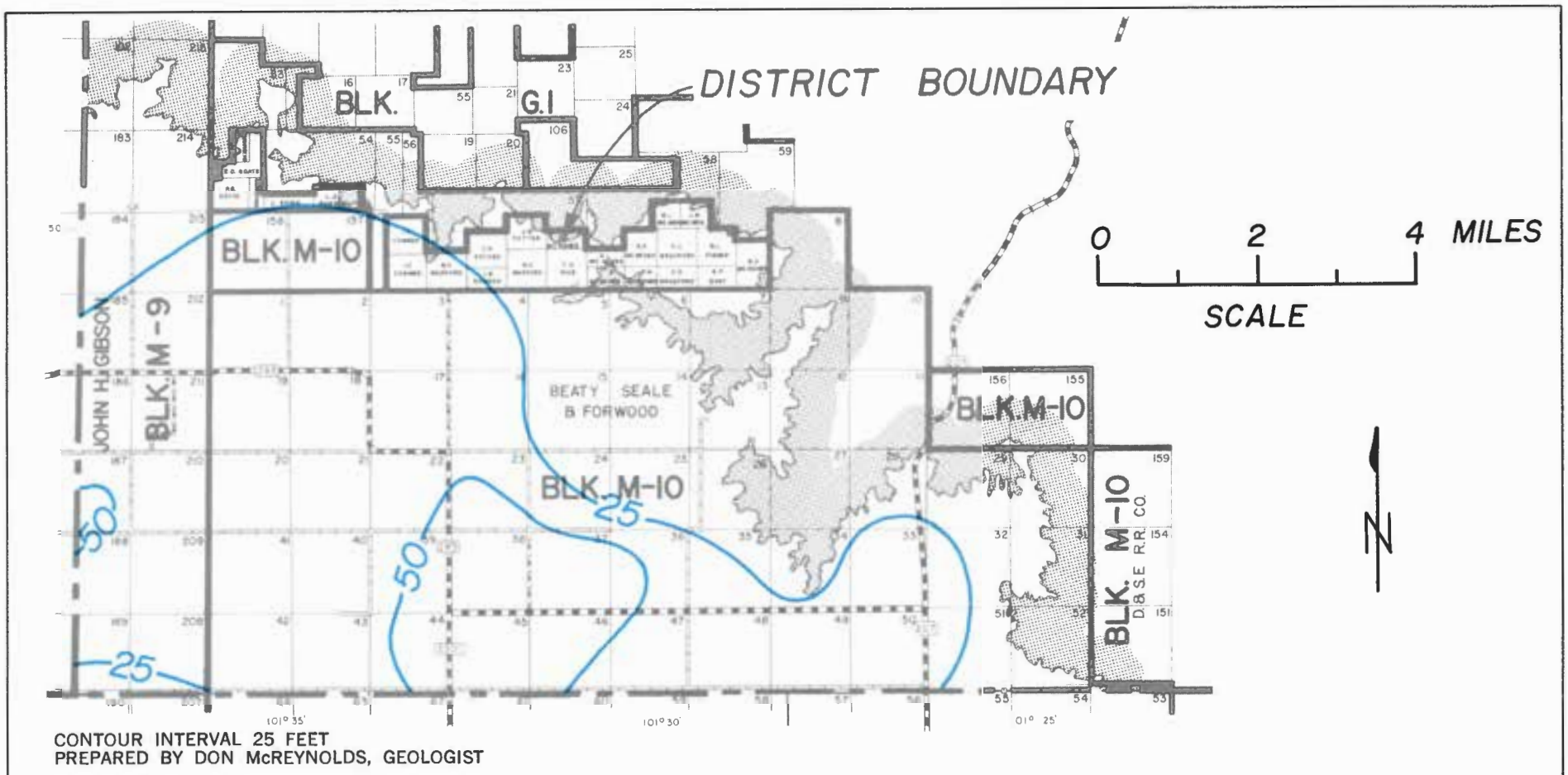
Recognizing that there is the possibility of not having enough water for irrigation in the future, the researchers are also studying various methods of conserving moisture in a dryland farming environment. Such methods as stubble mulching, terracing, bench levelling and water harvesting are under continuous study. Other studies in this area include the effect of time and method of tillage on wheat yields, moisture storage during fallow periods, and long term effect on soil properties. Climate-crop yield relationships, effect of position on a slope on soil moisture and wheat production, and the effect of frequency of tillage on soil moisture and wheat yields are also areas for study.

Other major areas of study and experiment include crop improvement, weed control, soil fertility, grass establishment and seed harvesting, livestock grazing, animal waste management, aquifer pollution control and insect control. The number of studies in each of these broad areas varies from a handful to nearly ten.

One other related area of extreme importance being studied is in the area of energy supply for irrigation pumps. With the cost of energy maintaining an every increasing profile it has been necessary to seek a means of cheap energy, and many efforts have been aimed at the farmer and rancher's old friend—the windmill.

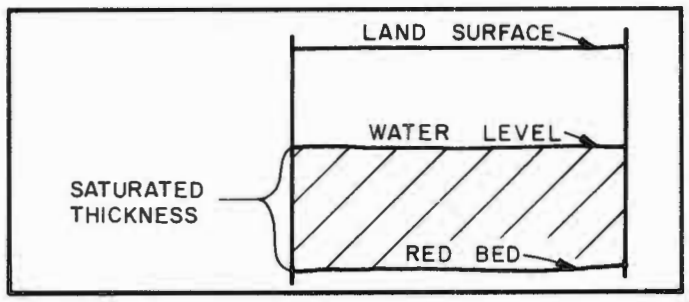
The High Plains is one of the best areas in the nation for wind energy research, according to a recent report. The report went further to say that by 1985 it will be possible that one-half of irrigation could be powered by wind turbines, or a combination of wind and conventional energy devices.

A combined effort between the USDA Science and Education Administration and the Alternate Energy Institute at West Texas State University is currently underway. In a "combined-energy" test, and from the data already collected it appears that the potential in the system is more than adequate to further the tests. The economics of this type of "combined-energy" system indicate the possibility of huge savings over conventional means.

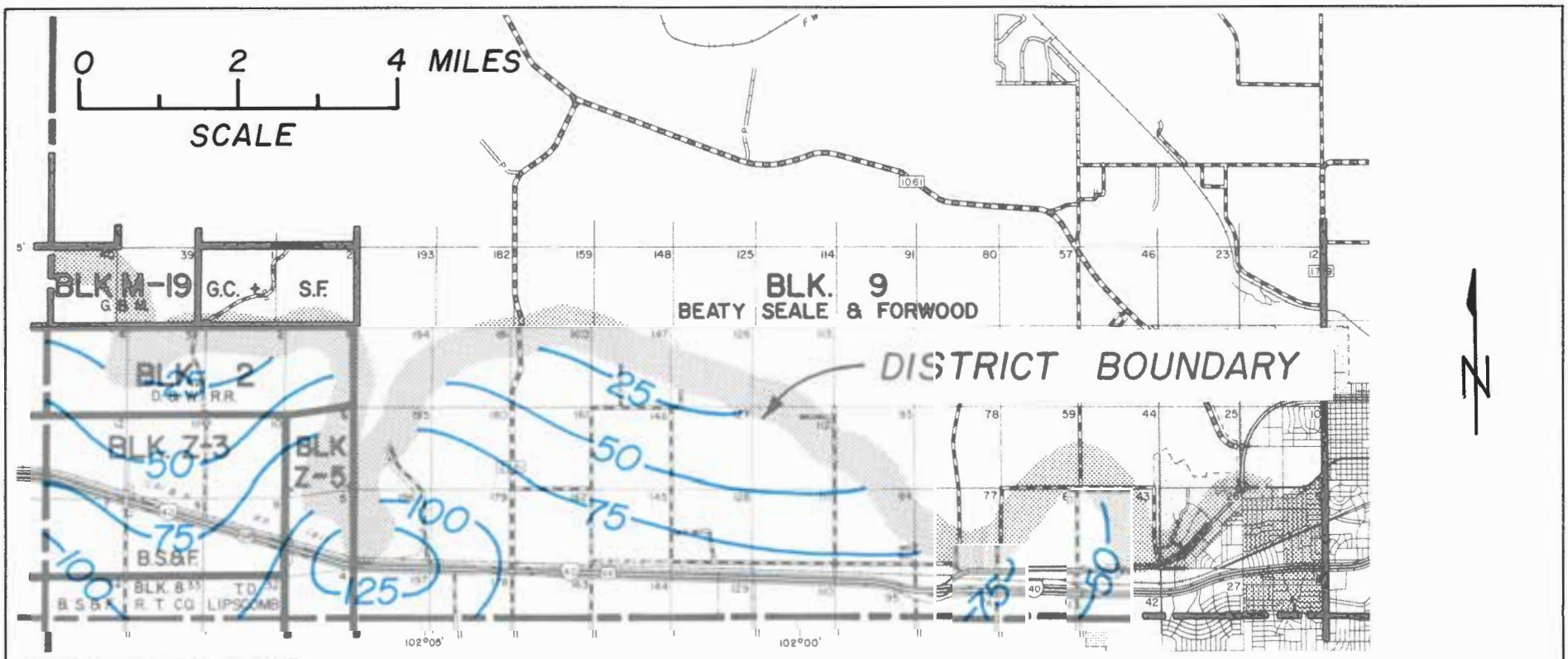


CONTOUR INTERVAL 25 FEET
PREPARED BY DON McREYNOLDS, GEOLOGIST

APPROXIMATE SATURATED THICKNESS OF THE OGALLALA FORMATION, 1976—ARMSTRONG COUNTY, TEXAS



A base of Ogallala Formation map, necessary for the construction of this map was developed pursuant to Texas Department of Water Resources and U.S. Geological Survey sponsorship through contract TDWR 14-90012.



CONTOUR INTERVAL 25 FEET
PREPARED BY DON McREYNOLDS, GEOLOGIST

APPROXIMATE SATURATED THICKNESS OF THE OGALLALA FORMATION, 1976—POTTER COUNTY, TEXAS

THE Cross SECTION

THE CROSS SECTION (USPS 564-920)

WATER CONSERVATION IN AND AROUND THE HOUSE

The following article is the first part of a two-part article covering household water conservation practices. It was taken from a 1978 publication of the Texas Department of Water Resources.

Poor Richard's Almanac tells us that, "When the well's dry we know the worth of water." It's time in Texas to pay heed.

Texans have realized for decades the value of water to their health and the state's economy. Now, however, with a population that has grown by tens of thousands and is continuing to grow, we face water shortages in many regions of our State. More people using more water for more purposes places an acute demand on water resources which have not increased as water requirements have grown.

From 1964 through 1974, average municipal water use per person in Texas increased each year by one and one-third gallons per person. During the same ten-year period, average water use has been about 139 gallons per person each day, and during the past five years it increased to 145 gallons per person per day.

Per capita water use varies across the State, however, generally increasing from east to west and, during periods of extended drought, water use increases markedly, largely because of increased outdoor use.

Most municipal water is used for normal domestic purposes — bathing, drinking, cooking, washing dishes, laundering, and other in-house purposes, plus outside uses such as lawn watering and car washing.

It is these household water uses which, if carefully managed, can represent real water conservation which means using only the water you NEED and saving the rest for another time.

And remember, not only will you conserve our most valuable resource, but you will, at the same time, reduce that water bill that seems to grow with each monthly statement.

Here is the first part of 50 easy ways to reduce water consumption in and around your home, and lower the water bill while you're doing it.

In the bathroom . . .

About 75 percent of the water in the home is used in the bathroom. Put these conservation tips to work.

Showers usually use less water than tub baths. Do this the next time you shower: Plug the drain and compare the water level with the level you would use for a tub bath. This will give you a good idea as to how much water you save with a shower.

Install a shower head that restricts the amount of flow. You can reduce the amount of water used from about five gallons per minute to approximately two-and-a-half gallons per minute and the new, or modified, shower head will pay for itself in a short time.

Take shorter showers. Turn the water off while soaping and back on again only to rinse.

Don't use hot water when cold will do. Save water and energy by washing hands with soap and cold water; add hot water only when hands are especially dirty.

If you have no shower and must take tub baths, reduce the level of the water you have been using by one or two inches.

When brushing your teeth, turn off the water until you need to rinse your mouth.

Even when washing hands, don't let the water run. Wet hands, turn off the water while soaping and scrubbing, and turn it on again to rinse.

Shampoo your hair in the shower. It takes little more water than for the bath, and much less than a separate shampoo will use.

When shaving, pond hot water in the basin instead of letting the faucet run.

Your commode could be leaking without your knowing it. Do this: Add a few drops of food coloring to the water in the tank, but do not flush. Now watch to see if the coloring appears in the bowl within a few minutes. If it does, the fixture needs adjustment or repair.

Weight two one-quart plastic bottles with stones and fill with water. Replace the caps and lower them into the tank of the commode. This will reduce the amount of water in the tank but still provide enough for flushing. (Bricks which some people use for this purpose are not recommended since they crumble eventually and could damage the working mechanism, necessitating a call to the plumber.)

Install faucet aerators to cut water consumption.

Never use the commode to dispose of cleansing tissues, cigarette butts or other trash. This can waste a great deal of water and also places an unnecessary load on your sewage treatment plant.

If you are building a new home or remodeling a bathroom, install a new 3½-gallon commode rather than the conventional 5 to 6 gallon fixture.

THE CROSS SECTION (USPS 564-920)
HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1
2930 AVENUE Q
LUBBOCK, TEXAS 79405

SECOND CLASS PERMIT

THE Cross SECTION

Published monthly by High Plains Underground Water Conservation District No. 1, 2930 Avenue Q, Lubbock, Texas 79405

Volume 25—No. 2 | Publication number USPS 564-920, Second Class Postage paid at Lubbock, Texas | February, 1979

Texas District Court Judge John R. McFall (left) presided over the swearing-in ceremonies for recently elected Water District Board of Director's Members A. W. Gober of Farwell (center) and Jim Conkwright of Hereford (right). Gober, Director for District Director's Precinct Three, was elected for his fourth term on the Board and Conkwright, representing District Director's Precinct Four, was chosen for his first term. They will serve on the Board with James P. Mitchell of Wolfforth, Malvin Jarboe of Floydada, and Selmer Schoenrock of Levelland.

Farm Product Exports Are Major Factor In United States Balance Of Payments

United States farm product exports have contributed significantly in keeping down prices of imported products and could contribute even more if the U. S. played the world trade game according to the same rules used by other countries, according to Dr. Pierre Andre Rinfret. Dr. Rinfret, who has been the major economic advisor to three American Presidents, is currently the head of the international economic and financial intelligence firm of Rinfret Associates, Inc. Dr. Rinfret's remarks came recently when he addressed the 53rd Annual Convention of the East Texas Chamber of Commerce in Austin. A large part of Dr. Rinfret's comments at the convention were directed at U. S. Agricultural products in world trade and the importance of these products to the U. S. balance of payments.

Farm products have been a major factor in preventing the U. S. balance of payments problem from being even more severe than it has been. America now has net exports of $22 billion a year in farm products, he noted, whereas the amount prior to 1973 was only $3 billion.

In 1973 the Russians and Chinese began to buy wheat—leading to increased farm exports.

"The farmer is adding about $20 billion a year to the surplus of the United States . . . if we did not have the farm sector in the American economy . . . we would have ourselves a $45-50 billion trade deficit instead of $25 billion."

But unlimited and unrestricted farm exports aren't likely to occur at least any time soon, regardless of the American government's position on such matters, he feels.

The biggest barrier to trade between countries is how agriculture is subsidized, and farmers in all major countries are being subsidized, Rinfret says.

The U. S. also has the problem of where to export, since Russia has adequate wheat supplies at present, and Africa generally can't afford to pay for additional supplies.

China, which is producing only enough food for subsistence levels, will become a major market, Rinfret believes, adding that while there will be a good market for beef in the world trade, "the biggest market in years to come is for grains."

One side effect of that, he notes, will be increased prices for wheat throughout the world.

Rinfret sees the U. S. balance of payments problem as tied to that policy of bringing in large amounts of expensive overseas petroleum, and a failure of the U. S. to play the world trade game according to the same rules used by other countries.

He doesn't, he stresses, favor protective barriers or any mechanisms which could disrupt world trade, but feels the U. S. should trade with other countries on a "quid pro quo" basis.

For example, he says, German exporters receive a 25 percent tax rebate from their government, while the U. S. provides no such incentive. Or, he adds, consider the much higher import duties charged by Japan on U. S. goods entering that country compared to Japanese goods entering the U. S.

"Let's play the game even on both sides," he argues. "The minute we start, we'll have a balance of trade surplus."

Water Conservation In And Around The House–Part II

The following article is the second part of a two-part article covering household water conservation practices. It was taken from a 1978 publication of the Texas Department of Water Resources.

In the kitchen . . .

About 11 percent of in-home water use takes place in the kitchen, much of it wasted. Here are some tips for saving:

When cooking, use a pan of water (or stopper in the sink) for rinsing pots and pans and cooking implements rather than turning on the water faucet each time a rinse is needed.

Never run your dishwasher without a full load. In addition to water saving, you'll find that your expensive detergent goes a lot further, and a significant energy saving will show up on the utility bill.

Use your sink disposal sparingly, and never for just a few scraps.

Keep a container of drinking water in the refrigerator. Running water from the tap until it is cool is a waste. Or better yet, save both water and energy by keeping cold water in a picnic jug on a kitchen counter to avoid opening the refrigerator door needlessly.

When cleaning vegetables, use a small pan of cold water rather than letting the faucet run.

For cooking most food, use only a little water in the pot and put a lid on it. Not only does this method save water, but food is more nutritious since you don't pour vitamins and minerals down the drain with the extra cooking water.

If you hand wash dishes, use a pan of water for rinsing rather than a running facuet.

Keep water conservation in mind always, and think of ways you can save in the kitchen. Do you make too much coffee or tea and pour the excess down the drain? Are ice cubes left to melt in the sink? Even small kitchen savings like those can add up in a year's time.

Around the house . . .

Of the total household water use, the washing machine constitutes about 14 percent.

When using an automatic washing machine (32 to 59-gallons are required per cycle), wash only a full load.

If your machine has several load settings, use the one for light loads whenever you can.

Use cold water as often as possible to save energy and to conserve the hot water for uses which cold water cannot serve. (This is also better for clothing made of today's synthetic fabrics.)

If you are considering purchase of any new appliance that uses water, check water requirements of various models and brands. Some use less water than others.

Check all water line connections and faucets for leaks. If you pay $1.00 per 1,000 gallons of water, you could be paying a rather hefty sum for water that simply goes down the drain because of leakage. A slow drip can waste as much as 170 gallons of water EACH DAY, or 5,000 gallons per month added to your water bill.

Learn to replace faucet washers so that drips can be corrected promptly. It is easy to do, costs very little, and can represent a substantial sum saved in plumbing and water bills.

You may have a water leakage of which you are entirely unaware—a leak between the water meter and the house, for example. It's easy to check. Turn off all faucets, indoors and out, and then check your water meter. If it continues to run, you need to check for a leak.

Insulate all hot water pipes (especially if you are building a new house) to avoid long delays (and wasted water) while you wait for the water to "run hot".

Be sure your hot water heater thermostat isn't set too high. Extremely hot settings waste water and energy when the water has to be cooled with cold water before you can use it.

See "WATER CONSERVATION" Page 2

THE Cross SECTION

THE CROSS SECTION (USPS 564-920)

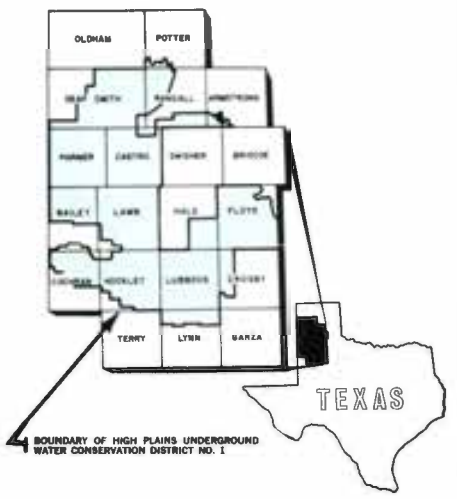
A MONTHLY PUBLICATION OF THE HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1

2930 Avenue Q, Lubbock, Texas 79405

Telephone 762-0181

DEAN THOMPSON, Editor

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



BOARD OF DIRECTORS

Precinct 1
(CROSBY, LUBBOCK and LYNN COUNTIES)
James P. Mitchell, President ..... Wolfforth

Precinct 2
(COCHRAN, HOCKLEY and LAMB COUNTIES)
Selmer H. Schoenrock ..... Levelland

Precinct 3
(BAILEY, CASTRO and PARMER COUNTIES)
A. W. Gober ..... Farwell

Precinct 4
(ARMSTRONG, DEAF SMITH, POTTER and RANDALL COUNTIES)
Jim Conkwright, Secy.-Treas. ..... Hereford

Precinct 5
(FLOYD and HALE COUNTIES)
Malvin A. Jarboe, Vice President ..... Floydada

COUNTY COMMITTEEMEN

Armstrong County
Carroll Rogers, Secretary
Wayside, Texas

Guy Watson, 1981 ..... Wayside
Bill Heisler, 1981 ..... Wayside
M. L. McGehee, 1981 ..... Wayside
James Bible, 1983 ..... Wayside
James Stockett, 1983 ..... Wayside

Bailey County
Doris Wedel, Secretary
H&R Block, 224 W. 2nd, Muleshoe

Eugene Shaw, 1981 ..... Rt. 2, Muleshoe
David Stovall, 1981 ..... Rt. 2, Muleshoe
Ernest Ramm, 1981 ..... Rt. 2, Muleshoe
D. J. Cox, 1983 ..... Enochs
Marshall Head, 1983 ..... Muleshoe

Castro County
Garnett Holland, Secretary
City Hall, 120 Jones St., Dimmitt

Jackie Clark, 1981 ..... Rt. 1, Box 33, Dimmitt
W. A. Baldridge, 1981 ..... 608 W. Grant, Dimmitt
Frank Wise, 1981 ..... Rt. 4, Box 10, Dimmitt
George Elder, 1983 ..... Dimmitt
Floyd Schulte, 1983 ..... Dimmitt

Cochran County
W. M. Butler, Jr., Secretary
Western Abstract Co., 108 N. Main Ave., Morton

Hershel M. Tanner, 1980, Route 2, Box 36, Morton
Danny Key, 1980 ..... Star Route 2, Morton
H. H. Rosson, 1980 ..... Star Route 2, Morton
Keith Kennedy, 1982 ..... Star Route 2, Morton
Robert Yeary, 1982 ..... Route 2, Box 66, Morton

Crosby County
Clifford Thompson, Secretary
2930 Avenue Q, Lubbock

Tommy McCallister, 1980 ..... 209 N. Van Buren, Lorenzo
Edward S. Smith, 1980 ..... 102 N. Van Buren, Lorenzo
Pat Yoakum, 1980 ..... Box 146, Lorenzo
Mike Carlisle, 1982 ..... Route 1, Box 274, Lorenzo
Alvin C. Morrison, 1982 ..... Box 6, Lorenzo

Deaf Smith County
B. F. Cain, Secretary
County Courthouse, 2nd Floor, Hereford

James E. Higgins, 1981 ..... 200 Star St., Hereford
Garland Solomon, 1981 ..... 303 Sunset Dr., Hereford
Tom Robinson, 1981 ..... 211 Cherokee Dr., Hereford
Bill Cleavinger, 1983 ..... Hereford
W. L. Davis, Jr., 1983 ..... Wildorado

Floyd County
Verna Lynne Stewart, Secretary
Floyd Co. Abstract, 215 W. California, Floydada

C. O. Lyles, 1980 ..... Route 4, Floydada
Connie Bearden, 1980 ..... Route 1, Floydada
M. M. Smitherman, 1980 ..... Silverton Star Rt., Floydada
Charles Huffman, 1982 ..... Route 1, Lockney
Gilbert L. Fawver, 1982 ..... Route 4, Floydada

Hale County
J. B. Mayo, Secretary
Mayo Ins., 1617 Main, Petersburg

Clint Gregory, Jr., 1980 ..... Box 98, Petersburg
Homer Roberson, 1980 ..... Box 250, Petersburg
Henry Scarborough, 1980 ..... Route 2, Petersburg
Gaylord Groce, 1982 ..... Box 314, Petersburg
Bill John Hegi, 1982 ..... Route 2, Petersburg

Hockley County
Jim Montgomery, Secretary
609 Austin Street, Levelland

Billy Ray Carter, 1980 ..... Route 5, Levelland
Leon Young, 1980 ..... Route 1, Ropesville
Robert Phillips, 1980 ..... 218 Redwood, Levelland
J. E. Wade, 1982 ..... Route 2, Littlefield
Jack Earl French, 1982, Rt. 3, Box 125, Levelland

Lamb County
Robert Richards, Secretary
509 Phelps Avenue, Littlefield

P. A. Washington, 1980 ..... Box 124, Springlake
Jack Stubblefield, 1980 ..... Box 397, Spade
Larry Lockwood, 1980 ..... Star Rt. 2, Littlefield
Billy J. Langford, 1982 ..... Box 381, Olton
Edward Fisher, 1982 ..... Box 67, Sudan

Lubbock County
Clifford Thompson, Secretary
2930 Avenue Q, Lubbock

Don Bell, 1980 ..... Box 114, Wolfforth
Ronald Schilling, 1980 ..... Route 1, Slaton
Granville Igo, 1980 ..... 1304 8th Street, Shallowater
Owen Gilbreath, 1982 ..... 3302 23rd St., Lubbock
Clifford Hilbers, 1982 ..... Route 1, Box 14, Idalou

Lynn County
Clifford Thompson, Secretary
2930 Avenue Q, Lubbock

S. B. Rice, 1980 ..... Route 1, Wilson
W. R. Steen, 1980 ..... Route 2, Wilson
Wendell Morrow, 1980 ..... Route 1, Wilson
Gary Houchin, 1982 ..... Box 54, Wilson
Freddie Kieth, 1982 ..... Box 283, New Home

Parmer County
Pat Kunselman, Secretary
City Hall, 323 North Street, Bovina

Troy Christian, 1981 ..... Rt. 1, Farwell
Dalton Caffey, 1981 ..... P.O. Box 488, Friona
Ronald Elliott, 1981 ..... Rt. 3, Muleshoe
Floyd Reeve, 1983 ..... Friona
Ralph Roming, 1983 ..... Bovina

Potter County
Jim Line, 1981 ..... Box 87, Bushland
Albert Nichols, 1981 ..... Rt. 1, Box 491, Amarillo
Weldon Rea, 1981 ..... Bushland
Sam Line, 1983 ..... Bushland
Mark Menke, 1983 ..... Bushland

Randall County
Mrs. Louise Tompkins, Secretary
Farm Bureau, 1714 Fifth Ave., Canyon

Harry LeGrand, 1981 ..... 4700 S. Bowie, Amarillo
Jack Brandt, 1981 ..... Rt. 1, Box 280, Canyon
Johnny Sluder, 1981 ..... Box 56, Bushland
Bill Dugan, 1983 ..... Happy
Roger B. Gist, III, 1983 ..... Happy

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

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

Lubbock Civic Center Selected As Site For March 28 Federal Water Hearing

Dean Thompson, the Water District's Director of Information and Education, has submitted his resignation from the District effective February 28. He has been with the District for nearly a year and will be leaving to take a similar position with the Harris-Galveston Coastal Subsidence District in Houston.

U.S. Representative Kent Hance has announced that a hearing to be conducted jointly by the White House and U.S. Department of Agriculture, will be held in Lubbock on March 28 and will be concerned with the water situation of the High Plains area.

Hance urged all persons interested in the economic future of the Texas High Plains to attend the hearing. He stated that "this will be our opportunity to have our local and state officials to present our side of the water story." He went on to say that everyone, not just water and government officials, should attend the hearing because "without participation in the hearing we could easily be overlooked in any major water programs developed in the future." He continued by saying that the hearing was designed to gather information to be used by the President in determining future water policy.

The Lubbock hearing will be held March 28, at 10:15 a.m., in the Civic Center and Rep. Hance urged everyone concerned to come to the hearing with a prepared statement.

WATER CONSERVATION . . .

(Continued from page 1)

Use a moisture meter to determine when your house plants need a drink. More plants die from over-watering than from being on the dry side.

Out-of-doors . . .

Water your lawn early in the morning during the hot months. Much water used on the lawn can simply evaporate between the sprinkler and the grass. (Watering late in the day to avoid evaporation can invite plant disease.)

Use a sprinkler that produces drops of water rather than a fine mist, to avoid evaporation.

If you use a soaker hose, turn it so the holes are on the bottom, again to avoid evaporation.

Water slowly for better absorption, and never on windy days.

Forget about watering the streets or walks or driveways. They won't grow a thing.

Condition the soil with compost before planting grass or flower beds so that water will soak in rather than running off.

Fertilize lawns at least twice a year for root stimulation. Grass with good root systems use less water.

Learn to know when your grass needs water. If it has turned a dull grey-green and when foot prints remain visible as you walk across it, it's time to water.

Don't water too frequently. Too much water can overload the soil so that air cannot get to the roots, and can encourage plant diseases.

Don't over-water. Soil can absorb only so much moisture and the rest simply runs off. A timer will help, and either your kitchen timer or an alarm clock will do. An inch-and-a-half of water applied once a week will keep most Texas grasses alive and happy.

Automatic sprinkler systems should be operated only when the demand on your town's water supply is lowest. Set the system to operate between four and six a.m.

Don't scalp your lawn during hot weather. Taller grass holds moisture better. Grass cut fairly often, so that only ½ to ¾ inch is trimmed off, will produce a better looking lawn.

If small areas in your yard need more frequent watering (those near walks or driveways or in especially hot, sunny spots), use a watering can or hand water with the hose only in those areas.

Learn what types of grass, shrubbery and plants do best in your area, and in which parts of your yard, and then plant accordingly. If you have a heavily shaded yard, no amount of water will make roses bloom. In especially dry sections of the state, consider attractive arrangements of plants that like arid or semi-arid climates.

You don't have to be a horticulturist to have an attractive yard, but do learn about the plants you have so that you can water just enough to keep them healthy, and not enough to waste water and injure the plants at the same time.

Consider decorating areas of your yard with rocks, gravel, wood chips, or other materials which are now available and which require no water at all.

Never "sweep" your walks and driveways with the hose. Use a broom or rake.

When washing the car, use a bucket of soapy water and use the hose only for rinsing.

Remember that saving water also saves energy. About 50 percent of the water used in a home is hot water. Providing energy to fuel your hot water heater is a major drain on your utility bill. So save water and you save energy and money at the same time.

Texas Department of Water Resources, 1978.

HIPLEX: Precipitation Augmentation Research In The High Plains

People in the High Plains face frequent water shortages, and studies running the gamut from conservation to groundwater recharge to development of new sources are underway to solve the water supply problems. Precipitation augmentation—cloud seeding—is being looked at as a workable alternative to the more traditional sources of water. Clouds and precipitation are renewable resources which, when tapped, can contribute to improving both the quantity and the quality of water supplies.

The High Plains Cooperative Program—known as HIPLEX—is a research effort to develop a technology for increasing useful summer rainfall over West Texas and the rest of the High Plains. HIPLEX officially came into being in 1973 when the Bureau of Reclamation was directed to mount an effort "to test the basic concepts of precipitation augmentation."

Dr. Archie Kahan, Chief of the Bureau's Office of Atmospheric Resources Management, sent letters to the governors of the High Plains states proposing a joint program of state and Federal agencies. Dr. Kahan envisioned a program planned, organized, and conducted with high regard not only for the science but also for the desires and needs of the people living in and near the experimental sites.

Two parallel efforts were soon launched. One focuses on the physical science, defining more completely the way convective clouds and precipitation develop naturally and the changes that occur when these clouds are seeded. Responsibility for this part of HIPLEX rests primarily with the Bureau of Reclamation. The other effort concerns the economic value of additional precipitation, the environmental and social effects of a precipitation augmentation program, and other issues that affect the way the technology can be used as a water resource tool. Major responsibility for this part of HIPLEX has been accepted by the states.

Three experimental sites were chosen because climatic conditions and cloud characteristics—and thus the opportunities and perhaps the techniques for seeding—vary over the north-south extent of the High Plains. Miles City in eastern Montana was chosen to be representative of the northern Plains. The Goodland-Colby area of northwest Kansas represents the central Plains. The Big Spring-Snyder area of West Texas was selected as representative of the southern High Plains. Field work at the sites began in 1975, following a period of planning and equipment procurement.

HIPLEX is based on the philosophy that an orderly development of cloud seeding technology is best achieved by starting with simple conditions, then moving to more complex systems as rapidly as sound scientific and engineering practices allow. Activities at each of the three sites emphasize different aspects of precipitation augmentation.

The atmospheric objectives of Texas HIPLEX focus on describing the ways natural clouds and precipitation evolve, developing techniques for recognizing and seeding the different types of convective situations that occur in Texas, and establishing a data base that will promote transfer of the developing technology among the three HIPLEX sites and the rest of the scientific community.

Radar, located near Snyder, Texas, records the location, size, and motion of clouds over the HIPLEX area and provides estimates of the rainfall.

The Bureau's prime contractor for the Texas HIPLEX program is the Texas Department of Water Resources, which has subcontracts with Texas A&M University, Texas Tech University, the Colorado River Municipal Water District, and Meteorology Research, Inc. In 1978, the field program operated during June and July and was based at the Big Spring Municipal Airport.

Texas A&M University has been studying the interactions between convective clouds and their environment to describe what causes cloud formation, growth, and dissipation. A team of scientists headed by Dr. James Scoggins described characteristics related to the occurrence of convective activity. They found, for example, that convective activity alters the flow of moisture at the surface and in the air and that the interactions between a cloud and the environment around it can sometimes enhance subsequent cloud development.

Texas Tech University has been analyzing satellite data to help describe overall cloud characteristics and has also analyzed some rain-gage and climatological data. Dr. Donald Haragan prepared a climatology of clouds and precipitation for the summer months, with some studies based on 55 years of data. His results show that May is the wettest month and that there are usually fewer than four periods with rain each month from June through September, each period typically lasting only a day or two.

The Colorado River Municipal Water District operates an extensive raingage network, records temperature, moisture, and wind aloft, and provides a radar meteorologist who also operates a radar at Big Spring. The District operates two multi-engine aircraft for cloud seeding calibration experiments and for cloud sampling flights.

Staff meteorologists from the Texas Department of Water Resources prepare daily weather forecasts during the field season, and they are developing better procedures for forecasting seedable convective clouds. They have also prepared criteria for suspending cloud seeding activities prior to development of intense thunderstorms and other severe weather to avoid the possibility of aggravating these natural conditions. Meteorology Research, Inc., operates a radar near Snyder and analyzes the data from it.

Instrumented aircraft fly in and around convective clouds to study their characteristics and observe the effects of seeding.

The socioeconomic studies of HIPLEX in Texas have been pursued by the staff of the Texas Department of Water Resources in an effort funded jointly by the State and the Bureau of Reclamation. The first part of a study of the economic effects of increased rainfall examined the relationships among yield, technology, and weather for major crops in a 14-county region around the Texas HIPLEX site. Results showed, for example, that a 10-percent increase in average March rainfall could increase revenues from cotton and grain sorghum by at least $320,000 (1967 prices).

The second part of the study looked at range production and the relationships among agriculture and other sectors of the region's economy. When the increased crop and livestock incomes are combined with their effects on other sectors of the regional economy, a 10-percent increase in average March precipitation could lead to about a million-dollar increase in income in the Big Spring-Snyder area.

The third part of the economic study, now being prepared, assesses the effects of rainfall on the level of municipal and industrial water supplies and on water-use patterns in the Texas HIPLEX study area. It will also include an assessment of the value of additional precipitation in terms of reducing the energy costs of pumping equivalent amounts of groundwater for irrigation.

Bureau of Reclamation scientists are using a crop-yield model for grain sorghum to estimate the value of increments of additional rain. The model, which uses daily values of rain, temperature, and solar energy, was developed at the Agricultural Experiment Station at Temple, Texas. Results from the Bureau's use of the model thus far suggest that small increases in precipitation during the growing season can increase crop yield, but that soil moisture at the time of planting also is important. The work supports indications from Texas and elsewhere that the timing of additional rainfall probably is more important than the total amount of the increase. Crop-yield models for other important crops (wheat and cotton, for example) will be used in future studies.

The Bureau of Reclamation, which has been involved in water-resource research, planning, and development since 1903, believes that precipitation augmentation technology can be valuable for increasing water supplies. HIPLEX is designed to develop that technology for the High Plains, a technology that is both effective and acceptable, a technology that can be incorporated within the framework of integrated water management policies of the states and the nation.

Pre-Plant Soil Moisture Is Good To Excellent In Many Plains Areas

by K. A. Wigner

The 12th Annual Soil Moisture Survey for fourteen counties on the Texas South Plains was recently completed. Results indicated that nearly 80 percent of the area has good to excellent soil moisture this year. The overall average was up somewhat from last year when the entire area was very dry.

Purpose Of The Survey

The primary purpose of the annual fall and winter soil moisture survey is to determine the average amount of moisture that is present in the top five feet of South Plains soils. This in turn provides a basis for estimating the need for and the amount of preplant water required to rewet the soil and give the farmer his best chance for a profitable crop.

During the early years of South Plains irrigation, it was found that better crops could be produced if the soil was wet prior to spring planting. Over the years no better method for estimating crop production potential has been found so the need for a well saturated soil profile prior to planting still holds.

In early years farmers could only guess at the amount of preplant water needed. However, with modern techniques, such as this survey, farmers have more information upon which to base a reliable estimate of preseason water needs. Farmers who irrigate in excess of that which is necessary will probably lose money and precious water. Those farming sandy soils could see loss of nutrients by the process of leaching from the soil.

