

TEXAS WATER DEVELOPMENT BOARD

REPORT 198

WATER-LEVEL AND WATER-QUALITY
DATA FROM OBSERVATION WELLS IN
NORTHEAST TEXAS

By

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and

Staff of the Water Levels

and Ground Water Quality Monitoring Sections

February 1976

TEXAS WATER DEVELOPMENT BOARD

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WATER-LEVEL AND WATER-QUALITY DATA FROM OBSERVATION WELLS IN NORTHEAST TEXAS

INTRODUCTION

Purpose and Scope

This report presents basic quantitative and qualitative information concerning ground water which has been collected by the Texas Water Development Board and the U.S. Geological Survey from observation wells in a 20-county area in northeast Texas. The tabulations include current and historical water-level measurements, chemical analyses of the ground water, summaries of ground-water quality by aquifers, and reported amounts of ground water pumped for industrial and municipal purposes. Some of the earlier water-level measurements and water-quality data were collected in cooperation with the U.S. Geological Survey, while the later information was collected from wells in the water level and ground-water quality monitoring networks maintained by the Board in this area. The earlier network was expanded when rapid water-level declines, specifically in Dallas and Tarrant Counties, occurred during the late 1950's and continued into the 1960's. These declines were particularly noticeable in wells developed in the Twin Mountains (Fisher and Rodda, 1966) or Travis Peak Formation.

The report contains introductory material, including a section defining many of the terms appearing in the report; a section on the general geology of the report area as it relates to ground water; tables of basic data; and illustrations portraying conditions reflected by the information in the tables.

Much information dealing with ground water in this area has been published previously by the Board, its predecessor agencies, and the Board in cooperation with the U.S. Geological Survey. Most of those publications are listed in the selected references and are available for examination in the Board's water-resources library.

Location and Extent of the Area

The report area, shown on the following map, covers approximately 16,270 square miles. It includes all of 20 counties located in north-central and northeast Texas between latitude 31°47' and 33°58'N and longitude 94°44' and 98°04'W. This 20-county area had a 1970 population of 2,657,091 inhabitants with slightly over 75 percent of that population concentrated in Dallas (1,327,321) and Tarrant (716,317) Counties.