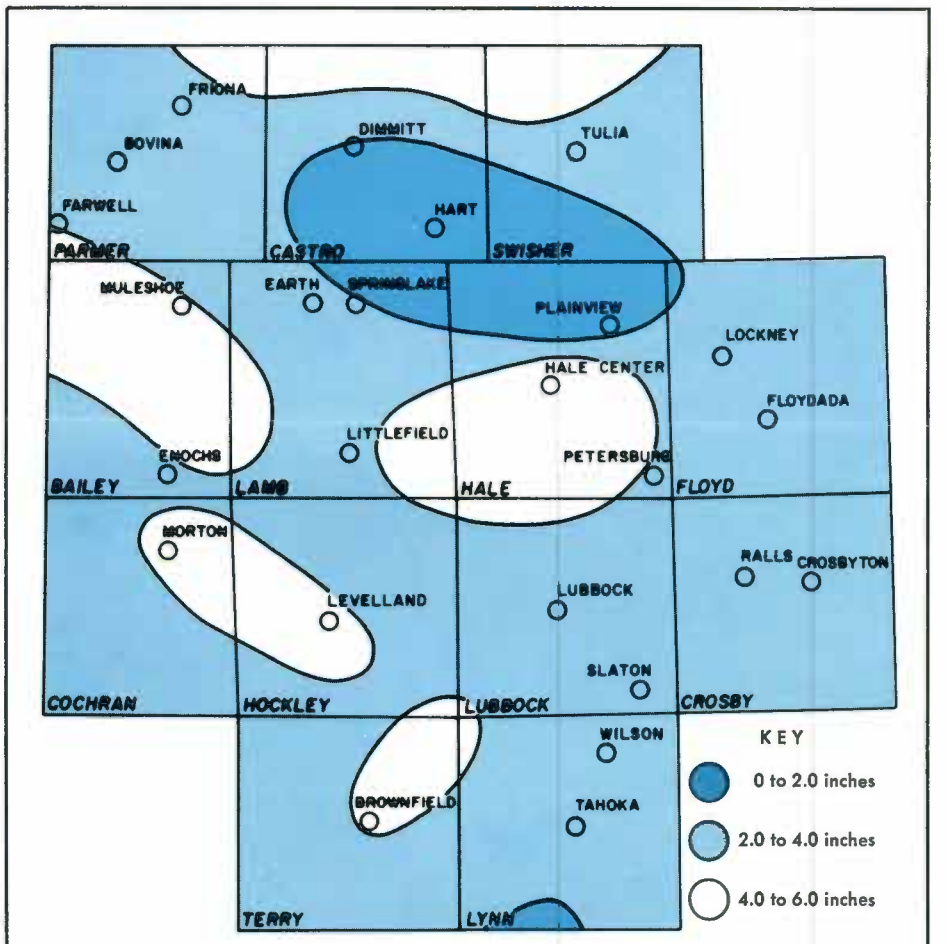
Measurement of the soil moisture was made at many locations across the South Plains area. Many years ago eight to twelve sites per county were established as measuring points. A few locations have been lost over the years but nearly one hundred still exist. Soil moisture is evaluated at each of the sites at one foot intervals down to a depth of five feet. Then the total amount of soil moisture is determined and then compared to the previously determined maximum amount of moisture possible for the site. The difference is expressed as the soil moisture deficit. When plotted on the accompanying map the patterns of dry versus wet areas across the South Plains emerge. A farmer would only need to glance at this map to find the general conditions for his area. The values shown on the map are the soil moisture deficits in inches.

Results And Applications

Much of the South Plains area was found to have excellent soil moisture. The average for the 93 readings made over the fourteen counties was —3.1 inches. This compares favorably with the long-term average of —3.9 inches and last year when the average was —5.9 inches. This does indicate that prospects for the upcoming season will be much brighter than last year and better than normal. Fall precipitation, especially after most of the crop development had taken place, is a probable explanation for the levels of soil moisture found.

The question in the mind of the farmer could possibly be, "Okay, so now what do I do with this information?" For the farmer who has irrigation capabilities, he can look at the map, determine the deficit for his farm and make a decision as to whether or not to apply pre-plant water. At current prices, the cost of one unnecessary application of water may be the difference in a profit or a loss for his crop. Accordingly for those farmers who have irrigation water and find their area in the relatively wet category, a decision to wait and see if nature can provide the pre-plant water might be profitable this year. The options are fewer for the dryland farmer, of course. However, knowledge of the amount of soil moisture may allow him to make decisions as to the time of planting and crop selection, as well as plant population.

In either case, a thought foremost in the farmer's mind is, "What are the chances for rain in the spring?" As a general rule, the wetting efficiency of rainfall is about 60 percent. This means that if six inches of moisture is needed in the soil, rainfall must total around ten inches. This far exceeds the amount normally expected before crops must be planted. The following chart is offered as a help in determing the probability of that spring rain. Developed from rainfall records at Lubbock since 1911 the probability of getting from one to four inches of rain in the spring is shown. Farmers west and southwest of Lubbock can expect a slightly lower probability and those east and northeast slightly higher probability than for Lubbock.



1978-1979 Amount Of Water Needed To Rewet The Top Five Feet Of Soil

PERCENT OF PROBABILITY FOR RAINFALL

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

IRRIGATION PUMPAGE MEASUREMENT SET

by Jerry Carr

A two county area in Texas has been chosen as a test area to develop sampling techniques for determining irrigation pumpage from the Ogallala Aquifer. This test is being conducted by the High Plains Regional Aquifer-System Analysis Project of the U. S. Geological Survey and the National Water User Data Systems Program. Pumpage will be measured for 50 specially selected irrigation wells in Lamb and Hockley Counties. Field work will begin in March and end in October, 1979.

Irrigators who operate the selected wells will be contacted by U. S. Geological Survey personnel during March 1979, to solicit their cooperation, to obtain information about crops irrigated by the wells and to further explain the program. A small vibration sensing device will be installed on each well to measure the total times the well is operated. Discharge will be measured periodically during the 1979 irrigation season.

The data is being collected by the U. S. Geological Survey as part of a regional study of the High Plains Aquifer system.

THE CROSS SECTION (USPS 564-920)
HIGH PLAINS UNDERGROUND WATER
CONSERVATION DISTRICT NO. 1
2930 AVENUE Q
LUBBOCK, TEXAS 79405

SECOND CLASS PERMIT

THE Cross SECTION

Published monthly by High Plains Underground Water Conservation District No. 1, 2930 Avenue Q, Lubbock, Texas 79405

Volume 25—No. 3 Publication number USPS 564-920, Second Class Postage paid at Lubbock, Texas *March, 1979*

NATIONAL GROUNDWATER POLICY

*By Jean O. Williams**

The National Water Policy with respect to groundwater appears to be tied to some mystique of conservation, translated to mean "cutback", "control pumping", "regulate".

The paper storm that has come out of the Administration's Water Policy initiative is mind boggling. In sorting through the mass of drafts, redrafts, comments, hearings, testimony, press releases, and on and on, there seems to be a consistent thread of increased Federal intervention using the leverage of Federally funded programs.

A review of the succession of documents that have been a part of the development of the National Water Policy should set the framework for what this all seems to mean to groundwater users and managers.

In May of 1977, in the President's environmental message to the Congress, he stated his strong commitment to "improve the protection and management of the nation's public lands and natural resources. The administration will propose new legislation where needed and will aggressively administer existing laws and programs to correct past abuse and assure the contribution of the country's resources for the future." In that May 1977 environmental message, he directed that a study be undertaken leading to a "comprehensive reform of water resources policy, with water conservation as its cornerstone." He said "I believe that it is essential to confine the public works efforts of the water development agencies to projects that can meet such defensible criteria as economic efficiency, safety, environmental protection, and a fair distribution of project benefits."

The President named Secretary Andrus of Interior to lead this comprehensive study. And in a document released in June 1977 setting out study plan and time table, great emphasis was placed on the involvement of the public and the Congress through solicitation of views and suggestions during the evolution of the national policy study.

In the plans for study of institutions and institutional arrangements we find "the task force will establish how and to what extent water use and management is affected and what change may be reasonable, recognizing the predominance of state jurisdiction."

cont. pg. 3—GROUNDWATER POLICY

ANNUAL WATER LEVEL MEASUREMENT DATA COMPILED

Measurement of water levels in the network of approximately 800 wells measured annually by the High Plains Underground Water Conservation District in its 15 county service area revealed an average change of 1.26 feet from January 1978 to January 1979.

Even though 1978 was an extremely dry year in most of the area, the 1.26 feet change compares favorably with the five year average change of 1.64 feet and the ten year average change of 1.45 feet. Water District officials attribute the reduced decline rate to improved water conservation practices and to the high cost of energy to pump water.

Average Decline For All Water Level Observation Wells Measured In The Following Counties For Time Period Indicated

	Number of Wells Measured	*1969-1979*	*1974-1979*	*1978-1979*
Armstrong	9	—10.26′	— 4.15′	+ 0.05′
Bailey	65	— 7.60′	— 7.38′	—1.47′
Castro	68	—27.99′	—15.16′	—1.87′
Cochran	52	— 2.59′	— 1.89′	—0.10′
Crosby	19	—23.59′	—14.13′	—2.28′
Deaf Smith	89	—22.31′	—13.11′	—1.44′
Floyd	94	—25.53′	—12.69′	—1.64′
Hale	17	—12.87′	— 7.55′	—1.35′
Hockley	77	— 3.65′	— 3.31′	—0.82′
Lamb	74	—19.66′	—14.22′	—2.70′
Lubbock	115	— 9.06′	— 5.61′	—1.36′
Lynn	31	+ 0.76′	— 2.30′	—1.29′
Parmer	62	—31.85′	—16.58′	—3.28′
Potter	5	— 9.60′	— 0.73′	—0.40′
Randall	32	—12.73′	— 4.79′	+ 1.07′
District Average		—14.57′	— 8.24′	—1.26′

The average depth-to-water below land surface in the water level observation wells measured in 1979 was 166.01 feet.

Board of Directors and County Committeemen attend District-Wide County Committee Meeting to learn of District activities and services being performed this year. They were also asked for suggestions and ideas for improving District activities and programs.

TEXAS WATER FACTS

We in the High Plains of Texas quite often feel we are the only one's with water problems. This assumption is quite wrong. The Texas Department of Water Resources recently published "Texas Water Facts" which contains summaries of water facts for the entire state as well as various regions of the state. The following are excerpts from this publication which might be of interest to our readers.

STATEWIDE

Current Facts

• The population of Texas is 12.8 million. Employment in Texas is 5.7 million. Total annual personal income is $87.3 billion. The State's per capita income is $6,803; National per capita income is $7,019.

• The State's manufacturing production is $77.1 billion. There are over 200 major water using industrial businesses in Texas.

• The State's agricultural production is $6.9 billion annually. Total irrigated acreage is 8.5 million. Feedlot beef production is 6.8 million head annually.

• Land Use in Texas

Use	*Acres (Millions)*
Open Range	95.4
Crops	30.5
Planted Pasture	18.8
Forestry	9.3
Urban	7.3
Water	3.3
Federal	2.9
Other	3.6
Total	171.1

Current Water Use

• Withdrawals for municipal, manufacturing, irrigation, livestock, and mining uses plus consumptive use by steam-electric power generation are 17.3 million acre-feet (one acre-foot is 325,851 gallons) per year.

• Municipalities and rural communities withdraw 1.9 million acre-feet per year (surface water — 0.95; ground water—0.95). The average water use per capita is 144 gallons per day.

• Manufacturing industries withdraw 1.6 million acre-feet per year (surface water—1.1; ground water—0.5).

• Irrigated agriculture withdraws 13.1 million acre-feet per year (surface water—2.7; ground water—10.4).

• Livestock consume 300,000 acre-feet annually.

• Steam-electric power generation and mining consumes 0.43 million acre-feet per year (surface water—0.21; ground water—0.22).

Ground Water

• More than 50 percent of Texas is underlain by seven major aquifers and seventeen minor aquifers of local importance.

• Average annual natural recharge from precipitation is 5.1 million acre-feet.

• Recoverable reserves of useable quality water (containing not more than 3,000 milligrams/liter of total dissolved solids) in aquifers exceed 325 million acre-feet.

• In Texas in the mid-1930's ground water supplied 670,000 acre-feet annually.

Continued page 2—WATER FACTS

THE Cross SECTION

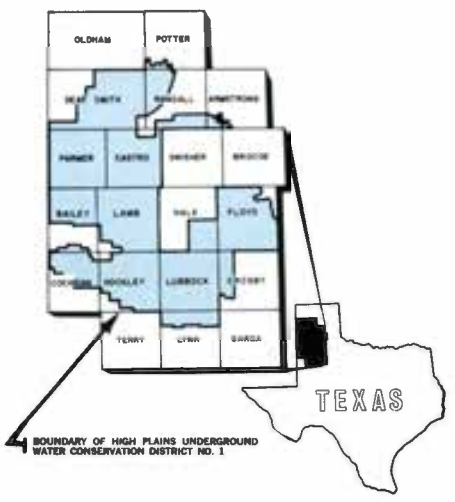
THE CROSS SECTION (USPS 564-920)

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

2930 Avenue Q, Lubbock, Texas 79405

Telephone 762-0181

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



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

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

WATER FACTS . . .

(continued from page 1)

• Currently, ground water supplies 70 percent of the water used in Texas or 12.2 million acre-feet annually.

Surface Water

• Texas has 3,700 designated streams and tributaries having 80,000 miles of stream-bed. Average annual runoff is 49 million acre-feet.

• Water quality is generally within established State standards. Water quality problems in the streams of north and west Texas are related to high concentrations of mineral salts dissolved from geologic formations. Some problems of low dissolved-oxygen content are evident near urbanized areas during periods of low flow.

• Since 1930, more than 100 major reservoirs (each with 5,000 acre-feet or greater total capacity) have been constructed in Texas.

• Water supply storage capacity (conservation storage) in major reservoirs and reservoirs under construction totals 32.3 million acre-feet; flood control storage capacity totals 17.5 million acre-feet.

• Dependable water supply from major reservoirs is 10 million acre-feet annually in a critical drought period.

• Currently, surface water supplies 30 percent of the water used in Texas or 5.1 million acre-feet annually.

Long Term Water Supply Outlook

• Major areas of the State will be limited in growth potential to provide jobs for an increasing population unless additional supplies are developed.

• Areas where some long-range (20 to 50 years) water shortages are anticipated include Dallas - Fort Worth, Wichita Falls, Abilene, San Angelo, Midland-Odessa, High Plains, Trans-Pecos, El Paso, Lower Rio Grande Valley, Middle Rio Grande, Corpus Christi, and San Antonio. Implementation of projects selected from various alternative plans for developing and supplying water can prevent projected shortages in many of these areas.

• The Middle Gulf Coast, Houston, Beaumont, East Texas, Northeast Texas, and a part of the Dallas-Fort Worth and Central Texas regions can be supplied through intra-state, local area development over the next 50 years if surface-water supplies in those areas are developed on a timely schedule as presently planned.

Summary

• In the Nation, Texas is third in population, first in oil, gas, and petrochemical production, and third in agriculture. Since 1900, Texas has shifted from 83 percent rural to 80 percent urban population. Since 1950, Texas has expanded from a ranching, farming, and energy based economy, to a complex, interdependent agricultural, energy, manufacturing, national defense, and services economy.

• At present, without extracting ground water that is in storage in aquifers (mining) the total dependable water supply is about 15.1 million acre-feet annually. Current annual water use for the purposes described above is 17.3 million acre-feet. Projected annual requirements are 27.0 and 39.6 million acre-feet for the years 2000 and 2030, respectively. Studies of the fresh water needs of bays and estuaries are being conducted.

• About 5.3 million acre-feet of additional dependable surface-water yield can be developed with construction of reservoirs that have been authorized by Congress or have undergone detailed planning by the State or local governments. This construction would bring the State's total dependable annual supply of ground and surface waters to 20.4 million acre-feet.

• Cooperative local, State and federal planning and development programs are in progress that can, if fully implemented, meet municipal, manufacturing, steam-electric power, and mining requirements in most areas of the State in the foreseeable 50-year period, using intra-state water, Texas is participating in Congressionally authorized efforts to find and implement solutions to meet long-range requirements, principally irrigation, that cannot be met with intra-state resources.

REGIONS

High Plains and Pecos Valley

• Has very scarce surface-water supplies with practically all such supplies dedicated to municipal use.

• The Ogallala aquifer—the major source of municipal and irrigation water—is being exhausted.

• Currently, the Ogallala supplies irrigation water to 4.6 million acres in the Southern High Plains and 1.3 million acres in the Northern High Plains.

• At present annual use trends, by the year 2000 the Ogallala will be able to supply irrigation water to only 1.97 million acres and 1.2 million acres in the Southern and Northern High Plains, respectively. By the year 2030, the Ogallala will be able to supply water to irrigate only 1.08 and 1.0 million acres, respectively.

• Municipal and industrial water supplies are becoming more difficult to obtain and more expensive as the water table declines. Some cities of the region will need additional supplies by 1990. In many areas, ground water is higher in fluoride content then the Environmental Protection Agency and the State allow for public consumption under the Federal Safe Drinking Water Act.

• Has local flooding problems.

Upper Rio Grande

• Has a very limited surface-water supply. During the past 30 years, the Rio Grande delivered only 65 percent of the water needed for the El Paso irrigation area.

• Has salinity in surface-water supplies during periods of low flow. The sources of salts are saline ground water and municipal and agricultural return flows.

• The Hueco Bolson aquifer is the primary source of municipal and industrial supply. Ground water is being mined (withdrawal rate grossly exceeds replenishment), and saline water encroachment is evident.

• Ground water is projected to meet El Paso's needs through 2030, but at higher costs for pumping and with deterioration of water quality.

• Water supplies for smaller cities are a problem now: water is scarce, has high salinity, and pumping costs are high.

• Flash flooding and major river flooding are problems in some areas.

South Texas

• Has insufficient surface and ground water to support growth. Surface water supplies are practically all committed. During a critical drought period, all current requirements cannot be met.

• Has soil salinity and drainage problems.

• Has flooding and storm surge problems from hurricanes and other storms.

• More phreatophyte control is needed.

• Water quality in the lower portion of the river basins is generally good, but low dissolved oxygen is evident in some stream segments during summer months.

• Navigation facilities, channel maintenance, dredge spoil disposal, and bay and estuary protection require continuing management programs.

Low Rolling Plains

• Has very scarce surface- and ground-water supplies.

• Natural salt pollution in the upper reaches of the Red and Brazos River basins precludes full utilization of the water resources of these basins.

• High nitrate concentrations occur in the ground-water supplies in some counties.

• Major cities will need additional supplies within 12-15 years. Smaller cities experienced water shortages during the drought of 1978 and as a rule have poor quality water (high in chloride, fluoride, nitrate, and dissolved-solids content).

• Phreatophyte and brush controls are needed.

• Has flooding problems from locally intense storms.

North Central Texas

• Surface-water development is near the maximum potential in the Upper Trinity River basin. Potential surface-water projects for the region are located in neighboring basins to the east.

• Major cities have adequate supplies to meet projected needs to the year 2000.

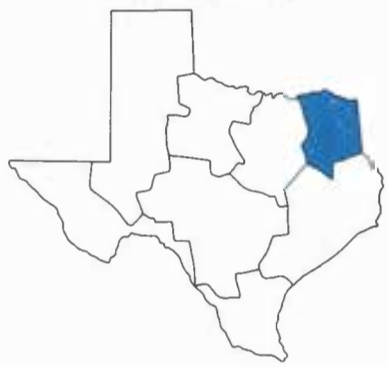
• Other cities throughout the region are barely meeting current needs, without supplies for growth.

• Water levels in the Trinity Group aquifer have been severely lowered; thus pumping costs are burdensome and will get worse. The quality of ground water has deteriorated as the water levels declined. Fluoride concentrations in ground water are high in many areas.

• Surface-water quality is lowered by wastewater discharges and urban run-off during periods of low flows.

• Major flooding problems exist.

Northeast Texas



• Sufficient surface- and ground-water resources are available to meet projected needs, if the planned water development schedule is met.

• In many areas, shallow ground-water has high concentrations of iron and high acidity which makes the waters undesirable for municipal use and many manufacturing processes. These problems generally can be solved by completing wells in deeper water-bearing sands or by adequate but expensive treatment of water from shallow wells.

• Presently, water supplies for some smaller cities are inadequate in both quality and quantity.

• Rapid growth due to development of lignite reserves is expected. This growth may negatively impact air and water quality.

• Periodically, dissolved-oxygen content in streams is low due to low discharge and reaeration rates.

• Has flooding problems in local areas.

South Central Texas

• Rapid growth of suburbs is straining existing water supply facilities.

• Surface water to firm up municipal supplies is needed to relieve pressures on the Edwards aquifer in critical drought periods, thereby maintaining the ecosystem and recreational facilities of major Edwards springs and the base flow of streams below the aquifer. Protection of the Edwards aquifer from excessive pollution must continue.

• Water quality of most streams is good but some are adversely affected by frequent periods of low flows. Upper Colorado River has serious water quality problems due to inflow of saline ground water.

• Pumping from the Carrizo aquifer in the Winter Garden irrigation area has lowered the water level more than 300 feet since 1930. With pumping lifts near 400 feet; the cost of pumping may soon render major parts of this aquifer uneconomic as a source of irrigation water.

• Guadalupe, San Antonio, and Lower Colorado River basins have potential surface-water projects that can be developed consistent with environmental protection.

• Region has other local salinity problems and flooding problems from locally intense storms.

Southeast Texas

• Land-surface subsidence, fault activation, and saline-water encroachment occur when the Gulf Coast aquifer is over-pumped.

• Major cities have surface- and ground-water supplies to meet growing needs to about the year 2000.

• Smaller cities are having problems from lack of surface-water availability, and inadequate treatment, conveyance, and storage facilities.

• Has water quality protection, riverine and storm surge flooding, and drainage problems.

• Salt-water intrusion during low-flow periods in the lower reaches of the Neches and Trinity River basins has the potential for contaminating the fresh-water supply at existing intake facilities.

• Navigation facilities, channel maintenance, dredge spoil disposal, and bay and estuary protection require continuing management programs.

Groundwater Policy . . .

(continued from page 1)

The task force on water conservation was to "develop options and alternatives to improve management and allocation of existing resources as well as improve priorities for use. Their focus will be on developing ways to reduce waste and use existing supplies in a more efficient manner."

In a speech delivered at that same time to the National Conference on Water held in St. Louis, Missouri, Secretary Andrus described the intent of the National Water Policy effort. He said at that time, and I would say parenthetically that this statement probably most clearly sets the administration's position on water, "Dams, reservoirs and canals do not create water. Since they take years or decades to plan and build, they certainly are not emergency measures to water-short areas today. Coping with a drought like 1977 requires programs of relief, cooperation, short-term rationing, sacrifice, and management.

"The time is upon us when we have to meet the problems head on—when we have to convince people that water conservation is their only salvation in certain areas—the government cannot rescue them from either waste or refusal of states and localities to effect land and water use policies which protect the public."

In that same speech, Secretary Andrus spoke to the administration attitude toward groundwater. He noted the significance of groundwater and said "yet, other than through a tedious process of litigation, in some states there is no such system of controls for how or at what rate groundwater is used, nor is there a management process for interrelating groundwater and surface supplies.

"The Federal government is involved in numerous projects to provide surface supplies to 'rescue' users from groundwater overdraft situations. Often, the new supply is provided below actual cost to induce users to shift from the depleted groundwater system but with no provision for integrated management. Obviously, this unwise resource practice creates more problems than it solves.

"Certainly, where the Federal government is muddying up the water, we must revise our programs so that we promote rather than sabotage water conservation.

"As for the states, I would hope that they could begin cooperative efforts to bring laws, rules, and institutions governing water into the 20th century. If this does not occur, eventually the Federal Government will be encouraged to step in and another area of state prerogatives will be lost."

In the first report of the task force on water conservation late in June of 1977, the dual questions of allocation of groundwater resources in the "arid and semi-arid west and Florida" and the degradation of groundwater quality in some parts of the country were cited as primary concerns.

In this report also, the question of

Cont. pg. 4—GROUNDWATER POLICY

Groundwater Policy . . .

(continued from page 3)

irrigation efficiencies was discussed at length.

And for the first time, the reliance of the participants on some of the concepts from the National Water Commission report of the National Commission on Water Quality was explicitly cited.

Beginning in July 1977, a series of hearings were held on the first round of task force reports. I attended two of those hearings, and was impressed with the attitude of the federal agency hearing chairmen that the hearings were held not so much for the purpose of eliciting suggestions and public involvement, but to announce decisions and positions that were already firm.

One statement of public reaction to the National Water Policy was articulated in late April 1978 at the annual New Mexico Water Conference held on the New Mexico State University campus. National Water Policy was one of the subjects discussed on the floor of the conference meeting. A task force assigned at that conference prepared a statement which was adopted by the conference as a whole. Part of that statement reads "Throughout the history of New Mexico, the state has operated to the satisfaction of its citizens without any national water policy. It is the concensus of our group that in the absence of a national water policy, the state and its citizens could continue to operate to the benefit of that state. Should there be established a national water policy, however, our group recommends the following: 1) the states have the primary authority and responsibility for water resources management. 2) The role of the Federal government should be to provide assistance to the states in the development of programs to meet state needs. 3) State and regional programs should be weighted more on the needs of the states, regions and nation than on the economics involved. 4) Water resources management must be approached in a more comprehensive and coordinated manner at Federal, state, local and interstate levels. 5) Federal actions must be consistent with state and related land resources, plans and programs."

Presumptively, this is the sort of reasoned thoughtful comment the public should make. But its impact appears to this point to have been negligible.

In June 1978 in a message to the Congress, the President stated that he was sending to the Congress water policy initiatives designed among other things, to "provide a new, national emphasis on water conservation." He said "none of the initiatives would impose any new Federal regulatory program for water management." The implementation schedule for the national water policy deals with guidelines, legislation, and regulations as products.

A little further on in the June 1978 message, the President said: "in addition to adding the consideration of water conservation to the principles and standards, the initiatives I am taking include: directives to all Federal agencies with programs which affect water supply or consumption to encourage water conservation, including: —making appropriate community water conservation measures the condition of the water supply and wastewater treatment grant and loan programs of the Environmental Protection Agency, the Department of Agriculture and the Department of Commerce; —integrating water conservation requirements into the housing assistance program of the Department of Urban Development, the Veterans Administration and the Department of Agriculture; . . . requiring development of water conservation programs as a condition of contracts for storage or delivery of the municipal and industrial water supplies from Federal projects."

That certainly suggests a strong-arm, though back door, approach to regulation.

In a July 12, 1978 memorandum from the President to the Administrator of EPA, the Secretary of Commerce, the Secretary of Agriculture, and the Secretary of Housing and Urban Development, the following directive was issued. "Review those programs of your agency that provide loans and grants for municipal water supply and wastewater treatment systems, and modify those programs to remove any disincentives to water conservation and to require appropriate community water conservation programs as a condition of such loans and grants. These water conservation modifications are to apply to all loans and grants awarded after September 30, 1979."

Now, let's go a step further—how is conservation defined? What does it mean to the people who will be implementing these policies? Conservation is described as a tool in overall and total water resource management.

In his July 12, 1978 directive to Heads of Executive Departments and Agencies, the President instructed: "During the planning of a water resources project and prior to requesting funds for construction of the project, the Federal Planning Agency shall determine whether any groundwater problems exist, whether and to what extent the Federal water resources projects will cause or contribute to groundwater problems, and what actions would avoid or minimize such groundwater problems. A report on this groundwater assessment shall be a part of the water project planning document. Federal agencies involved in constructing, maintaining and operating water resources projects shall initiate actions to work closely with State and local governments to seek resolution of groundwater problems."

In view of the approach taken throughout that conservation requires control of withdrawals where long term depletion of groundwater resource is taking place, the impact of the implementation of this directive here in Texas is readily apparent.

It is imperative that we try to understand what the implementation of these directives is going to mean. Conservation equates through all of this with regulation and control, not with management. In that context, let's look at what management really means, at least from my perspective.

Certainly, I think in the areas of our state where groundwater is a significant resource on which local and regional economies rely, the people involved in its use and protection are very definitely interested and involved with the question of effective conservation and management. The goal of such management, I think we could agree, would be the operation of the groundwater resource conjunctively with available surface supplies by procedures calculated to achieve objectives the water users agree are important. Depending on the particular characteristics of the aquifer involved, and the uses made of the groundwater resource, the objectives may be to produce water at minimum cost; protect the usability of the aquifer for storage; prevent or control land subsidence; extend the life of the groundwater basin; maximize the availability of flood storage in surface reservoirs; or perhaps, to maintain water quality at a given level. Once the desired objectives have been determined for a given area, the procedures and criteria of operation necessary to produce that result can be determined. This requires detailed knowledge of the nature of the surface and groundwater resource involved — hydraulic characteristics, sources of water, drainage area, recharge rates, stream diversions, amounts and rates of water extractions from groundwater aquifers, upstream developments, standards of well construction, pollution hazards, waste disposal alternatives, cost of surface and groundwater under various alternatives, authority to ensure successful management, economics, water rights and legal constraints. In short, it's necessary to establish definitively all of those factors which make it possible to predict performance of water resources under varying conditions.

Such management is possible, and has been implemented.

Whatever comes out of the National Water Policy initiatives, it appears certain that some such planned and articulated management and conservation strategy may be mandated as a predicate to receiving Federal funding.

We need to think about what conservation with respect to groundwater really means—intelligent management of a valuable resource in the light of situation specific factors. . . . There is certainly nothing inherently wrong with the concept that federal investments in water development should promote efficiency and conservation. My concern is with the decision-making process that determines what is efficient. Conservation to me is the wise use of a resource—and this may not mean—and almost certainly will not mean—the same management strategy from one area to another. Yet, federal regulators inexperienced in actual resource management might very well find a good solution to a groundwater problem in one area an attractive measure for another area without knowing how different those areas might be.

The high cost of energy for pumping —if nothing else—would assure that our groundwater users are committed to real conservation and to real effective management to achieve their objectives. We do need to look at the entire resource—ground and surface water—and make certain that their development, use and management occur within the context of a comprehensive and thorough examination of the economic, social, and environmental goals of the region they serve.

For this paper, however, I think my message must be—the national water policy initiatives are potentially very threatening, and the clock is running on implementation. I would urge that you monitor developments closely, and that you consider presenting testimony at hearings when scheduled.

*Jean O. Williams, Vice President, Camp Dresser and McKee, Inc., Austin, Texas. Presented at 35th Annual Meeting of Texas Water Conservation Association.

THE CROSS SECTION (USPS 564-920)
HIGH PLAINS UNDERGROUND WATER
CONSERVATION DISTRICT NO. 1
2930 AVENUE Q
LUBBOCK, TEXAS 79405

SECOND CLASS PERMIT

THE Cross SECTION

Published monthly by High Plains Underground Water Conservation District No. 1, 2930 Avenue Q, Lubbock, Texas 79405

Volume 25—No. 4 Publication number USPS 564-920, Second Class Postage paid at Lubbock, Texas *April, 1979*

TORNADO SAFETY RULES

TO KNOW WHAT TO DO WHEN A TORNADO IS APPROACHING MAY MEAN THE DIFFERENCE BETWEEN LIFE AND DEATH!

1. **IF YOU ARE NEAR A TORNADO CELLAR:**

   When time permits, go to a tornado cellar, cave or underground excavation which should have an air outlet to help equalize the air pressure. It should be kept fit for use, free from water, gas or debris; and preferably equipped with pick and shovel. THERE IS NO UNIVERSAL PROTECTION AGAINST TORNADOES EXCEPT UNDERGROUND EXCAVATIONS.

2. **IF YOU ARE IN OPEN COUNTRY:**

   1. **Move at right angles to the tornado's path. Tornadoes usually move ahead at about 25 to 40 miles per hour.**
   2. **If there is no time to escape, lie flat in the nearest depression such as a ditch or ravine.**

3. **IF IN A TOWN OR CITY:**

   1. **Seek inside shelter, preferably in a strongly reinforced building. STAY AWAY FROM WINDOWS!**
   2. **In homes: The corner of the basement toward the tornado usually offers greatest safety, particularly in frame houses. People in houses without basements can sometimes be protected by taking cover under heavy furniture against inside walls. Doors and windows on the sides of the house away from the tornado may be opened to help reduce damage to the building.**
   3. **Standing against the inside wall or on a lower floor of an office building offers some protection.**

4. **IF IN SCHOOLS:**

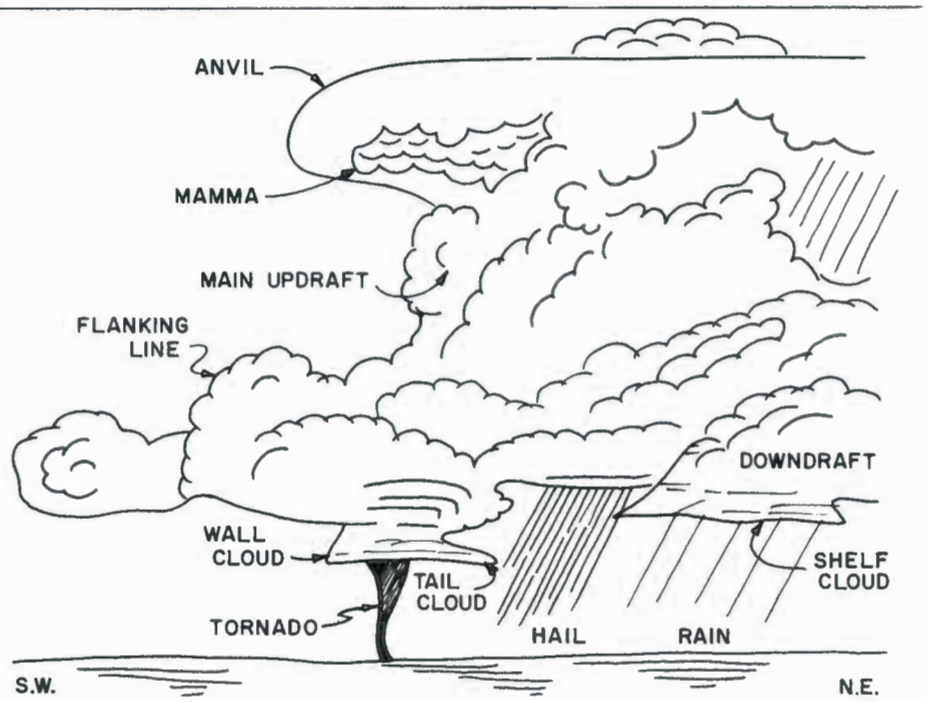
   1. **In city areas: If school building is of strongly reinforced construction, stay inside, away from windows, remain near an inside wall on the lower floors when possible. AVOID AUDITORIUMS AND GYMNASIUMS with large, poorly-supported roofs!**
   2. **In rural schools that do not have strongly reinforced construction, remove children and teachers to a ravine or ditch if storm shelter is not available.**

5. **IF IN FACTORIES AND INDUSTRIAL PLANTS:**

   On receiving a tornado warning, a lookout should be posted to keep safety officials advised of the tornado's approach. Advance preparation should be made for moving workers to sections of the plant offering the greatest protection.

6. **Keep calm. It will not help to get excited. People have been killed by running out into streets and by turning back into the path of a tornado. Even though a warning is issued, chances of a tornado striking one's home or location are very slight. Tornadoes cover such a small zone, as a rule, that relatively only a few places in a warned area are directly affected. You should know about tornadoes though, "just in case."**

7. **Keep tuned to your radio or television station for latest tornado advisory information. Do not call the Weather Service, except to report a tornado, as your individual request may tie up telephone lines urgently needed to receive special reports or to relay advisories to radio and television stations for dissemination to thousands in the critical area.**



TYPICAL TORNADO-PRODUCING CLOUD — *The form of the usual tornado-producing cloud is anvil-shaped at its crest with a rougher overshooting top at the dome. Mamma, which appear to be balloon-shaped formations, may drop from the anvil shape. At ground-level the common appearance is rain falling from a shelf cloud, usually in the northeastern portion of the parent cloud. Southwest of this there will be a wall cloud, sometimes with a horizontal tail cloud at the forward or northeast lower position of it. This tail cloud is not the tornado. The tornado itself forms typically at the southwest lower edge of this wall cloud. Behind the tornado there is not likely to be rain, but instead, a precipitation-free cloud base.* (Drawing courtesy Texas Tech University Institute for Disaster Research.)

AREA RAPS WITH USDA ON WATER

U. S. Department of Agriculture officials conducted a technical meeting in Lubbock, Texas, on March 28, 1979, to receive information on water resources and problems of the area. Assistant Secretary of Agriculture Rupert Cutler, in opening the meeting, told the audience that the Department of Agriculture had reevaluated their water policy proposals and had concluded that many of them were not feasible and that the Department would not support these proposals. The proposals which Assistant Secretary Cutler referenced were developed by a task force in Washington and included the levying of a tax on groundwater pumped and used in the business of irrigation farming; required metering of wells; increasing the cost of fuel to irrigators; limiting the use of fertilizers, herbicides and pesticides for farm use; disallowing crop price support participation of landowners/operators which do not practice good soil and water conservation; etc., all intended to promote water conservation.

Assistant Secretary Cutler stated that he believed that the U. S. Department of Agriculture should increase its role in water conservation activities and requested participants at the meeting to offer suggestions as to how this might be achieved.

At the day long meeting numerous area leaders presented testimony to the Secretary. James P. Mitchell, President of the Board of Directors of the High Plains Underground Water Conservation District No. 1 presented the following statement.

"In the Southwestern United States and especially here in the Southern High Plains of Texas, water conservation has always been a way of life. Early settlers to our area had to be good conservationists to survive. These conservation habits have been passed on from generation to generation, and it has been only through the wise use of our natural resources, land and water, that our region has developed and prospered. We believe you have come to the right place to learn about conservation.