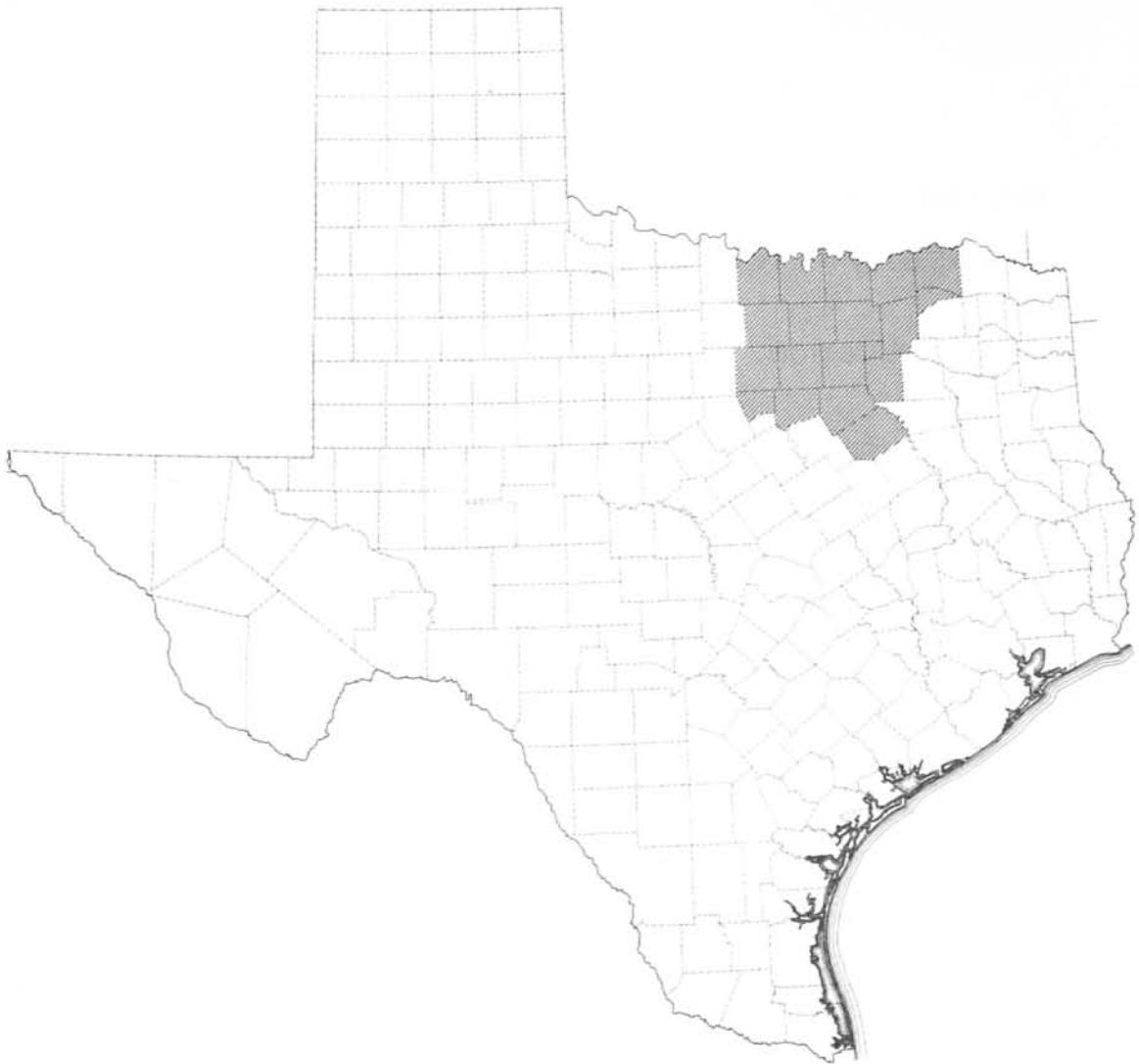
Personnel

The water-level observation network and the ground water quality monitoring network are the responsibility of personnel in the Ground Water Data and Protection Division, under the general direction of C. R. Baskin, Principal Engineer—Data and Technical Review, and Fred L. Osborne, Jr., director, Ground Water Data and Protection Division. This report was prepared under the supervision of A. Wayne Wyatt, assistant director of the Division, Howard D. Taylor, chief, Water Levels Section. The tabulations of water-level and water-quality data were prepared by the Board's Information Systems and Services Division which is under the direction of David L. Ferguson.

Members of the Water Levels and Ground Water Quality Monitoring Sections who assisted in compiling data for this report are: Dan Corley, Charles Cornelis, Hershel Davidson, John Derton, Stephen Moore, Herbert Spradlin, and Clayton Thornhill.

Acknowledgements

Special appreciation is expressed to the many individuals, private firms, towns, and cities for their concern and cooperation in allowing their wells in the report area to be measured and water samples taken for



Area Covered by This Report

analysis. The cooperation shown by the cities of Dallas, Hurst, and Waxahachie in allowing automatic water-level recorders to be installed on city-owned wells is gratefully acknowledged.

Definitions of Terms

Definitions, or brief explanations, of some of the terms used in this report are included in the hope that they will make the data herein more beneficial to the reader. All definitions originated with recognized authorities in the fields of hydrology and geology.

Acre-foot.—The volume of water required to cover one acre to a depth of one foot (43,560 cubic feet, or 325,851 gallons).

Alluvial deposits.—Sediments deposited by rivers and streams, including flood-plain and stream-terrace deposits.

Aquifer.—A water-bearing unit of rock, consolidated or otherwise, which is sufficiently permeable to yield water to wells readily.

Artesian or confined aquifer.—An aquifer which is overlain by rock of lower permeability (for example, clay) that confines the water under pressure greater than atmospheric. The water level in an artesian well will rise above the top of the aquifer and may or may not flow.

Contact.—The plane or surface where two different kinds of rock or geologic units come together; shown as lines, broken or solid, on geologic maps and cross-sections.

Dip of rocks or attitude of beds.—The angle or amount of slope at which a bed is inclined from the horizontal; direction is also usually expressed (for example, one degree, west; or 90 feet per mile, west).

Discharge.—Refers to water withdrawn, either naturally or artificially, from the zone of saturation (see definition of ground water).

Dissolved solids.—A measure of the total concentration of dissolved material in water. Widely used in evaluating water quality and comparing waters with one another.

Fault.—A fracture or fracture zone in rock along which there has been movement or displacement of the two sides relative to one another parallel to the fracture.

Formation.—A body of rock that is sufficiently homogeneous or distinctive over fairly large areal distances to be regarded as a mappable unit, generally named from a locality where the formation is typical (for example, Hosston Formation and Woodbine Formation).

Ground water.—Refers to water in that area below the land surface in which all the pore spaces and voids are filled with water (called the zone of saturation) and from which wells, springs, and seeps are supplied.

Hydrograph.—A graph or line plot showing the fluctuation of the water level in a well over a period of time.

pH.—A measure indicating the acidity or alkalinity of water. A pH of 7.0 indicates neutrality, values below 7.0 indicate increasing acidity, and values above 7.0 indicate increasing alkalinity. Other measures are expressed in terms of "phenolphthalein alkalinity," "methyl-orange alkalinity," or its equivalent "total alkalinity."

Marl.—A calcareous (limy) clay.

Measuring point (MP).—A fixed point at a well from which each water-level measurement in that particular well is calculated.

Milligrams per liter (mg/l).—Metric units commonly used in chemical analyses of water to indicate a ratio of dissolved substances, by weight, in a unit volume of water. To illustrate in more common terms, 0.000035 of an ounce of a dissolved substance in 1.05 quarts of water is equivalent to 1 milligram of a dissolved substance in 1 liter of water. For water containing less than 7,000 mg/l dissolved solids, 1 milligram per liter is equivalent to 1 part per million.

Observation well, current.—A well from which the Texas Water Development Board is presently collecting and maintaining records either on water-level or water-quality data or both.

Observation well, historical.—A well from which the Texas Water Development Board formerly collected and maintained records either on water-level or water-quality data or both.

Outcrop.—That part of a rock layer which appears at the land surface. On an areal geologic map, a geological formation or other stratigraphic unit is shown as an area of outcrop where exposed and some times where covered by alluvial deposits (when shown, the contacts below the alluvial deposits are illustrated by dashed or dotted lines).

Percent sodium.—A determined value which was previously used to predict the suitability of water for irrigation use. A high value (exceeding 50 percent) found in the water was taken as an indication that, with its repeated use for irrigation, the tilth and permeability of the soil would be adversely affected by the development of excessive sodium in the soil. In 1954, the U.S. Salinity Laboratory proposed replacement of the sodium percentage concept with another determined value called the sodium-adsorption ratio (SAR).

Potentiometric surface.—An imaginary surface which everywhere agrees with the static level in an aquifer and to which water in the aquifer will rise under its full head.