"Secretary of Agriculture Bergland's letter requested that we present testimony on the current water situation,

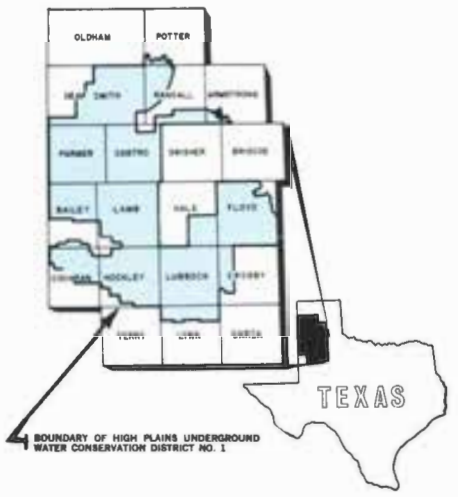
continued on page 3 . . . USDA

THE CROSS SECTION (USPS 564-920)

A MONTHLY PUBLICATION OF THE HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1
2930 Avenue Q, Lubbock, Texas 79405
Telephone 762-0181

PATRICIA BRUNO, Editor

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



BOARD OF DIRECTORS

Precinct 1
(CROSBY, LUBBOCK and LYNN COUNTIES)
James P. Mitchell, President ..... Wolfforth

Precinct 2
(COCHRAN, HOCKLEY and LAMB COUNTIES)
Selmer H. Schoenrock ..... Levelland

Precinct 3
(BAILEY, CASTRO and PARMER COUNTIES)
A. W. Gober ..... Farwell

Precinct 4
(ARMSTRONG, DEAF SMITH, POTTER and RANDALL COUNTIES)
Jim Conkwright, Secy.-Treas. ..... Hereford

Precinct 5
(FLOYD and HALE COUNTIES)
Malvin A. Jarboe, Vice President ..... Floydada

COUNTY COMMITTEEMEN

Armstrong County
Carroll Rogers, Secretary
Wayside, Texas

Guy Watson, 1981 ..... Wayside
Bill Heisler, 1981 ..... Wayside
M. L. McGehee, 1981 ..... Wayside
James Bible, 1983 ..... Wayside
James Stockett, 1983 ..... Wayside

Bailey County
Doris Wedel, Secretary
H&R Block, 224 W. 2nd, Muleshoe

Eugene Shaw, 1981 ..... Rt. 2, Muleshoe
David Stovall, 1981 ..... Rt. 2, Muleshoe
Ernest Ramm, 1981 ..... Rt. 2, Muleshoe
D. J. Cox, 1983 ..... Enochs
Marshall Head, 1983 ..... Muleshoe

Castro County
Garnett Holland, Secretary
City Hall, 120 Jones St., Dimmitt

Jackie Clark, 1981 ..... Rt. 1, Box 33, Dimmitt
W. A. Baldridge, 1981 ..... 608 W. Grant, Dimmitt
Frank Wise, 1981 ..... Rt. 4, Box 10, Dimmitt
George Elder, 1983 ..... Dimmitt
Floyd Schulte, 1983 ..... Dimmitt

Cochran County
W. M. Butler, Jr., Secretary
Western Abstract Co., 108 N. Main Ave., Morton

Hershel M. Tanner, 1980, Route 2, Box 36, Morton
Danny Key, 1980 ..... Star Route 2, Morton
H. H. Rosson, 1980 ..... Star Route 2, Morton
Keith Kennedy, 1982 ..... Star Route 2, Morton
Robert Yeary, 1982 ..... Route 2, Box 66, Morton

Crosby County
Clifford Thompson, Secretary
2930 Avenue Q, Lubbock

Tommy McCallister, 1980 ..... 209 N. Van Buren, Lorenzo
Edward S. Smith, 1980 ..... 102 N. Van Buren, Lorenzo
Pat Yoakum, 1980 ..... Box 146, Lorenzo
Mike Carlisle, 1982 ..... Route 1, Box 274, Lorenzo
Alvin C. Morrison, 1982 ..... Box 6, Lorenzo

Deaf Smith County
B. F. Cain, Secretary
County Courthouse, 2nd Floor, Hereford

James E. Higgins, 1981 ..... 200 Star St., Hereford
Garland Solomon, 1981 .... 303 Sunset Dr., Hereford
Tom Robinson, 1981 .... 211 Cherokee Dr., Hereford
Bill Cleavinger, 1983 ..... Wildorado
W. L. Davis, Jr., 1983 ..... Hereford

Floyd County
Verna Lynne Stewart, Secretary
Floyd Co. Abstract, 215 W. California, Floydada

C. O. Lyles, 1980 ..... Route 4, Floydada
Connie Bearden. 1980 ..... Route 1, Floydada
M. M. Smitherman, 1980 ..... Silverton Star Rt., Floydada
Charles Huffman, 1982 ..... Route 1, Lockney
Gilbert L. Fawver, 1982 ..... Route 4, Floydada

Hale County
J. B. Mayo, Secretary
Mayo Ins., 1617 Main, Petersburg

Clint Gregory, Jr., 1980 ..... Box 98, Petersburg
Homer Roberson, 1980 ..... Box 250, Petersburg
Henry Scarborough, 1980 ..... Route 2, Petersburg
Gaylord Groce, 1982 ..... Box 314, Petersburg
Bill John Hegi, 1982 ..... Route 2, Petersburg

Hockley County
Jim Montgomery, Secretary
609 Austin Street, Levelland

Billy Ray Carter, 1980 ..... Route 5, Levelland
Leon Young, 1980 ..... Route 1, Ropesville
Robert Phillips, 1980 ..... 218 Redwood, Levelland
J. E. Wade, 1982 ..... Route 2, Littlefield
Jack Earl French, 1982, Rt. 3, Box 125, Levelland

Lamb County
Robert Richards, Secretary
509 Phelps Avenue, Littlefield

P. A. Washington, 1980 ..... Box 124, Springlake
Jack Stubblefield, 1980 ..... Box 397, Spade
Larry Lockwood, 1980 ..... Star Rt. 2, Littlefield
Billy J. Langford, 1982 ..... Box 381, Olton
Edward Fisher, 1982 ..... Box 67, Sudan

Lubbock County
Clifford Thompson, Secretary
2930 Avenue Q, Lubbock

Don Bell, 1980 ..... Box 114, Wolfforth
Ronald Schilling, 1980 ..... Route 1, Slaton
Granville Igo, 1980 .... 1304 8th Street, Shallowater
Owen Gilbreath, 1982 ..... 3302 23rd St., Lubbock
Clifford Hilbers, 1982 ..... Route 1, Box 14, Idalou

Lynn County
Clifford Thompson, Secretary
2930 Avenue Q, Lubbock

S. B. Rice, 1980 ..... Route 1, Wilson
W. R. Steen, 1980 ..... Route 2, Wilson
Wendell Morrow, 1980 ..... Route 1, Wilson
Gary Houchin, 1982 ..... Box 54, Wilson
Freddie Kieth, 1982 ..... Box 283, New Home

Parmer County
Pat Kunselman, Secretary
City Hall, 323 North Street, Bovina

Troy Christian, 1981 ..... Rt. 1, Farwell
Dalton Caffey, 1981 ..... P.O. Box 488, Friona
Ronald Elliott, 1981 ..... Rt. 3, Muleshoe
Floyd Reeve, 1983 ..... Friona
Ralph Roming, 1983 ..... Bovina

Potter County
Jim Line, 1981 ..... Box 87, Bushland
Albert Nichols, 1981 ..... Rt. 1, Box 491, Amarillo
Weldon Rea, 1981 ..... Bushland
Sam Line, 1983 ..... Bushland
Mark Menke, 1983 ..... Bushland

Randall County
Mrs. Louise Tompkins, Secretary
Farm Bureau, 1714 Fifth Ave., Canyon

Harry LeGrand, 1981 ..... 4700 S. Bowie, Amarillo
Jack Brandt, 1981 ..... Rt. 1, Box 280, Canyon
Johnny Sluder, 1981 ..... Box 56, Bushland
Bill Dugan, 1983 ..... Happy
Roger B. Gist, III, 1983 ..... Happy

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

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

FULL SLATE OF POLICIES ADOPTED AT ANNUAL MEETING

The Texas Water Conservation Association conducted its 35th Annual Meeting in Austin, Texas, during February 1979. Membership in the Association is represented by virtually all of the local, regional, and state-wide water entities in the State of Texas. The Association adopted numerous policies at the Annual Meeting, some of which are very important to the residents of the High Plains. The following are those policies which we at the District feel are the most important to our area.

General Policy

I. The state faces growing water and energy crises which demand that water conservation, development and management be of the highest priority. Texas Water Conservation Association will continue to support and assist efforts to provide adequate supplies of water for all beneficial uses in Texas at the lowest practicable cost.

II. We believe that "water conservation" properly includes the development and wise use of all available water resources as well as the elimination of waste.

III. In view of the energy shortage, we believe that there must be a commitment at all levels of government to the early development of necessary water resources to support and enhance expansion of the national energy capability.

Federal Policy

I. We urge that any national water policy adopted by the Federal Government provide for:

(a) continued federal investment in development of the nation's water resources.

(b) balanced consideration of *all* the factors involved in decision-making with regard to water resource development and management, rather than giving overriding weight to environmental factors.

(c) water conservation through sound development and wise use of all available water resources as well as through reduction in water demands and elimination of waste.

(d) recognition of regional differences and the responsibilities and prerogatives of state and local governments in meeting people's needs under conditions prevailing in their regions.

II. We urge that Congress assert its proper role in the determination of national water policies.

IV. We urge all regulatory or action agencies of the federal government consider and be mindful of the economic and social as well as the environmental impact of their decisions or actions affecting major water projects, including the consideration of reasonable alternatives.

IX. We urge that the Environmental Protection Agency delay the promulgation of regulations for non-point source discharge of runoff from irrigated agricultural land until adequate research and studies are completed to determine the effects that regulation of such discharges would have on the quality and quantity of the nation's agricultural production.

X. We urge continued and expanded efforts to effect needed increases in the 160-acre limitation in Section 5 of the Reclamation Act of 1902, as amended to an economical unit in the light of the economics of modern agricultural practices. This is particularly important because of the very favorable impact of agricultural exports.

XII. We support the continuing primacy of the states over all matters involving water rights.

XIII. We support the goals and objectives of the Clean Water Act of 1977. However, development regulations under this act need careful consideration as to practicality and cost effectiveness. In addition, development of national standards are not practical in all cases due to the wide variation in regional conditions. Input from state and local organizations should be considered in developing standards, regulations and guidelines.

XIV. We urge that the Secretary of Commerce and the Economic Development Administration continue to recognize the primacy of the High Plains Council for the planning, directing and completion of the High Plains Region Studies as provided for in Section 193 of PL 94-587.

XV. EPA should delegate administrative authority for the Clean Water Act, Safe Drinking Water Act, and Solid Waste Disposal Act to the state as provided in such acts.

XVI. We urge Congress to be more specific in defining legislative terms when adopting laws. We further urge that on proposed major legislation regional public hearings be held in the affected areas of the nation.

XVII. We oppose, as impairing the ability of state and local agencies of government to provide for the needs of their citizens, any change in federal law or regulation directed toward reducing the tax exempt status of the interest on bonds issued by such agencies, including proposals for the substitution of federal subsidies for tax exemption on interest.

XIX. We share the EPA's concern for the quality of the nation's surface and groundwater supply. However, we have difficulty in accepting treatment techniques for the removal of synthetic organics which can result in monumental capital investment and operating costs on what can only be unsubstantiated evidence of carcinogenic effects. We take exception to the condemnation of all water resources inherent in the imposition of uniform treatment technique regulations. The establishment of a maximum contaminant level of the trihalomethanes does not appear to give proper consideration to the value of present day methods of water treatment as they affect the health of individuals. While all water purveyors strive to provide the public with the best water quality possible, it must be recognized that all systems must function within economic constraints. We urge the EPA to exercise restraint and patience before such regulations are imposed. It is recommended that a thorough investigation of each utility affected be made in order that the economic needs may be evaluated and that action priorities desired be established.

XX. We urge that additional research be initiated to determine the effects of non-point source pollution on stream quality.

continued on page 3 . . . POLICIES

USDA . . . continued from page 1

the prospects for the future and the degree of federal involvement, if any, that is necessary.

"In response to this request, we are submitting as an attachment to this paper, a summary of a study entitled, 'A Study of the Volume of Water in Storage in the Ogallala Aquifer With Projections of Future Reserves.' This paper contains county-by-county estimates of the volume of water in storage in the Ogallala Aquifer in 1974 and estimates of volumes of water which will be in storage by decade periods from 1980 through the year 2020 for each of the 45 counties underlain by the Ogallala Aquifer in the High Plains of Texas. Also being submitted as attachments to this paper are copies of colored maps which illustrate: 1) 'Estimated Saturated Thickness of the Ogallala Aquifer in 1974' and as projected for the year 2000; 2) 'Potential Capacity of the Ogallala Aquifer to Yield Water to Wells in 1974' and as projected for the year 2000; 3) 'Estimated Pumping Lifts of the Ogallala Aquifer for 1974' and as projected for the year 2000.

"Total volume of water estimates for the 45 county area are as follows: 1974—340 million acre feet; 1980—293 million acre feet; 1990—241 million acre feet; 2000—196 million acre feet; 2010—158 million acre feet; and 2020—127 million acre feet.

"We feel that the results of this study might now be somewhat pessimistic due to the drastic increases in energy prices and their effects on pumping cost and the increased efforts our irrigators have made to conserve their water supplies.

"We base this observation on a comparison of water level measurements made during the past ten (10) years in a network of approximately 800 wells in our water district. Records from these wells indicate a ten (10) year average change of 1.45 feet per year against this past year's average change of 1.26 feet. This decrease in the average decline rate of the water table occurred during one of the driest years on record for our area.

"In response to the Secretary's question as to the degree of federal involvement, if any, that is necessary . . .

"We believe that federal involvement in water conservation should ONLY be on a voluntary cost-share basis with landowners/operators in our area.

"An examination of your (USDA's) records will show that High Plains landowners/operators have utilized annually all available federal funds for soil and water conservation practices under the Great Plains Program and Agricultural Conservation Programs (ACP) in nearly every county in this area.

"Also for the record, we would like to point out that a large portion of the water conservation effort which has been accomplished here in the High Plains of Texas has been completed at total landowner/operator expense with no help from the federal government. These private water conservation efforts will, in all probability, decline due to the current 'cost price' squeeze on our farmers. This squeeze has become critical in the Texas High Plains during the past four years. This squeeze came about partially as a result of increased production costs such as in the price of tractor fuel which has increased by 150-300 percent. Another example is irrigation pumping fuel which has increased in price by 400 percent or more during the same time period. It appears now that opportunities for our farmers to have surplus income for use on water and soil conservation practices will be limited. Also for the record, I would like to point out that the return on dollars invested on water and soil conservation are very small as compared to returns on money invested in certificate of deposits at banks. Fortunately, most landowners/operators view soil and water conservation efforts as an investment in future generations, not as a good return on their dollars.

"We therefore recommend that the life of the Great Plains Program be extended and adequately funded. Also, we recommend that the current annual agricultural conservation programs be continued and funding be increased.

"Through these proven programs (ACP and Great Plains Programs) and through individual effort, much has been accomplished in the High Plains area to conserve water. We would like to review with you briefly some of the effort that has been made by High Plains irrigators to conserve water in our area.

1) They have installed approximately 22,000 irrigation sprinkler systems which are utilized to irrigate approximately 1,700,000 acres of land.
2) They have installed and utilize almost 4,000 irrigation reuse (tailwater) systems to capture and prevent the escape of irrigation tailwater from their farms.
3) They have installed more than 3,000 playa lake pump-back systems to recover and utilize rainfall runoff water collected in playa lakes in the area in an effort to conserve their underground water supplies.
4) They have installed and utilize almost 20,000 miles of underground pipelines to prevent loss or waste of underground water to seepage and evaporation while irrigating about 4,250,000 acres. Additionally, they utilize another 5,000 to 10,000+ miles of portable aluminum pipe for the same purposes (a reliable estimate of the miles of pipe in use is extremely difficult to obtain due to the mobility of the pipe).
5) They have leveled more than 200,000 acres of land and bench leveled 40,000 acres to make maximum use of their precipitation.

"These five major water conservation practices listed above are only a few of a long list of conservation methods being employed by the people of the High Plains of Texas; however, the magnitude of each of these efforts should demonstrate that the people of the High Plains of Texas have for a long time been thinking and practicing conservation and that the current ACP and Great Plains Programs are being utilized effectively.

"We were relieved when we read Larry Meyers statements to Duane Howell, made while discussing today's meeting, that were published in the March 22, 1979, morning edition of the Lubbock Avalanche-Journal. Mr. Meyers was quoted as saying that 'one thing we want to do is lay to rest some of the fears that have been stirred up by a discussion paper which talked about ways to limit use of groundwater through taxation, monitoring and metering and so on. Most of us on the Secretary's staff never saw that paper. It was an internal staff paper looking at all the options concerning groundwater. Some of the options were pretty ridiculous. They never had any credibility around here but they sure did get attention out in the country. So we want to let folks know that those things didn't have any credibility and answer questions.'

"With all due respects to Larry, we can't keep from remembering past experiences with other federal agencies where we have been assured that our fears were unfounded concerning proposed rules and regulations at hearings and later found, to our sorrow, that our fears were in fact quite justified when the final rules and regulations were published.

"Also, on page 9, paragraph 4, of the review material we were provided for today's meeting, in reference to the Southern Great Plains — the material states; 'both the off-farm application efficiency (average 80 to 100 percent) and the on-farm application efficiency (average 50 to 70 percent) for irrigation in this area are higher than national averages.'

"We are very pleased with our efficiency and especially pleased that you are aware of it; however, we are striving to improve these efficiencies.

"The state conservationist with the Soil Conservation Service in Texas has established a three-man technical team to serve the High Plains and Southern High Plains of Texas. This is an irrigation water management team whose principle objective will be to become experts in the field of on-farm irrigation water management and efficiency, and to also provide training to Soil Conservation Service personnel and others to enable better assistance to farm irrigators within this area.

"To support this increased emphasis by the SCS on water conservation, and to achieve our own objectives, the High Plains Underground Water Conservation District has recently signed an agreement with the local Soil Conservation Service area office to work with local irrigators to help them improve their 'on-farm' efficiencies. This Water District-SCS cooperative effort is the first of its kind to our knowledge. We are constructing a 'Field Water Conservation Laboratory' which in essence is a trailer equipped with all the necessary equipment to conduct on-farm water efficiency tests. The tests will begin at the well and follow the water into the soil and/or through the field to determine the efficiency of the application. Suggestions for improvements will be made to the irrigator if the tests indicate that improvements can be made. Local SCS and Water District personnel working together will provide this service to local farmers on a voluntary request basis.

"We believe that these programs have a great deal of potential and would invite you to monitor the success of these programs for possible introduction in other areas.

"Also, I would like to point out another recent water conservation action by our Water District. This action consists of the purchase of about $44,000 worth of research equipment for use by our local experimental station exclusively in 'water conservation research.'

"The above mentioned items should demonstrate local involvement and interest in promoting water conservation. This involvement and interest should demonstrate to you that we do not need 'forced' conservation programs or federal legislation to force us to conserve water."

POLICIES . . . continued from page 2

State Policy

I. We urge adequate funding to enable the Texas Department of Water Resources and other state agencies to perform their proper functions in the furtherance of a sound water program.

II. We urge all regulatory or action agencies of the state to consider and be mindful of the economic and social as well as the environmental impact of their decisions or actions affecting major water projects, including the consideration of reasonable alternatives.

III. We urge that the Legislature continue to appropriate funds to the various state agencies and institutions to support the research programs necessary to determine:

(b) more efficient means for use of water to conserve our limited water resources.

(c) constraints and solutions related to interbasin transfer of water.

VI. We urge that the Texas Department of Water Resources request and actively seek adequate appropriations to accelerate the evaluation of operational weather modification projects as a means to more fully develop our water resources and to incorporate the results of this evaluation into state water planning.

VIII. We consider that effective control and management of the state's groundwater resources can best be accomplished through establishment, by local option, of local districts for such purposes, and that a general law of statewide applicability is not necessary or desirable as a means of coping with groundwater management. However, the implementation of conjunctive management of surface and groundwater resources in some areas of Texas would provide for more adequate, dependable and lower cost water supplies, and for the more efficient use and conservation of both surface and groundwater supplies, provided that the conjunctive management agency be a local one and that it be structured to give equitable consideration to the use and management of both water supply sources and to the unique properties and potentialities of each.

IX. In view of the continuing danger of groundwater contamination associated with oil and gas exploration and development, we urge that the Texas Railroad Commission continue their surveillance of these activities and their programs for insuring adequate protection of the quality of the state's ground and surface waters.

X. We urge the adoption of legislation authorizing the creation of the necessary water authorities for the purpose of guaranteeing the repayment cost of and/or acting as wholesale contractors of imported waters for resale to users within the areas of delivery through the Texas Water System where no other existing agency can perform these functions.

Patricia Bruno joins the staff with this issue of the Cross-Section. A graduate of TTU, she brings media, journalism and art background to her role as Information and Education Director. We look for great things from her.

League Position On Water

During the past two years the League of Women Voters have been studying potential management programs for use of ground water in conjunction with surface water as well as research, assistance, and incentives for water conservation. Water Resources Director Catherine Perrine of Dallas, has directed this effort throughout the state by meeting and speaking with local League chapters and by attending virtually every water meeting conducted throughout the state. Betty Anderson of Lubbock is recent past President of the League of Women Voters of Texas and has provided full support of her office to this effort.

In November 1978, the League of Women Voters of Texas adopted the following position on ground water management.

A. Measures for the protection, conservation, and development of the state's ground water resources should be an integral part of the comprehensive state water plan.

B. Ground water management should achieve the following objectives: 1) Maintain ground water quality by preventing harmful contamination of aquifers; 2) Assure the long-term productivity of the state's ground water resources and availability of ground water supplies; and 3) Minimize adverse effects of ground water withdrawals, including land subsidence and reduction of spring flows.

C. Continuing water resources planning should include: 1) Detailed information concerning the hydraulic characteristics and recharge of the state's aquifers; quantities, locations, and trends of ground water withdrawals; measures that could conserve and extend existing supplies; current and projected costs of ground water and alternative surface water supplies; potential conjunctive use of ground water and surface water; 2) Management options developed specifically for each area of the state where ground water is a significant resource; 3) Full public consideration of ground water management options; 4) Recommendations of measures to be taken by the state, by political subdivisions of the state, and by the private sector to assure wise management of the state's ground water resources; and 5) Coordination of state plans for ground water management with relevant policies and programs of the federal government and of other states.

D. Adequate funds should be appropriated for planning and for management of the state's resources.

HIGH PLAINS ECONOMIC STUDY PROGRESSES

DALLAS-FORT WORTH — The High Plains Study Council held its annual meeting here recently to review the work plan of the federally authorized and funded Economic Development Administration's six-state Ogallala Aquifer Area study and to elect officers.

Forty-two attended the meeting at the Airport Marina Hotel.

Dayle Williamson of Lincoln, Neb., was elected chairman to succeed A. L. Black of Friona, Texas. Williamson is executive secretary of the Nebraska Natural Resources Commission, and Black is chairman of the Texas Water Development Board which is the policy making body of the state's water agency, the Texas Department of Water Resources.

Kansas Governor John Carlin was elected vice chairman, and Morgan Smith, commissioner of the Colorado Department of Agriculture, was named secretary. All will serve one-year terms.

Black was appointed to a second term as chairman of the liaison committee of the council, a group composed of representatives from each state in the council who meet frequently to coordinate the work of the states and federal agencies and advise the full council on the technical matters.

Council membership is composed of governors or their designates from Texas, Oklahoma, New Mexico, Kansas, Colorado, and Nebraska.

The council represents the member states in the organization in the conduct of a $6 million study authorized by Congress in 1976 to "assure an adequate supply of food to the nation and to promote the economic vitality of the High Plains region." The legislation further instructed the Secretary of Commerce in cooperation with the Secretary of the Army, to develop plans to increase water supplies in the area and report thereon to the Congress. in formulating these plans, the Secretary is directed to examine the feasibility of various alternatives to accomplish these objectives.

A general contractor, Camp, Dresser and McKee, was selected late last year to conduct and coordinate the study, with the U.S. Corps of Engineers conducting the water importation studies.

Several resolutions were adopted without dissent relating to membership and operation of the study. Included were: Observer states may be admitted to the council liaison committee from states neighboring the six-state area, upon designation by their governors because of the expressed desire to observe and coordinate with the High Plains Study Council.

The council adopted a recommendation from the liaison committee dealing with transmittal of the general contractor's master plan of study wherein the plan of study will be transmitted to the Secretary of Commerce and the Congress to fulfill interim report requirements of P.L. 94-587, Section 193, the authorizing act for the study. The council recommends that the interim report be considered a flexible master plan to guide the study.

Also adopted was a resolution concerning the water importation study element. It recommends to the Secretary of Commerce that the Corps of Engineers and the general contractor closely coordinate the importation study element so as to accomplish objectives of the authorizing congressional act.

Other resolutions concerned recommendations for allocation of federal monies to member states for the state study work which will be incorporated into the regional study, and plans for a briefing of the Ogallala area congressional delegation later this year regarding the plan of study and progress of the work.

Representing Texas at the meeting were Black and Harvey Davis, executive director of the Texas Department of Water Resources. Dr. Herbert Grubb, chief of planning and development for the department, gave reports on liasion committee work.

Each state representative gave the council an update of activities in his area. The general contractor's report was made by Harvey Banks. Brig. Gen. James Donovan of Dallas, commander of the Southwestern Division of the Corps of Engineers at Dallas, reported on plans for the importation study. James A. Power Jr. of Topeka, Kan., executive director of the Kansas Water Resources Board, made the combined states report to the council.

Jeanne McFarland of Washington, D.C., director of the office of economic research for the Economic Development Administration, discussed federal activities relating to the study.

Two members of the Texas Water Development Board, George McCleskey of Lubbock, and W. O. Bankston of Dallas, attended the council meeting.

HAPPY CENTENNIAL—U. S. GEOLOGICAL SURVEY

The U. S. Geological Survey, an important branch of the Interior Department, celebrated its 100th birthday on March 3. The USGS is a very competent agency that quietly goes about its business of scientific investigation and data gathering that provides the basis for many important natural resources decisions. The original legislative act which established the USGS provided for "the classification of the public lands and the examination of the geological structure, mineral resources, and products of the national domain."

Subsequent Congressional actions expanded this authorization to include examinations outside the national domain (including space) and for gauging the streams and determining the water supply of the U. S. The USGS budget for its Centennial Year is over $640 million, with which it employs 13,000 scientists, engineers, technicians, and support personnel to provide information on the land and its mineral, energy, and water resources; to prepare topographic and other maps of the land; to supervise mineral leasing on federal lands, including the Outer Continental Shelf; and to carry out investigations leading to a reduction of hazards posed by earthquakes, volcanic eruptions, landslides, etc. The Water District salutes a very efficient 100-year young agency with the hope that the work it conducts in the future will be as beneficial to the U. S. and its citizens as it has been for the past century.

THE CROSS SECTION (USPS 564-920)
HIGH PLAINS UNDERGROUND WATER
CONSERVATION DISTRICT NO. 1
2930 AVENUE Q
LUBBOCK, TEXAS 79405

SECOND CLASS PERMIT

THE Cross SECTION

INDUSTRIAL AGRICULTURAL MUNICIPAL

Published monthly by High Plains Underground Water Conservation District No. 1, 2930 Avenue Q, Lubbock, Texas 79405

Volume 25—No. 5 Publication number USPS 564-920, Second Class Postage paid at Lubbock, Texas May, 1979

BUCKET AUGER is used by Paul McMillian, a Soil Conservation Service agriculture engineer in Lubbock to take large samples. It is similar to the soil probe which takes samples less than an inch in diameter.

SPEEDY MOISTURE METER check by John Henry of Plainview SCS tests the soil. Carbide is added, then pressure from the resulting acetylene is measured on a guage. Soil moisture is found with use of tables.

Team Measures Soil Moistures

The delicate balance of agricultural economics, particularly as they relate to the availability and cost of energy, has created a most favorable environment for renewed dedication to conservation practices. Recently, the USDA - SCS State Conservationist Gene Vittitoe established for the High Plains a three-man "Irrigation Water Management Team" to "become experts in on-farm irrigation water management and efficiency." To support the increased SCS emphasis on water conservation, the Water District's Board of Directors signed an agreement with the State Conservationist to provide the area SCS office equipment and supplies needed to conduct "on-farm" water efficiency tests from the well to the field application.

The District has purchased a mobile laboratory of necessary equipment and has retained the services of retired SCS Area Engineer Y. E. McAdams to support the efforts of Area Engineer Myron Namken in conducting training workshops for SCS and High Plains Water District personnel. The workshops and field demonstrations throughout the area will cover basic economics, plant-soil-water relationships, sprinkler and furrow application efficiencies and pumping plant efficiency.

The District and SCS goal in these efforts is that each participant will become proficient and capable of not only conducting efficiency tests, but also teaching others. The continued success of irrigated agriculture in our area is totally dependent upon the irrigators wise blending of soil, water and plant relationship in such a manner as to assure maximum efficiency.

By DOUG McDONOUGH
Plainview Daily Herald

A training workshop this past week for Soil Conservation Service and High Plains Underground Water Conservation District No. 1 employees showed that the old, tried-and-true method of checking soil moisture levels is just as accurate as more sophisticated methods.

Geared at sharpening the skills of older SCS technicians and teaching the younger workers how to determine available and total soil moisture, the group worked with the familiar "feel" method, the speedy moisture method and carbide gas method.

"The results were very close," explained Jimmy Lewis of the Soil Con-

continued on page 2 . . . TEAM

Water Meters Save Water And Money

By MILVERN H. NOFFKE*

Diminishing water supplies, high energy costs, low crop prices, high equipment costs — these and other problems are putting an economic squeeze on irrigators.

When water supplies were abundant and energy cheap and plentiful, efficient water management was a low priority. This situation has changed rapidly and drastically in the past few years. Water supplies are diminishing and energy costs are moving upward with no end in sight.

The irrigator can no longer afford to guess or watch his neighbor. He must achieve greater efficiency in all phases of his irrigation operation if he is going to stay in business. The question is—can irrigators adopt practices and techniques to improve their water management program? The answer, of course, is yes. Technology is available now for much more efficient irrigation management.

Measurement of irrigation water (both flow rates and total quantity) is the first step that must be taken to establish an effective water management program. There are various measurement methods and devices available for use by the irrigator. One of the most reliable and accurate methods of measurement is the use of propeller-type water meters. Propeller water meters are installed in pipelines and can measure both the rate and the quantity of water flow.

How much water does my well pump? Does the output drop during the season? How many inches of water am I applying? Has the efficiency of my pump or pumping plant decreased significantly? At what rate am I applying water? Many irrigators have pondered these questions without really knowing for sure. The answers to these and other questions are needed to maintain a highly efficient irrigation system and water management program. Propeller-type water meters can help provide most of these answers.

Pumping Plant Efficiencies

Pumping plants use energy. Inefficient pumping plants waste energy. It is that simple and our country can not really afford to waste energy which will be needed in the future. Besides, it is a needless expense.

Many pumping plants operate inefficiently today even though they originally had high efficiency ratings. Dropping water tables, pump-bowl wear, and corroded well screens are examples of events occurring constantly which affect well efficiencies.

Dr. Robert A. Longenbaugh, Associate Professor of Civil Engineering at Colorado State University, reported on Colorado's pumping plant efficiency at the Western Irrigation Forum in Denver in March. He stated, "Tests conducted by pump efficiency teams operating in Colorado the past three summers indicate that from 50 to 75 percent of all pumps tested are operating at efficiencies which are below

continued on page 4 . . . WATER METERS

MAKE WAY FOR WATER TO WEST TEXAS

Local legislation to enable the residents of the High Plains of Texas the opportunity to create a water import authority to bring water to West Texas has been working its way through the Legislature in Austin. The bill was introduced by Representative Bob Simpson of Amarillo, and co-sponsored by most other representatives serving this area. While HB 2205 does not create the authority, it does provide the method by which the authority can be created and outlines its powers and duties if created.

Major features of the bill include the provision for elections to create the water import authority. An election *can not* be called, however, until water is determined to be available for contract to the area and evidence is presented by the Texas Water Development Board to demonstrate the economic, environmental and human benefits to result within each county of the import area if water is imported. The bill requires a majority vote of the local residents to create the authority, a majority vote on the tax rate to be levied to support the authority, and the election of directors to govern the authority. Its boundaries would include all of the area of Texas that has beneath it the Ogallala formation.

House Bill 2205 is being sponsored in the Senate by Senator E. L. Short. At press deadline the Natural Resource Committee had passed the bill to the floor for full Senate consideration. Senator Bob Price of Pampa offered support for the water import bill, but was seeking some changes.

THE Cross SECTION

THE CROSS SECTION (USPS 564-920)

A MONTHLY PUBLICATION OF THE HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1
2930 Avenue Q, Lubbock, Texas 79405
Telephone 762-0181

PATRICIA BRUNO, Editor

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

BOARD OF DIRECTORS

Precinct 1
(CROSBY, LUBBOCK and LYNN COUNTIES)
James P. Mitchell, President ..... Wolfforth

Precinct 2
(COCHRAN, HOCKLEY and LAMB COUNTIES)
Selmer H. Schoenrock ..... Levelland

Precinct 3
(BAILEY, CASTRO and PARMER COUNTIES)
A. W. Gober ..... Farwell

Precinct 4
(ARMSTRONG, DEAF SMITH, POTTER and RANDALL COUNTIES)
Jim Conkwright, Secy.-Treas. ..... Hereford

Precinct 5
(FLOYD and HALE COUNTIES)
Malvin A. Jarboe, Vice President ..... Floydada

COUNTY COMMITTEEMEN

Armstrong County
Carroll Rogers, Secretary
Wayside, Texas

Guy Watson, 1981 ..... Wayside
Bill Heisler, 1981 ..... Wayside
M. L. McGehee, 1981 ..... Wayside
James Bible, 1983 ..... Wayside
James Stockett, 1983 ..... Wayside

Bailey County
Doris Wedel, Secretary
H&R Block, 224 W. 2nd, Muleshoe

Eugene Shaw, 1981 ..... Rt. 2, Muleshoe
David Stovall, 1981 ..... Rt. 2, Muleshoe
Ernest Ramm, 1981 ..... Rt. 2, Muleshoe
D. J. Cox, 1983 ..... Enochs
Marshall Head, 1983 ..... Muleshoe

Castro County
Garnett Holland, Secretary
City Hall, 120 Jones St., Dimmitt

Jackie Clark, 1981 ..... Rt. 1, Box 33, Dimmitt
W. A. Baldridge, 1981 ..... 608 W. Grant, Dimmitt
Frank Wise, 1981 ..... Rt. 4, Box 10, Dimmitt
George Elder, 1983 ..... Dimmitt
Floyd Schulte, 1983 ..... Dimmitt

Cochran County
W. M. Butler, Jr., Secretary
Western Abstract Co., 108 N. Main Ave., Morton

Hershel M. Tanner, 1980, Route 2, Box 36, Morton
Danny Key, 1980 ..... Star Route 2, Morton
H. H. Rosson, 1980 ..... Star Route 2, Morton
Keith Kennedy, 1982 ..... Star Route 2, Morton
Robert Yeary, 1982 ..... Route 2, Box 66, Morton

Crosby County
Clifford Thompson, Secretary
2930 Avenue Q, Lubbock

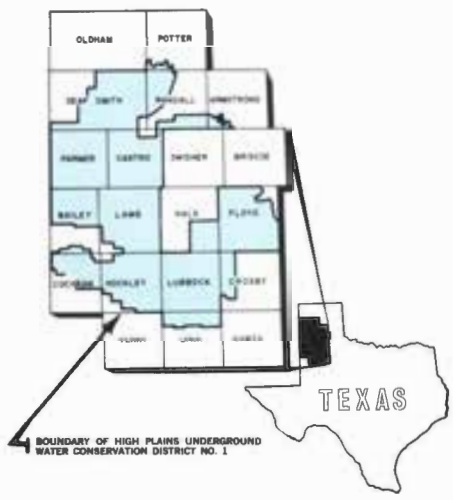
Tommy McCallister, 1980 ..... 209 N. Van Buren, Lorenzo
Edward S. Smith, 1980 ..... 102 N. Van Buren, Lorenzo
Pat Yoakum, 1980 ..... Box 146, Lorenzo
Mike Carlisle, 1982 ..... Route 1, Box 274, Lorenzo
Alvin C. Morrison, 1982 ..... Box 6, Lorenzo

Deaf Smith County
B. F. Cain, Secretary
County Courthouse, 2nd Floor, Hereford

James E. Higgins, 1981 ..... 200 Star St., Hereford
Garland Solomon, 1981 ..... 303 Sunset Dr., Hereford
Tom Robinson, 1981 ..... 211 Cherokee Dr., Hereford
Bill Cleavinger, 1983 ..... Wildorado
W. L. Davis, Jr., 1983 ..... Hereford

Floyd County
Verna Lynne Stewart, Secretary
Floyd Co. Abstract, 215 W. California, Floydada

C. O. Lyles, 1980 ..... Route 4, Floydada
Connie Bearden, 1980 ..... Route 1, Floydada
M. M. Smitherman, 1980 ..... Silverton Star Rt., Floydada
Charles Huffman, 1982 ..... Route 1, Lockney
Gilbert L. Fawver, 1982 ..... Route 4, Floydada



Hale County
J. B. Mayo, Secretary
Mayo Ins., 1617 Main, Petersburg

Clint Gregory, Jr., 1980 ..... Box 98, Petersburg
Homer Roberson, 1980 ..... Box 250, Petersburg
Henry Scarborough, 1980 ..... Route 2, Petersburg
Gaylord Groce, 1982 ..... Box 314, Petersburg
Bill John Hegi, 1982 ..... Route 2, Petersburg

Hockley County
Jim Montgomery, Secretary
609 Austin Street, Levelland

Billy Ray Carter, 1980 ..... Route 5, Levelland
Leon Young, 1980 ..... Route 1, Ropesville
Robert Phillips, 1980 ..... 218 Redwood, Levelland
J. E. Wade, 1982 ..... Route 2, Littlefield
Jack Earl French, 1982, Rt. 3, Box 125, Levelland

Lamb County
Robert Richards, Secretary
509 Phelps Avenue, Littlefield

P. A. Washington, 1980 ..... Box 124, Springlake
Jack Stubblefield, 1980 ..... Box 397, Spade
Larry Lockwood, 1980 ..... Star Rt. 2, Littlefield
Billy J. Langford, 1982 ..... Box 381, Olton
Edward Fisher, 1982 ..... Box 67, Sudan

Lubbock County
Clifford Thompson, Secretary
2930 Avenue Q, Lubbock

Don Bell, 1980 ..... Box 114, Wolfforth
Ronald Schilling, 1980 ..... Route 1, Slaton
Granville Igo, 1980 ..... 1304 8th Street, Shallowater
Owen Gilbreath, 1982 ..... 3302 23rd St., Lubbock
Clifford Hilbers, 1982 ..... Route 1, Box 14, Idalou

Lynn County
Clifford Thompson, Secretary
2930 Avenue Q, Lubbock

S. B. Rice, 1980 ..... Route 1, Wilson
W. R. Steen, 1980 ..... Route 2, Wilson
Wendell Morrow, 1980 ..... Route 1, Wilson
Gary Houchin, 1982 ..... Box 54, Wilson
Freddie Kieth, 1982 ..... Box 283, New Home

Parmer County
Pat Kunselman, Secretary
City Hall, 323 North Street, Bovina

Troy Christian, 1981 ..... Rt. 1, Farwell
Dalton Caffey, 1981 ..... P.O. Box 488, Friona
Ronald Elliott, 1981 ..... Rt. 3, Muleshoe
Floyd Reeve, 1983 ..... Friona
Ralph Roming, 1983 ..... Bovina

Potter County
Jim Line, 1981 ..... Box 87, Bushland
Albert Nichols, 1981 ..... Rt. 1, Box 491, Amarillo
Weldon Rea, 1981 ..... Bushland
Sam Line, 1983 ..... Bushland
Mark Menke, 1983 ..... Bushland

Randall County
Mrs. Louise Tompkins, Secretary
Farm Bureau, 1714 Fifth Ave., Canyon

Harry LeGrand, 1981 ..... 4700 S. Bowie, Amarillo
Jack Brandt, 1981 ..... Rt. 1, Box 280, Canyon
Johnny Sluder, 1981 ..... Box 56, Bushland
Bill Dugan, 1983 ..... Happy
Roger B. Gist, III, 1983 ..... Happy

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

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

TEAM . . . continued from page 1

servation Service. "With work in this area we hope to be able to save the farmers some irrigation energy costs by giving them accurate information on soil moisture and exactly how much water a field needs."

The Conservationists in the workshop looked at two different areas with different types of soil, one in Halfway and one in Cotton Center. The tests showed that the field near Halfway, which had not received an irrigation since last fall, had good to excellent soil moisture in the top two feet while at three feet it required some additional moisture.

At Cotton Center, the top three feet were very marginal, moisture wise, with probably not enough moisture to even start a crop.

The feel method, which most farmers are familiar with, requires a soil probe and about 15 minutes of time, Lewis said. Cost of the probe is less than $10.

The probe, about three-feet long, is inserted at various depths and the moisture is determined by actually feeling the soil sample. "Each soil type has its different characteristics," explained Carl Hutcherson, SCS conservationist. By matching how well various soil types will stick together with photographic charts, they are able to accurately measure the soil moisture and then determine how much, if any, should be added through irrigation.

"With very little training, a farmer can make as accurate and speedy measurements as with any method," Hutcherson said. "The soil probe is a simple, easy tool that he can carry around in his pickup."

Another method, the gravimetric method, again shows total moisture in the soil, but is a little more complicated. First the individual must decide on a representative area in the field and then decide on the depth he wishes to take the sample.

A hole, about a foot in diameter, is dug six inches deep then the actual sample is taken with a large spoon. The sample should immediately be placed in a plastic bag to insure that no moisture is lost. The sample is weighed on a gram scale and put on a stove to cook out all possible moisture. Meanwhile, the volume of the actual soil sample is taken by placing a plastic bag in the hole left by the sample, filling the bag with water, and then pouring the water in a graduated cylinder.

When the soil sample has completely dried, it is again weighed on a scale.

DRYING OUT the soil sample is a gravimetric method of testing by cooking on a camp stove so the soil's dry weight can be measured.

The results are used in a mathematical formula to discover the density of the soil and the amount of moisture contained in the sample.

"It takes at least an hour and a half to run the tests," Hutcherson said. "It gives more details, but when someone is sharp with the feel method, he can come up with a ballpark estimate that is about the same. This method is a lot more scientific, but it also gives the general public more figures than they really need. We did it just to prove how close the feel method comes."

The speedy moisture method is very similar in principle to the gravimetric method since the soil again is dried. First, the soil sample is measured in an Eley Volume Meter, then it is weighed on a gram scale. The sample, normally between 12 and 14 cubic centimeters, is placed in the speedy moisture meter with two large steel balls. Through the hollow cap, a predetermined amount of carbide is added.

When the carbide mixes with the moisture in the soil, acetylene is formed. A gauge in the handheld tester indicates the amount of pressure formed by the gas. That reading is then applied to a table to reveal soil moisture.

"At best, it takes an hour to hour and a half to complete the test and it requires $420 to $450 investment," Lewis explained.

The SCS is available to conduct soil moisture tests, but Lewis said their activities will be geared more at training individual farmers with how to conduct the test, "using the charts that the SCS will furnish.

DISTRICT DEVELOPS SUPPLEMENTAL WATER TEXT

District staff discovered that little is being taught in most schools on the High Plains about water and water conservation. A need surfaced during public school teachers' workshops and from questioning teachers who have contacted the District office seeking local facts on water. Apparently the reason is a lack of available information and materials for teachers to use in the classroom.

The High Plains Underground Water District is preparing to close at least a portion of the information gap on this vital issue for schools in our area. A supplemental text and teacher's guide are being developed for use in the general science classes in the public school system's eighth and ninth grades. The materials are designed to teach youngsters about water and its wise use on the High Plains.

The preliminary drafts are being reviewed for critique and suggestions by teachers, principals, administrators and water experts in Texas with an eye to accuracy and student appeal. Initial responses have been enthusiastic although potential distribution and cost estimates are still being examined. The text is entitled "Water, A Mini-Guide to Its Sources, Uses, Abuses and Conservation," and is planned to supplement the earth science course text.

40 Years Of Appraising High Plains Makes "Mr. Charlie" An Expert

Around Lubbock's High Plains Water District office, Charles A. Whitfield is respectfully and affectionately known as "Mr. Charlie". He is respected for his wealth of 40 years experience and knowledge of West Texas soils and land values. He is endeared for his long standing association with the District as a Federal Land Bank appraiser, consultant, mentor, expert witness, employee and friend.

Mr. Charlie has probably hand augered more West Texas soil, walked more land and seen more growth than nearly anybody on the High Plains. He is greatly admired for his personal contributions to the growth of the area by helping young farmers obtain farmland loans and begin farming.

Southern High Plains landowners save between three and five million

"MR. CHARLIE" WHITFIELD

dollars annually on their income tax, due partially to his efforts. Mr. Charlie works for the Water District each year to provide information to support local landowners' claims for cost-in-water depletion allowances.

When the United States Fifth Circuit Court of Appeals, in 1965, affirmed the District Court's ruling that, "taxpayers are entitled to a cost depletion deduction for exhausting their capital investment in the groundwater extracted and disposed of by them in their business of irrigation farming," (Marvin and Mildred Shurbert, et al vs. United States of America) it was as much a victory for Mr. Charlie as for anyone. He had researched and prepared much of the testimony to document the difference between irrigated and dry land sale prices based on groundwater in storage beneath the land. He gave much of the expert testimony on land values in the Shurbert case. As for the many hours of work and testimony that went into the trial, Mr. Charlie grins, "We pointed that out pretty well."

After the victory, he poured over all the records of farm sales, as far back as 1948, to develop cost guidelines for use in every county in the District for every year from 1948 to 1966. Fourteen years later he is still calculating the value of water in land sales for the District. The Southern High Plains of Texas and New Mexico are the only areas in the nation enjoying such a tax advantage.

Mr. Charlie got to be an expert by appraising land in these parts for close to 50 years. He worked for the Federal Land Bank in Houston until 1961. The open plains, rolling hills and the high country of Texas were his territory. That's a lot of land, seeing lots of change. Mr. Charlie recalls, "back in 1933, Lubbock's population was just 22 thousand and there was only a dab of irrigation in Hale and Floyd Counties."

"Back then" he tells it, "the highest priced farm I knew of was in the Acuff community. Land was selling for forty dollars an acre, down to fifteen dollars an acre in parts of Bailey County. It stayed pretty steady until the late Forties when the boys got home from World War II and started irrigating.

"Insurance companies began recognizing the value of water in about 1945, but land sale values continued to follow the national average until about 1948; then they shot off the top of the page for irrigated land on the plains. They used all ditch irrigation then. There were no sprinklers in this part of the country even in '61. I'm a horse and buggy boy so I never investigated, but they have plenty now."

Mr. Charlie has also observed how land appraisal methods have been updated along with the horse and buggy. "Today, they use aerial photographs, colors and formulas to classify whole areas for land values . . . but nothing beats going out and visually seeing a farm. I'm cantankerous about some things, I trust my experience."

So do his colleagues. Mr. B. L. Jones also worked for the Federal Land Bank and was one of Mr. Charlie's pupils 30 years ago. "He's an excellent appraiser and a real good teacher. He knows as much about the soil and water of this country as anybody I know," says Jones, who smiles over a lesson he learned from Mr. Charlie which he has not forgotten.

"Mr. Charlie asked me to go for a ride with him, which I always tried to do because I always learned something from him. We drove around some and visited until we were on a piece of land I recognized I'd appraised. Then Mr. Charlie opened the car door and pointed down and said, 'By golly, that's bind weed and don't you ever forget it,' and I haven't."

To auger soil is a lot of work, according to Jones; but Mr. Charlie says he wouldn't do it any other way. "I've been looking at land for close to 50 years. I got out and walked across the farm, augered out soil samples and handled them. I'd get some soil, spit on it, and ribbon it out in my hand to tell if it was clay loam or sandy loam. I can judge soil by sight."

To make an appraisal for a good loan takes more than looking. Mr. Charlie not only evaluated topography, noxious weeds, and erosion, but until the 60's when credit managers began processing such information, he was also charged with personally interviewing folks about their financial status

A MONUMENTAL STRUCTURE of Texas history stands in Stonewall County. Mr. Charlie appraised this historical home near Aspermont a few years back. Now the Baldwin Estate, it was the original courthouse for Stonewall's county seat.

and credit. Mr. Charlie was a realist. He believed it was no favor to make a loan to a man who couldn't possibly repay it.

"In the 30's during the depression, we would interview folks and had to ask how much money they had in the bank to get a financial picture. They needed a twenty-five percent agricultural value equity in the farm in order to qualify for a Federal Land Bank loan. But most folks thought, 'the poorer I am, the more the government will loan me' . . . They'd get pretty mad at us for prying into their business; and we had to know all the tricks—to keep people honest."

Mr. Charlie chuckles over the bricks some landowners stashed in their pump discharge lines to make it appear the pump was producing a full pipe of water, so the land would qualify for a larger loan.

According to his friends, appraisal is a "science of judgment," and Mr. Charlie is a master of the science. More than that, everyone will tell you he is truly a gentleman, from his close shave and shine, to his jelly bean hat. The one story, they say, that really irritated Mr. Charlie is about an "old boy from Lamesa" who called one day and invited Mr. Charlie to have lunch with him. The fellow claimed that he wanted Mr. Charlie to teach him all he knew about appraising farms over lunch. Mr. Charlie still gets teased about that, and about being a "staunch Aggie". He graduated from Texas A&M with the Class of '13; however, he still laughs at, enjoys and even tells Aggie jokes.

If there is one thing Mr. Charlie does not do, it is attract attention to himself. But according to Jones, "his abilities don't need expounding on; they're self-evident if you ever work with him."

Something else self-evident to the High Plains Underground Water Conservation District and to many people of this area who purchased land and pursued farming careers, C. A. Whitfield's advice on land evaluation and water availability have meant success to many of this area's leading farmers.

SMYLIE WILSON JUNIOR HIGH students in Mrs. Stout's seventh grade social studies class enjoyed a slide show and films on water conservation recently. Dan Seale, District staffer, says he fielded some tough questions from these youngsters.

WATER METERS . . . continued from pg. 1

the recommended level. Some of the efficiencies were so bad that the pumps were using two to three times as much energy as would be required for an efficient pump. In many instances, the farmer did not know his pump was inefficient until after the test was made."

Flow meters are a necessary tool for making pumping plant efficiency adjustments and for keeping a watchful eye on condition changes. Dropping flow rates are a key to possible changes in efficiency.

To establish an engine and pumping plant efficiency program:

1. Install a water flow meter which includes a rate-of-flow indicator.
2. Have a complete efficiency adjustment made on your pumping plant to bring it up to maximum efficiency. (Use a qualified technician.)
3. Keep watch on future flow rates and fuel consumption. When changes occur, look for possible problems (worn points, old spark plugs, plugged screens, bowls worn or out of adjustment, etc.).

Now might be a good time to have your pumping plant checked. With the high cost of energy, your annual savings may be much greater than you think.

Irrigation Systems

Irrigation systems operate properly when designed properly. Proper sizing of sprinkler nozzles, pipelines, and engines are dependent on accurate flow rate data. Engineers must make their design calculations based on flow rate data you provide, by what the well driller says the well produces, or by a one-time special test.

Flow rates can change considerably during a season, however, and a special test may not be a true reflection of average conditions. Inaccurate design information will result in an inefficient system. Flow meters can provide the necessary information for accurate design.

Once your system is properly designed and in use, your flow meter can be used to keep a constant check on your system's efficiency. If you are pumping sand for example, periodic checks with a flow meter might tell you when to replace worn sprinkler nozzles. In any case, a change in flow rates is the result of a condition change.

In some areas, lack of adequate water supplies have caused irrigators to tie together a number of small wells to achieve sufficient flow quantity for running a sprinkler system. Proper design is very important when doing this. One irrigator installed flow meters and found he was actually recharging into one of the wells which he assumed was pumping. Another irrigator is using his meter's rate-of-flow indicator to make sure all eleven (11) of his submersible pumps are operating. If one quits he can spot the problem on his flow meter.

Irrigation Water Management

More efficient water management will: 1) conserve water; 2) reduce energy use and cost; 3) reduce chemical and fertilizer use and leaching which could contaminate aquifers; and, 4) reduce labor requirements. Scientific scheduling of irrigations (applying water according to crop needs) will be the backbone of all good irrigation water management programs. Water meters can play an important role in this scientific water management process.

The potential exists for large savings of water and energy resources if known water management techniques are put into large-scale practice. Research in Nebraska indicates that 30-40 percent water use reductions can be achieved without seriously affecting crop yields.

The soil profile of the active root zone of the crop is the moisture reservoir and source of water for the plants. Additions to this reservoir are made with rainfall and irrigations. Subtractions are made by plant use, evaporation, and deep percolation. When water is applied to an already full profile, waste occurs by deep percolation or surface runoff. By carefully monitoring soil moisture conditions, it is possible to know exactly what the moisture status of a field is and future irrigations can be planned from this knowledge. Soil moisture conditions can be measured with probes, tensiometers, gypsum blocks, or moisture meters. Rainfall can be measured with rain gauges. Know how much you have applied by measuring with a flow meter. Apply only enough water to refill the soil profile, or better yet, leave some storage capacity to accept timely rainfall. Deep percolation can be stopped by never overfilling the profile and runoff can be eliminated with better management practices.

Miscellaneous Uses

Many irrigated areas have water management districts whose purpose is to assist irrigators to better manage available groundwater supplies. These supplies can be better managed if accurate water use data is available. They can offer management and educational programs which will help extend the life of these groundwater supplies. Water meters can supply the needed water use data.

In some states it is necessary to prove use of water in order to vest rights to the use or ownership of water. Records made from actual measurement by metering is one of the best methods of proof available to the irrigator.

We are entering a new era of water conservation and management. Economics tell the irrigator he must be more efficient for financial reasons. The government tells the irrigator he must be more efficient because of a need to conserve water and energy supplies. Measuring flow and pumpage is the first step to take toward establishing a better water management program on your farm.

**Milvern H. Noffke, Great Plains Area Manager, McCrometer, Division of Ametek, Inc.*

SET ASIDE A TIME FOR THANKS

Soil Stewardship Week was traditionally observed this May 20 through 27 by churches throughout our nation. It is a special time to express thanks for and create larger awareness of the natural resources of soil, water and air which nuture and give daily food and fiber to our communities. Stewardship observances also draw the public's attention to local resource problems and community efforts to help solve them.

The concept of soil stewardship had its origins in the special Rogation Days set aside by the Bishop of Vienne, France, following bad weather and earthquakes that brought crop failures and widespread hunger to much of France some 15 hundred years ago. In 1946, publishers of Farm and Ranch magazine suggested to religious leaders in a number of southern states that a Sunday be set aside for their congregation to recall their ethical obligations and responsibility as stewards of the land. Soil Stewardship Week has been sponsored in the United States since 1955 by the National Association of Conservation Districts in cooperation with the nation's nearly three thousand Conservation Districts.

DR. SAM CURL

Ag Science Gets 5th Dean

Dr. Samuel E. Curl is coming back to Texas Tech, this time as the fifth Dean of the University's College of Agricultural Sciences. He takes his post on July 1, to head the only U.S. non-land grant college of agriculture granting the doctoral degree. The new dean served previously as a member of the TTU College of Agricultural Sciences faculty for thirteen and one-half years and rose to associate vice president of Academic Affairs. He worked five years in the dean's office. His record of research and administration is impressive. During his earlier tenure at Tech, Curl served as interim assistant dean for a seven-month period in 1968; as assistant dean and director of research, '68 - '70; as interim dean and director of research, '70 - '71; and, as associate dean and director of research, '71 - '72, all within the College of Agricultural Sciences.

"I couldn't pass up the opportunity to come back to Lubbock and TTU," says Curl. "I look forward to a close working relationship with the Water Resource Center, other Texas Tech scientists, and the area and state agencies concerned with water."

Dr. Curl identified a number of studies in agricultural research he hopes to continue and expand, including a study of the cost of energy for pumping, and projects to increase water use efficiency, and drought resistence of plants. He believes it is especially important that the College's role is to be out on the frontiers of research for the industry.

THE CROSS SECTION (USPS 564-920)
HIGH PLAINS UNDERGROUND WATER
CONSERVATION DISTRICT NO. 1
2930 AVENUE Q
LUBBOCK, TEXAS 79405

SECOND CLASS PERMIT

THE Cross SECTION

Published monthly by High Plains Underground Water Conservation District No. 1, 2930 Avenue Q, Lubbock, Texas 79405

Volume 25—No. 6 | Publication number USPS 564-920, Second Class Postage paid at Lubbock, Texas | June, 1979

Center Pivot Tests Show How To Improve System Efficiency

EDITOR'S NOTE:

The High Plains Underground Water Conservation District No. 1, in cooperation with the Soil Conservation Service has conducted ten field demonstrations testing on-farm irrigation efficiencies during the past two months.

In addition to assisting local irrigators, these workshops are designed to train SCS and Water District staff participants to be proficient in teaching others how to apply a blend of basic economics, plant-soil-water relationships, sprinkler and furrow application efficiencies and pumping plant efficiencies to get the maximum water conservation for their dollar. These field workshops have been directed principally at plant-soil-water needs and center pivot efficiencies.

By DOUG McDONOUGH
Plainview Daily Herald

Getting maximum efficiency and uniform distribution of irrigation water are two of the major selling points of center pivot irrigation systems. To help producers get the top benefits of these systems, training workshops are being conducted throughout the area.

During one workshop, conducted by Y. E. McAdams of the High Plains Underground Water Conservation District No. 1 in Lubbock, tests were made on a center pivot system two miles south of Olton for SCS members in Littlefield and Plainview along with members of the High Plains Underground Water Conservation District No. 1 and one staff member of the Texas Department of Water Resources.

"With this training," Jimmy Lewis of the SCS explained, "we can now go out on request and check a farmer's center pivot system, making sure it has the correct nozzles at the right locations and figure out his actual cost per inch of water. All it will cost him is about half an hour of his time."

During the day-long training session, the engineers and conservationists were shown a series of tests to be conducted. The results of these tests were graphed and processed through a computer to determine efficiency and what system modifications are needed.

"One of the tests conducted was checking the velocity of the water moving through the system. By determining the flow rate in gallons per minute, this can be compared to the flow rate the system is designed to operate at," Lewis explained.

To get the actual flow rate per nozzle, a hose is placed over each sprinkler head individually. That water is drained into a five gallon bucket, again to get gallons per minute output.

"We check each sprinkler to make sure it is putting out what it is supposed to," Lewis said, "because each sprinkler head is designed for a different output to account for pressure reduction as the water goes through the system. By putting in different nozzles, a uniform pattern is available with the center pivot system."

The check on the nozzle discharge is important since occasionally the wrong nozzle is installed or sand from the well will corrode them.

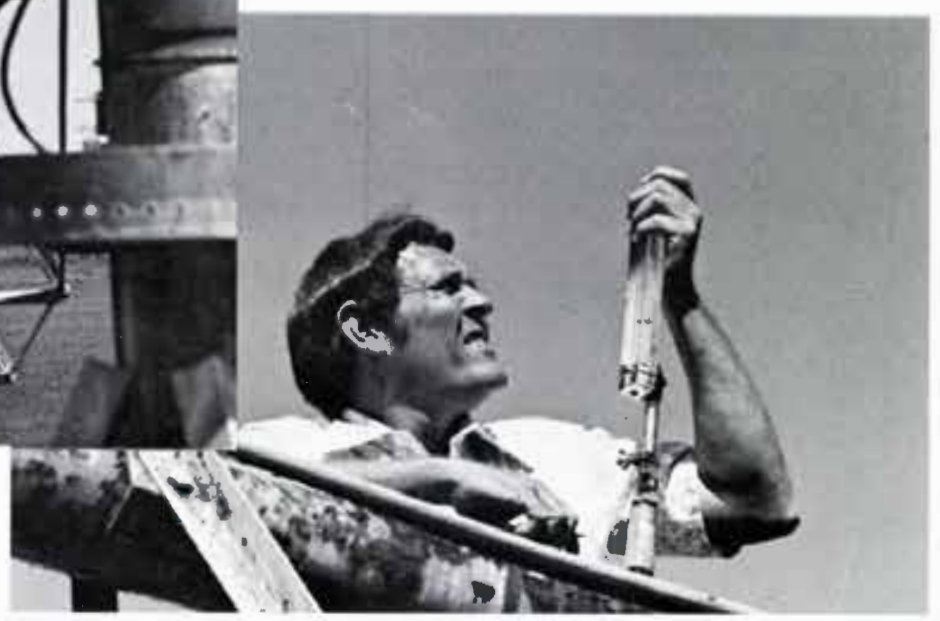
To test the actual amount of water that reaches the ground, empty quart oil cans are placed at set intervals through the field. "We then get the farmer to crank up the system and let it made a complete pass over the cans at normal speed." This test determines how much the sprinkler is putting out to the ground and if there are any uniformity of application problems.

The amount of water caught in the cans, compared with the speed setting on the pivot system, helps determine the amount of water being put out. "We also look to see if there is any runoff. If there is, that indicates that the system is running too slow and we tell the farmer he needs to lighten the application by making faster circles." However, the amount of water required normally varies, depending on the time of the growing season and amount of moisture already in the soil profile.

"Once we measure the water caught in the can and the speed of the end, we can calculate on a chart how much water in inches the farmer is putting out on the field," Lewis said. With this information compared to the amount of energy used and the cost-rate for that energy, SCS engineers can determine the actual cost of the application and the per inch application cost.

continued on page 2 . . . CENTER PIVOT

SPEED READER, Bob Arhelger of the Soil Conservation Service in Lubbock checks the water velocity through a center pivot system during workshop tests. The speed at which water is moving through the system helps determine the gallons per minute being discharged by the system's nozzles.



RIDING HIGH atop a center pivot system Bob gets a water reading before a hose is attached to the sprinkler head. Water is drained into a five gallon bucket to determine the gallons per minute discharged by a single nozzle.

Study Documents High Cost Of Open Ditch Irrigation

High Plains ditch irrigation farmers may be losing from 2,747 dollars up to 13,255 dollars each year to the high cost of deep water infiltration and evaporation loss inefficiencies. The High Plains Underground Water Conservation District has just released its study tabulating statistical data in a report titled, "Cost Analysis of Irrigation Ditch Losses."

While High Plains irrigators have installed almost 20 thousand miles of underground pipelines and utilize an additional ten thousand miles of portable aluminum pipeline to prevent water loss to seepage or evaporation, opportunities still exist on some farms to conserve water.

Field tests for irrigation ditch losses over the years have verified these financial and water drains. This report documents the substantial volume of water which may be lost each year in open ditch irrigation through both decreased efficiency and higher irrigation costs; and it is one of the first studies to statistically analyze these findings.

The report examines three approaches in order to determine the dollar value of the quantities of ditch irrigation water lost in different soil types, the lost water's potential for yield increases, and the economic feasibility of replacing irrigation ditches with alternative irrigation distribution systems. Findings indicated these losses are indeed expensive, not only in decreased irrigation efficiency which then requires added pumping, but in added fuel costs for the additional pumpage. The water lost due to infiltration and evaporation from irrigation ditches becomes more costly yet if its potential for converting additional crops to irrigation is figured.

continued on page 4 . . . OPEN DITCH

THE Cross SECTION

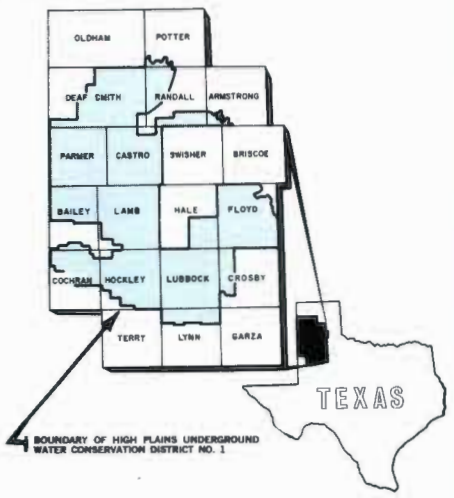
THE CROSS SECTION (USPS 564-920)

A MONTHLY PUBLICATION OF THE HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1
2930 Avenue Q, Lubbock, Texas 79405
Telephone 762-0181

PATRICIA BRUNO, Editor

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

A. Wayne Wyatt ..... Manager
Don Smith ..... Assistant Manager
Don McReynolds ..... Chief, Technical Division
Tony Schertz ..... Chief, Support Division
Clifford Thompson ..... Chief, Permit Division
Kenneth Carver ..... Chief, Agricultural Division
Patricia Bruno .... Information-Education Director
Butch Bates ..... Chief, Field Support Team
Obbie Goolsby ..... Chief, Permit Support Team
Dan Seale ..... Engineer Technician
Keith Whitworth ..... Draftsman
Dwight Adams ..... Agricultural Economist
Mrs. Norma Fite ..... Bookkeeper-Librarian
Miss Kathy Redeker ..... Head Secretary
Miss Pennye Newberry ..... Clerk-Typist
Mrs. Charmone Bednarz ..... Receptionist



BOARD OF DIRECTORS

Precinct 1
(CROSBY, LUBBOCK and LYNN COUNTIES)
James P. Mitchell, President ..... Wolfforth

Precinct 2
(COCHRAN, HOCKLEY and LAMB COUNTIES)
Selmer H. Schoenrock ..... Levelland

Precinct 3
(BAILEY, CASTRO and PARMER COUNTIES)
A. W. Gober ..... Farwell

Precinct 4
(ARMSTRONG, DEAF SMITH, POTTER and RANDALL COUNTIES)
Jim Conkwright, Secy.-Treas. ..... Hereford

Precinct 5
(FLOYD and HALE COUNTIES)
Malvin A. Jarboe, Vice President ..... Floydada

COUNTY COMMITTEEMEN

Armstrong County
Carroll Rogers, Secretary
Wayside, Texas

Guy Watson, 1981 ..... Wayside
Bill Heisler, 1981 ..... Wayside
M. L. McGehee, 1981 ..... Wayside
James Bible, 1983 ..... Wayside
James Stockett, 1983 ..... Wayside

Bailey County
Doris Wedel, Secretary
H&R Block, 224 W. 2nd, Muleshoe

Eugene Shaw, 1981 ..... Rt. 2, Muleshoe
David Stovall, 1981 ..... Rt. 2, Muleshoe
Ernest Ramm, 1981 ..... Rt. 2, Muleshoe
D. J. Cox, 1983 ..... Enochs
Marshall Head, 1983 ..... Muleshoe

Castro County
Garnett Holland, Secretary
City Hall, 120 Jones St., Dimmitt

Jackie Clark, 1981 ..... Rt. 1, Box 33, Dimmitt
W. A. Baldridge, 1981 ..... 608 W. Grant, Dimmitt
Frank Wise, 1981 ..... Rt. 4, Box 10, Dimmitt
George Elder, 1983 ..... Dimmitt
Floyd Schulte, 1983 ..... Dimmitt

Cochran County
W. M. Butler, Jr., Secretary
Western Abstract Co., 108 N. Main Ave., Morton

Hershel M. Tanner, 1980, Route 2, Box 36, Morton
Danny Key, 1980 ..... Star Route 2, Morton
H. H. Rosson, 1980 ..... Star Route 2, Morton
Keith Kennedy, 1982 ..... Star Route 2, Morton
Robert Yeary, 1982 ..... Route 2, Box 66, Morton

Crosby County
Clifford Thompson, Secretary
2930 Avenue Q, Lubbock

Tommy McCallister, 1980 ..... 209 N. Van Buren, Lorenzo
Edward S. Smith, 1980 ..... 102 N. Van Buren, Lorenzo
Pat Yoakum, 1980 ..... Box 146, Lorenzo
Mike Carlisle, 1982 ..... Route 1, Box 274, Lorenzo
Alvin C. Morrison, 1982 ..... Box 6, Lorenzo

Deaf Smith County
B. F. Cain, Secretary
County Courthouse, 2nd Floor, Hereford

James E. Higgins, 1981 ..... 200 Star St., Hereford
Garland Solomon, 1981 .... 303 Sunset Dr., Hereford
Tom Robinson, 1981 .... 211 Cherokee Dr., Hereford
Bill Cleavinger, 1983 ..... Wildorado
W. L. Davis, Jr., 1983 ..... Hereford

Floyd County
Verna Lynne Stewart, Secretary
Floyd Co. Abstract, 215 W. California, Floydada

C. O. Lyles, 1980 ..... Route 4, Floydada
Connie Bearden, 1980 ..... Route 1, Floydada
M. M. Smitherman, 1980 ..... Silverton Star Rt., Floydada
Charles Huffman, 1982 ..... Route 1, Lockney
Gilbert L. Fawver, 1982 ..... Route 4, Floydada

Hale County
J. B. Mayo, Secretary
Mayo Ins., 1617 Main, Petersburg

Clint Gregory, Jr., 1980 ..... Box 98, Petersburg
Homer Roberson, 1980 ..... Box 250, Petersburg
Henry Scarborough, 1980 ..... Route 2, Petersburg
Gaylord Groce, 1982 ..... Box 314, Petersburg
Bill John Hegi, 1982 ..... Route 2, Petersburg

Hockley County
Jim Montgomery, Secretary
609 Austin Street, Levelland

Billy Ray Carter, 1980 ..... Route 5, Levelland
Leon Young, 1980 ..... Route 1, Ropesville
Robert Phillips, 1980 ..... 218 Redwood, Levelland
J. E. Wade, 1982 ..... Route 2, Littlefield
Jack Earl French, 1982, Rt. 3, Box 125, Levelland

Lamb County
Robert Richards, Secretary
509 Phelps Avenue, Littlefield

P. A. Washington, 1980 ..... Box 124, Springlake
Jack Stubblefield, 1980 ..... Box 397, Spade
Larry Lockwood, 1980 ..... Star Rt. 2, Littlefield
Billy J. Langford, 1982 ..... Box 381, Olton
Edward Fisher, 1982 ..... Box 67, Sudan

Lubbock County
Clifford Thompson, Secretary
2930 Avenue Q, Lubbock

Don Bell, 1980 ..... Box 114, Wolfforth
Ronald Schilling, 1980 ..... Route 1, Slaton
Granville Igo, 1980 .... 1304 8th Street, Shallowater
Owen Gilbreath, 1982 ..... 3302 23rd St., Lubbock
Clifford Hilbers, 1982 ..... Route 1, Box 14, Idalou

Lynn County
Clifford Thompson, Secretary
2930 Avenue Q, Lubbock

S. B. Rice, 1980 ..... Route 1, Wilson
W. R. Steen, 1980 ..... Route 2, Wilson
Wendell Morrow, 1980 ..... Route 1, Wilson
Gary Houchin, 1982 ..... Box 54, Wilson
Freddie Kieth, 1982 ..... Box 283, New Home

Parmer County
Pat Kunselman, Secretary
City Hall, 323 North Street, Bovina

Troy Christian, 1981 ..... Rt. 1, Farwell
Dalton Caffey, 1981 ..... P.O. Box 488, Friona
Ronald Elliott, 1981 ..... Rt. 3, Muleshoe
Floyd Reeve, 1983 ..... Friona
Ralph Roming, 1983 ..... Bovina

Potter County
Jim Line, 1981 ..... Box 87, Bushland
Albert Nichols, 1981 ..... Rt. 1, Box 491, Amarillo
Weldon Rea, 1981 ..... Bushland
Sam Line, 1983 ..... Bushland
Mark Menke, 1983 ..... Bushland

Randall County
Mrs. Louise Tompkins, Secretary
Farm Bureau, 1714 Fifth Ave., Canyon

Harry LeGrand, 1981 ..... 4700 S. Bowie, Amarillo
Jack Brandt, 1981 ..... Rt. 1, Box 280, Canyon
Johnny Sluder, 1981 ..... Box 56, Bushland
Bill Dugan, 1983 ..... Happy
Roger B. Gist, III, 1983 ..... Happy

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

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

High Plains Of West Texas Gain Right To Create A Water Import Authority

Texas Governor Bill Clements has signed into law House Bill 2205 which gives residents of the 42 counties above the Ogallala Formation the means to create a Water Import Authority. The passage of this act is a great stride for the High Plains in seeking to solve its water problems, however, much remains to be done before the authority is created or water can be imported to the area. The power to create an import authority lies with the people as the bill outlines:

- A petition by a least 50 landowners in the proposed import area or a motion by the Texas Water Development Board (TWDB) can begin the process of defining and certifying the area,
- The TWDB must give notice and conduct at least five hearings within the import area boundaries, and provide for special hearings in each county which petitions for one,
- The TWDB shall prepare evidence of the cost and benefits to be reasonably expected from the importation of water into the area and the estimated quantities of water that are and may be available, and are required for import into the area, as well as evidence showing the economic, environmental and human costs and benefits that will result within each county within the import area.
- An election will not be authorized until adequate water is determined to be contractually available on an equitable basis for all the water needs existing within the authority for import into the area,
- A majority vote cast by residents of the defined area which will be divided into 15 precincts of equal population, will confirm the authority, elect 15 directors, and authorize collection of an ad valorem tax which is not to exceed 50 cents on each 100 dollars of fair market value of property,
- The authority's Board of Directors will hold the powers and duties of importing, storing, managing, selling, recharging, preserving and conserving water. It will have the power of contract, indebtedness, bonding, eminent domain, and of making assessments within zones of benefit where an election has authorized such taxation,
- The authority will also have power to establish and enforce rules to conserve, preserve and protect imported water. But those rules will not supercede existing district rules pertaining to all other water,
- The authority will recognize ownership and rights of a landowner to underground water existing within the authority, and will have the power of annexation and deannexation of import areas by election.

CENTER PIVOT TESTS . . .

(continued from page 1)

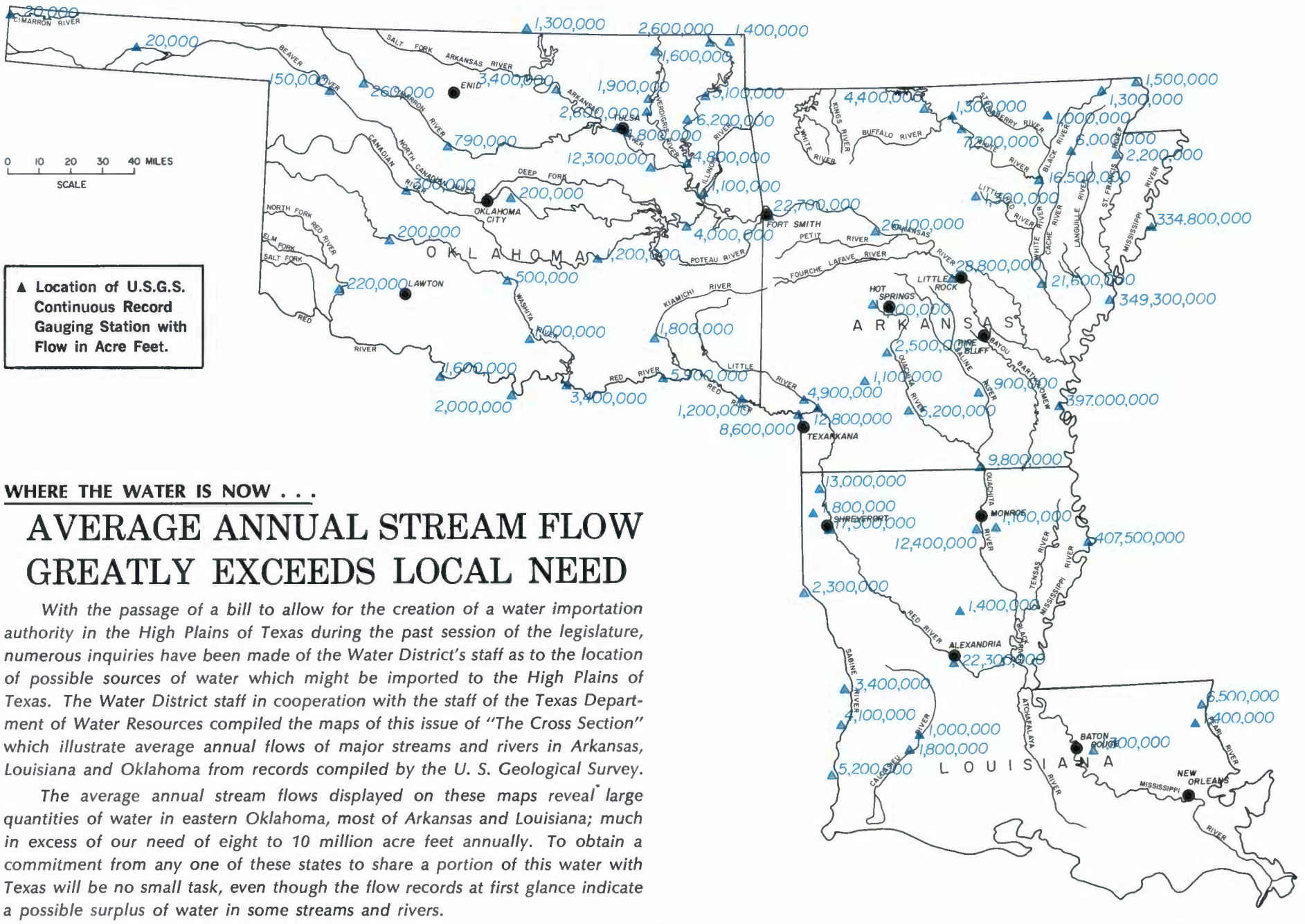
On the system at Olton, those in the workshop determined that it was operating at an overall efficiency of 67 percent. But by replacing 15 nozzles the system was brought up to the 80 percent efficiency range.

"In tests in the Muleshoe area, it was found that the efficiency of center pivot systems ranged from a low of 18.5 percent for an experimental system and 31 percent for commercial systems to 82 percent," Lewis said.

"The whole purpose of the testing program is not to tell the farmer he has to do this and that, but to give him the data from the tests and show him what he can do if he is not satisfied with the performance of the system," Lewis explained.

Lewis recommended that the tests be conducted on new systems after they have been used a few times and when farmers notice a variance in plant height or growth, which could indicate that insufficient water is being discharged from a specific nozzle or nozzles or a problem with water pressure.

PAYING ATTENTION to their lesson, SCS and Water District pupils watch Y. E. McAdams explain the use of a velocity gauge to compare actual flow rate against design specifications.



WHERE THE WATER IS NOW . . .

AVERAGE ANNUAL STREAM FLOW GREATLY EXCEEDS LOCAL NEED

With the passage of a bill to allow for the creation of a water importation authority in the High Plains of Texas during the past session of the legislature, numerous inquiries have been made of the Water District's staff as to the location of possible sources of water which might be imported to the High Plains of Texas. The Water District staff in cooperation with the staff of the Texas Department of Water Resources compiled the maps of this issue of "The Cross Section" which illustrate average annual flows of major streams and rivers in Arkansas, Louisiana and Oklahoma from records compiled by the U. S. Geological Survey.