Recharge of ground water.—The process by which water is added to the zone of saturation (see definition of ground water); when used to designate the quantity added, usually expressed in acre-feet per year or in million gallons per day.

Residual sodium carbonate (RSC).—A value used in predicting the suitability of water for irrigation. It indicates the concentration of sodium carbonate in waters after removal of all calcium and magnesium ions by precipitation as carbonates, indicates the effects the waters will have on the soil structure.

Sodium-adsorption ratio (SAR).—A determined value used to predict the suitability of water for irrigation use. Repeated use of water for irrigation which has high SAR values (18 or over) may adversely affect the tilth and permeability of a soil by development of excessive sodium in the soil.

Specific conductance.—A measure of the ability of a substance to conduct an electrical current, expressed in terms of micromhos per cubic centimeter. The addition

of a very small amount of dissolved minerals to chemically pure water renders the water conductive and, therefore, increases the specific conductance value. This value is often used in the field to give a quick indication of the mineralization of the water obtained from one well or aquifer as compared to that from another well or aquifer.

Stratigraphy.—Description of geologic units, such as formations, as to their composition, sequence, and correlation in an area.

Structure.—Description of the structural features of rocks in an area (for example, faulting and attitude of beds).

Total hardness as calcium carbonate (CaCO₃).—Generally this term indicates the calcium carbonate equivalent of the calcium and magnesium content of the water. Probably the most common significance associated with water hardness is its effect on soap—the “harder” the water the more soap is consumed before a lather will form. Hard water also forms scale on boilers, water heaters, and other plumbing fixtures.

Transpiration.—The process by which water, absorbed by plants for building plant tissue, escapes from the plant into the atmosphere.

Water level.—The depth below land surface (or distance above land surface if the well flows) to water in a well, usually measured in feet.

Water level, pumping.—The level at which water stands in a well when pumping of the well is in progress.

Water level, static.—The level at which water stands in a well when no water is being withdrawn from the aquifer.

Water table.—The upper surface of a saturated zone except where that surface is confined by a relatively impermeable body of rock.

Well-Numbering System

The systematic well numbering used in this report was developed by the Texas Water Development Board and is in use statewide. It was designed to identify, facilitate the location of, and avoid duplication of well numbers in present and future studies. The system is based on division of the State into 1-degree quadrangles of latitude and longitude and the repeated division of

these quadrangles into smaller ones as shown in the following diagram.

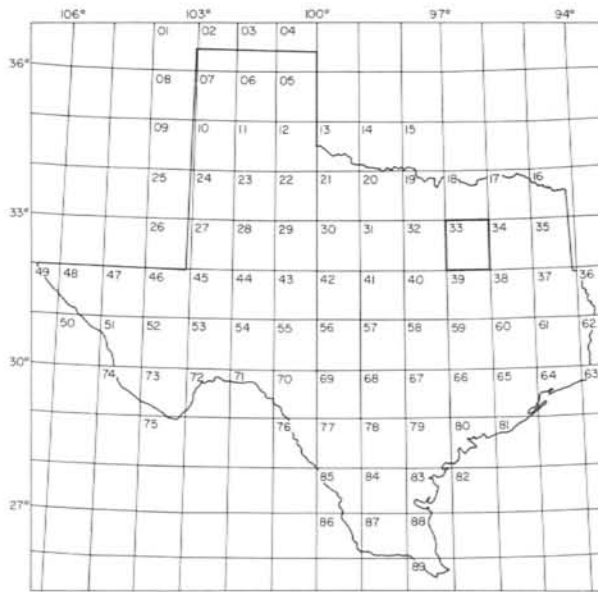
Each 1-degree quadrangle is subdivided into sixty-four 7½-minute quadrangles each of which is further subdivided into nine 2½-minute quadrangles. Each 1-degree quadrangle in the State has an assigned number. The 7½-minute quadrangles are numbered consecutively from left to right, beginning with quadrangle number 01 in the upper left-hand corner of the 1-degree quadrangle. The 2½-minute quadrangles within each 7½-minute quadrangle are numbered similarly. The wells are numbered consecutively, beginning with 01, within each 2½-minute quadrangle. The first two digits of a well number identify the 1-degree quadrangle; the third and fourth digits, the 7½-minute quadrangle; the fifth digit, the 2½-minute quadrangle; and the sixth and seventh digits identify the particular well in the 2½-minute quadrangle.

On the well-location maps in this report, the 1-degree quadrangles are identified with large open-block numbers. The 7½-minute quadrangles are numbered in the upper left-hand corner or as near to that position as possible in the cases where a part of the quadrangle falls outside the county. The three-digit numbers near the wells identify the 2½-minute quadrangle and the well within that quadrangle.

GENERAL GEOLOGY AS RELATED TO GROUND WATER

It is not the intent of this report to propose changes in geologic nomenclature or age relationships from those accepted and in use, but rather to relate ground-water data contained herein to the geology of this area in general terms. The nomenclature and stratigraphic relationships used are drawn mostly from sources listed in the references. The general geology of the land surface and the stratigraphic position of the rock units in the report area are shown on the accompanying map and geologic cross section.