The average annual stream flows displayed on these maps reveal large quantities of water in eastern Oklahoma, most of Arkansas and Louisiana; much in excess of our need of eight to 10 million acre feet annually. To obtain a commitment from any one of these states to share a portion of this water with Texas will be no small task, even though the flow records at first glance indicate a possible surplus of water in some streams and rivers.

USING GO-CART TIRES . . .

TTU Researcher Installs Screen In Existing Irrigation Well

Texas Tech University Civil Engineering Professor, Bill Claborn has succeeded in removing 60 feet of mill-slotted well casing and installing a commercial well screen in the four year old irrigation well at Tech Farms near New Deal. His two year struggle with methods of water well renovation for the Water Resources Center has paid off. Claborn rigged up a researcher's version of a pneumatic bag with eleven inch go cart tires mounted on five inch column pipe. He installed them in the well at regular intervals, blew them up simultaneously, and successfully pulled back the casing, allowing him to install a well screen.

Claborn was building on Dr. Bill Lyle's 1976 findings at Texas A & M University Agricultural Experiment Station at Halfway. Lyle had demonstrated that a properly engineered well will produce the same amount of water at a fixed rate for considerably less energy expended. He had drilled a new well, installed a commercial well screen and properly sized gravel pack, and used a pressure jetting tool for development to eliminate sand pumpage. Well screens may provide as much as 30 percent open surface in the exposed area, as compared with about six percent or less open spacing in conventional mill-slotted casings.

Claborn saw the advantage in adapting Lyle's techniques to renovate existing wells. He figured if he could replace mill-slotted casings with screen, he would improve pumping efficiency. The screen would offer savings by either reducing the drawdown for a fixed amount of water pumped and thus save energy, or by increasing the water yield for the same drawdown and thereby save irrigating time or increase production potential.

"We're looking to save a little," he commented, "with the idea that everything we save is worthwhile." He speculates that a reasonable amount would be in the order of five to ten percent, but the research remains to be done to document his best guess.

Some definite savings can already be expected based on figuring the amount of energy needed for one foot of lift. Assuming five million acre feet pumped annually at the average observed pumping plant efficiency, reducing the pumping lift by one foot would save 10.5 million kwh of electricity which is equal to 441 thousand dollars at today's prices, or 162 thousand mcf of natural gas which translates into 324 thousand dollars currently. Savings could also be anticipated based instead, on the production potential of increased water yields. Figures for gross income resulting from additional irrigated acreage have been computed for different crops and soils as part of a cost analysis of irrigation ditch losses in a report just published by the Water District (see story page 1).

However, Claborn's first job was to figure a way to pull the old casings and set the screens. "That proved difficult," Claborn says. "There is no easy way, from a mechanical standpoint, to set a screen and pull back the casing to expose it. Many of the wells were drilled

continued on page 4 . . . SCREEN

FOR SALE: Thirty slightly used go-cart tires and pipe fittings. 1. Typical assembled gripping device of tire, placement washer and connecting hose. 2. Stock item go-cart tires and tubes used in gripping assembly. 3. Drill pipe used inside for additional strength.

ABANDONED WELLS LURE CHILDREN TO DANGER

by Butch Bates

Have you ever dropped stones into the casing of an old well and listened to the sound it makes? Maybe you have leaned over the opening to hear the echo of your own voice bounce back from the mysterious darkness below? These are just two examples of the phenomena that arouse a child's curiosity and make abandoned wells as intriguing and as dangerous as a discarded ice box with the door still on it.

It is only natural for a person to assume no one would ever fall into his deserted well as the odds are high against this happening. But it can and has happened as it did in December of 1959 on the F. W. O'Bannion farm near Dell City, Texas.

While playing with other children Mr. O'Bannion's three year old grandchild, Randy Gene McKinley, fell into an abandoned irrigation well cased with 16-inch pipe. Randy was lucky, for the water level stood only 68 feet below the surface cushioning his fall. Randy was also fortunate that J. Manuel Carrol, an adult who possessed a small enough physique and an ample amount of courage, volunteered to be lowered head first into the well with a rope tied around his ankles, so he could pull the child to safety. Aside from some minor injuries, Randy survived but still remembers it all vividly.

IN THE LAB Bill Claborn points out the tire assembly section of the pneumatic bag snuggled into a model well casing. In the four corners stand hydraulic jacks in a steel frame. The unit is capable of lifting 500 thousand pounds.

SCREEN INSTALLED . . .

(continued from page 3)

in the late 40's and 50's when steel pipe was almost impossible to get. Most irrigators installed used gas pipe for their casing or whatever they could get. Consequently, the quality of the pipe is not very great. No one ever anticipated pulling the stuff out of the ground. Many times, they simply tack welded the lengths together and if it held till the pipe got to the bottom, fine. People who try to pull casings around here have less than a 50 percent batting average. Almost invariably they get a hold and the casing splits in two, generally close to the surface."

Claborn started with a battery of lab tests and then moved into the field with the help of Hi Plains Drilling Company of Abernathy. "Our technique was to put down a pneumatic bag inside the casing at regular intervals, blow up the bags and get a grip on the inside of the casing. The intervals depended on the length of the pipe and what shape it was in. The idea was that if we got hold of it often enough we would not stretch the pipe. Instead of being pulled apart, it would actually be pushed together. Since then, we've discovered that didn't work perfectly, but that's the basic idea.

"The problem was to find something we could use in lieu of a pneumatic bag for research purposes. We wound up using 30 go-cart tires inserted every eleven feet. We were shooting 150 psi air pressure into the tires and were getting about 100 psi because of mechanical problems in trying to stop leaks. You can't believe all the stuff we had down that hole.

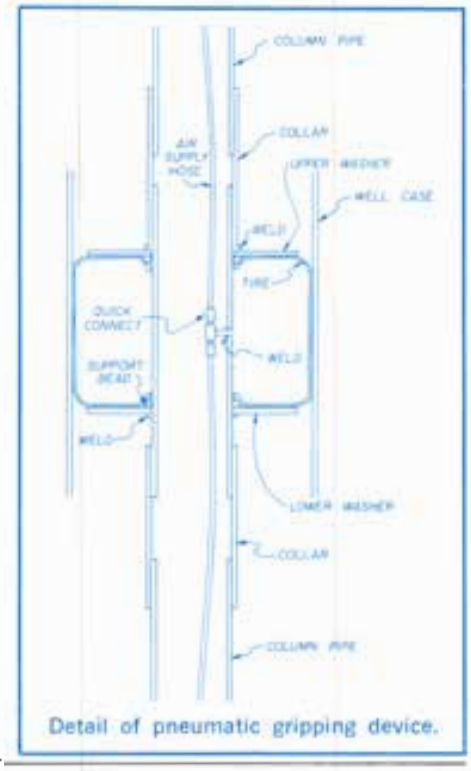
"To pull, we built a mechanism using four, eight-inch hydraulic jacks and a lot of heavy pigiron. But the biggest difficulty was that we did not anticipate the amount of load that it was going to take. It took 270 thousand pounds pull to start that string of pipe moving; but it dropped back pretty fast after that. We designed for 500 thousand pounds pull, but just for something down the road."

Claborn did not install the screen first and then pull the casing to expose it. He explained, "Ideally I'd like to, but if the casing is really rotten and rusted it will pull apart right below my last tire, so I didn't dare try that." The result was that the well caved in below the pulled casing and the new screen had to be bailed down. Claborn's big problem right now is getting the fine sand pumped out. He has installed the screen, however, and says he has little fear he can repeat that operation for a lot of wells. He's been pumping a lot of sand and that is not what he had originally hoped for. He hoped the hole would stay open and allow him to get a gravel pack around it.

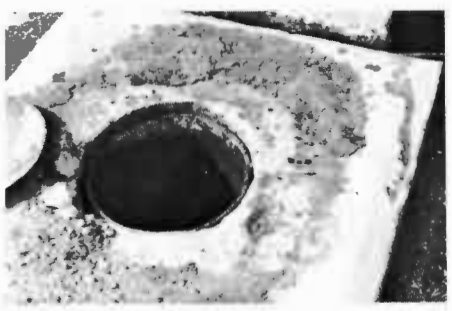
"What I'm looking for now is some kind of drilling mud, a gel-type material with enough inherent strength to hold open the hole in the region where the casing will be removed and then be dissolvable." So far his researcher's mind has conceived of jello, which he imagines is "something in that nature."

Claborn is concerned that his work not be oversold. "Farmers are caught in a tremendous energy crunch, it's no longer whether the water is down there, but whether they can afford to pump it. So anything we do to decrease the cost of pumping is going to look good. But we're not talking ten percent of the total bill, it is only the cost of the energy it takes to lift within the drawdown zone."

The research has cost about 25 thousand dollars, according to Claborn and lots of it went down blind alleys. He thinks there may be better ways of picking up the casings once they get started. While reconstruction of old wells is obviously desirable, additional testing and research are required to prove its economic benefits.



Detail of pneumatic gripping device.



OPEN OR IMPROPERLY CAPPED WELLS are potential death traps. District rules require owners to permanently cap open wells with a cover capable of sustaining a weight of at least 400 pounds.

OPEN DITCH . . . continued from page 1

Also examined is the economic feasibility of replacing open irrigation ditches with underground pipeline systems, plastic or aluminum pipe. Tables evaluate the breakeven point (years required to recover cost of investment) for installing such systems. Replacement systems are financially justified as the cost of water conveyed to the furrow without loss is converted into potential savings.

The study concludes it is hard to justify the revenue losses of open ditch irrigation considering the high cost of production to the irrigation farmer, especially when that cost might be directly translated into a "net" column.

Copies of the report may be obtained free of charge by contacting the Water District office at 2930 Avenue Q in Lubbock, Texas.

THE CROSS SECTION (USPS 564-920)
HIGH PLAINS UNDERGROUND WATER
CONSERVATION DISTRICT NO. 1
2930 AVENUE Q
LUBBOCK, TEXAS 79405

SECOND CLASS PERMIT

THE Cross SECTION

Published monthly by High Plains Underground Water Conservation District No. 1, 2930 Avenue Q, Lubbock, Texas 79405

Volume 25—No. 7 Publication number USPS 564-920, Second Class Postage paid at Lubbock, Texas *July, 1979*

Field Lab Practical Tool For On-Farm Water Management

"The whole purpose of the Field Water Conservation Laboratory," according to Water District Agriculturalist Ken Carver, "is to show the farmer some simple, inexpensive and commercially available equipment he can use in practical water management on his farm." With that brief introduction, the District's Board of Directors took a hands-on tour of the recently assembled and equipped trailer which has since been delivered to the Lubbock area Soil Conservation Service office for use in field training workshops.

The trailer is equipped with meters, gauges, fittings, probes, instruments and hand tools enough to do the job of evaluating the efficiency of nearly any irrigation system used on the High Plains. Total cost of the equipment and trailer was six thousand, six hundred dollars, an expense the Directors feel is well justified in the potential savings it offers to area irrigators.

Board members also heard a status report on the field demonstration program where some of the equipment has already been put to use in testing on-farm irrigation efficiencies and training personnel.

Water District representative Y. E. McAdams, and SCS area engineer Myron Namken have, since May first, conducted five water - soil - moisture workshops, three center pivot and one side roll irrigation system evaluations, and one furrow irrigation field workshop in addition to their classroom lessons. They have trained over 75 SCS and Water District staff from an eleven county area during these workshops.

On July 18, fifty employees of the Soil Conservation Service met in the South Plains Electric Co-op building in Lubbock to get their first look at the final version of the Field Water Conservation Laboratory. The occasion was a one day workshop to review the procedure they will follow in working with irrigators on water management of furrow irrigation and to receive instructions on the use of some of the special equipment in the mobile laboratory.

LOADIN' UP. District staff Ken Carver and Dwight Adams pack some 50 pieces of testing and evaluation equipment into the modified trailer's lower deck.

The first on-farm use of the mobile Field Water Conservation Laboratory was scheduled in July for SCS employees from Littlefield and Levelland to be familiarized with the equipment and try their hand at making a furrow evaluation. Continued use of the mobile lab is planned through the summer in other South Plains counties where training is planned for High Plains Underground Water Conservation District and SCS employees in Lubbock and Amarillo areas.

The evaluation procedure that SCS will be using includes a cost analysis of a pumping plant, losses in the delivery system and the uniformity of water applied to the land. From the evaluation the irrigator will learn where inefficiency problems exist in his system and what are the alternatives available to him to improve his management of water.

There is no charge for the evaluation by SCS and the irrigator has the option of changing or continuing his present management plan.

SCS plans to instigate an extensive water management program during the summers of 1980 and 1981 when they will be taking requests from irrigators to do evaluations. Interested irrigators should request assistance through local Soil and Water Conservation District Board Members or through local county SCS offices.

CANDID SMILES AND TV CAMERAS registered the Board's satisfaction with the fully equipped lab. Getting a rear view are, from top left, Jim Conkwright and Malvin Jarboe while Jim Mitchell chuckles with Selmer Schoenrock. A. W. Gober (bottom left) gets a question settled with Ken Carver.

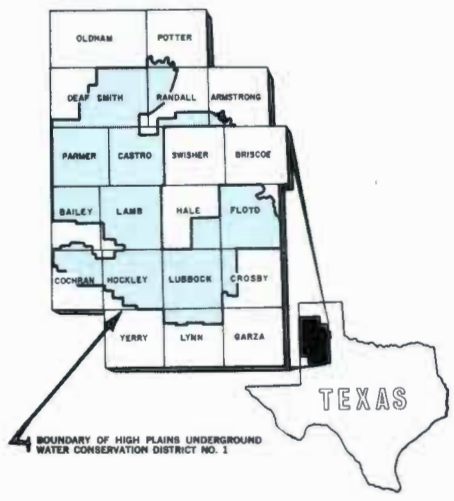
THE Cross SECTION

THE CROSS SECTION (USPS 564-920)

A MONTHLY PUBLICATION OF THE HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1
2930 Avenue Q, Lubbock, Texas 79405
Telephone 762-0181

PATRICIA BRUNO, Editor

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



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

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

HOW TO DETERMINE THE PUMPING PLANT EFFICIENCY OF YOUR WELL

By KEN CARVER and DWIGHT ADAMS

Improving irrigation pumping plant efficiencies will conserve energy, reduce farmers' pumping costs, and improve the overall economic stability of a farming area. An efficient pumping plant may also increase the amount of water delivered by a pump which, with improved scheduling, could result in an increase in crop yields and overall production. Thus, by improving the efficiency of their pumping plants, High Plains farmers could simultaneously reduce expenses and increase production.

In 1967, Texas Tech University conducted a study and found that the average efficiency in the High Plains area for electric and natural gas powered pumping plants was 48.6 percent and 10.8 percent respectively. Excellent efficiencies for an electric pumping plant would be 72 to 75 percent, and for a natural gas pumping plant would be 16 to 18 percent. While it was concluded from this study that most wells in the area needed improvements in efficiency, the importance of maintaining an efficient pumping unit is just now being fully realized as the cost of fuel steadily increases.

What Is Efficiency?

Efficiency is defined as the ratio of the amount of work done by a mechanical device to the input energy used. When referring to irrigation wells, efficiency is usually expressed as the percentage of water horsepower over input energy horsepower. The term "Overall Efficiency" simply refers to the combined efficiency of both the pump and motor.

Determining Efficiency

When evaluating a well's efficiency, a few basic measurements can be taken to calculate the output water horsepower and input energy horsepower. In determining water horsepower, the needed measurements are the discharge rate and total pumping head. The discharge rate can be found with a few specialized tools designed either for open or closed irrigation systems. For an open system, a propeller meter, weir, or Parshall flume may be used, while the closed system requires an orifice, pitot tube, or Collins impact tube. The other needed measurement, total pumping head, involves the summation of the pumping lift (which can be measured with an electric water level device) and pressure on the discharge side of the pump.

The input power figures can be determined without the use of any specialized tools. These measurements can be taken directly from the power company's watt-hour meter for an electrically powered plant and the natural gas meter for a natural gas powered plant.

Once these measurements are completed, the figures can be plugged into a series of formulas which will reveal the wells actual overall efficiency. Listed below is a six step procedure (includes formulas) for determining pumping plant efficiency:

1. Measure well yield in gallons per minute (GPM).
2. Determine pumping head in feet.
   Total Head (ft.) = Pumping lift (ft.) + Discharge head (ft.)
   (Discharge head (ft.) = Discharge head (psi) × 2.31)
3. Calculate water horsepower (WHP) output.
   $$\text{Water horsepower (WHP)} = \frac{\text{Total head in feet} \times \text{GPM}}{3960}$$
4. Measure fuel consumption of power unit.
   Electric watt-hour meter—count number of resolutions in specific number of seconds (usually a few minutes).
   Natural Gas meter—count cubic feet used in specific number of seconds (usually about one hour).
5. Determine Input horsepower (IHP)
   IHP (Electricity) = 4.8 × kh factor (which is given on meter) × Revolutions ÷ $seconds
   IHP (Natural Gas) = Cubic feet ÷ seconds × 1033[1] × Meter Multiplier[2] ÷ .7075[3]
   [1]1033 = a constant which is BTU content per cubic foot of fuel.
   [2]Meter multiplier must be obtained from local gas company.
   [3].7075 = a constant factor to convert BTU to horsepower.
6. Calculate Overall Efficiency
   $$\text{Overall Efficiency} = \frac{\text{WHP}}{\text{IHP}} \times 100$$

Following the above procedures a farmer can determine whether his irrigation well is pumping an adequate amount of water to justify the amount of energy being used. Many times the benefits in terms of dollars saved prove to be quite significant. For example, an electric well pumping 221 acre feet annually, at a 300 foot lift, will save approximately $2,200.00 a year operating at 70 percent efficiency rather than 45 percent. In the case of a natural gas well, with the same lift and pumpage, annual savings between a well operating at 16 percent and 10 percent approach $1,600.00. These figures are based on present day fuel costs of $.04/killowatt hour and $2.00/thousand cubic feet.

Upon completing an efficiency test, a farmer may be confronted with the decision of whether to repair, replace, or adjust the existing pump or motor. Information provided from an efficiency test will not always pinpoint the specific reason or cause of low efficiency. It may be that the perforations in the casing are partially blocked, the pump impellers may be badly worn, or some other factor. However, the test will provide the farmer with some information on which to make a decision. One thing for certain, with energy costs rising at present rates, today's farmers cannot afford to pump water inefficiently.

Investigations Focus On Water Conservation

The search that never ends for a better method of spreading water dollars into optimum yields, often begins at agricultural research centers such as the Texas Agricultural Experiment Stations (TAES) at Lubbock and Halfway, Texas.

High Plains Water District staff recently took a closer look at different water related research projects in irrigation systems and soil-plant-water use being conducted by Drs. Bill Lyle and Charles Wendt.

Their investigations include research on breeding lines of cotton and grain sorghum, anti-transpirants, plastic moisture barriers, surfactants, plant stresses, compost, mobile drip and sprinkler irrigation systems, crop rotations, and well reconstruction.

The High Plains Water District is contributing to these studies by providing some of the basic testing equipment needed as well as several of the more sophisticated data collection instruments now being shared by investigators in virtually all of these research projects. One of the tools most frequently used is the neutron

PROBING FOR MOISTURE, TAES research associate Mike Gerst set up the neutron source in a crop of "sheltered" cotton.

probe. Its job is to indirectly measure the presence of and the amount of change in moisture in the soil. The probe itself contains a radioactive source which emits fast neutrons.

The probe is lowered through a section of thin wall aluminum tubing buried in the soil. When the radioactive source's fast neutrons hit hydrogen atoms (one of the constituents of water) they begin slowing down. This rate of slowing is recorded by the instrument and can be interpreted to indicate the amount of moisture present in the soil. One of the probe's jobs in these research projects is to allow the investigator to locate how deep and when the plant roots obtain soil moisture.

Other key equipment being used in the soil-plant-water and irrigation system studies are the tensiometer, which measures the tension with which the water is held in the soil; the pressure plate which indicated how much pull is needed to get water out of the soil; resistance blocks and meters which indicate the amount of soil moisture; various sized flow meters; and a pressure bomb which measures how much water stress a plant is undergoing.

Along with these essential pieces of hardware go the hard work of the

UNDER STRESS, a tiny plant stem gets squeezed in the pressure bomb by TAES assistant Carole Kelley for District staff.

researchers. Dr. Wendt, TAES Plant-Soil-Water expert, accompanied our staff to the experimental research sites and explained their purpose.

His "rain out shelter studies" at the Lubbock station are examining different breeding lines of cotton and sorghum under controlled stress conditions in order to find a plant which is more water efficient than the varieties now commonly grown. These studies are in cooperation with Dr. Darrell Rosenow, grain sorghum breeder, and Dr. Jerry Quisenberry, cotton geneticist. By sheltering a specific crop area with a portable shed, Dr. Wendt can control amounts of moisture or sunlight received and deliberately induce crop stress. He is now testing an exotic line of cotton which he has found fruits with shortened days, but does not wilt on the High Plains. This line also extracts water from deeper in the soil profile. Even with a fruit load it has not wilted until frost. In the future Dr. Quisenberry hopes to combine some of these characteristics into lines which will make commercial varieties and use water more efficiently.

Research on anti-transpirants, also going on at the Lubbock station, is looking at ways to cut water loss by plants. One series of studies is examining the potential of spraying a solution of polyethelene in very low concentrations on a potato crop to cut down on the water loss through the potato leaves. The sprayed film barrier is eventually broken down by sunlight. Studies in a controlled environment chamber indicate that it may also slow down evaporation of water from the soil. Information obtained to this point indicates that it works best at very low concentrations when applied with water, a factor which will help in making it economically feasible for use.

An off-station research project with moisture barriers is going on at the Hill Farms near Olton. The water holding capacity of the soil on the Hill farm is only about a half inch per foot at most, as soil composition in the area is 95 percent sand for the first ten feet. Dr. Wendt's research here uses a machine-layed bed of plastic strips at approximately 18 to 20 inches under the sand surface to create a moisture barrier. Neutron probe holes are being set with a coring rig to monitor the crop's water use on the research plot. The project is designed to study whether this method can feasibly hold more moisture in the soil at a depth where the plant root can use it by preventing deep infiltration.

Moving on to Halfway, we examined a series of ground rings and meters enclosing plots of soil for surfactant research. There are a number of surfactant chemical products, or "soaps", now available on the market which claim to "make water wetter". These compounds act as surface active chemicals to break water's surface tension or the ability of water molecules to hold together. The compound's affect is to increase water movement through the soil. What is not known is whether making water wetter increases yields. The principal object of Dr. Wendt's research is to learn whether an investment in surfactants will pay off in increased yields.

Lack of water is not the only thing that causes crop stresses. Corn and sorghum farmers know that insect damage can seriously affect their yields. One insect that is causing problems in grain sorghum and corn production is Bank's grass mites. Dr. Wendt is cooperating with Dr. Bill Lyle, agricultural engineer and Dr. Tom Archer, entomologist, in a corn irrigation study at Halfway involving different levels of stress during the various stages of growth. Researchers hope to determine if the crop can withstand the stress of decreased irrigation water requirements in early stages of growth, and yet have adequate water during critical stages (fruiting) of growth to minimize the insect damage and get good yields. The dividend in this approach is that the crop will then use its water most efficiently to produce grain yet still withstand the insect stress.

Another off-station research project at the Paymaster farms east of Plainview will compare the use of cotton burr and fertilizers. At twenty dollars a ton, composting a field may cost more than the benefits it yields as fertilizer. The objective of the study is to determine if compost influences water movement, water holding capacity, soil nutrients, and the ease with which a soil can be worked. From this study Dr. Wendt hopes to make some realistic conclusions concerning the value of compost as a fertilizer and soil amendment.

Dr. Bill Lyle has two irrigation system research projects in progress at Halfway. He is working with Jim Bordovsky to evaluate a low pressure center pivot system. It uses low pressure hoses and nozzles and simultaneously applies water close to the ground by four different, constant irrigation

BORING DOWN, the coring rig was drilling neutron probe holes to monitor crop water use at Hill Farms.

treatments. The rig irrigates a tract with varied plant populations and varied plant row spacings in order to study the effects of row spacing and plant populations on yields at different moisture levels with this low pressure pivot system.

The other project is a linear, low energy precision application system. This rig can push water through the main line at five to fifteen pounds pressure, depending on the flow rate,

continued on page 4 . . . WATER RIG

SIGNING OFF. After ten years of research here the US Geological Survey closed its artificial recharge research center on campus at Texas Tech University last month. Don Signor cut the power to the data collection and computation system which aided in studies of methods of artificial recharge from playa lakes, spreading ponds, pits and wells. Most recent analysis focused on chemical and sediment plugging. Staff have been reassigned, and more refined research is continuing at the USGS Denver labs.

DOING FINE. Dr. Wendt's research potato patch is wallowing in moisture retained under a thin film of polyethelene, which acts to cut plant transpiration.

Chemical Tested To Cut Plant Water Use

A whole new approach to increasing plant water use efficiency is about to break ground . . . Scientists at the Texas Agriculture Experiment Station are betting on the possibility of reducing water use by crops grown on the High Plains by 40 percent, while maintaining current yields. Better still, they hope to increase yields by over 50 percent with the same amount of water by applying chemical plant growth regulators. Drs. Charles Wendt and John Abernathy of the Lubbock Experiment Station will soon be evaluating the use of plant growth regulators to chemically increase water use efficiency on High Plains crops. The Water District will participate jointly in this research effort with the TAES by providing approximately half the funds for the 24 thousand dollar project.

Herbicides are examples of plant growth regulators which are used by farmers. These chemicals have saved producers on the Texas High Plains millions of dollars in weed control in the past few years. New types of growth regulators have been developed which change the way plants grow and develop. Scientists have recently found that a growth regulator called "PIX" produced by the BASF Wyandotte Corporation increases cotton yields by as much as 50 percent. Laboratory research at Arkansas has shown that "PIX" reduced the water use of cotton by 40 percent while still producing the same amount of yield. It is not known how crops are affected by these regulators. Researchers speculate on whether the chemicals thicken leaves, slow down water use, or cause deeper root systems so the crops get more soil-water. Some of these chemicals also appear to stabilize the growth of the plant under excess water situations.

Another unknown is the influence of these compounds on water use efficiency and the climate and soil conditions under which yield increases can be expected. Wendt and Abernathy will be looking for the answers to how "PIX" influences water use efficiency on cotton under dryland and irrigated conditions and the potential of other plant growth regulators to increase the water use efficiency of crops grown on the Texas High Plains beginning with 1979 field conditions.

WATER RIG . . .

(continued from page 3)

and drop it into the furrow to spoon feed the plants. For test purposes the rig is also equipped with high pressure impact sprinklers so that spray evaporation losses may be determined at about fifty pounds pressure for comparison with the low energy precision application system. Both these application techniques will be applied to both furrow diked and conventionally prepared land to determine the effect of water application and land preparation on irrigation efficiency and yield. Uniformity of water distribution and total energy consumption will also be compared.

Additional crop research at Halfway includes the investigation of rotation patterns related to maximum yields. The researchers are comparing a crop rotation cycle of sorghum, wheat, summer fallow and cotton to a "check" cycle of sorghum and cotton. Initial results suggest cotton following wheat and fallow rotation reaps a larger reservoir of stored water, and produces better weed control, deeper root penetration, disease resistance and greater yields.

Our last stop was at the site of Dr. Lyle's well reclamation research still in its initial stages. He is attempting to develop a procedure for reclaiming old wells. After studying the well log, and where feasible, redrilling the well deeper—to red bed if possible, a closed circuit TV camera is lowered into the hole to determine its current condition. Then the old well casing is mechanically perforated and opened up. Next a well screen and a gravel pack are installed between the screen and the old casing. Finally a pump is installed. Dr. Lyle is currently working to reclaim one of the station's wells. The scope of this research will later include wells drilled in various aquifer situations and presenting a variety of problems associated with existing wells.

We realize that many landowners are as eager as the researchers for the results of these projects. We will continue to report on future TAES research and progress.

"A BRIGHTER FUTURE", theme of the 51st Convention of the Texas Association of Future Farmers of America, is reflected in the faces of its new leadership under President David Alders of Nacogdoches (lower right). Today there are over 60 thousand FFA members statewide. They set a standard for vocational agricultural education and leadership.

PROTECTING HIGH PLAINS IRRIGATORS INTERESTS . . .

US Representative Kent Hance (D-TX) has a keen eye out for irrigation farmers, as he demonstrated last month by getting the House Agriculture Committee to approve his amendment to HR 2610 which is the Water Resources Planning Act. His measure would protect irrigation farmers from the possibility of being eliminated from federal farm programs by policy directives of federal agencies. The President's Water Task Force, trying to save energy, decided that irrigation farmers were using energy unnecessarily; so they proposed to exempt these farmers from government farm payment programs. Hance's amendment states that "no person can be prohibited from participating in government farm programs unless specifically stated in law."

SCIENTISTS OFFER A PROFITABLE IDEA FOR 1980 YIELDS

This would be a good year to give limited tillage a try on dryland. So says Dr. Allen Wiese, Texas Agricultural Experiment Station Weed Scientist from Bushland. After several years of research, Wiese along with USDA scientists Paul Unger, Jack Musick and Ron Allen, are confident that using herbicides to control weeds from wheat harvest to sorghum planting the next year is more profitable than plowing. Using a combination of three pounds per acre active ingredient of atrazine and one pound per acre of 2,4-D will do the job, according to scientists.

Wiese pointed out that chemical fallow or limited tillage has many advantages for the 1979-1980 season if farmers are going to follow wheat with sorghum. First, it is cheaper than plowing. Second, it saves diesel fuel. Third, erosion is almost eliminated. Finally, abundant straw on the soil surface from the 1979 crop will increase soil water storage compared to plowing. This will increase sorghum yields in 1980. "Reducing plowing costs by $1.50 to $6.50 per acre and at the same time increasing sorghum yield up to $15.00 per acre makes this a good year to give limited tillage a try on dryland," Wiese said.

THE CROSS SECTION (USPS 564-920)
HIGH PLAINS UNDERGROUND WATER
CONSERVATION DISTRICT NO. 1
2930 AVENUE Q
LUBBOCK, TEXAS 79405

SECOND CLASS PERMIT

THE Cross SECTION

Published monthly by High Plains Underground Water Conservation District No. 1, 2930 Avenue Q, Lubbock, Texas 79405

Volume 25—No. 8 Publication number USPS 564-920, Second Class Postage paid at Lubbock, Texas *August, 1979*

How Much Is The Recharge To The Ogallala

By C. DON McREYNOLDS

"No one has made an indepth study of the amount of natural recharge or irrigation recirculation occurring to the Ogallala Aquifer in the High Plains of Texas in the past 40 years. We are still using the same old figure of one-tenth of one inch annually, estimated by hydrologists in their original studies of natural recharge to the Ogallala Aquifer back in the late thirties and early forties. But many conditions which likely influence the natural recharge rate have changed over the years." A. Wayne Wyatt, Manager of the High Plains Underground Water Conservation District No. 1 sees both the need and the advantage in attempting to determine the current amount of natural recharge and irrigation recirculation to the aquifer.

The Water District is participating in such a study as a subcontractor to the Texas Department of Water Resources as part of the U. S. Geological Survey's multi-state study of the Ogallala Aquifer. The new estimates will be determined from data collected weekly from access tubes and automatic rain gauges located at select sites throughout the High Plains of Texas. Staff of the High Plains Underground Water Conservation District, the North Plains Ground Water Conservation District, and the Texas Department of Water Resources monitor the sites. Twenty-two test sites have been constructed and are monitored weekly in 20 counties. Each logging site consists of two access holes approximately thirty feet deep and cased with two inch thin wall aluminum tubing which is sealed at both ends with rubber plugs. At each site, one of the access holes is located in irrigated land while the second hole is located in non-irrigated soil. Precipitation and irrigation water movement through the soil profile is expected to be recorded in the irrigated field, while only precipitation movement is expected to be recorded in the dryland field.

PLOTTING ALONG, Ken Carver calibrates the geo-logger to record soil moisture levels from the full depth of the probe hole.

HOOKIN' IT, Dwight Adams aligns the probe over the tripod above the access tube.

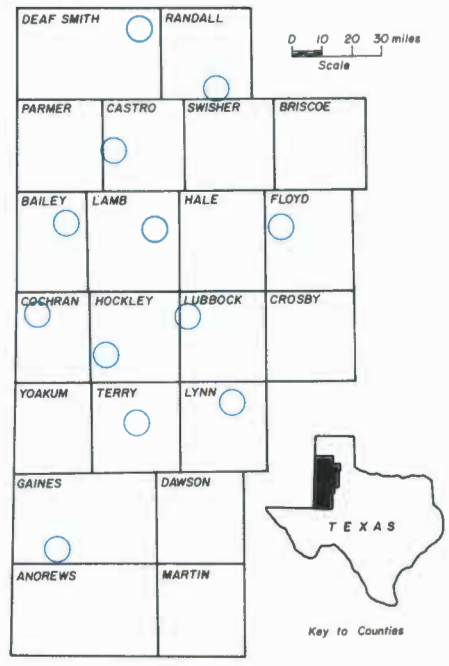
A neutron moisture logging instrument is used to determine moisture content in the formational material surrounding the access tubes. The logging instrument consists of a down hole probe containing a neutron source and detecting components electrically connected by cable to surface recording equipment. As the probe is pulled up the access tube at a constant rate it receives indications of moisture content and transmits data to produce a graph which depicts a percentage of water present as a volume. Two readings are taken at each hole on a regular basis. Accurate determinations of both the amount of rainfall received and irrigation water applied are necessary to verify and quantify these measurements.

Each non-irrigated logging site has an automatic recording rain gauge located nearby, which records on a graph the precipitation received during a week's operation. The amount of irrigation water applied is calculated from the power consumption reading from the irrigation pumping unit and/or from the time of operation of these pumping units.

One basic assumption of the project is that moisture passing below the thirty feet depth will ultimately reach the water table. If the amount of moisture passing that zone can be accurately determined, this data may substantially add to our knowledge of the Ogallala.

Information gathered during this one year monitoring program should be analyzed and available sometime during the middle of next year.

continued on page 2 . . . LOG



LEGEND

○ Area of neutron soil moisture monitoring sites.

NOTE: Deaf Smith and Randall County sites are monitored by the Texas Dept. of Water Resources. Gaines and Terry Counties are monitored by the High Plains Water District.

BETTER SAFE THAN SORRY

You've been sold on getting to the root of your weed problems with "herbigation". The process of applying chemicals to the field through irrigation water transportation systems is gaining wide acceptance on the High Plains. It's easy, cheap, effective, saves energy, allows fewer trips over the field, and gets two jobs done in one function. But it can also pose a hazard that irrigators need to keep a check valve on . . . the possibility of chemical contamination of your groundwater by draining or siphoning back into the well through carelessness or through a worn or malfunctioning check valve. A recent case in Dawson County drives home the point.

This farmer filled the herbicide tanks on his tractor with Treflan and water. Then he turned off the well and went to lunch, leaving two garden hoses submerged in the Treflan mixture. By the time this farmer got back to his tractor some 80 gallons of the mix had siphoned out of the tanks. He figured about half that had leaked on the ground through a bad washer on one of the faucets and the other half into the well.

But the accident was reported so that a water sample could be collected. Chemical analysis confirmed 210 parts-per-billion (ppb) Treflan contamination in the groundwater supply. This farmer was notified to flush the well continuously over the weekend so that another sample could be collected.

During the second testing of the week, water was allowed to run for five minutes before a sample was collected, and a yellow oily substance was observed floating on the surface water standing on the ground. Results of the second sample indicated a Treflan level of 170 ppb. By the third flushing and sample the contamination level was down to 50 ppb.

But this farmer's problems won't be over for a long time. His well will probably continue to carry Treflan traces for the years it may take to get rid of the yellow oily residue by now

continued on page 2 . . . LEAK

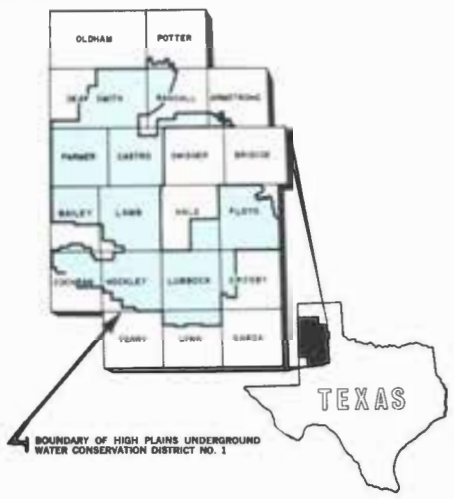
THE Cross SECTION

THE CROSS SECTION (USPS 564-920)

A MONTHLY PUBLICATION OF THE HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1
2930 Avenue Q, Lubbock, Texas 79405
Telephone 762-0181

PATRICIA BRUNO, Editor

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



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

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

A Charm By Any Other Name...

Our newest asset to the District staff is Tech graduate Charmone Bednarz. A geography major, Charmone has put her talents to work as receptionist and support secretary for the Lubbock office.

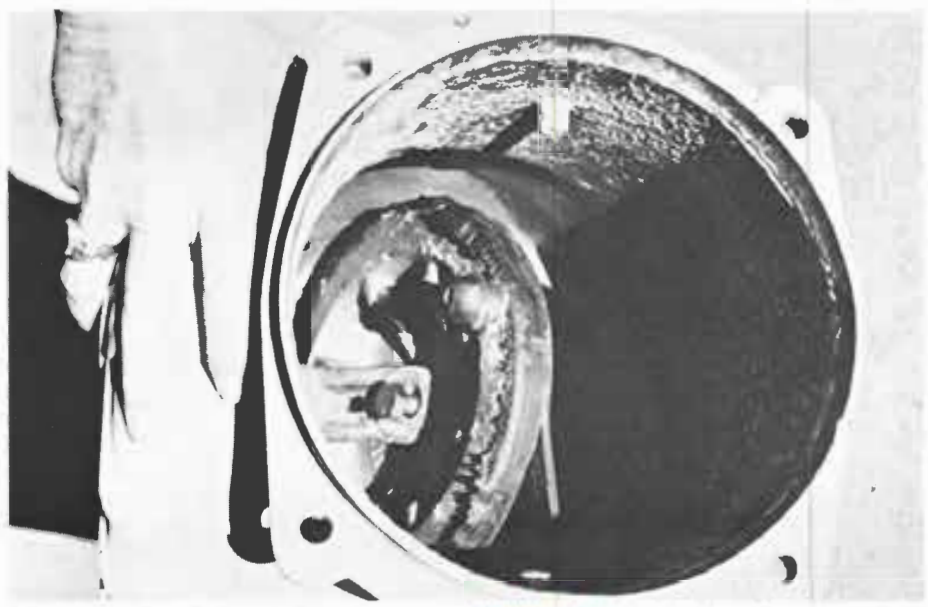
She earned her degree and elementary teaching certificate this Spring after working her way through all four years of college as an accountant clerk for the City of Lubbock. She is a swimming and tennis enthusiast, and a staunch Raider football fan.