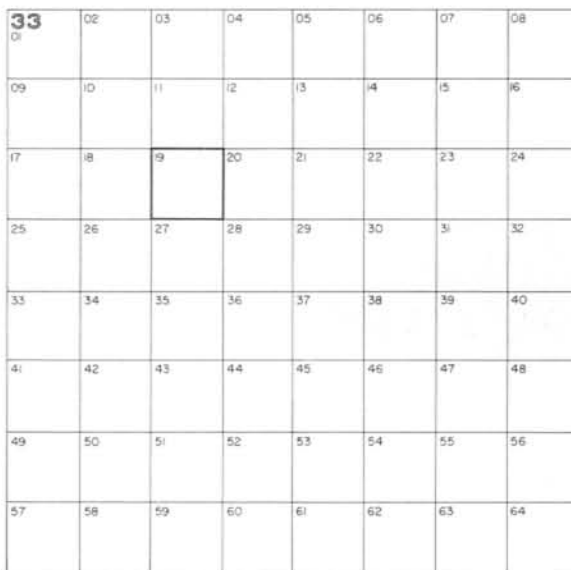
In the report area, potable ground water occurs in rocks ranging from the Pennsylvanian System through the Quaternary System. The principal aquifers are beds of the Cretaceous System which are exposed or are in the subsurface over all but the extreme western part of the area. Ground water is also found in Quaternary alluvial gravels, sands, and silty sands along the Brazos, Red, Sulphur, and Trinity Rivers and their main tributaries. Small amounts of ground water are contained in Pennsylvanian and Permian beds in or near their outcrop areas to the west, and also in rocks of



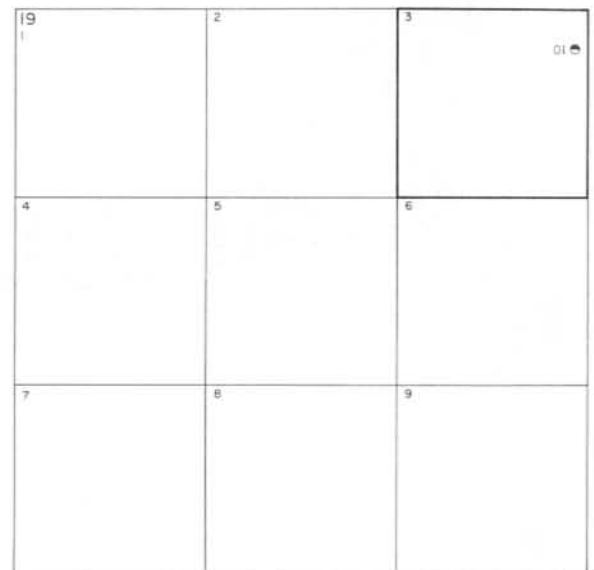
1 - degree Quadrangles

Location of Well

- 33** 1 - degree quadrangle
- 19 7 1/2 - minute quadrangle
- 3 2 1/2 - minute quadrangle
- 01 Well number within 2 1/2 - minute quadrangle



7 1/2 - minute Quadrangles



2 1/2 - minute Quadrangles

Well-Numbering System

Tertiary age which outcrop along the eastern edge of the area.

Stratigraphy and Water-Bearing Properties

The Pennsylvanian beds exposed in the report area are composed primarily of shales, sandstones, conglomerates, and some limestones. Ground water occurs primarily in the sandstones and conglomerates. The quality of the ground water is reported to vary within wide limits. These quality variations apparently are not related systematically to depth or location. The yields of wells are small but sufficient for domestic, livestock, and small public supply purposes.

The Permian rocks in Montague County are composed primarily of sandstones and shales. Although many wells are developed in these beds, they have small yields and are used mostly for livestock and domestic purposes. As in the case with the Pennsylvanian, Permian ground-water quality reportedly varies within wide limits with no apparent systematic relationship of the quality variations to depth or location.

Ground water occurs throughout beds of the Cretaceous System from the Trinity Group (oldest) in the western part of the report area to the Navarro Group (youngest) in the eastern part. The principal aquifers are in the Trinity Group of the lower Cretaceous and the Woodbine Group of the upper Cretaceous. The discussion of the geology will be confined almost entirely to these two groups, beginning with the oldest.

The Trinity Group forms the basal section of Cretaceous rocks in the area. It outcrops primarily in Hood, Parker, Wise, Montague, and western Cooke Counties. In ascending order, the Twin Mountains Formation, the Glen Rose Formation, and the Paluxy Formation are divisions of the Trinity outcrop in Hood, Parker, and southern Wise Counties. Northward from central Wise County, limestones of the Glen Rose, which delineate the sands of the overlying Paluxy from those of the underlying Twin Mountains in the area to the south, are absent. In this area a predominantly clay unit is partially equivalent to the Glen Rose and an upper sand unit is partially equivalent to the Paluxy. The lower sands (Twin Mountains) can be traced northward to the vicinity of the Red River. Convenient division of the Trinity into the three subdivisions found to the south cannot be done locally and is not apparent on the outcrop. The name Antlers Formation has been proposed to refer to all sand sequences below the Walnut Formation and above the base of the Cretaceous System (including all Trinity Group rocks) in the outcrop area of northern Wise, Montague, and western Cooke

Counties. The Trinity beds in this area are also known as the Western or upper Cross Timbers sands, Trinity sands undifferentiated, Trinity sands, and Antlers sands.

The Twin Mountains Formation consists chiefly of sands, silty clays, and siliceous conglomerates. It commonly goes by the name "lower Trinity sands" and also is referred to as the Travis Peak Formation by many in the area. However, it is a distinctly different facies from that of the Travis Peak found to the southwest of the report area along the northeast side of the Llano Uplift. In that area, the Travis Peak is primarily made up of conglomerates of pebble and cobble-size limestone and dolomite, calcareous sands and silts, and impure limestones. In the report area, a middle clay unit in the Twin Mountains facies is probably correlative with clay and limestone intervals of the subsurface basinal Pearsall and Sligo Formations found southeastward from the outcrop. Basinal sequences of Hensell and Hosston sands in the McClennan County area to the south are probably correlative with the upper and lower sand units in the Twin Mountains outcrop. The Twin Mountains contains large amounts of ground water throughout the report area, with larger yields coming from thicker sections downdip from the outcrop. Other than having a somewhat high dissolved-solids content, the quality of the ground water generally is suitable for most purposes.