Most exciting recent event: Charmone was the June bride of husband Greg, an Agricultural Economics major at Texas Tech who will graduate next Spring. The Bednarz claim kinship to most of the folks in Wilson and Slaton, Texas . . . another asset Charmone brings to the job. Knowing many of the District's Lubbock and Lynn County Committeemen, she makes them feel right at home.

LOG . . . continued from page 1

Many factors are thought to influence the rate of natural recharge from precipitation. These include the amount, duration and intensity of precipitation events; the amount of moisture in the soil when the rain or snowmelt begins; and the temperature, vegetative cover and permeability of materials at the site. In recent years farming practices are believed to have favorably altered the recharge rate through a number of practices. These include clearing land of deep-rooted native vegetation, deep plowing of fields (which eliminates hard pans), and the plowing of playa lake bottoms and sides. Also, bench leveling, contour farming and terracing help to maintain a generally higher soil moisture condition which enhances natural recharge. Additionally, the increased humus level in the root zone resulting from plowing under a larger amount of foliage from crops grown under irrigation will increase the infiltration rates. Because of the wide variety of changing conditions, researchers are optimistic that there is presently more recharge to the aquifer than estimated from the earlier studies.

To conduct such a study requires the cooperation of many individuals, and the Water District owes a debt of thanks to those landowners and operators who have willingly consented to participate in this study by providing their land, equipment, advice and assistance.



LEAK . . . continued from page 1

collecting in the aquifer around his well. It will take an undetermined number of cycles for the chemical to be scrubbed from the formation materials because portions may adhere to the sand grains as the area within the cone of depression is dewatered, only to return to solution each time the pump is stopped and the depressed cone filled.

When you realize that the maximum contamination levels of many of the common agricultural chemicals like Endrin, Lindane, Toxaphene and Silvex have been set by the EPA at minute parts per billion (1ppb = 1 gallon in 3,069 acre feet of water); and when you figure the value of groundwater these days; an ounce of prevention is certainly worth a billion gallons of cure—and then some.

It wouldn't hurt to double check if you are injecting chemicals into the plumbing of your distribution system. Do you have a vacuum break or some type of back flow preventer? Does it function? Or ask yourself: Would you feel comfortable giving your family or friends a quick swig or a long tall thirst quencher out of the same water well you used to herbigate?

Moisture Tool Can Increase Net Profits

"Farmers have lived much too long without knowing what they're dealing with in the way of soil moisture and this sets up traditions." Oliver Newton, agriculture meteorologist at the Texas Agricultural Experiment Station for 13 years, has seen a lot of tradition. He's convinced "the farmer can't afford to go on tradition any more or he'll go broke. To get the most out of his water he has to know how much is stored in the plant root zone and how much water the crop is using each day. It's up to the farmer to do it."

The "it" which the farmer can use to figure "how much water he's got where," is the tensiometer. Newton believes it is the most practical tool a farmer could buy and use for in-season irrigation scheduling. Newton is practicing what he preaches on the Marble Farms in Floyd and Hale counties. Don Marble thinks economics have had a lot to do with jarring traditional approaches. He has installed some 46 tensiometers on Newton's advise, and has hired Oliver to mastermind a Moisture Monitoring Program.

"I'm real excited about this," Don volunteered. "What's working below the soil surface is a dark zone that farmers can't see. The bottom line is to get down into the soil and measure moisture. The tensiometer lets you see what you've got. Anybody can operate one. You just read the numbers every day and keep a record."

The tensiometer does not give you a moisture profile, but it reads a specific point in the soil. It gives a moisture picture at the spot, not in an absolute quantity but by measuring the tension by which water is held in the soil. If the plant's suction capability for extracting soil moisture is exceeded by the suction reading on the tensiometer, then there is no more useable moisture left at that level in the soil. By keeping a log of tension readings and rainfall, you can "see" how and where the plant root is taking in water.

"If we can establish what we've got, we can figure what we need," says Don who gives Oliver Newton credit for putting the original program in place to establish the monitoring program. Months of records are beginning to show moisture use patterns of corn, soybeans, cotton and grain sorghum.

"The charts help us recognize and establish the warning periods," says Garry Burson who is involved in collecting, evaluating and assimilating the data with the assistance of Kelly Marble.

Don admits "this was a perfect year to start the program because the rainfall was unusually high and gave us something to work with—even on some dryland crops." But he expects this program to be an ongoing evaluation whose data will become more meaningful each year as they get more experience in interpreting the data.

Oliver sees his job as that of staying objective. He isolates the options and Don weighs them.

"The only chance we've got to stay in business here on the High Plains of Texas is to make some changes . . . and that's really hard for a farmer to do. He gets so involved with trying to get the crop growing and watered he forgets the main objective, the net profit. Oliver helps keep things in context." But Don also added, "Oliver is not giving us any secrets. We're just using tools available to everybody. They've been in the book for 35 to 40 years. It's just that nobody reads the book."

One of the opportunities Don is hoping to cash in on with the tensiometers is to be able to delay watering at the end of the season. He expects to better be able to make that decision with the graphs from figures the monitoring program is providing. And that could save him a lot. "Oliver could be worth more to me in half a day than he costs me in a year, with the kind of operation I've got," says Marble. And one thing he's become convinced of over the years is that a lot more water has been wasted in over-watering the field than has ever approached the end of the turn row. The trick is to know when to water and when not to.

TENSION MOUNTS as the tensiometer reading reflects less water available to the plant.

A TALENTED TEAM, Oliver Newton isolates the options, Don Marble makes the decisions.

WATER DISTRICT EXTENDS SPECIAL THANKS TO:

COUNTY	LOGGING SITE	LANDOWNER	OPERATOR
Bailey	*Dryland*	*Mr. Robert N. Eddins*	*Mr. Donald Harrison*
	Irrigated	*Mr. Robert N. Eddins*	*Mr. Donald Harrison*
Castro	*Dryland*	*Ms. Mary Lou Hoffman*	*Mr. Elbert Smith*
	Irrigated	*Mr. Elbert Smith*	*Mr. Elbert Smith*
Cochran	*Dryland*	*Mr. Danny Key*	*Mr. Danny Key*
	Irrigated	*Mr. Danny Key*	*Mr. Danny Key*
Deaf Smith	*Dryland*	*Ms. Betty F. Tucker*	*Mr. Bill Cleavinger*
	Irrigated	*Mr. Bill Cleavinger*	*Mr. Bill Cleavinger*
Floyd	*Dryland*	*C. W. Mitchell Estate*	*Mr. Warren Mitchell*
	Irrigated	*C. W. Mitchell Estate*	*Mr. Warren Mitchell*
Gaines	*Dryland*	*Mr. James Porter*	*M-J Farms Inc.*
	Irrigated	*Mr. James Porter*	*M-J Farms Inc.*
Hockley	*Dryland*	*Mr. C. B. Singleton*	*Mr. C. B. Singleton*
	Irrigated	*Mr. Martin Lawson*	*Mr. Martin Lawson*
Lamb	*Dryland*	*Hill Farms*	*Mr. Bill Hill*
	Irrigated	*Hill Farms*	*Mr. Bill Hill*
Lubbock	*Dryland*	*Mr. Glenn B. Blackman*	*Mr. Glenn B. Blackman*
	Irrigated	*Mr. Glenn B. Blackman*	*Mr. Glenn B. Blackman*
Lynn	*Dryland*	*Mr. Earl Cummings*	*Mr. Leonard Dube*
	Irrigated	*Mr. Earl Cummings*	*Mr. Leonard Dube*
Terry	*Dryland*	*A. A. Sawyer Estate*	*Mr. Truett Flache*
	Irrigated	*A. A. Sawyer Estate*	*Mr. Truett Flache*
Randall	*Dryland*	*Ms. Betty J. Spiser*	*Mr. A. E. Spiser*
	Irrigated	*Ms. Betty J. Spiser*	*Mr. A. E. Spiser*

Save Water, Save Money...

While it is not *everything* you ever wanted to know about efficient field water conservation, it is a comprehensive "Summary of Techniques and Management Practices for Profitable Water Conservation on the High Plains." This valuable collection of water saving application measures has just been published by the Water District. It was prepared jointly with the Texas Department of Water Resources, and is intended to provide information to encourage the use of water conservation measures in the High Plains of Texas.

The summary covers three major areas of field water conservation. The first, rainfall and moisture utilization, examines limited and basin tillage practices, terracing and leveling measures, and playa lake water storage. A number of types of irrigation equipment systems and efficiency guidelines are then discussed; and finally the report suggests a range of management practices to be used by High Plains farmers for improved water use efficiency.

The summary also offers a "how to" guide for estimating and comparing the efficiency of energy kinds, costs and consumptions on four different irrigation applications. These include side roll, center pivot and hand moved sprinkler systems and furrow irrigation.

The supporting graphs which document and illustrate the results of these application and conservation techniques cover a variety of High Plains crops. They are both informative and sometimes surprising.

The vitality of the High Plains area in crop and livestock production, which contributes so significantly to the nation's agricultural economy and export programs, depends on the availability of water supplies. The balance of that equilibrium in this region grows more fragile as this vital natural resource is depleted. Increased efficiency in our use of rainfall and rainfall runoff can increase yields under dryland farming conditions and together with increased irrigation efficiency, can also reduce the amount of water needed for supplemental irrigation. The techniques and management practices for water conservation presented in this publication offer the farm manager a variety of ideas from which to select an appropriate combination of physical and managerial practices for his farm.

Copies of this report may be obtained free of charge by contacting the High Plains Underground Water Conservation District at 2930 Avenue Q in Lubbock, Texas 79405.

A SPECIAL COLLECTION, 15 years worth of area engineering maps, plans, books and papers were recently donated to the Water District by Mrs. Eula Isbell from the library of her late husband, Robert.

MODERN DAY RAIN MAKERS WORK PUBLISHED

Recent weather modification activi ties in Texas are described, but not evaluated, in a new report by the Texas Department of Water Resources.

The report, titled "Weather Modification Activities In Texas 1974-77, Report 219", notes that efforts to change or control the weather began in Texas as far back as the 1890's on the High Plains with "simulated heavy artillery bombardment of surrounding hills in an attempt to produce rain."

In 1967, Texas enacted its Weather Modification Act (since amended) and several more sophisticated efforts at weather modification have taken place.

Those efforts by the Colorado River Municipal Water District, Atmospherics Inc., Plains Weather Improvement Association Inc., Meteorology Research Inc., Irving P. Krick Inc. of Texas and the High Plains Cooperative Program (HIPLEX) are discussed and described.

However, as the report notes, "no attempt has been made . . . to analyze the degree of success or failure of these activities. The great variability of natural weather phenomena in Texas makes results extremely difficult to ascertain."

Projects are described by calendar year, with information on type of seeding employed, material and amounts of material used, etc., with maps and charts.

Copies of the report are available without charge from the TDWR, P.O. Box 13087, Austin, Texas 78711.

Image Makers Promote The American Farmer's Contribution

LUBBOCK—One of the more striking paradoxes of American life is how casually we take for granted some of the things which are most vital to our existence, such as food and fiber.

Overcoming this lack of appreciation is the basic goal of the Food & Fiber National Institute of Achievement, which is headquartered in Lubbock, Texas. The motto of the three-year old Bicentennial-inspired non-profit organization is "telling how agricultural science and technology impacts American life."

"Our purpose is to help Americans, especially urban Americans, better appreciate the processes through which they get their food and clothing by helping them understand the history of how each food and fiber commodity came to its present state," says Food & Fiber President Arnold Maeker, a Lubbock engineer.

Food & Fiber seeks to emphasize the indispensable role of American farmers, ranchers and others in feeding and clothing the nation and the world.

This effort is carried out mostly through exhibits, fixed and traveling, and production of educational materials.

The heart of the organization's work is the 3,600 - square - foot Hall of Achievement located in the Museum of Texas Tech University in Lubbock. Here the Institute honors individuals who have made outstanding contributions to the development of individual foods and fibers. Taking one commodity at a time, Food & Fiber commissions historical research, publishes a history, then develops exhibits based on that research.

The research and the exhibits on display at the Lubbock museum also become the basis for Food & Fiber's traveling exhibits and educational materials.

The best-known of the traveling exhibits is a "talking" mannikin which has been seen by millions in the past two years at fairs, shopping malls, conventions and other museums. Other traveling shows, more static, are available for displays in bank lobbies or school libraries or museums.

Meanwhile, educational materials include the filmstrip - cassette unit "Blue Jeans, French Fries & America." This 15-minute full-color cartoon contrasts today's fast-food, ready-to-wear lifestyle with colonial and pre-historic days. It shows how agricultural innovations such as the cotton gin changed American life and how industrial changes like the railroad and assembly line affected agriculture.

Food & Fiber's future is in its finances. The non-profit organization is presently supported by a combination of state, county, city and membership funding. Grants are obtained for specific projects, such as planning money for a sheep and goat exhibit from the Texas Committee for the Humanities. State funding was recently reduced severely, however. The organization is working toward a much broader range of financial support.

"We feel that we are performing a vital service to agriculture," says Maeker. "Other industries have done a better public education job than has agriculture, and we hope to help fill this void. We hope the industry will agree with us at this critical time in our financial life."

The Water District is a member and supporter of Food and Fiber. Food and Fiber is working very hard to promote products grown by the agricultural producers in our nation with particular emphasis on products grown in the High Plains area. The *Cross Section* would like to encourage agricultural producers to support Food and Fiber so they can better support you. For information on how you can become a member, please write "Food and Fiber" at Box 10436 in Lubbock, Texas 79408.

Bits & Briefs:

Mark your calendar for the 70th Annual Field Day of the Texas Agricultural Experiment Station (TAES) at Lubbock, on Tuesday, Sept. 11 beginning at 1 p.m. The field tour offers an in-depth look at five major research projects. The soil fertility stop will present research results of tissue analysis of cotton petioles and the factors affecting their nitrogen content as well as their relationship to final lint yield. Additional stops along the field tour will include research plots for weed control, cotton breeding, grain sorghum breeding with emphasis on midge resistance, and water use efficiency. Grape vineyard tours and soybean research will be among the added attractions this year.

—:— —:— —:—

"Living with Legalitis" is what some 500 agribusiness leaders anticipate for September 12 and 13. Legal regulations and ramifications will be the focus of the 27th Annual West Texas Agricultural Chemical Conference at the Lubbock Memorial Civic Center. Wednesday morning registration will give way to afternoon programs and a series of discussions ranging from federal and state regs for agricultural chemical manufacturers and users to integrated pest management, herbicide application techniques and plant growth regulators. Golf activities at the Hillcrest Country Club and the civic center exhibit are calculated to enhance an impressive roster of presenters and celebraties from researchers to humorists.

The third in a continuing series of reports of water level observations in the Southern High Plains of Texas has been released. Report 228, "Water-Level Data from Observation Wells in the Southern High Plains of Texas, 1971-77," continues to show water level declines in the Ogallala Aquifer. Most of the 1,800 wells from which water level data were obtained for the report are in areas of large withdrawals of ground water for irrigation, industrial, and municipal use. Copies of Report 228 may be obtained from the Texas Department of Water Resources, P.O. Box 13087, Austin, Tex. 78711.

—:— —:— —:—

Keep an eye on . . . a water bill by Sen. Frank Church (ID) to update federal irrigation water laws. It is expected to be the second order of business when the U.S. Senate resumes September 5th. The Reclamation Reform Act of 1979, S 14, contains three key provisions affecting water rights. "Farm size, residency, and leasing are at the heart of achieving the primary objectives of the law," according to Sen. Gaylord Nelson (WI), the leading opponent of the measure. The bill would expand the number of acres a farmer could hold in contracting for water on a Bureau of Reclamation Project from 160 acres up to 1,280 acres. It would also abolish farm residency requirements. These provisions in the bill are vital to efforts to import water to the High Plains of Texas. One hundred and sixty acres was probably an economical farming unit in 1902 when the original law was passed, but it is not in 1979.

THE CROSS SECTION (USPS 564-920)
HIGH PLAINS UNDERGROUND WATER
CONSERVATION DISTRICT NO. 1
2930 AVENUE Q
LUBBOCK, TEXAS 79405

SECOND CLASS PERMIT

THE Cross SECTION

Published monthly by High Plains Underground Water Conservation District No. 1, 2930 Avenue Q, Lubbock, Texas 79405

Volume 25—No. 9 Publication number USPS 564-920, Second Class Postage paid at Lubbock, Texas *September, 1979*

Secretary Bergland Assesses Hail Damage, Disaster Relief

"I'm here because Kent Hance and Charlie Stenholm made me an offer I couldn't refuse." Secretary of Agriculture, Bob Bergland came in from touring hailed-out cotton fields in Hockley County to the Lubbock Civic Center late last month. By invitation from Congressmen Hance and Stenholm, Bergland inspected parts of the 10 county strip of hail-damaged crops along with Texas Agriculture Commissioner Reagan Brown the morning of September 20th, and fielded questions during a public forum that afternoon. Speculation on the possibility of a twenty percent reduction on farmer's payments of government loans from Bergland turned out to be just that. Bergland explained that such a program of "forgiveness" to farmers was an economic impossibility. He stated that not only could money not be given outright, but getting it through Congress was also impossible, and such a plan must be set in law, and not through his Department.

Bergland offered no grants in aid, but talked of extending the loan repayment period to ten years for disaster relief.

Farmers applauded Bergland's answer to one man's quip "when am I gonna get this cheap SBA money from last year's disaster loan," by saying, "SBA doesn't know how to run farm money. We're getting them out of the business and turning it over to the FmHA where it belongs."

Later the Secretary acknowledged that FmHA will not have enough people to handle all the loan processing needed. He added, "I'm working out an arrangement with the local banks and production credit people to help cut the red tape and make people available to process farm loans." He says he's looking for ways to use the local system to help relieve the paper work and cut delays.

Questions were not limited to disaster relief. Bergland fielded a number of queries from area farmers dissatisfied with the current farm program and parity. Rather than argue the merit of percents of parity, Bergland admitted its inadequacy. He felt a grower's subsidy was a fair question, but not the answer. He preferred to ask: What is the role of price supports? How does the family farm compete with the "superfarm"? Is our farm policy headed in the right direction? Is there another way to strengthen the family farm?

BOB BERGLAND
Secretary of Agriculture

Bergland tends to think our tax structure is closer to the source of the problem. He wondered out loud how much current tax policies contribute to inflation and how inflationary is the capital gains tax treatment on farm land?

"I don't think the old programs of the last 45 years will do the job any longer," he stated. Bergland invited the public to offer their comments and suggestions. He announced a series of ten "frank, open and honest discussions planned to study the future of agriculture." The Department of Agriculture will hold these public forums beginning in December. The meeting closest to this area is planned for December 6 in Wichita Falls. Bergland encouraged everyone to bring their ideas about how to change our farm program.

Water District Directors Vote 10 Percent Tax Rate Cut

Tax rate cuts do not come easily in a period of double digit inflation, but the High Plains Water District's Board has managed to figure their way to providing a tax rate cut for property owners served by the Water District. What the Directors did, however, was soon undone in three District counties. The Board of Directors unanimously voted in a special session last month, to decrease the District's ad valorem tax rate from 5.0 cents to 4.5 cents on each $100 of assessed valuation. However, increases in county valuations and/or assessment ratios in Lynn, Armstrong, and Lamb counties cancelled out the tax rate cut and amounted to an actual tax increase for those county residents. The percentage of tax hike in Lynn is 56 percent, while in Armstrong it is 60 percent and in Lamb County the tax increase is 31 percent.

Recent tax code revisions and guidelines established in the wake of the 1979 legislative session, in Senate Bill 621, specify that a taxing body may not impose a tax that will produce income in excess of the past years' income by more than three percent without first advertising and conducting a special hearing on the proposed tax increase. The ten percent tax rate cut was enough to eliminate the need for such hearings in 12 of the 15 counties served by the Water District. The Water District's Board, seeking to comply with the "Truth in Taxation" provision of Senate Bill 621, published the legal notices for the three counties in which the Water District tax rate cut did not provide enough relief and invited public comment at a hearing on September 20.

Appreciating the concerns of those county taxpayers, the five Board Members gave careful consideration to each individual's remarks during the special hearing. The following week the Board again convened in special session to discuss and finally adopt the proposed new tax rate.

In earlier related action, the Board adopted a resolution that the Water District will participate in each of its fifteen counties' newly created appraisal districts. These appraisal districts are being created in each county, also in accordance with Senate Bill 621, to handle all the appraisal work for all taxing units in the county with the exception of the county unit. The county has an option to become a part of and participate in the county-wide appraisal districts. The purposes of the appraisal districts are to uniformly handle the appraising of property for ad valorem tax purposes for each taxing unit in the county. The advantage of this action by the Board of Directors of the Water District will be realized by the savings of 14 separate appraisal fees on a per parcel basis to privately contracted appraisers outside Lubbock County.

The final tax related issue the Board is currently grappling with relates to House Bill 1060 which came out of the 66th Texas Legislative Session. The bill provides for value-in-water allowances for groundwater depleted in the courses of agricultural operations when that agricultural land is appraised for tax purposes on its productivity rather than on its market value. The Board anticipates that the Water District will be requested to provide support data to landowners and/or assessors for use in calculating the value of groundwater. Part of the necessary data for providing the initial information, which includes current saturated thickness maps and the annual decline in water levels, is currently being compiled as a part of the District's contract with the Texas Department of Water Resources and the District's established federal cost-in-water income tax depletion allowance program.

Board members are currently reviewing the different ways the necessary data can be compiled and used as well as which method of providing data will be acceptable to the School Tax Assessment Practice Board in Austin before making any final decision.

WHAT'S LEFT of a cotton crop in the wake of last month's hail storm. Several hundred thousand acres in parts of 10 counties were damaged.

Fed's Groundwater Report Gets Aired In West, And...

A panel of federal officials in Albuquerque last month listened to water leaders critique and comment on a preliminary Task Force Report on Ground Water. It was the second round of workshops to review and obtain public comment on President Jimmy Carter's water policy reforms.

Federal and non-federal panel members discussed three preliminary reports recently issued by the task forces charged with implementing the President's water policy initiative. The topics discussed in Atlanta, Knoxville, Portland, Los Angeles, and finally Albuquerque were Ground Water, Instream Flows and Environmental Statutes. Assistant Secretary of the Department of the Interior, Guy Martin, stated that these workshops were a part of an informal review and encouraged public discussion and written comments to be submitted to his office. He noted any Federal regulations issued would be subject to a further formal comment period through the Federal Register process.

Sitting in for Martin during the Albuquerque go-round as moderator was John Cunningham of the Interior Department, with US Department of Agriculture's Al Geiger as the Ground Water Task Force federal panelist. Summarizing the Ground Water Task Force Report, Geiger identified its two-fold primary thrust as improving consideration of the ground-water resource in Federal water planning, and expanding Federal cooperation and mutual assistance with the States in resolving problems associated with ground-water resources. He noted that several other study units of the 19 task force groups have been assigned water resource issues that involve consideration of additional, more-specific aspects of the ground-water resources.

With respect to federal planning, the Task Force concluded that ground-water resources are only weakly considered in the Federal water planning processes. The report proposed eight measures for improvement. They are intended to apply to both structural and non-structural programs and projects.

The report also presents recommendations of organizational and staff improvements to accommodate the proposed expanded ground water planning efforts. It advises that ground water technology and availability of information be assessed in the early stages of planning and that steps be taken to meet additional requirements. The report notes that although deficiences in techniques and data may be significant, many of today's problems related to the ground-water resources stem from inadequate application of existing technology and knowledge or from indifference to the welfare of the resource.

With respect to federal cooperation and mutual assistance with the states, the report contains six recommended measures. Among these is a proposal for active federal agency planning with local and state agencies and regional organizations to resolve mutual and interdependent issues surrounding the ground-water resources. It recommends technology exchange, mutual staffing assistance with the states in ground-water hydrology, legal, administrative and economic management, and agency sponsored advanced educational opportunities in ground-water hydrology and water resources planning and management for both state and federal personnel as appropriate within their missions.

The concluding recommendation, perhaps the most promising, according to Task Force report writers, is the commissioning of a National Ground-Water Advisory Commission composed of eminent leaders of business, industry, agriculture, science, education and government; supported by technical and clerical staff and operating funds. The commission is viewed as "an effective means of confronting squarely and fairly (1) the policy, legal, and management predicaments surrounding the ground-water resources, (2) their integrated role in land and water utilization and protection efforts, and (3) necessary fundamental steps to an improved national ground water situation."

Non-federal panelists responding to the Task Force Report were New Mexico State Engineer Steve Reynolds, and Sierra Club representative Dr. Philanora Howard. Reynolds commented that the report viewed ground water as a national resource. Referring to a 1973 National Water Commission Report which had identified and recommended options under which federal agencies might consider exercising more authority or control over ground water, Reynolds found this report less threatening by comparison. He observed however, this Task Force Report did not have a positive view of "mining" ground water and felt the report implied there is something wrong with "mining," which he viewed as a practical use of an abundant ground water supply even where recharge was minimal. Reynolds suggested, with reference to technical assistance, that the 50-50 cooperative agreement between the US Geological Survey and states continued to be funded and expanded.

The Task Force view on ground water mining was defended by Geiger as "not always bad," unless it involved "unknown or unplanned mining without control of a supply's economic life."

A strong recommendation came from an audience participant at this point that the task force withdraw editorial comment on aspects of inter-basin transfer, particularly as it relates to the Ogallala water import plan, until the Six State High Plains Ogallala Aquifer Study funded by the Economic Development Administration is completed.

If you have written comments or would like further information or a copy of these Task Force Reports, contact John Cunningham, Room 4356, Department of the Interior, 18th and C Streets, N.W., Washington, D.C. 20240.

The deadline for review and comment on these task force reports has been set for November first.

CONVINCE ME, Don Smith and Bill Scherle, President of U.S. Consultants, challenge this man's concept that our farmers should move to the Southeast where he claims land and water are available.

THE Cross SECTION

THE CROSS SECTION (USPS 564-920)

Texas Water Leader Critiques Carter's Water Policy

EDITOR'S NOTE: The following comments are taken from proceedings of a two day Symposium devoted to "The Multi-Faceted Water Crisis of West Texas," held on November 8 and 9, 1978, in Lubbock. Dr. Frank Baird directed the project, sponsored by the Division of Continuing Education and The Center for Public Service, Texas Tech University. The wealth of comments from water experts presented during the Symposium have been preserved and edited by Dr. Baird under a Title I, HEA grant through the Division of Community Colleges and Continuing Education of the Coordinating Board, Texas College and University System and Texas Tech University. The proceedings will be offered to our readers in whole or in part on a continuing basis as time and space permit.

GEORGE W. McCLESKEY*

On June 6, 1978, President Carter released his Water Policy Message, accompanied by another set of papers generally referred to as background materials, which interpret and reveal the statement made in the Message.

Setting for the Message:

1. Years of accomplishments in Federal Water programs accompanied by some pork barrel activities.
2. Divided authority and inadequate coordination between Federal agencies and individual states. 25 agencies spending over 10 billion dollars per year; 34 billion dollars backlog of authorized and uncompleted projects.
3. Greatly increased concern for environment.
4. Inflationary costs.
5. Water shortages with increasing demands and over-drafted supplies.

These complications and conflicting demands cried out for some sort of organized policy. It is to the credit of the President that he has recognized the importance of water policy and that he has accepted the challenge.

Like most actions taken under a democratic form of government, the policy does not please anyone in every aspect of the policy.

From Texas' standpoint, it could have been better and it could have been worse. In a brief overview of it, our purpose today will be to identify some of the areas of the Policy which will affect our water situation in Texas.

Purposes of the Policy:

When given our own interpretation, the stated purposes are commendable. They are:

1. Improve planning and efficient management of Federal water resource program to prevent waste and to permit necessary water projects which are cost effective, safe and environmentally sound to move forward expeditiously.
2. Prove a new, national emphasis on water conservation.
3. Enhance Federal-State cooperation and improve State water resources planning.
4. Increasing attention to environmental quality.

Many of us in Texas would have stated Purpose No. 1 more positively and rather than talking about "permitting" projects would have said

"and to develop supplies so as to make water available to our people, where needed and where to do so is economically and environmentally sound."

The use of the word "permit" connotes to me that we let as little "slip-through" as we are forced to do. Texas favors a more aggressive stance and is committed to more positive thinking as evidenced by the growth, prosperity, and good way of life that we enjoy in this state.

Policy:

The policy statement is divided into four parts:

1. Improving Federal water resource programs.

   A. The Water Resources Council is to improve the implementation of the principles and standards governing the planning of Federal water projects, retaining the basic planning objectives of national economic development and environmental quality.

   (1) To these basic planning objectives, there should be added water conservation as a specific component of both the economic and environmental objectives. From background materials, it is apparent that this means State actions must be taken to reduce the quantity of water to be used from existing supplies as well as from new projects. Specifically, the Federal people will require States to: (a) reduce quantity used per capita; (b) reduce quantity used per unit of produce in industry; and, (c) to reduce quantity used per acre irrigated in agriculture. All of this without mention of the increasing number of industries using water and a needed increase in agricultural production to feed and clothe our own people as well as to make products available for export. This, in effect, infers that water supply problems can be solved by reducing consumption through enforcement of government regulations. Note the similarity here to the implications involved in the energy program where more emphasis has been put on conservation than upon increased production.

   Conservation also infers increases in the cost of living by reason of the necessity to install new equipment to cut down on the use of water.

   (2) There is required the explicit formulation and consideration of a primarily non-structural plan as one alternative whenever structural water projects or programs are planned. Presumably this is now done when projects are planned; however, in many cases the structural plan is chosen since the non-structural alternative really means to "do nothing." For example, many of the water development projects in Texas require the construction of storage reservoirs, the construction of levees to protect low-lying areas from flooding, and the inclusion of flood storage in multi-purpose water development projects. The non-structural alternative, as apparently envisioned in the President's message, would be to meet the growing water supply requirements by implementing a "conservation" alternative which would show the people of that area how to live and operate on less water per capita and per unit of water use in industrial production. Another non-structural alternative to water supply would be to expand the use of ground water as is discussed in the background materials; but the lack of feasibility for that non-structural alternative in most of Texas is obvious without comment. The non-structural alternative for flood protection is to preclude the use of flood plain land by excluding the flood protection benefits under the cost/benefit ratio calculations.

   (3) On the one hand the President appears to be attempting to reduce the annual investment in water resources development by effectuating "water conservation" programs including public education and increasing the price of water to the consumers; on the other hand, the President's objection to structural development, in many ways, may limit the use of lands within regions where water supplies are presently available by

Texas favors a more aggressive stance and is committed to more positive thinking . . .

   making it impossible to locate homes and business properties in areas that are subject to flooding. These two elements of the President's policy seem to be in conflict with each other and will make it difficult if not impossible to develop potential surface water supplies for use in many parts of Eastern Texas.

B. To avoid inconsistent application of the benefit/cost analysis to water projects, the President directed the Water Resources Council to prepare within 12 months a manual which insures that benefits and costs are calculated uniformly for all projects regardless of the agency in which they originate using the best techniques and current information. To prepare a manual that will result in all federal agencies consistently applying the same computation guidelines in determining cost/benefit ratio is a larger assignment than appears on the surface due to the fact that the legislation underlying each federal agency's program specifies objectives and determines procedures for computing benefits and cost. I hurriedly comment in passing that I hope no Texas projects are dependent upon or must await a satisfactory and acceptable standardization of guidelines.

C. The President directs that a project review function located within the Water Resources Council must be the clearing house for evaluating all plans for water projects from each federal agency. These reviews are mandated to be completed within 60 days and the review cycle to be completed within the same budget cycle in which the sponsoring agency intends to make budget requests. This presents one more review process as an additional hurdle to cross, delaying implementation and initiation of construction projects which may well result in increasing the costs of planning projects; but the full impact of this requirement will not be known until at least after (perhaps long after) the WRC manual is available.

D. *Priorities.* A restatement of the President's criteria for setting priorities among competing projects places emphasis upon net national economic benefits having the highest cost/benefit ratios; projects with widely distributed benefits; projects stressing water conservation and non-structural approaches; projects without safety problems involving design, construction, or operation; projects approved by active public support including that of state and local officials; projects where governments assume a share of costs over and above existing cost sharing; projects having no significant international or intergovernmental problems; projects having vendible outputs resulting in greater recovery of federal and state costs; projects in compliance with relevant environmental statutes; and, projects providing funding for mitigation of fish and wildlife damages.

E. Cost sharing is mandatory on projects not yet authorized. 10% of the costs for project purposes with vendible outputs plus 5% of the project costs without vendible outputs, with a limit of one-fourth of 1% of the State's revenues per project per year. Flood control cost sharing is at the ratio of 80% for the Feds and 20% for the State. Vendible output in proportion to the investment should be repaid. This would require legislation and budgetary processes in Texas. Though Governor Briscoe and 4 other state governors, in their meeting with the President on May 17, 1978, advocated that cost sharing requirements should allow local participation as an alternative to state cost sharing, this is not permitted as the policy has been published. Also, in this connection, requirements for additional funding for fish and wildlife habitat mitigations would require higher taxes upon Texas residents or higher charges to water users.

F. Though pressed to do so, the President did not change the present approach to computing the discount rate used in water projects cost/benefit evaluations.

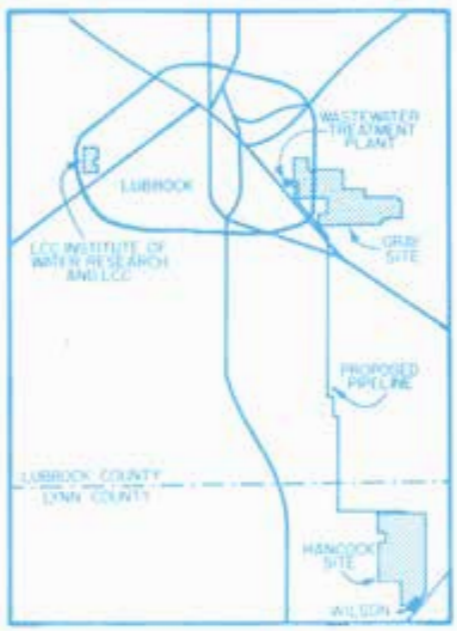
(To be concluded next month)

*Mr. McCleskey is a local attorney and member of the Texas Water Development Board.

EPA Awards Top Dollar For Local Wastewater Study

Lubbock Christian College's Institute of Water Research has been awarded a nine and one-half million dollar grant from the Environmental Protection Agency for a wastewater land treatment research demonstration project in Lubbock and Lynn Counties in Texas. It is the largest R & D project ever funded by EPA. It covers some seven thousand acres of land and provides an opportunity to make comparisons of land treatment which has been in use for some 40 years with a new system, under controlled conditions.

These factors make the project unique and exemplary not only for this area, but nationally and internationally,



according to the project's local advisory committee. EPA's project officer, Dr. Curtis Harlin, points out the dual nature of the grant as both research and as a demonstration effort with wastewater on agricultural land.

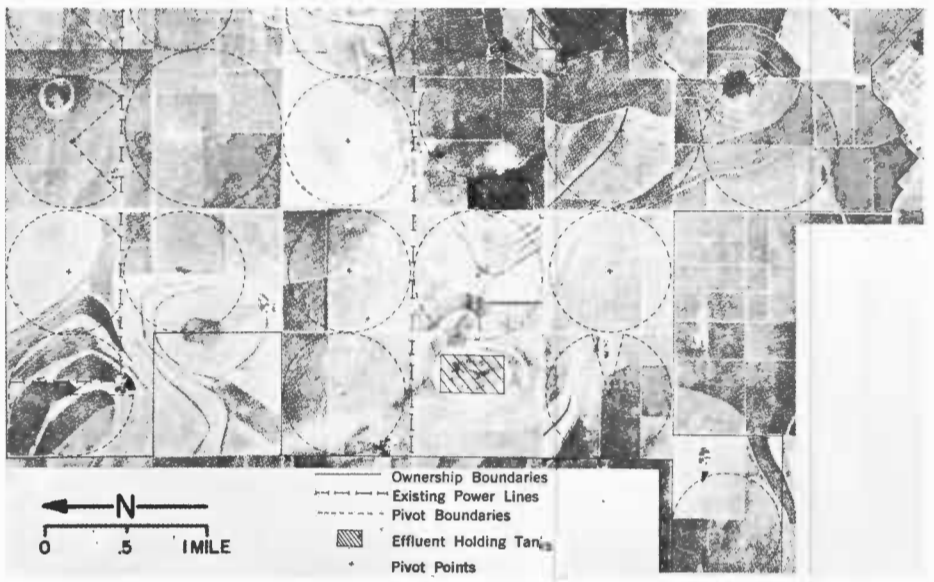
The grant was made last November from EPA with the assistance of now retired Congressman George Mahon. The seed proposal grew out of a contractual arrangement between Frank Gray and the City of Lubbock whereby Mr. Gray receives Lubbock wastewater effluent to irrigate his land. As the City's wastewater flow increased, Gray extended his farm holdings to accommodate the additional supply. While that represented a good example of water reuse and resource management, problems began to develop.

The City of Lubbock has been delivering pretreated effluent from its municipal wastewater plants for irrigation to Gray's agricultural land east of the city for 40 years. The Gray farms finally reached the limits of expansion and irrigation capacity. Annual increases in the City's water flows have resulted in operational problems on the Gray Farm due to inadequate water storage facilities and insufficient irrigation acreage for the now excessive supply. Overwatering has adversely affected agricultural yields, created mounding of the groundwater surface beneath the site, and contributed potentially hazardous concentrations of nitrates to the local residential water supply.

To relieve the situation an expansion program was proposed by Lubbock Christian College to include a 39 hundred acre parcel of additional land in the wastewater land treatment program with storage facilities, irrigation equipment and an associated land treatment research program. The new parcel is known as the Hancock Farm located south of Lubbock, boardering on the City of Wilson. The land is assigned with a long term lease to the LCC Institute of Water Research. The principal participants in the grant are the Frank Gray Farm, the Hancock Farm, and the City of Lubbock. The project is designed to address the problems of excessive water, groundwater mounding and (nitrate) contamination. Twenty-three center pivot irrigation systems are proposed for operation on four thousand acres, to be supplied from three wastewater storage ponds to be constructed on site, and supplied by a 17 mile pipeline engineered from Lubbock's wastewater treatment plants to the research land parcel.

The principal objectives of the project are to: 1) demonstrate and evaluate a large scale, properly designed and operated land treatment system for municipal wastewater from this semi-arid physiographic region and; 2) to make a comparative analysis of the differential response of the two farms, the 29 hundred acre Gray site which has been irrigated with effluent for over 40 years, and the 39 hundred acre Hancock site which has never been irrigated with wastewater.