The Glen Rose Formation is composed primarily of marly limestone, marl, shale, some sand, and anhydrite. It contains small amounts of ground water. However, the overlying Paluxy sands and those of the underlying Twin Mountains contain much more ground water of better quality, so that the Glen Rose is not significant as a water-bearing unit in this area.

The Paluxy Formation consists primarily of fine cross-bedded sands, shaly sands, and some sandy limestones. The Paluxy throughout its extent in the report area contains substantial amounts of ground water that is of suitable quality for most uses.

The following table sets out correlations of the Trinity Group and shows nomenclature and stratigraphic relationships in localities in central and northern Texas. The localities shown apply generally in the report area as follows: (1) "North-Central Texas subsurface, eastern part"—southeastern part of the report area, including Navarro, southern Ellis, and southern Kaufman Counties; (2) "North-Central Texas outcrop and subcrop"—central and southern parts, including Hood, Johnson, northern Ellis, Dallas, northern Kaufman, Rockwall, Tarrant, Parker, southern Wise, southern Denton, and Collin Counties; and (3) "North Texas (north of Decatur)"—northern part, including Montague, Cooke, Grayson, northern Wise, and northern Denton

Nomenclature and Stratigraphic Position of Trinity Group Rocks in Some Localities in Central and Northern Texas
 (Adapted from Fisher and Rodda, 1966)

GROUP	FORMATION NAMES AND LOCALITIES					
	NORTH-CENTRAL TEXAS SUBSURFACE, EASTERN PART	NORTH-CENTRAL TEXAS OUTCROP AND SUBCROP		CENTRAL TEXAS (NORTHEAST SIDE OF THE LLANO UPLIFT)	NORTH TEXAS (NORTH OF DECATUR)	
TRINITY	Glen Rose Formation	Paluxy Formation		Paluxy Formation	Antlers Formation	upper unit
		Glen Rose Formation		Glen Rose Formation		middle unit
	Hensell Formation	Twin Mountains Formation	upper unit	Travis Peak Formation		lower unit
	Pearsall Formation		middle unit			
	Sligo Limestone		lower unit			
	Hosston Formation					

Counties. The Central Texas locality is southwest of the report area and includes southern Brown, western Mills, and western Lampasas Counties.

In Trinity Group rocks, fresh to slightly saline ground water (3,000 mg/l or less total dissolved solids) is found as far downdip from the outcrop areas as Navarro, Kaufman, northern Hunt, northern Delta, southern Lamar, and middle Red River Counties.

The Woodbine Group outcrops primarily through eastern Johnson, Tarrant, Denton, and Cooke Counties as well as western and northern Grayson County and extreme northwestern Fannin County. It consists of crossbedded, ferruginous sand, sandy clay, and shale and contains lignite and gypsum in the upper part. The thicker sands are generally in the lower part and are lenticular in nature. In the Tarrant County area, the Woodbine is divided into the Lewisville and Dexter Members. In this area and southward into Johnson County, lignite and gypsum beds in the upper part of the Woodbine cause the ground water to be more highly mineralized than ground water in the lower part of the Woodbine. Northward from Tarrant County the Woodbine thickens and is not readily divided into recognizable units. Eastward from Grayson County the clay content increases and sands decrease so that the Woodbine ceases to be an aquifer in parts of Lamar and Red River Counties.

Ground water is present in the Woodbine in substantial quantities throughout most of the central part of the report area. Although typically high in iron content, the water is suitable for many purposes. Fresh to slightly saline ground water is found as far downdip from the outcrop as western Navarro, Kaufman, Hunt, and northwestern Lamar Counties.

Other Cretaceous System water-bearing units are the Blossum Sand of the Austin Group and the Nacatoch Sand of the Navarro Group. The Blossum Sand consists of unconsolidated, glauconitic, ferruginous, fine- to medium-grained sands interbedded with sandy and chalky marl. The outcrop forms the land surface eastward from central Fannin through central Lamar Counties. In Red River County, the Blossum is largely covered by alluvial terrace gravels. The Blossum Sand contains relatively small amounts of ground water that is generally of suitable quality for most uses except irrigation. The Nacatoch Sand forms a narrow outcrop through central Navarro, Kaufman, southeastern Hunt, southern Delta, and southern Red River Counties. It consists of unconsolidated, massive, glauconitic, calcareous sand and marl. The sands tend to be lenticular with the more persistent ones found in the upper part. The lower Nacatoch is predominantly marl in the eastern

outcrop area in Red River County; however, the proportion of marl decreases westward. The Nacatoch contains small amounts of ground water which tends to deteriorate in quality over fairly short distances downdip. The better quality water is suitable for most uses except irrigation.

The remaining Cretaceous System rocks are the Washita, Fredericksburg, Eagle Ford, Austin, Taylor, and Navarro Groups consisting of clays, marls, limestones, chalks, and shales which, in general, are not conducive to the capture or storage of ground water. The minor amounts of usable ground water in these formations are restricted to the outcrop areas.

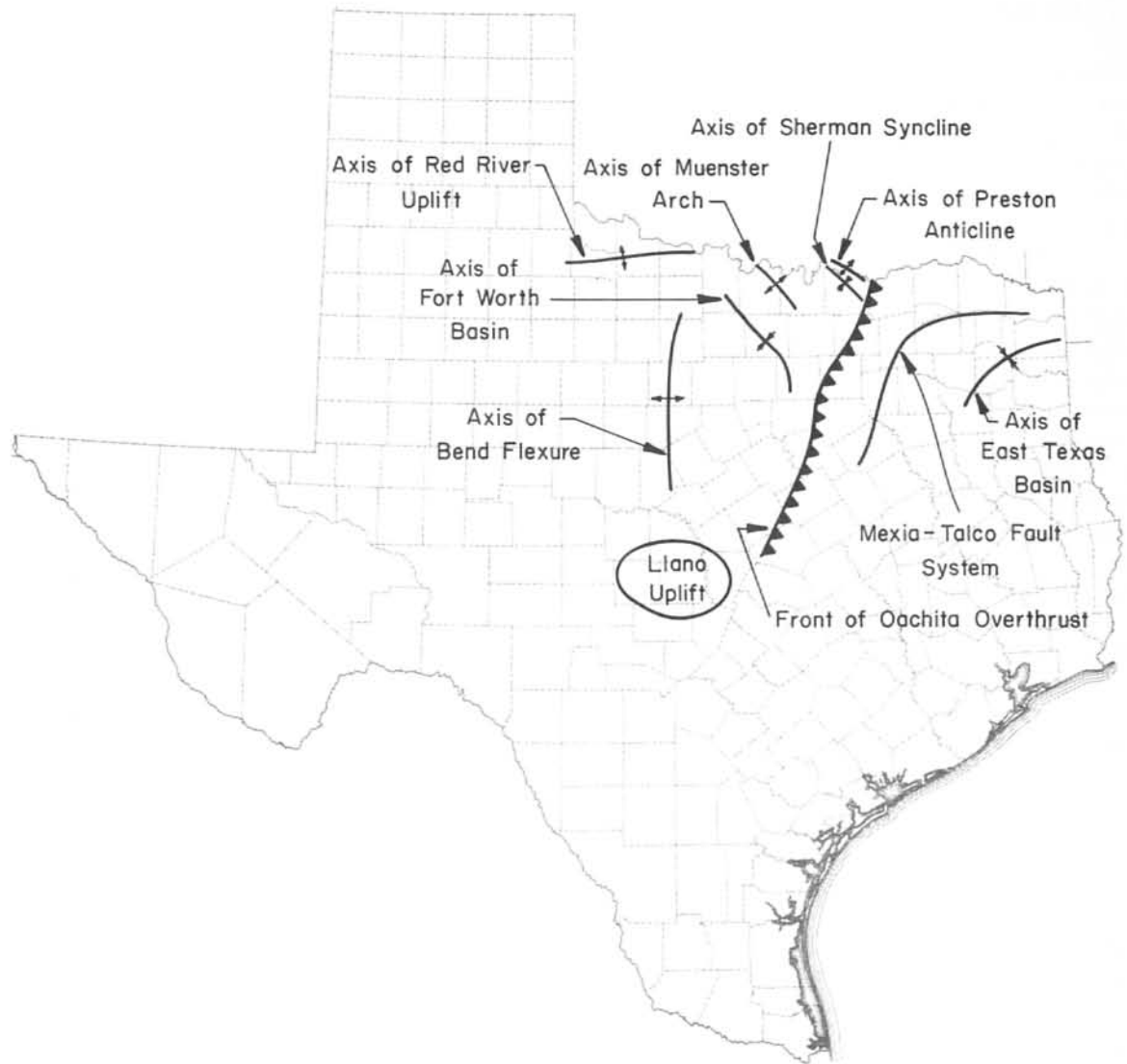
Rocks of the Tertiary System are located in the southeastern and extreme eastern parts of the report area. The Midway Group is composed primarily of silty clay, silt, calcareous and glauconitic sandstone, and sandy limestone. Occurrence of usable ground water in the Midway is erratic and restricted to the outcrop. The Wilcox Group consists of fine sand and silt and contains small amounts of ground water.

Quaternary System alluvial deposits, consisting of sand, clay, silt, and gravel, are found in the floodplains of the Brazos, Red, Sulphur, and Trinity Rivers and along their main tributaries. Quaternary deposits also occur as terraces adjacent to and at slightly higher elevations than the present floodplains of many of these drainage systems. The quantity of ground water in these deposits varies from fairly substantial amounts in areas with thick porous beds, high water levels, and favorable recharge conditions, such as along the Red River in Fannin, Lamar, and Red River Counties, to minor amounts where the beds are thin and conditions for recharge are poor. The quality of the water is generally satisfactory for most uses although it is usually hard and relatively high in silica.

Structure

Pennsylvanian and Permian rocks in the outcrop dip westward and northwestward at about 40 feet per mile. Permian beds in the report area probably extend not much farther eastward than Montague County. The Pennsylvanian sediments, which underlie the Cretaceous rocks in most of the remaining area, thicken from the outcrop eastward into the deeply buried Fort Worth basin.

The Cretaceous System forms a southeastward-thickening wedge extending across the area into a structural feature known as the East Texas basin. Thickness of these rocks ranges from zero in the



**Major Structural Features From the Llano Uplift
North and Northeastward to the Red River**

west to nearly 7,500 feet in the southeast. Regional dip is east and southeast at rates of about 15 to 40 feet per mile. The dip rate increases to as much as 300 feet per mile on the flank of a southeastward-plunging ridge called the Preston anticline. This anticline and an associated trough immediately to the south called the Sherman syncline have caused deflection in the regional outcrop pattern as shown on the geologic map.

Tertiary System beds dip regionally southeastward from the Mexia-Talco fault system, which extends in a northerly direction along the eastern margin of the report area, at a rate of about 100 feet per mile. Deviations from this dip rate occur locally due to faulting. These beds attain a thickness in excess of 1,000 feet in Navarro County.