The Institute of Water Research is hoping to verify the design criteria for land treatment of domestic wastewater



HANCOCK SITE

by sprinkler irrigation of various crops; determine the applicability of Lubbock's land treatment system for other arid areas; demonstrate to area residents, neighboring communities, municipalities, and farmers of the feasibility of land treatment for water conservation through water reuse, increased crop productivity and cost effectiveness; monitor the effects of wastewater effluent irrigation on crops, soils and groundwater on land never before irrigated with wastewater; determine health effects related to land application of treated wastewater effluent by sprinkler irrigation on residents near the land treatment site; evaluate responses to land application systems in the Southern High Plains; and augment Lubbock's wastewater disposal and land treatment capabilities.

The project has now been underway for about 18 months, and pipeline construction should begin this fall.

HOT ISSUE UNDER STUDY

Electrical safety in and around irrigation systems is the hot item on October's agenda. The High Plains Water District is sponsoring Electrical Safety Training Workshops in Lubbock and Amarillo in cooperation with the Soil Conservation Service for SCS District Conservationists and their field teams and Water District field personnel. Texas Agriculture Extension Service employees and the rural electric cooperatives will also be invited to participate. The featured instructor is LaVerne E. Stetson, Agricultural Engineer with the USDA Science and Education Administration stationed at the Univ. of Nebraska Agricultural Engineering Research Unit. He is a veteran of this kind of program. He will share research findings showing how, as a practical matter, the electrical safety of irrigation systems can be improved.

Since embarking on a Field Water Conservation Laboratory program to conduct irrigation efficiency tests on farms throughout the High Plains area, the SCS and Water District have had a vested interest in electric safety. Many of these efficiency tests are conducted on sprinkler systems which are powered by electricity. In recent months, at least 75 employees have been in training and evaluating these systems. The District hopes to train these people to make a routine electrical inspection before conducting efficiency tests. The rural electric cooperative people will also be enlisted to assist in educating contractors as well as in providing inspections of irrigation systems prior to intalling meters.

UPDATE . . .

LUBBOCK—The Reclamation Reform Act of 1979, S-14, passed the Senate on September 14 on a vote of 47 to 23. It awaits referral to the House for further action. Sponsored by Senator Frank Church, the bill's key provisions affect water rights by expanding the number of acres a farmer could hold in contracting water on a Bureau of Reclamation project from 160 acres up to 1280 acres. S-14 would also abolish farm residency requirements. These measures are vital to water importation efforts to the High Plains of Texas.

THE CROSS SECTION (USPS 564-920)
HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1
2930 AVENUE Q
LUBBOCK, TEXAS 79405

SECOND CLASS PERMIT

THE Cross SECTION

Published monthly by High Plains Underground Water Conservation District No. 1, 2930 Avenue Q, Lubbock, Texas 79405

Volume 25—No. 10 Publication number USPS 564-920, Second Class Postage paid at Lubbock, Texas *October, 1979*

OPTIMISTIC, Dan Harmon—Merrill Lynch (r), Duncan Ellison—Water, Inc., and Wayne Wyatt—HPWD (l), discuss financing water importation.

Bond Advisor Bullish On Imported Water

Many of Texas' leading water architects and forecasters assembled in the High Plains Underground Water Conservation District office on October 11 for a water importation parley designed to take the "bull" by the horns. The workshop was billed as an information exchange between financial experts and water leaders on how to handle the financing of a large water importation project for the High Plains of Texas and Eastern New Mexico.

Seated in the vantage position for a good look at the supporting evidence for water importation was Merrill Lynch's New York bonding group Vice-President, Daniel Harmon. Merrill Lynch was aware of the plan but was unfamiliar with many of the details of the current productivity and potential of the High Plains area. Merrill Lynch Bonding Group's involvement with the financing of the California and Central Arizona Water projects provided experience on which to offer suggestions and guidance on how to move forward with the financing of importing water to the High Plains.

Also present and prepared to discuss the issues were Senator E. L. Short of Tahoka, Texas, and Representative Bob Simpson of Amarillo, Texas. Simpson successfully linebacked key water import legislation through the House this spring, passing the bill to Short who carried it to Senate victory in the waning hours of the last session.

However, the convincing case for water importation currently appears to rest more with economics than with politics. Dr. Herbert Grubb, Director of Planning and Development for the Texas Department of Water Resources, guided participants through an impressive litany of vital water-related statistics about the Texas High Plains' impact on the local, state and national economy. His figures targeted the scope of each sector's water dependency in production, labor, market values and energy.

Duncan Ellison, Executive Director of Water, Inc., one of the meeting's cohosts, along with the High Plains, North Plains and Panhandle Groundwater Conservation Districts notched the bench marks of progress which have been made towards importing water to the area. He traced the milestones with the Texas Water Plan, adopted by the Legislature in 1967, to the current version of a $20 billion dollar interstate project. He cited studies in progress under federal agency direction which are expected to further document the need for water importation as well as the strong spirit of self-help in Texas evidenced by our institutional philosophy of local control and management.

Then came the awaited moment . . . the broker spoke and everyone listened. "The scope of this project has balance of payment implications," Harmon commented. "The unusual size and need involved will require some unusual answers and creative solutions."

Harmon advised that many groups and individuals would need to be involved, and while not all would play a pivotal role at the outset, all had best be pulled together as soon as possible.

He outlined the financial steps involved from his perspective:

continued on page 3 . . . BULLISH

ENTHUSIASTIC, LaVerne Stetson (l) offers Myron Namken—SCS, his expertise in irrigation electrical safety.

STATE-FEDERAL COURT DISPUTE LOOMS OVER WATER RIGHTS/EMINENT DOMAIN

WARNING . . . *from the Nebraska Water Resources Association*

FEDERAL CONTROL OF WATER NO LONGER A MYTH AS GOVERNMENT ACTS IN MONTANA . . . "Never before has the federal government filed statewide lawsuits to adjudicate water rights," the Wall Street Journal editorial of Sept. 6 said. The editorial, entitled "Washington and Water Rights," reports the state-federal controversy that has arisen over adjudication of water rights in Montana. The paper calls the federal suits to wrest control of water "unprecedented," and Montana state officials say if the federal government wins the suit, WATER COMPACTS ALL OVER THE WEST WILL BE INTERRUPTED.

Montana, like Nebraska, has had beneficial use and prior use doctrines concerning rights to the use of streams. Because of federal implications of water controls in a new national water policy, the Montana Legislature began efforts to sort out the uncertainties and quantify the right of various owners. The process was set to adjudicate water rights before state water judges, but before it got far, the Journal reports, the U. S. Justice Department, at the request of the Interior Department, filed suit to demand the water rights be adjudicated in federal courts. This is seen as a brazen move by the feds since water rights have always come under ajudication and purview of the states. WHAT THIS TELLS US IS: THE FEDERAL GOVERNMENT MAY DISREGARD THE STATES' RIGHTS AND SIMPLY DETERMINE THAT IT HAS EMINENT DOMAIN OVER WATER.

Unless the states wake up now, we can in fact have federal regulation of our streams, and loss of local operation of our many irrigation and other water resource projects. What can you do? Write your Senators and Congressmen for new legislation that clearly establishes water rights as states' rights.

Workshop Sparks Concern Over Hazardous Conditions

Like the proverbial two blind men examining the elephant, electricians and irrigators tend to see the same center pivot as two very different systems. The participants in two electrical safety workshops at Lubbock and Amarillo last month got an eye-opening lesson on seeing and recognizing the many hazardous electrical conditions that may exist on High Plains irrigation systems. The workshops were conducted for Water District, SCS and Rural Electric Cooperative staff by LaVerne Stetson, an Agricultural Engineer and nine year veteran of irrigation systems electrical research and training programs with the USDA at the University of Nebraska.

Stetson pointed out that about 60 percent of all irrigation electrical hazards were found in bringing the power supply from the meter to the equipment, and that he sees the same problems virtually everywhere he goes.

"The problems I see out in the field relate to wiring methods, grounding, bonding and improper equipment," Stetson began.

Allowing these conditions to go unobserved or unchecked can be costly. Neglect or ignorance of these hazardous conditions has been more than costly, it has been fatal. Of the eight fatalities Stetson has investigated since 1971, all but three in his opinion were operator error. A classic example involved an irrigation system where the line had been damaged. The operator stepped on the damaged line section and was electrocuted.

Stetson identified a number of clearly hazardous common practices in the field, with the biggest offense being against proper grounding.

Violations he cited include grounding connections made over painted or enameled surfaces; terminating aluminum and copper conductors in the same fitting, having no grounding electrode at the pivot, failing to properly ground the frame of a pump motor, or having loose conductor terminations.

Stetson also cautioned that repairs with electrical tape won't fix a faulty conduit. Improper splicing destroys the integrity of a line. Proper splicing of wires should be in a separate junction box or be done underground. He recommended fuses over circuit breakers which can freeze up in adverse environments or be difficult to immediately replace. Improperly supported conduit pulls out connectors

TEXAS WATER LEADER CRITIQUES CARTER'S WATER POLICY . . .

EDITOR'S NOTE: The following comments are concluding remarks by George W. McCleskey, presented during a two day Symposium devoted to "The Multi-Faceted Water Crisis of West Texas," held on Nov. 8 and 9, 1978, at Texas Tech University in Lubbock. Copies of the Symposium proceedings are available for $3. to cover postage and handling from the Center for Public Service, Texas Tech University, P.O. Box 4290, Lubbock 79409.

Conservation Emphasis:

2. In adding the consideration of water conservation to the principal and standards, the President initiated a number of other actions which we shall not list here except to refer to some which are considered to be of more importance to the states and particularly to the state of Texas. They are:

   A. Increase from about $3 million per year to $25 million per year the appropriation to be used in the 50/50 State/Federal matching program for state level water resources planning. Texas has been receiving $85 thousand to $100 thousand per year for this type of assistance and presumably would receive about $800 thousand under the increase. This is of no real significance to Texas in that we are way ahead of other states on our planning anyway and the guidelines for allocating the funds have not been developed.

   B. The President proposes to provide 25 million dollars annually in a 50/50 State/Federal matching grant assistance to states to implement water conservation technical assistance programs.

   C. Federal agency heads are directed to implement vigorously the Fish and Wildlife Coordination Act, the Historic Preservation Act, and other environmental statutes.

   D. Make appropriate community water conservation measures a condition of the water supply and the waste water treatment grant and loan program of the EPA, Department of Agriculture, and the Department of Commerce. This obviously will put communities, as well as river authorities and other supply agencies, and also waste disposal agencies, to the choice of whether they will comply with federal regulations in order to participate in the loan and grant programs. This is viewed in Texas as another inroad by the federal government into local affairs.

   E. Require the development of water conservation programs as a condition of contract for storage or delivery of municipal and industrial water supplies from federal projects.

   F. Promote water conservation in the agricultural assistance programs of the Department of Agriculture and the Department of Interior which affect water consumption in water short areas. This could be of real concern to our agricultural water short area.

   G. Require that new and re-negotiated contracts include provisions for recalculation and renegotiation of water rates every 5 years.

   H. Prepare legislation to allow states the option of requiring higher prices for municipal and industrial water supplies from federal projects in order to promote conservation, and provide that the state revenues in excess of federal costs would be returned to municipalities of the public water supply entities for use in water conservation or rehabilitation of water supply systems.

3. *Federal - State Cooperation.* The background materials as well as the message state that water policies are fundamentally to be determined by states. Some of the specific proposals however suggest strongly that those state policies must be in conformity with federal mandates. As an example, see the September 26, 1978, Statement by Commissioner of Reclamation R. Keith Higginson wherein he expressed the thought that Congress may be reluctant to fund federal water projects if the members feel that states are acting in an arbitrary and capricious manner to control development of their own natural resources. He said it might be wise for States to act "judiciously—with real caution and care." This statement was made after he cited a recent Supreme Court decision ruling that the 1902 Reclamation Act sanctions state control of water impounded in federal conservation projects, provided the state regulations don't run counter to specific congressional directives.

   A. The increase of $3 million to $25 million for matching funds in planning.

   B. The providing of $25 million for matching funds to implement water conservation technical assistance programs.

   C. The President proposed working with state governors to create a task force of federal, state, county, city, and other local officials to continue to address water related problems.

   D. Promptly inventory and quantify federal reserve and Indian water rights. This has little to do with Texas, at least this part of Texas.

4. *Environmental Protection*

   A. Implement the Fish and Wildlife Coordination Act, the Historic Preservation Act, environmental statutes, and set forth the implementing procedures promptly.

   B. On all projects there should be included designated funds for environmental mitigation in water project appropriation requests.

   C. Implement Executive Order No. 11988 on Flood Plain Management so as to require agencies to protect flood plains and reduce risks of flood losses by not conducting, or supporting, or allowing actions in flood plains unless there are no practicable alternatives.

   D. A directive to the Secretaries of Army, Commerce, Housing and Urban Development, and Interior to help reduce flood damages through acquisition of flood prone land and property where consistent with primary program purposes.

   E. Federal agency heads are to provide increased cooperation with states and assume leadership in maintaining instream flows and protecting ground water through joint assessment of needs, increased assistance in the gathering and sharing of data, appropriate design and operation of federal water facilities, and other means. This is of real significance to our part of the country in that federal water resource agencies are to assess ground water problems as federal projects or plans. With respect to instream flows, only the Rio Grande, Sabine, Canadian, Pecos and Red rivers are involved in multi-state river compacts, with the first four being already compacted, while the Red River Compact lacks only legislative approval.

SUMMARY

Though it seems desirable for some sort of order to be brought out of the general hodge podge of federal water activities, the implementation of the President's Policy will undoubtedly result in more federal intervention in local affairs and will increase the cost of water, rather than decrease it. It probably will make water less available because: (1) in some instances, the absence of federal funds as they are withheld because of non-compliance with federal regulations; and, (2) the non-use of available waters because

THE CROSS SECTION (USPS 564-920)

the structural development to make the waters available might interfere with other values which may be given a higher priority under the President's program. Texas has been somewhat in the forefront in water planning and water management as compared to other states; so the implementation of the President's Water Policy may well have a net adverse effect in this State while having a net beneficial effect in less progressive states. Some think that governmental programs have a tendency to level out different competing units whether they be states or persons, but the levelling out process inevitably brings down the level of those who excel as well as raise the level of those who are below average. Because Texas has excelled in the past, the application of this new program may well mean that we will have a greater challenge to try to excel in the future.

BULLISH . . . continued from page 1

—Testing the economic impact, viability and alternatives.

—Analyzing the cost, initially and through time.

—Forecasting the project's revenues and self-sustaining ability.

—Involving many people from the beginning, in addition to the engineers.

Harmon sketched in a people profile with water experts, staff, legal counsel, bonding underwriters, independent financial advisers, and separate legal and bonding counsel as well as non-vested underwriting counsel.

From a bonder's perspective Harmon felt the recently passed Ogallala Import Authority legislation provides maximum flexibility. Its taxing power allows for a backup to the initial series of bonds until the project gets on its feet, develops a success record, and turns to revenue bonds.

"It will be done because it is needed," was Harmon's summary reaction.

But realism over the current unsettled state of the market, the conjectural nature of how these components would fall into place, and the complicated political nature of interstate bonding ratification, left room for many questions.

George McCleskey, attorney and member of the Texas Water Development Board, responded. "We are knowledgeable in the need. People as a whole need to recognize the need to preserve and maintain production. How can we get politicians to play the role of statesmen and think 40 years ahead?"

"Pure need doesn't necessarily mean the politics will fall into place," commented Representative Simpson. "But the word politics comes from the Greek meaning 'people' and that's where I'd take my case. We need to recruit as many people as possible to be part of the solution to the problem especially if they are going to have to vote taxes on themselves."

The issue of a better educational program was raised by A. L. Black, local banker, and chairman of the Texas Water Development Board. Mr. Black noted that federal agency support and involvement in the project can best be achieved by Congressional directive which is accomplished by knowledgeable people expressing their desires and views to their elected representatives.

It was Black who, in a most sober manner, had the last word in the discussions with his offer to buy Merrill Lynch's bull, grind it up for hamburger, and sell them one more representative of this area.

Area Water Well Network Surveyed

An intense field survey of water wells in the High Plains area is underway. So don't be surprised in the coming months to see a blue and white vehicle traveling through or parked on some of your land near one of your irrigation wells.

It will, in all probability, be a Water District staff vehicle in the field gathering and recording depth-to-water measurements from a network of more than 900 observation wells in the High Plains Water District service area. These are part of a statewide network of observation wells measured annually in cooperation with the Texas Department of Water Resources. In addition to measuring the water levels in the current network of wells, several hundred more wells will be measured this year to fill in a data gap where more detailed water level information is needed.

Information gained from this program is used for declining rate projections, determining the amount of water left in storage and, very importantly, as a basis for the income-tax depletion allowance claims on landowners tax returns.

Measurements will be made to find the static water level by lowering a steel tape down the well's casing until it is in contact with the water in the

continued on page 4 . . . WATER WELLS

GRUBB GRAM . . .

AN IMPRESSIVE LITANY OF WATER RELATED STATISTICS

DR. HERBERT GRUBB, Director, Planning and Development, TDWR

1. The area overlying much of the Ogallala Aquifer is known as the Texas High Plains. This region comprises 59,783 square miles and fifty-six (56) counties accounting for 21.6 percent of the total land area of the State.
2. The High Plains region has 8 percent of the State's population with an estimated 999,200. Over 50 percent of the region's population is located in four areas: Amarillo (Potter and Randall Counties), Lubbock (Lubbock County), Midland (Midland County), and Odessa (Ector County).
3. Between 1960 and 1970 the region experienced a population decline of 3.4 percent; however, TDWR projected estimates indicate that the regional population will nearly double by the year 2030 to an estimated 1.9 million.
4. Total employment in the High Plains is estimated at 466,800. Agriculture is the third largest employer although the number of agricultural employees decreased from 1950 to 1970.
5. It is estimated that 25 percent of the labor force is in irrigated agriculture industries, 20 percent in petroleum industries, 10 percent in dryland agriculture, and 45 percent in other industries.
6. The High Plains region accounts for 8.1 percent of the total personal income in Texas. In 1977, the region's total personal income amounted to about $7.4 billion.
7. Regional contributions in the form of tax revenue expressed as a percentage of all tax revenue collected in Texas are:

Federal taxes	16.9 percent
State taxes (excluding education)	21.7 percent
Local taxes (excluding education)	15.3 percent
Education taxes	12.5 percent

8. The High Plains region has 34 percent of the total cropland in Texas and approximately 70 percent of the total irrigated cropland in the State.
9. Percentages of 1977 harvested acres by crop in the region are:

Irrigated cotton	19.4	
Irrigated wheat	9.1	
Irrigated feed grains	20.5	
Other irrigated crops	4.0	53.0
Dryland cotton	21.9	
Dryland wheat	16.5	
Dryland feed grains	6.5	
Other dryland crops	2.0	47.0

10. In 1977, about 68 percent of the value of crop production was associated with irrigation.
11. From 1970-1977, the High Plains has produced:
    - 61 percent of the cotton in Texas
    - 50 percent of the grain sorghum in Texas
    - 61 percent of the wheat in Texas
    - 78 percent of the fed cattle in Texas
12. The High Plains region produces enough fed cattle to feed 13.2 million people.
13. During 1970-1977, the average annual value of production from the various agricultural commodities are:

Cotton	$478.8 million
Grain Sorghum	280.4 million
Wheat	$131.5 million
Corn	$166.2 million
Fed Cattle	$892.3 million

14. In 1977, the value of the High Plains' cotton crop was a record $888.4 million due to the third best average yield in the last decade, increased acreage, and solid prices.
15. In 1974, the water requirements of the High Plains amounted to more than 8.6 million acre-feet of which an estimated 98 percent was supplied from groundwater sources, predominately the Ogallala Aquifer.
16. Municipal water use is the largest surface water demand category accounting for nearly 64 percent of the total surface water requirements of the region.
17. The amount of groundwater used for irrigation purposes in 1974 was estimated at 8 million acre-feet, supporting more than 6 million irrigated acres. This is an increase of approximately 1.6 million acre-feet and 427,000 acres above the 1969 estimates.
18. Studies made by the TDWR indicate that in 1974 the total quantity of water in storage in the Ogallala underlying the Texas High Plains was 340.1 million acre-feet.
19. It is estimated that by the year 2000 about 3.5 million acre-feet will be available annually from the Ogallala, and that this quantity of water can be expected to irrigate about 3.2 million acres. By 2030, water available from the Ogallala is expected to decline to about 2.2 million acre-feet annually which can be expected to irrigate only 2.1 million acres annually.
20. For 1972-1978, the mining of oil and gas in the region has provided an estimated 44.6 percent of the State's annual crude oil production and approximately 40.7 percent of the State's annual natural gas production. Together, the average annual value of crude oil and natural gas production for the same period is estimated at more than $5 billion (crude oil—$3.7 billion; natural gas—$1.6 billion).
21. Latest available information indicates that the estimated proven reserves for the region's crude oil production is approximately 3.7 billion barrels as of 12/31/78. Since 1972 the average annual decline of proven reserves has been estimated at 6 percent.
22. Natural gas reserves have declined at an average annual rate of approximately 8 percent over the last 6 years with existing proven reserves estimated at 16.5 trillion cubic-feet as of 12/31/78.
23. Like the water resources of the region, energy resources have proven to be exhaustible to the point of economic recovery. Consequently, continued contributions from irrigated agriculture, crude oil, and natural gas producing industries to the region as well as the State economy are now questionable.
24. Declining supplies of water and energy resources will have major adverse effects on the continued economic vitality of the Texas High Plains.

STETSON—"It's in code."

WATTS . . . continued from page 1

and allows varmints to get into the bottom of the pump panel.

"Proper initial installation increases safety, lessens maintenance and prolongs the life of increasingly expensive equipment," Stetson emphasized. "Concerning proper maintenance and repairs," he commented, "irrigators need to be alerted to damage to wiring or equipment and get it repaired immediately. People are somewhat callous to an occasional shock and continue to operate equipment. The difference between a tingle and a severe shock simply depends on specific conditions at the moment which can change immediately."

Stetson offered this simple, routine maintenance safety checklist for irrigation systems:

—Visually inspect equipment.
—Immediately repair or replace faulty or defective equipment.
—Check for rodent damage.
—Check for loose or broken wires.
—Protect equipment from livestock damage.

"If you get a tingle, don't do nothing," Stetson finally stressed. He recommended the use of a backhand pass over equipment if any hazard is suspected and the use of a volt meter test with a 50 volt ac scale. "Touch one line to the equipment frame such as the pivot, motor or pump panel, and the other line to the ground. If it reads anything," he warned, "there's a problem somewhere. It's the current that gets you, not the voltage. 110 volts are just as dangerous as 480, and anything above 25 volts can be fatal."

As the slide lecture ended, an SCS technician shook his head in realization, "We've got systems out there that look just like his bad example slides."

Concerned irrigators can get a copy of the ASAE diagrams and code details on Irrigation Equipment Electrical Standards by contacting: *LaVerne Stetson, USDA-SEA, Room 5, Agricultural Engineering, University of Nebraska, Lincoln 68583, (402) 472-2945.*

IRRIGATOR SOLD ON MOISTURE TOOL

The High Plains Water District encourages landowners to use every affordable technique available to enhance their water-use-efficiency management program. One type of equipment gaining usage is the moisture sensors, such as the tensiometer and the moisture block. These tools offer convenience and simplicity in use, cost effectiveness, and their initial investment is low. Our own Board President, James Mitchell, has been working with Dr. Leon New, Area Irrigation Specialist with Lubbock's Agricultural Experiment Station, on a research project using tensiometers and moisture blocks in his soybeans. He has four tensiometers and four blocks buried at the one, two, three and four foot levels in his field. As the study has progressed through this first season, we recorded some of the key impressions about what they discovered. Here are excerpts from those conversations:

MITCHELL: *"I've been fascinated to see the root development of plants as it goes down and as they began to use the moisture at the deeper soil levels. The moisture in the first foot went down pretty rapidly; and then the plants really drained that second foot. Then I saw some of the 3 foot moisture come back into the second foot. The four foot level still has pretty good moisture."* (August)

MITCHELL—"It helped."

NEW: *"We feel like the sensors have a lot of potential. James can tell you how they caught his attention. It can tell you where the water is when you apply irrigation and how deeply it penetrates the soil. This is important to irrigation management procedures. It can give you guidelines on when to start irrigating and when to stop."*

MITCHELL: *"These monitors don't say yes or no, you've still got to make the decisions, but they simulate the amount of moisture that's available for the plant to use. I was surprised when they let up in the one foot zone and pulled heavily in the two foot zone."* (August)

MITCHELL: *"Tensiometers are pretty practical. It doesn't take a major investment in labor to dig five foot holes all over your farm.*

"Several people cranked up and irrigated cotton. But I just can't believe that it all needed irrigating. I think if they had had a set of tensiometers or blocks and understood them, I don't believe many of them would have cranked their wells. I believe there was enough deep moisture at least on some farms stored in the root zone that it would have finished out the crop if they'd had something to guide them." (September)

NEW: *"It's difficult for a grower to go out and just start using blocks and say, 'well, I'm gonna irrigate by 'em.' To use them he must work them into his program. So all those daily measurements James has taken on his tablet we will chart on a graph. This is the value of continuous reading. It is not a situation where you go out in the field, read it today and make a decision. It is the continuous trend and changes that you look for in relation to what the grower already knows about the crop, the soil and how he's been watering."* (October)

MITCHELL: *"I think it helped me, based on Leon's ability, I didn't understand what I was doing. I called a few weeks ago and asked if he thought I could continue watering two circles. He came out and looked and said we were still in good shape in the four foot zone and we had a little moisture back up in the one foot zone. We thought we could go ahead and finish out."* (September)

NEW: *"At James' we have $100. worth of tensiometers and $8. worth of blocks and the meter which cost about $160. We're looking at both because we want to get a relationship between the two. Electrical conductivity is measured in the block. When the soil is wet it conducts electricity easily so we get a high reading. When it's dry it gets more difficult for it to conduct electricity so we get a lower reading . . .*

NEW—"It has potential."

and vice versa with the tensiometer. When the soil is wet it's not sucking very hard so you get a low reading. If it is sucking hard you get a high reading. We're trying to read these two together. We've got quite a bit of information. We're trying to improve our interpretation of what the meters are telling us which is the key in successful use of any block . . . being able to interpret what it says."

NEW: *"We feel like the blocks probably offer the best potential for cotton. Should somebody want to use them, we suggest they take the 'green' out of them first. That is, before you install them submerge them in water. They'll fizz like an Alka Seltzer. Then hang them to dry out completely and repeat this each day for three days."*

"We had a good year at James' and he's fascinated with them. I don't know of anything dramatic that's going to help the farmer. It's these little things that he can do to increase his efficiency and profits."

WATER WELLS . . . continued from page 3

well, then retrieving the tape and observing and recording the depth to water. After measuring, a red identification tag will be attached to the well equipment for the owner's information.

Since most of the wells to be measured are operational irrigation wells, the time of measuring is calculated to allow for reading in wells that have not been used for some time. This dormant period allows for recovery from the cone of depression developed during the pumping season.

The Texas Department of Water Resources and the High Plains Water District Board of Directors express their appreciation for the warm cooperation received from the many well owners throughout the High Plains whose wells are a part of the regularly measured network, as well as to the owners of those wells which will be measured this year as a part of the special data gathering effort.

THE CROSS SECTION (USPS 564-920)
HIGH PLAINS UNDERGROUND WATER
CONSERVATION DISTRICT NO. 1
2930 AVENUE Q
LUBBOCK, TEXAS 79405

SECOND CLASS PERMIT

THE Cross SECTION

Published monthly by High Plains Underground Water Conservation District No. 1, 2930 Avenue Q, Lubbock, Texas 79405

Volume 25—No. 11 | Publication number USPS 564-920, Second Class Postage paid at Lubbock, Texas | November, 1979

STUDENTS LEARN ABOUT WATER

We're about to face our toughest critics since the Board of Directors of the District adopted the creed "Dedicated To The Principle That Water Conservation Is Best Accomplished Through Public Education." Every school within the High Plains Water District's fifteen county service area will be offered copies of a supplemental water text titled, An Introduction To Water And Water Conservation With An Emphasis On The High Plains Of Texas for use in their eighth and ninth grade Earth Science classes.

HYDROLOGISTS AT WORK.

"Area teachers identified the need for such a teaching tool to us," explained A. Wayne Wyatt, District Manager, "so we got busy and tried to fill that need. We have imposed on many of our friends and area teachers in an effort to make sure that the text is instructional, understandable and fun for the students."

The water text is a two to three week study unit designed for Earth Science or Social Studies classes. It offers just what its title suggests, a basic understanding of water and its wise use from the perspective of a Texas High Plains user.

I Like Water In My Instant Soup is just another way of introducing Chapter One, "Water: The Vital Essence." After a brief go round on "The Unending Cycle," the stream of instruction tumbles into "TINSTAAFL," the chapter that describes nature's water distribution system. *Just Because You Can't See It, Doesn't Mean It Isn't There* paraphrases the chapter introducing "Ground Water." And on the lessons go, into "Texas High Plains Ground Water," "Municipal Water," an explanation of how "Conservation = Responsible Management," and finally to a look at "What the Future May Bring," with a "Glossary" of *Water Words For The Water Wise* and "Selected References" of *Other Things You Might Want To Know About Water*.

The text is heavily spiced with graphics, charts and figures which further illustrate and clarify these water concepts. But the real eye-stoppers are the many cartoons designed to capture the youngsters' imaginations by tickling their funny bones with the pen of one of their peers.

Developing lesson plans, classroom work assignments, drills and tests can be very time consuming for teachers who already have very busy schedules. Therefore, a Teacher's Aid packet has been prepared to assist the teachers in using the study unit. This packet contains a Water IQ pre-test, a bulletin board poster of the hydrologic cycle, ready quizzes for each of the chapters, activity suggestions, and of course, the answer sheets, because not even teachers know everything about our unique High Plains water problems.

The Water District's Board of Directors reviewed the report as it developed through its many stages and requested that we express their appreciation to the many teachers and water professionals across the state who critiqued its progress. Perhaps the most valuable of our critics were the 1978-1979 eighth grade Earth Science classes at Idalou Junior High School who, under the enthusiastic guidance of Mrs. Pat Davenport, pilot tested the first draft at the end of this past school year. Back then we called it a Water Conservation Mini-Guide. The students called it like they saw it in these candid evaluations: (The text had no illustrations or accompanying activities then.)

continued on page 3 . . . STUDENT

A BRIGHT IDEA, one of the many illustrations in the text designed to add humor to a dry subject.

Give'm Your Views

Agriculture Secty. Bergland will preside at a series of public "national dialogues" to re-examine the forces shaping American agriculture today. He wants to hear from individuals and organizations on the type of policy that can best serve farmers and ranchers in the future. The program will include pre-scheduled speakers and impromptu audience comments. So mark your calendar to be in Wichita Falls, Texas at the Activity Center, 10th and Indiana, on Thursday, December 6 and tell him what you think.

Landowners To Get Tax Break

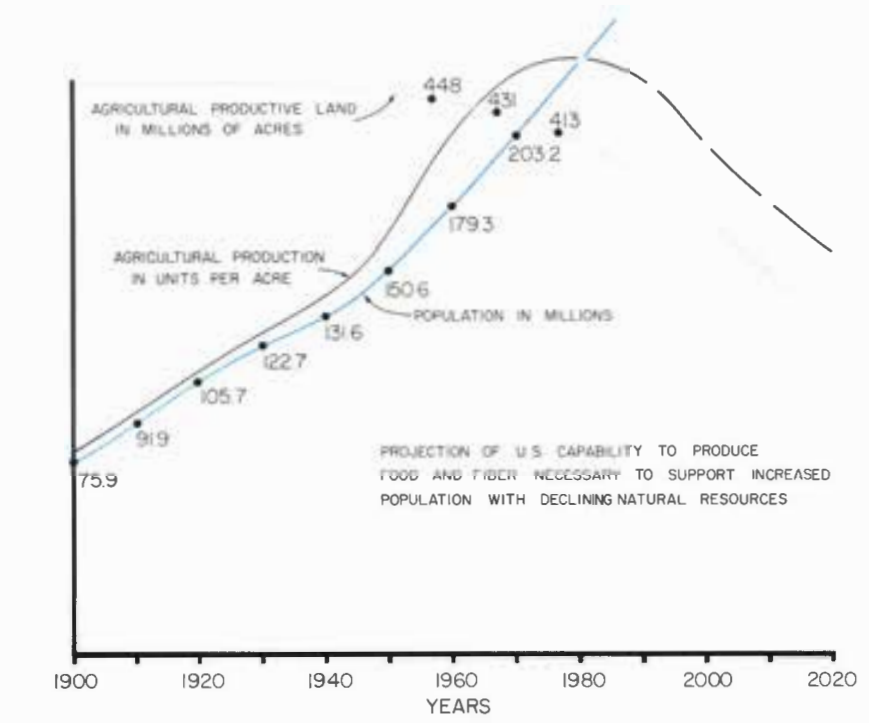
If you are exhausting your capital investment in groundwater in the Southern High Plains of Texas, you may be entitled to a tax deduction. You are eligible if you acquired land within the geographic area covered by the Ogallala aquifer in the Southern High Plains of Texas and New Mexico anytime after 1947. Land with proven groundwater reserves and which had irrigation potential sold at a higher price after 1947 than comparable land without water. The difference in the actual sales price, of comparable dryland vs. irrigated land, is attributed to water when all other factors are determined equal.

The deduction is called a cost-in-water income tax depletion allowance and the information you will need to support your claim within the District's 15 county service area can be obtained from the Water District. For those of you that have previously filed claims, decline data to support your 1979 deduction will soon be available from the Water District. District staff will have ready the decline values needed to figure this year's deduction for individual landowners and/or their accountants as of the first of January 1980. To receive a specific decline value for your land in the Water District's service area, you or your accountant will need to provide the Water District with the following information: landowner's name, address, social security number; the taxpayer's agent's name and address; and a complete legal description of the land involved. The District will provide blank forms, upon request, which detail all necessary legal and general information needed to support your claims.

Last year the District supplied decline maps to Hale, Lynn, Crosby, and Cochran Counties' landowners, however, for the 1979 tax year, these counties will be handled under the parcel claim system in the same manner as all the other counties in the District.

"The Water District expects to process between five and six thousand requests for decline values this tax season," says Manager A. Wayne Wyatt. "Though there are no exact figures available on how much money landowners in the Water District save each year by this allowance, we estimate that it is at least $3 to $5 million."

REVENUERS, the IRS reviews tax guideline maps prepared by District staff.



THE Cross SECTION

THE CROSS SECTION (USPS 564-920)

ONE MAN'S OPINION...

by A. Wayne Wyatt

Unless we have a significant and imminent technical breakthrough, U.S. farmers will not be able to produce enough food and fiber to meet the three to four percent increased demand per year. In fact, we can only expect their total production to decrease as more and more of our land goes out of production and our water supplies for irrigation become shorter and shorter.

In recent months a great deal of speculation has been made as to how much longer the farmers in the United States can continue to produce adequate quantities of food and fiber for the U.S. population as well as to provide surplus food and fiber for other nations. Food and fiber have become increasingly important to the United States in world trade, principally to offset our balance of payment deficit created by importing large quantities of high priced oil.

Agriculture is a unique industry which cannot be compared with other types of industry where assembly lines are used to produce products. Many factors influence agricultural production from year to year for good and bad. The bushels of corn, pounds of cotton, bags of potatoes, etc., that the farmer has produced per acre have increased through time due to advances such as better equipment, better varieties, fertilizers, herbicides, pesticides and irrigation. Irrigated acres produce from two to three times more product per acre than non-irrigated acreage. But climatic conditions, insect infestations, cost and availability of fuel and labor as well as other necessary ingredients also take their toll in producing a crop. And, of course, government programs — or lack of them — affect agricultural production.

There are, however, several other major factors which influence a reasonable guess as to what our farmers' ability will be in the future to produce food and fiber for domestic needs and for world trade. Some of these influences are the expected increase in the U.S. population, the continuing decrease in acres of agriculturally productive land and the anticipated decrease in acres of irrigated agricultural land due to depleting groundwater supplies and as the result of diverting surface water now used in agricultural sectors to the municipal or industrial sectors.

The chart projecting production capabilities against resource declines illustrates what I believe the future holds for agriculture. Note first, the projected decline in the number of acres of agriculturally productive land in the United States. The numbers indicate an approximate decline of 1.8 million acres each year during the past 20 years even with the reentry into production of acreage set aside by various farm programs in the 1950's, 1960's and 1970's. Most of this land has been claimed for urban sprawl, industrial sites, and highway expansion.

The second curve projecting the expected increase in population for the U.S. will probably prove near true. As the population increases, the demand for food and fiber will undoubtedly continue to increase.

The third curve illustrating agricultural production in units per acre was plotted using several sources and was adjusted to eliminate the seasonal ups and downs resulting from changing weather conditions and other factors. The trend is generally believed correct; however, combining all agricultural products into a meaningful curve requires a great deal of imagination and nerve.

The chart depicts what I think will happen if we do nothing; however, there is no need for a nation as strong as ours to adopt a do nothing attitude when we can avoid a food and fiber crisis for the people of this nation and actually increase our agricultural productivity to feed the world's starving people.

There are millions of acres of potentially productive land in the western United States that will produce an abundance of food and fiber provided ample water is available to support the crops grown. There is an abundance of water in the eastern portion of the United States which is in excess of the 50-year projected need of many of those states. The two must be brought together to produce if we are to continue to be a strong nation. In my opinion, the greatest strength of our nation is its ability to produce an abundance of food and fiber. If we lose this strength, we may lose more than we care to imagine.

Views

We invite YOUR views, comments, and opinions on any issue addressed in the Cross Section or elsewhere that bears on the future of this nation's water resources.

Everything we do in life carries with it some element of risk. It would be irrational to try to eliminate all risk. The problem then is how much risk should be taken in light of the penalty and payback. We live in a real world where millions die each day from disease, malnutrition, and man's inhumanity to man, and where the environment is influenced by many variables. We should work to improve conditions as they are influenced by all factors, including those of water. But the improvements should be made realistically, from the standpoint of what will bring the most good to the greatest numbers.—Paul Hersch

"Saving the family farm" has in the past been a matter of legislating to protect against low prices, natural disasters, market manipulators and other common enemies of every producer. Plains Cotton Growers now judges that the move may be toward farm programs and policies designed to protect the family farm from whatever category of farms Washington decides is "non-family." There is an inherent danger for agriculture, as PCG Executive Don Johnson sees it, when Washington sets out to draw a line between family and non-family farms and then design federal tax laws, farm programs and other policies to protect one at the expense of the other.

Student Evaluation Of The Water Conservation Text

Composit Answers Of The 69 Students

(continued from page 1)

1. I live
   - 37 a. In town.
   - 20 b. On a farm.
   - 12 c. Other.
2. The part of the Mini-Guide that I found most interesting was
   - 13 a. The general information about water in the first three sections.
   - 2 b. The section on surface water.
   - 8 c. The section on ground water.
   - 18 d. The section on the High Plains (its history and water problem).
   - 2 e. The section on municipal water.
   - 11 f. The section on conservation on the farm.
   - 14 g. The section on conservation around the home.
3. I already knew
   - 3 a. Most of the information in the Mini-Guide.
   - 34 b. Some of the information in the Mini-Guide.
   - 32 c. Almost none of the information.
4. I found the material and the way it was covered
   - 9 a. Boring.
   - 20 b. Interesting.
   - 40 c. O.K.
5. I found most of the material
   - 2 a. Too hard for my reading level.
   - 8 b. Too easy for my reading level.
   - 58 c. About right for my reading level.
6. My water IQ has
   - 50 a. Been raised substantially.
   - 3 b. Decreased.
   - 16 c. Stayed about the same.
7. The quizzes and exercises
   - 59 a. Helped me learn the material.
   - 7 b. Were too easy to be helpful.
   - 3 c. Were too hard to be helpful.

SQUEEZING THE NICKEL. Luther Davis, Area Representative, OWRT (r), and Jack Runkles, Director, Texas Water Research Institute, discuss water research needs of Texas with Lloyd Urban and Bob Sweazy, TTU Water Resource Center and Water District staff.

8. When I get the chance to discuss water with people in my community, I
   - 42 a. Will feel fairly competent and confident.
   - 18 b. Will feel that I don't know enough
   - 8 c. Will not be interested.

Some of the children also gave us the benefit of their frank and honest comments which are delightfully candid and worth sharing here:

The book was interesting.
It would be more interesting with projects to do.
It was O.K.
I could care less.
Illustrations help people to understand it better.
The book is better than the regular books we have to use in the 8th grade like Earth Science and Life Science.
At first I thought it would be fun (that was before I knew what we were gonna study). Then I thought it was a waste of time.
I liked the book very much because I learned more about water than I used to know.
I enjoyed the general information about water in the first three sections. Very interesting.
It was O.K. I liked it better than Earth Science.
I think the Mini-Guide was very interesting. I hope many other students will be given the opportunity to read it.
I thought it was interesting and a good thing to learn about.
Needs more interesting things.
I think it was helpful and I hope it helps everybody else.
I would like to learn more about ground water.
I loved doing the drawings. They were a lot of fun. I also learned how to conserve water around my home.
Save water. Don't waste it.
I really enjoyed it and hope our aid has been helpful.
Water your grass twice a week. Wash your car once a week.
I found the study O.K. It was more interesting than Science. I learned a lot about water.
Fair.
I think that all students should have the opportunity to learn about water and how to conserve it.
It is O.K. I like Earth Science better.
This course was interesting, knowledgeable and fun. I hope more programs like this will come along.
The book was very informing and to the point.
SCHOOL'S ALMOST OVER ! ! !

As the last copy of the text rolled off the press, James Mitchell, President of the District's Board of Directors, explained how the Board feels about the project. "Earth Science is a required subject for all students. The information on water in most Earth Science textbooks is limited and very general. Developing and supplying to the schools in the District a supplemental text with information on the local water situation appears to be the best and fastest way we can introduce to our young people the unique water problems we have here in the High Plains. We feel like this is the most efficient and economical way to impress the importance of our water resource upon the minds of our future leaders. We sincerely hope it will be well received and used in our public schools."

Carter Water Task Force Reports

Recommendations are in from another one of President Carter's 17 Water Task Forces and the conclusions are "there are opportunities to reduce (1) seepage from on farm and off-farm ditch and conveyance systems, (2) on farm irrigation return flows, and (3) incidental water uses." The Interagency Task Force on Irrigation Efficiencies reported that these reductions would make possible an increase in benefits from the use of the existing water supply.

Their report offers 16 recommendations for adopting a policy to emphasize the conservation of water used in irrigated agriculture and to provide improved protection and management of water and related land resources.

Representatives of the Departments of Interior, Agriculture, Environmental Protection Agency, and nonfederal representatives finally concluded that improving irrigation water management in the U.S. at a cost of up to $5 billion could result in some two to five million acre-feet of water being made available for other uses. Some of the benefits they say will accrue from these policy recommendations are: (1) increasing the nation's water supplies, (2) increasing the productivity of current water resources, (3) improving water quality and instream flows, and (4) contributing to a more stable social fabric for the agricultural community and the nation as a whole.

The Task Force recognizes that state and local entities are the key to implementing water conservation measures. They recommend that Governors of the individual states take the leadership in initiating and maintaining a cooperative program through federal, state, local and private entities to bring about improvements in irrigation water use and management and to achieve water conservation. Federal agencies would act in a service capacity to assist the states.

Secretary of the Interior Cecil D. Andrus commented that the benefits would be both qualitative and quantitative, from these recommended measures, "in addition to making water available for new agricultural, municipal or industrial uses, annual diversions could be reduced by 15 to 20 million acre-feet with a resulting increase in streamflows."

Endorsing the sizable investments in ongoing programs that are already being made, the Task Force suggests that an additional investment of up to $5 billion should be made by federal, state and local interests over the next three decades to implement the water conservation proposals.

The report also contains a "States' Views" comment by Utah Governor Scott Matheson as representative to the Interagency Task Force Technical Work Group. Reacting to the report Matheson states, "the States consider this report to represent a reasonably accurate overview of irrigated agriculture... We do not consider that the proposed program and practices outlined in this report constitute an entire comprehensive program of water development and management..."

Matheson expressed the States' concern that "water conservation does not provide any additional long-term water supply sources in the limited water resources areas of the western United States. It only delays the inevitable construction of additional storage facilities and allows the cost of such facilities to increase dramatically."

continued on page 4 .. CARTER

SOAK OPERA

"Water Follies: (A Soak Opera)" is a seven minute, full color, animated movie recently acquired by the High Plains Underground Water Conservation District No. 1 as an important new addition for its education and information programs.

The film gives a laughable look at a day in the life of a water-waster and shows, by comparing good and bad habits, how easy it can be to save water every day. Though it is a cartoon feature, the film is for all ages—children and adults.

It is an easily understood film and uses its visual impact so that dialog is unnecessary. Because of its universal appeal, the film has won numerous national awards of excellence.

Other films available at the District are: "Water on Demand: Basics of an Irrigation Well," "Groundwater, America's Buried Treasure," and "Groundwater, America's Hidden Reservoir."

Any group may request a showing of the films—schools, churches, civic, business or social. To schedule a showing for your group contact the District at 2930 Avenue Q, Lubbock, Texas 79405, or phone (806) 762-0181. The District will be glad to provide a showing of the film and a program for you at no charge.

NOW IS PRIME TIME FOR TESTING YOUR SOIL

HUNGRY SOIL? Collecting a good sample ensures proper analysis.

There are three very timely reasons to take soil samples as soon as possible, have them analyzed to determine your fertilizer requirements, and make definite plans for next year's fertility program.

First it is anticipated that we will see price increases in fertilizer after the first of the year. Second, this year's bumper crops are putting the railroad hopper cars in short supply; therefore your local dealer may have difficulty obtaining delivery on fertilizer; and third, the excellent crop yields in many areas this year—especially for dryland farmers—make this a good time to observe any weak cropping areas and identify their problems.

Dr. Dale Pennington, Area Soil Chemist at Lubbock's Agricultural Experiment Station made these observations in explaining why this fall is a prime time for soil testing. He noted that following a good crop year more plant nutrients are extracted from the soil, making last year's analysis, particularly of nitrogen levels, invalid for calculating next year's fertilizer needs.

"This is especially true," he emphasized, "for individuals who have harvested over ten thousand pounds of seed corn this year. Also, for every ton of corn sillage harvested in the hailed out areas, farmers have removed about 20 pounds of nitrogen per ton. It is extremely important for these individuals to be informed on the nitrogen needs for next year's crop."

Hailed out cotton and soybean fields, however, should be holding some residual fertilizer, says Pennington. A soil test is the most economical tool for capitalizing on current conditions in developing a fertilizer program for next year.

The easiest way to get information on a proper soil test is by contacting your local county agent. He will provide information on how to take the sample, and give you the forms and cartons for mailing your soil samples to the laboratory. The cost for a routine soil analysis is four dollars, or seven if the soil analysis is to include analysis for the micronutrients such as zinc, iron, manganese and copper.

Pennington also offered these precautionary soil testing tips. Early sampling of corn fields where cattle are to be grazed will prevent urine spot contamination of your sample. Where this occurs the nitrogen sample determined by the lab is not very useful.

For cotton crops that have areas of less height and development, now is a good time to examine roots for knots, nematodes, and hardpans, crow footing and lack of tap roots.

Fall application of fertilizer is a good practice in clay soils, particularly for nitrogen and phosphorus, because clay allows very little leaching.

If you are preparing to make your soil tests, Pennington recommends an inspection of the overall appearance of the field prior to sampling. Locate the irregular crop growth areas for sampling, but don't take samples in depressions, on old fence rows, in seep areas, gullies, or on last year's fertilizer band.

Avoid using rusty or galvanized sampling tools or containers. Don't use heat for drying your samples. Be sure to keep a record for yourself of the areas represented by each sample and be sure that the sample numbers on the sample boxes and the sample number on the information sheet correspond. Place the soil testing fee and the information form in an envelope and attach it to the outside of the package containing the soil samples so they will reach the lab together. Address the letter and package to: Soil Testing Laboratory, Agricultural Extension Service, Route 3, Box 213AA, Lubbock, Texas 79401, or to the Soil Testing Lab at the Extension Office in Seymour for routine tests only.

Irrigated Crops Make A Strong $

We now have 422 million acres of farm land in the U.S., according to recent information released by the U.S. Department of Commerce. Of this total, 37 million acres are irrigated through private investment and eight million acres are irrigated through Federal projects. Irrigated agriculture accounts for about 27 percent of the total value of U.S. agricultural production. The total value of farm products produced on irrigated lands totaled $11 billion in 1978.

The true value of irrigated agriculture is far greater than that. For most irrigated products, the number of off-farm jobs generated by processing, distributing, and retailing the produce exceed farm employment. Millions of "middlemen" jobs exist throughout the U.S., which rely on a plentiful year-round supply of farm products. An important aspect of agriculture is its key role in the international trade balance. The following shows the U.S. balance of trade situation for 1978.

	All Products	*Farm Products*
Exports	$143.6 bil.	$29.8 bil.
Imports	$172.0 bil.	15.0 bil.
Trade Balance	− 28.4 bil	+ 14.8 bil.

These export sales contribute importantly by strengthening the value of the dollar. A strong dollar helps improve the American standard of living by keeping the cost of imported goods down. Thus, if the $15 billion trade surplus in farm products increased the value of the dollar by ten percent, then U.S. consumers benefited by about $17 billion from this phenomenon in 1978. About 27 percent or $4 billion of this benefit could be attributed to irrigated agriculture.

CARTER . . . continued from page 3

Matheson requests that structural measures to augment water supplies be given appropriate consideration whenever conservation measures are proposed.

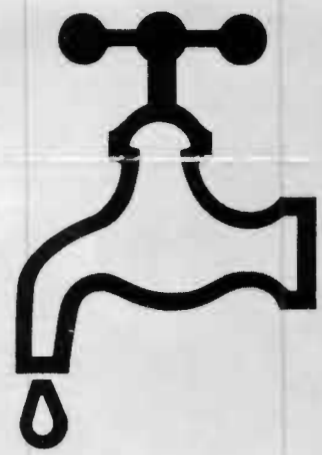
However, Matheson takes exception to "any federal assistance for development or rehabilitation (that) will depend on how well the States satisfy the federal government relative to instream flows, groundwater, and water quality standards being considered." He rejects the "obvious purpose of federal dominance in state prerogative" and further states that "we (the States) would be a reluctant participant in any program if this federal attitude were to persist."

Full copies of the report (stock number 024-003-00133-3) may be purchased for $4.50 each from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, and the Bureau of Reclamation, Engineering and Research Center, Attention: D-922, Denver Federal Center, P. O. Box 25007, Denver, Colorado 80225.

Bits & Briefs:

Many Texas farmers and ranchers will receive a crop or livestock questionnaire from the Texas Crop and Livestock Reporting Service between mid-November and early January, or they will be personally interviewed by the Service's field staff. All of the estimates published by the Texas Crop and Livestock Reporting Service are based on the data provided by Texas farmers and ranchers, County Extension Agents, ASCS offices, and many others in agriculture.

This cooperation provides the necessary data which is, in turn, returned to farmers and ranchers and others in the form of accurate estimates, essential in making the wisest production and marketing decisions. Each farmer or rancher receiving a questionnaire is urged to fill it out carefully and return it promptly to the Agricultural Statistician in Austin. Individual reports are confidential and used only for state and county estimates.



Water leaks cost money. You probably do not realize that a dripping faucet or other unsuspected leaks may be the cause of a high water bill. For example, a 1/32-inch leak wastes 170 gallons in 24 hours. A 1/16-inch leak wastes 600 gallons in a day. At fifty cents per thousand gallons, the smallest of these leaks will add $31. to your annual water bill. And . . . you are WASTING a needed resource.

THE CROSS SECTION (USPS 554920)
HIGH PLAINS UNDERGROUND WATER
CONSERVATION DISTRICT NO. 1
2930 AVENUE Q
LUBBOCK, TEXAS 79405

SECOND CLASS PERMIT

THE Cross SECTION

Published monthly by High Plains Underground Water Conservation District No. 1, 2930 Avenue Q, Lubbock, Texas 79405

Volume 25—No. 12 Publication number USPS 564-920, Second Class Postage paid at Lubbock, Texas *December, 1979*

WHAT'S GOING ON AT THE DISTRICT

EDITOR'S NOTE: The Water District has performed many worthwhile services in its 28 years of operation. The Board of Directors of the High Plains Underground Water Conservation District No. 1 set the pace for District activities with its first charge: "to provide for conserving, preserving, protecting, recharging and preventing waste of the underground water." From its very inception, the District has been dedicated to "conservation through public education . . ." This issue is specially dedicated to informing our readers in very specific terms about what's going on at the Water Distrtict and who are the people behind its programs and activities.

ABOUT THE CHAIN OF COMMAND

Creation and Structure

The boundary of Subdivision No. 1 of the Underground Water Reservoir in the Ogallala Formation was delineated by the Texas State Board of Water Engineers (now Texas Department of Water Resources) in August 1950, and ratified by popular vote of the residents of all or parts of 13 southern High Plains counties on September 29, 1951, in accordance with the Underground Water Conservation Districts Act passed by the Texas Legislature in 1949 (codified as Chapter 52, Vernon's Civil Statutes of Texas).

Parts of two more counties (Hale and Crosby counties) were added to the District by popular election in May 1967, and April 1969, respectively. The District now consists of all or parts of 15 southern High Plains counties in Texas, containing 8,149 square miles or 5,214,600 acres.

The District is governed by a five-member Board of Directors—one Director from each of the District's five Director's precincts, elected for staggering two-year terms. In its 28-year history, the District has been governed by 36 Directors.

The Board of Directors are the executive officers of the District. They are empowered to promulgate rules and regulations for its management, to hear any application for exception to such rules and regulations, employ a manager, approve or reject all applications for well drilling permits, set the ad valorem tax rate and pass on the spending of all of the District's income, to approve all major studies, and pass on all matters involving long term District policies.

District Staff

As the Board sets policy, it also gives overall direction to the District General Manager who is charged with implementing those directives in programs and projects.

A. Wayne Wyatt General Manager, directs the overall activities of the District.

All of the work programs of the District, as directed by the Board of Directors and as specified by law, are performed by the District's Lubbock office staff (except for well permitting and other specific functions being performed by the Directors, Committeemen or county secretaries). The District office structure has recently been reorganized into six divisions under Technical, Agricultural, Field Support, Technical Support, Permit and Information chiefs.

The District's staff currently consists of 15 full-time, salaried employees; however, because of the many programs and limited income of the District, staff members are not confined to rigid specializations. Most of the staff are able to perform many varied tasks ranging from speaking to elementary school classes to writing detailed engineering reports.

County Committeemen and Their Secretaries

The District's by-laws also provide for the election of 75 County Committeeman—five Committeemen from each of the 15 counties, or parts of counties, in the District.

County Committeemen are elected for four year terms, three Committeemen being elected one year at the election held for the Member to the Board for that county within the Director's Precinct, and two being elected at the next election held two years later in that county.

The duties of County Committeemen are outlined in the District's rules and regulations, which state in part: "It shall be the duty of the County Committee to recommend to the Board the granting or refusal of applications for permits to drill wells." Committeemen also act as advisors to the Board on matters of concern and interest in their counties.

Ten individual county secretaries, and two assistant county secretaries receive applications for well permits in Bailey, Castro, Cochran, Deaf Smith, Floyd, Hale, Hockley, Lamb, Parmer and Randall Counties.

The County Committeemen in Armstrong and Potter Counties receive their well applications and Mr. Clifford Thompson, a member of the District's staff, receives well applications in Lubbock for Crosby, Lubbock and Lynn Counties.

The name and addresses of Committeemen, Secretaries and their offices are listed on page 2 of almost every issue of *The Cross Section*.

continued on page 4 . . . WHAT'S GOING ON AT THE DISTRICT

1979 BOARD OF DIRECTORS are from left, seated, James P. Mitchell, President; A. W. Gober; and from left, standing, Selmer H. Schoenrock; Malvin A. Jarboe, Vice President; and Jim Conkwright, Secretary-Treasurer.

BOARD VETERAN RETIRES

With a tinge of sadness, the Board of Directors of the High Plains Underground Water Conservation District extend a heartfelt thanks to Selmer H. Schoenrock of Levelland who leaves the Board this January after ten years of service. Selmer has served as a Director since 1970. Prior to his tenure on the Board he served as a Hockley County Committeeman from 1963 until 1969.

A native of Clifton, Texas, Selmer moved with his family to the Levelland area in 1934. He graduated from Levelland High School in 1941 and returned from the U.S. Navy in 1946 to establish himself in farming.

The Hockley County farmer and his wife, Maurine, have been married and farmed in the Levelland area for 33 years. The Schoenrocks have three children and three grandchildren.

Selmer and Maurine farm nearly 2200 acres of cotton and maize. In all he operates seven farms, four northeast of Levelland, two east of Whitharral, and one west of Fairview.

At the height of the drought in 1956, he drilled his first irrigation well, "that had any water in it," smirks Selmer. Today he has 23 wells in operation. Selmer noted that as a result of the gradual decline of the water table throughout the High Plains area, his best well today pumps less than one-half as much as did his original well.

Selmer has both observed and experienced the changes and hardships forced upon the irrigator by a waning groundwater supply. This experience, combined with his "horse sense" and a progressive interest in solving groundwater problems has made him a valuable asset to the Board.

"I've enjoyed serving and meeting and working with the various people on the Board," Selmer nodded. "But it's a good experience to pass around. I'll miss it."

The Board, the staff and friends of the High Plains Water District want him to know he will be missed.

About The Programs And Services

Geohydrological Mapping Program

The Water District is currently constructing a set of detailed geohydrological maps which will illustrate: a) The elevation of the land surface; b) the elevation of the water table; c) the elevation of the base of the Ogallala Formation; and d) the feet of saturation of the Ogallala Formation for each county or portion of county served by the Water District.

C. Don (Mac) McReynolds
Chief—Technical Division, Geologist, supervises overall work program of technical support division; supervises Ogallala Aquifer study program as required by TDWR contract; mapping required for cost-in-water depletion program; provides responses for water information to public.

These maps, when completed, will be published and distributed in each respective county in the Water District's service area. They should provide local landowners/operators and other users with a tool by which they can determine the most favorable locations on any tract of land in the District for drilling new wells. Data such as the depth below land surface drillers will need to drill to reach the base of the aquifer and the depth below land surface to the water table are very important factors when considering drilling a well. Probably more important is an accurate appraisal of the quantity of water they have in storage.

The current time table for completing and publishing the maps for public distribution is November 1980. Approximately two-thirds of the cost for constructing these maps is being paid by the Texas Department of Water Resources. Also as a part of this work effort, all wells used for control are being tabulated on data sheets which we call a "Record of Wells." These data sheets contain the following information for each well; a) state well number, b) Water District permit number, c) location of each well as to its latitude and longitude, d) owner, e) driller, f) date completed, g) elevation of land surface at well, h) elevation of base of Ogallala Formation at well, i) water level in well, j) date of measurement, k) pump size, l) type of power used, m) use of water (irrigation, municipal, industrial), and n) comments.

Keith Whitworth
Draftsman, drafts for publication geohydrological maps developed by technical staff.

Cost-in-Water Income Tax Depletion Service

The Water District supplies change in water level data to approximately 6,000 landowners in the Water District's service area annually to support their claims for a cost-in-water income tax depletion allowance for water used in the business of irrigation farming.

Kathy Redeker
Executive Secretary, supervises all secretarial activities; coordinates cost-in-water income tax depletion parcel claim program.

To establish the original claim, the landowner must provide the IRS with factual data to establish his cost in the water at the date of purchase, the feet of saturated thickness under the tract at the date of purchase and for each year the claim is made, the change in the water level. Studies necessary to document all of these facts are made by the Water District and prior to providing these data to the landowner, the data are examined and approved for use each year by Internal Revenue Service Engineers.

Natural Recharge/Irrigation Recirculation Studies

The Water District is cooperating in a study with the Texas Department of Water Resources to obtain a more accurate estimate of natural recharge to the Ogallala Aquifer as well as to determine the amount of irrigation water being recirculated to the aquifer. The study has been in progress since about February 1, 1979. Weekly readings are being made by the Water District staff in specially constructed wells with a neutron moisture probe in 20 holes at ten sites located throughout the District.

Dwight Adams
Agricultural Economist, develops reports on economics of water conservation techniques; operates neutron logger.

Recent studies have indicated that natural recharge to the aquifer may be much greater than the 1/10 of one inch annually made by geologists/hydrologists who studied the aquifer in the 1930's and 1940's.

This is a one year study scheduled to end on or about February 1, 1980. Interpretations of the data collected during the study are to be made by the Texas Department of Water Resources and should be completed during 1980. Approximately two-thirds of the cost of this study is being paid for by the Texas Department of Water Resources.

Irrigation Efficiency Tests—Field Water Conservation Laboratories

The Water District worked with the Soil Conservation Service during 1979 by conducting a series of water conservation workshops and field demonstrations throughout the Water District's service area. The workshops were conducted to teach Water District-Soil Conservation Service staffs how to conduct irrigation efficiency studies, properly interpret the results of the studies and make proper recommendations to the irrigator on how he might improve irrigation efficiency on his farm.

Training included identificaton of soil types, measurements of the water holding capacity of a soil, determining the quantity of water in the soil, and calculating the quantity of water that needs to be applied by irrigation to bring the soil to field capacity in the root zone.

Other training included transportation and distribution of water on the farm. In essence, a measurement is made of the quantity of water delivered at the well and the losses, if any, through open ditches, leaky pipeline, etc., from the well to the point of discharge on the farm.

The next phase of the workshops involved training sessions to teach moisture extraction patterns of various crops and how to calculate the amount of time the soil reservoir can supply the crop with needed water. This information coupled with available water supplies, provides the irrigators with the data that he needs to begin irrigation and knowledge of the quantity of water he needs to apply.

Kenneth Carver
Chief—Agricultural Division, coordinates programs between District and other public agencies (SCS, TAES, etc.) to avoid duplication of effort; assists permit division by checking locations of permit applications against existing wells to avoid spacing violations; operates neutron logger.

Also included in the training sessions was testing the efficiency of the irrigation application. Measurements are made of the quantity of water being applied, the amount of water which percolates below the root zone, the amount of water loss at the end of the field in the form of irrigation tailwater, and/or the area of the root zone in the field which is not adequately filled to field capacity due to inefficient application. Loss due to evaporation in the furrow is estimated and/or measured. Once a determination is made in regard to the efficiency of the application, a recommendation can be made on how the irrigation efficiency can be improved.

Another phase of the workshops included the evaluation of various types of sprinkler systems with the principal objective being to determine their

THE CROSS SECTION (USPS 564-920)

evaporation loss and to check the distribution pattern.

The above described phases are not all inclusive and do not fully detail each individual phase of the training sessions, but hopefully will be adequate to give an idea of what is involved. Ultimately, when Water District personnel and the SCS's personnel are fully trained, they can work with a very large number of irrigators each year to achieve better water management throughout the area.

Three "Field Water Conservation Laboratories" have been purchased by the Water District. These laboratories contain all the necessary tools to conduct the irrigation efficiency tests described above (one of the three laboratories was purchased and equipped as a joint project with the North Plains Underground Water Conservation District and the Panhandle Underground Water Conservation District). One of the laboratories will be headquartered in Lubbock, one in Muleshoe and one in Amarillo.

Obbie Goolsby
Chief—Permit Support Team, checks validity of well permits; validates wells; coordinates open hole capping program; coordinates tailwater abatement program; measures water levels; collects water samples for chemical analysis; field inventories wells; assigns decline values to cost-in-water parcel claims.

Unused/Open Large Diameter Wells

During the past two years the Water District has accelerated its effort to locate and get improperly covered and/or uncapped large diameter wells closed. The purpose of this program is to render the wells safe to human and animal life as well as protect the underground water supply from contamination. A total of 530 open holes have been field located and notices mailed to landowners. Water District staff have revisited 355 of the wells and found 327 have been properly closed. The remaining 175 wells will be revisited as time permits. The 28 landowners who did not respond to the original contact will be recontacted.

Well Inventory

A complete field inventory of all irrigation, municipal, and industrial wells in the Water District has been recently completed and will be updated to current status each year. The base maps on which the wells are located are 7½ minute U. S. Geological Survey topographic maps.

The Water District has numerous uses for these data. One use of the data is the plotting of all new well permit locations on the completed well location map to make sure the new well permit has not been issued at a location in spacing violation to a previously filed permit or existing well(s).

Ruby Maritt
Clerk-Typist, compiles tabular data from well logs, maps, etc.; types compiled data onto "Records of Wells" forms and well schedules for TDWR contract; key punches water level measurements; general typing.

Norma Fite
Accounting-Bookkeeper, Librarian, maintains financial and other necessary records for the District; assists with election of officers, prepares legal notice, ballot; assists in audit of County Secretary permit deposit books and funds.

Well Permit and Log Files

The Water District issues a permit for each well which is to be drilled in the District that is expected to produce in excess of 69.4 gallons per minute. In addition to the issuance of permits for the wells, the Water District requires that a driller's log be filed for each well drilled under permit.

Clifford Thompson
Chief—Permit Division, generally responsible for all District's well permitting activities; conducts elections; maintains communication with County Committeemen and County Secretaries; conducts audit of their permit deposit books and funds.

These well permits and logs are considered to be open file information and are available for public inspection and use. The file now (1979) contains approximately 44,000 permits and logs.

Water Level Observation Network

A network of more than 900 privately owned wells in the Water District's service area are measured annually by Water District staff. Water levels obtained from these wells are used to keep an accurate inventory of the groundwater reserves, to support landowners' claims for cost-in-water income tax depletion allowances, for constructing geohydrologic maps, etc.

Dan Seale
Engineer Technician, oversees water level observation program; measures water levels in wells; collects water samples for chemical analysis; field inventories wells; validates wells.

The network of water level observation wells is being upgraded and in some counties expanded to provide increased accuracy for predicting depths to water and change in water levels in some localized areas.

Pennye Newberry
Clerk-Typist, compiles tabular data from well logs, maps, etc.; types compiled data onto "Records of Wells" forms and well schedules for TDWR contract; key punches water level measurements; general typing.

Water Assessment Studies

The Water District makes assessments of the ground water reserves under corporate limits and/or ground water rights areas of small towns in the Water District's service area. The studies evaluate the adequacy of these reserves to satisfy the towns future water needs by requests of city councils. Recent studies completed include: a) Shallowater, July 1978; b) Idalou, September 1978; c) Wolfforth, October 1978; d) Bovina, October 1978; e) Anton, November 1978; f) Wilson, November 1978; g) Farwell, April 1979; h) Texas Boys Ranch, April 1979; i) Floydada, May 1979; j) Canyon, May 1979, and; k) Abernathy, May 1979.

Education and Information Program

The Water District's Board of Directors has directed the Manager to develop a comprehensive public education program on water and the need for water conservation.

Present plans include the development of an adventure story book for grades kindergarten through third. The story characters are two water drops which have lived in the Ogallala Aquifer for hundreds of years. They were playing near a well one day and were pumped from the aquifer into a city water system. They are separated and the events which they experience in the story describe the hydrologic cycle. The story has a happy ending as the two drops manage to finally get back together.

For grades three through five, a film strip is being developed using as its central character "Hydro-Hound." Hydro-Hound is a detective type character with many disguises. He wears a trench coat and can change from a beagle to a bird dog with ease. He sniffs out water wasters and offers good water conservation advice.

Patricia Bruno
Chief—Information Division, edits the District's monthly publication "The Cross Section"; makes public presentations to service clubs, schools, etc.; edits and distributes news releases and special news letters.

For grades four through seven, the Water District has an educational comic book, "Chief Running Water's Story of High Plains Water." This book was written in the 1950's, therefore, the language will be updated before the booklet is republished and distributed again.

For grades eight through nine, the Water District has recently completed a supplementary textbook and teacher's guide for use with the Earth Science classes. The book, "An Introduction To Water and Water Conservation With Emphasis on the High Plains of Texas" will be distributed to schools within the Water District's service area shortly after the first of the year.

The Water District, in cooperation with the Texas Department of Water Resources, completed a report suitable for use by vocational agricultural classes during this past year. The report is titled, "A Summary of Techniques and Management Practices for Profitable Water Conservation on the Texas High Plains."

For the Future Homemakers of America, a slide presentation with a sound track is being developed. The audio-tape presentation illustrates and describes many ideas and methods for achieving water conservation in and around the home.

D. D. (Don) Smith
Assistant Manager, Geologist, provides responses for water information to public; city water assessment studies; geohydrological mapping for TDWR contract; mapping required for cost-in-water depletion program.

Comments, suggestions, and additional ideas will be welcomed.

Tony Schertz
Chief—Technical Support Division, drafts for publication geohydrological maps developed by technical staff; prepares artwork for "The Cross Section" and technical reports.

Water Quality Monitoring

A ground water quality monitoring network has been established by the Water District in cooperation with the Texas Department of Water Resources. The network was originally established to determine the native quality of the water in the aquifer and to determine variations in quality throughout the aquifer system. The same wells originally sampled are resampled at three to five year intervals to detect any significant changes in the aquifer's water quality which might be occurring as a result of man's activities. The network of 30 to 50 privately owned wells per county are scheduled to be resampled during calendar year 1980. In the cooperative arrangement between the two agencies, the Water District staff will collect the water samples from the wells and the Texas Department of Water Resources will pay for having the chemical analyses made of water samples.

Charmone Bednarz
Secretary, types and handles other general secretarial duties, assists with assigning decline values for cost-in-water income tax depletion claims.

Bacteriological Analysis

In years past, people have brought jars and bottles of water into the District office requesting that their contents be tested. We have also received numerous phone inquiries concerning a sudden bad taste or smell in domestic water supplies. These and similar incidents developed a concern on our part, and it was felt a program was needed for detection of cesspool, rodent, and feedlot contamination in water wells used for human consumption within the Water District's service area.

The Water District has acquired equipment for bacteriological analysis of water to determine the absence or presence of fecal coliform bacteria. Since this domestic water quality sampling program began, staff members have sampled wells in every county within the District on request, and performed 45 localized bacteriological surveys in the communities of Wilson and New Home located in Lynn County, and Ropesville and Smyer in Hockley County. The staff will ultimately cover the entire District on a community by community basis while at the same time answering inquiries where a suspicious condition may exist.

Butch Bates
Chief—Field Support Team, supervises day-to-day activities of field support team; measures water levels in District's observation network; collects water samples for water quality and bacteriological sampling program; field inventories wells.

WHAT'S GOING ON AT THE DISTRICT . . . continued from page 1

Powers of the District

The powers and functions of the District were specified by Article 7880-3c, Vernon's Civil Statutes, and again in Chapter 52 of the State's Water Code. This is both a general and specific law, giving broad powers to districts so created. Under this broad power the District has engaged in numerous activities, directly, and indirectly related to groundwater conservation. However, the law specifically directs districts to:

1) ". . . make and enforce rules to provide for conserving, preserving, protecting, recharging, and preventing waste of the underground water . . ."
2) ". . . employ registered professional engineers to make surveys of the underground water reservoir or subdivision and surveys of the facilities for development, production, and use of the water . . ."
3) ". . . develop comprehensive plans for the most efficient use of the underground water . . ."
4) ". . . carry out research projects, develop information, and determine limitations which should be made on withdrawing underground water . . ."
5) ". . . collect information regarding the use of underground water and the practicability of recharging the reservoir . . ."
6) ". . . publish its plans and the information it develops . . ."
7) ". . . acquire land to erect dams or to drain lakes, draws, and depressions; construct dams; drain lakes, depressions, draws and creeks; and install pumps and other equipment necessary to recharge the underground water reservoir . . ."
8) ". . . require that records be kept and reports be made of the drilling, equipping, and completing of water wells and of the production and use of underground water . . ."
9) ". . . require permits for the drilling, equipping, or completing of wells, or for substantially altering the size of wells or well pumps . . ."
10) ". . . require that accurate drillers' logs be kept of water wells, and that copies of drillers' logs and electric logs be filed with the district . . ."
11) ". . . provide for the spacing of water wells and may regulate the production of wells . . ."
12) ". . . enforce its rules by injunction, mandatory injunction, or other appropriate remedy in a court of competent jurisdiction."

The broad and specific powers given to groundwater conservation districts under this law first appear to infringe upon the individuals rights in his private property, and such could be the case if it were not for the very democratic structuring of such districts—as provided by law, and as developed and administered by the several districts, past and present, executive officers (Board of Directors). The District has more elected offices than any state in the nation (excluding the state legislatures).

REPORTS OFFER WATER AND MONEY SAVINGS

The District has published three major studies recently to reach the irrigator and offer him some practical information on field water conservation. The first, "An Analysis of Irrigation Ditch Losses," documents the stustantial volume of water which may be lost each year in open ditch irrigation, through both decreased efficiency and higher irrigation costs. It is the first study to statistically analyze these findings.

The study also examines the economic feasibility of replacing open irrigation ditches with various closed piping and shows how replacement systems can be justified by potential savings.

The second agricultural report is a comprehensive "Summary of Techniques and Management Practices for Profitable Water Conservation on the Texas High Plains." This report examines rainfall and moisture utilization, irrigation systems and their efficiencies, tillage practices, and a variety of management techniques for improving water use efficiency.

The third report is a "Guide to Irrigation Tailwater Recovery" which outlines the recommended plans and procedures to be followed in designing a tailwater return system. The study further discussed the planning, engineering and construction phases of pit and playa basin modifications, maintenance procedures and the costs and benefits of a tailwater return system. This is not to imply that tailwater waste is a necessary part of irrigation farming, but simply to offer some solutions and alternatives to the problem if it exists. The District has received a substantial number of requests this year for these publications.

NEW DIRECTOR DUE

The annual election for the High Plains Underground Water Conservation District No. 1 will be held on January 19, 1980, to elect three members of the Board of Directors and 24 County Committeemen.

The election will be held only in those counties (or portions thereof) comprising Director's Precincts One, Two and Five. The counties involved are: Crosby, Lubbock, Lynn, Cochran, Floyd, Hale, Hockley and Lamb.

Directors are being elected to serve two year terms and County Committeemen will serve four years. To be qualified to vote in the District's election a person must have a valid voter registration certificate and reside within the boundaries of the District and within the county where a vote will be taken.

In voting for a District Director, the qualified voter should cast a ballot only for the candidate for the Director's Precinct in which that voter lives and likewise each qualified voter will be allowed to vote only for the County Committeemen who are candidates from the County Commissioner's Precinct, County Committeemen's Precinct or County Committeeman - at - large from such voter's county.

The Order for Election was approved by the Board of Directors of the Water District at their December 18, regular meeting.

Nominees for each position being filled are:

FOR DISTRICT DIRECTOR:

James P. Mitchell, Precinct No. 1: Crosby, Lubbock and Lynn Counties

Mack Hicks, Precinct No. 2: Cochran, Hockley and Lamb Counties

Malvin A. Jarboe, Precinct No. 5: Floyd and Hale Counties.

FOR COUNTY COMMITTEEMEN-AT-LARGE:

Elect three in Crosby County: Tommy McCallister, Edward S. Smith, Pat Yoakum

Elect one in Floyd County: C. O. Lyles

Elect three in Hale County: Harold W. Newton, Jim Byrd, Ray Potter

Elect one in Hockley County: Robert Phillips

Elect one in Lamb County: Larry Lockwood

Elect one in Lynn County: Leland Zant.

FOR COUNTY COMMITTEEMEN FROM COUNTY COMMISSIONERS PRECINCTS:

Candidates for County Committeemen from the various County Commissioners' Precincts situated within District Director's Precincts One, Two and Five are as follows:

In Floyd County: in Commissioner's Precinct No. 1, elect one Committeeman—Cecil Jackson; in Commissioner's Precinct No. 3, elect one Committeeman—D. R. Sanders.

In Hockley County: in Commissioner's Precinct No. 1, elect one Committeeman—Leon Young; in Commissioner's Precinct No. 2, elect one Committeeman—W. C. McKee.

In Lamb County: in Commissioner's Precinct No. 2, elect one Committeeman—P. A. Washington; in Commissioner's Precinct No. 3, elect one Committeeman—Jack Stubblefield.

In Lubbock County: in Commissioner's Precinct No. 1, elect one Committeeman — Don Bell; in Commissioner's Precinct No. 2, elect one Committeeman—Ronald C. Schilling; in Commissioner's Precinct No. 4, elect one Committeeman—Granville Igo.

In Lynn County: in Commissioner's Precinct No. 1, elect one Committeeman—David R. Wied: in Commissioner's Precinct No. 4, elect one Committeeman—Wendell Morrow.

FOR COUNTY COMMITTEEMEN FROM COUNTY COMMITTEEMEN'S PRECINCTS:

In Cochran County: in County Committeeman's Precinct West of State Highway 214, elect two Committeemen —Donnie B. Simpson, Richard Greer; in County Committeeman's Precinct East of State Highway 214, elect one Committeeman—Hershel M. Tanner.

THE CROSS SECTION (USPS 564-920)
HIGH PLAINS UNDERGROUND WATER
CONSERVATION DISTRICT NO. 1
2930 AVENUE Q
LUBBOCK, TEXAS 79405

SECOND CLASS PERMIT