Quaternary deposits occur along the floodplains of the Brazos, Red, Sulphur, and Trinity Rivers and many of their main tributaries. Terraces, which represent remnants of older floodplain deposits of these drainage systems, occur at higher elevations along some of the rivers, particularly the Red River. Alluvial deposits are reported to be as thick as 60 feet in Grayson County. Generally, the alluvial deposits are irregular in thickness and areal extent. Regional slope of these deposits is probably less than 5 feet per mile and generally east and southeast in the direction of the slope of the land surface. Locally, the direction will vary according to the direction of stream or river flow. The following map shows many of the major structural features in and near the report area.

WATER LEVEL OBSERVATION NETWORK

Observation wells have been established and are measured by the Water Development Board in most areas of the State to observe changes in water levels in the principal aquifers. The Board's water level observation network is directed toward the accomplishment of the following objectives: (1) the selection, in all principal aquifers, of observation wells that are spaced to afford sufficient data for preparation of potentiometric-surface and related maps, and graphs which portray changes and fluctuations of ground water; (2) the annual or periodic measurement of water levels in each well in this network at the times when water levels have recovered from periods of peak water demand; (3) the operation of automatic water-level recorders in strategic wells where a continuous record of water-level changes is needed; (4) the evaluation and periodic publication of these water-level data; and (5) the maintenance of the records of these data in the Board's files for examination and use by anyone in need of the information.

GROUND WATER QUALITY MONITORING NETWORK

The Board maintains a network of observation wells for monitoring water quality in the principal aquifers of the State. Some of these wells are also water-level observation wells. It is the desire of the Board to accomplish the following objectives with this network: (1) selection of an adequate number of observation wells properly spaced in all the principal aquifers to be able to obtain sufficient data for preparation of various ground-water quality maps, graphs, and other illustrative and definitive material; (2) periodic sampling of the water in these wells for chemical analysis to detect any changes in the chemical quality of the water, in order to be able to make appropriate recommendations for any action deemed necessary; (3) evaluation and periodic publication of these water-quality data; and (4) maintenance and storage of the records of these data in the Board's files for examination and use by anyone in need of the information.

METHODS OF COLLECTING WATER-LEVEL AND WATER-QUALITY DATA

Water levels in most current observation wells in this report are measured on an annual basis. If possible, wells selected for annual observation purposes should

not be equipped with a pump and should be located a reasonable distance from heavily pumped wells. These conditions cannot always be met; therefore, it becomes necessary to measure water levels in equipped wells and wells in frequent use. In these cases, the water levels are measured after allowance of sufficient time following cessation of pumping for the water levels to recover to static or near-static conditions. In irrigation areas, it is desirable to measure water levels in the winter months when pumping is at a minimum and water levels have recovered to their highest levels.

In this report, water levels are recorded as depth to water in feet below land surface or, in rare instances, distance in feet above land surface (the plus sign before a figure in the "measurement" column the table of water-level measurements indicates a flowing well). The depth to water below land surface is obtained by subtracting the vertical distance between the measuring point on a well and the land surface from the vertical distance between the measuring point and the water level in the well. In flowing wells of small capacity, the distance above land surface may be measured directly with a hand tape; for large-capacity flowing wells the distance is calculated from a pressure reading. The following methods were used to obtain the water-level measurements in this report:

(1) Wetted Steel Tape

In using this measuring method, a calibrated steel tape is lowered into the well bore until a part, usually about one or two feet, is submerged in the water, and an even foot mark on the tape is held at the measuring point on the well. The depth to water below this measuring point is then calculated by subtracting the amount of wet tape from the foot mark held at the measuring point. Water levels measured with a steel tape are recorded to the nearest one-hundredth of a foot. This method of obtaining water-level measurements is considered the most accurate and is therefore the most commonly used.

(2) Electric Line

The electric line measuring equipment consists of a hand-operated reel, a current meter, a dry-cell battery for power, and a length of double-conductor insulated wire with electrodes at the lower end. The electric line operates on the principle of a completed electric circuit. When contact is made between the water surface in the well

and the electrodes on the end of the electric line, the circuit is completed and indicated on the current meter at the land surface. Calibrated markings along the electric line provide the means for direct reading of the depth to the water level. This method is used when a measurement with steel tape is not feasible, such as in a well in which water is leaking or flowing into the bore hole above the water level. Water-level measurements obtained by this method are recorded to the nearest tenth of a foot.

(3) Air Line

This method employs the use of a small diameter pipe or tube, such as copper tubing, which is airtight and installed in the annular space between the pump column and the casing in the well. This tube, or air line, should be stabilized and as true vertically as possible. It must extend several feet below the lowest pumping water level in the well, be open at the submerged end, and its length from a reference point on the well to the submerged end must be known. Airtight connections are necessary because air is forced into the tube, and pressure is measured with a gage installed at the surface. The air line device works on the principle that air pressure required to push all the water out of the submerged end of the line equals the pressure exerted by the column of water standing outside the air line. Gages that measure directly in feet of water are available; however, readings of pressure in pounds per square inch may be multiplied by 2.31 for conversion to feet of water. By subtracting the feet of water in the submerged end of the line from the known length of the line, the depth to water can be ascertained. This method is not as accurate as those previously described, but is in fairly wide use in certain applications due to its speed and simplicity. It is also used where deep water levels render the previously described methods impractical, or in a pumping well where a more precise method could not be used due to water turbulence.

(4) Automatic Water-Level Recorder

This method requires that an automatic recording device be installed over a well. A float is suspended in the well and attached to the recording device by a

calibrated metal tape or cable. As the water level rises or falls, the float moves up or down, and this movement is continuously recorded by a stylus on chart paper held on a clock-driven drum in the recorder. The recorders are housed in small metal buildings for protection against vandalism and the elements. Automatic recorders are the best means for obtaining continuous records of any rapid and irregular water-level fluctuations in areas of large ground-water development. The recorders are visited at frequent intervals for maintenance and collection of the water-level charts. Water-level readings taken from the charts are tabulated to the nearest one-hundredth of a foot.

Ground water quality data are obtained through the periodic sampling of water from observation wells for chemical analysis. The water is usually collected in one-quart, plastic, sterilized bottles, preferably after a well has been pumped for some time. Information concerning the identity of the well from which the sample was drawn, date of sample collection, and other data are tabulated, and the sample is forwarded to the State Health Department for, in most cases, a routine chemical analysis. Depending upon the specific information desired, frequency of collection of water samples for analysis may vary from more than once a day to once in several years.

The relatively slow movement of water through the ground affords a very close and lengthy contact of the water with the minerals in the various rocks that make up the earth's crust. These minerals are water-soluble to a greater or lesser degree, causing the ground water to become generally more mineralized as it moves along. The chemical processes are affected by many variables in the environment; wide variations in the chemical makeup of ground water, even within relatively small areas, are encountered. While many properties can be determined by chemical analysis, in most instances determining the concentrations of only the relatively few ions that commonly occur in ground water will convey an adequate picture of the suitability of the water for the usual domestic, municipal, industrial, and irrigation uses.

FLUCTUATIONS OF WATER LEVELS

The water level in a well is an indication of the water table or piezometric surface of an aquifer in a given area. Changes in the water level from time to time may be caused by one or more factors. Very slight

declines or rises of the water level may be due to climatic changes, tidal forces, or to the withdrawal of ground water from a distant or nearby well. Earthquakes can also cause changes in water levels. Heavy pumpage of wells, such as in areas where there is heavy usage of ground water for industrial, irrigation, or municipal purposes, can cause dramatic changes in water levels amounting to hundreds of feet, depending on the aquifer conditons. Generally, ground water is least affected during the winter months by such things as well pumpage, evaporation, and transpiration by vegetation. This is reflected by higher, more stable water levels at this time of year. Conversely, water levels are generally lower in the spring, summer, and fall months, reflecting the increase in well pumpage, higher evaporation rates, and renewed and continued growth of vegetation.

Long-term declines in water levels reflect decreases in the volume of water stored in an aquifer. Likewise, a long-term rise in water levels would indicate increase in the volume of water stored in an aquifer. When the discharge of ground water from an aquifer is greater than the recharge of water to it, water levels will decline, and when recharge exceeds discharge the water levels will rise.

Undoubtedly, water levels have declined considerably within the report area since the turn of the century. Long-term water-level measurements from scattered wells in Dallas and Tarrant Counties indicate some fairly steep decline rates within the past 20 years. The following seven illustrations show declines and related hydrologic information.

The hydrographs show declines ranging from as little as about 1 foot per year over a 20-year period from 1952-71 in a well in Dallas County, developed in the Woodbine Formation, to slightly under 46 feet per year during a 7-year period from 1951-57 in a well in eastern Tarrant County, developed in the Twin Mountains Formation. Also in eastern Tarrant County, another well reflected a water level decline rate of over 20 feet per year in the Paluxy Formation.

The map showing a generalized estimate of the decline of water levels in the Twin Mountains Formation in Dallas and Tarrant Counties for the period 1954-72 is based on the hydrographs as well as on current and historical water-level data in this area. Also, a map showing the approximate potentiometric surface of the Twin Mountains Formation in 1972 in Dallas, Tarrant, and parts of the surrounding counties is given. Both maps are based on limited data and should be used accordingly.

Graphs showing the reported ground-water pumpage for municipal and industrial purposes in Dallas and Tarrant Counties for the period from 1955 through 1972 are also shown. In Dallas County the demand for ground water for these purposes appears to have been fairly constant since the late 1950's, while the demand in Tarrant County has increased slightly since the early 1960's.

PRESENTATION OF DATA

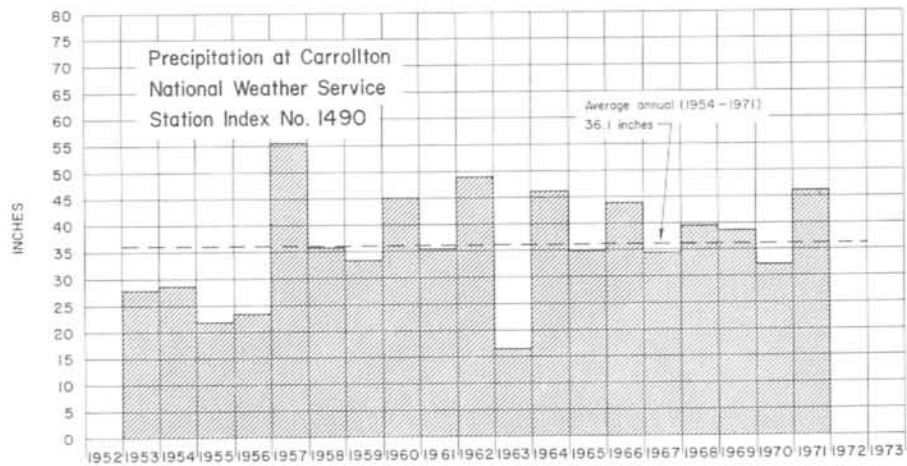
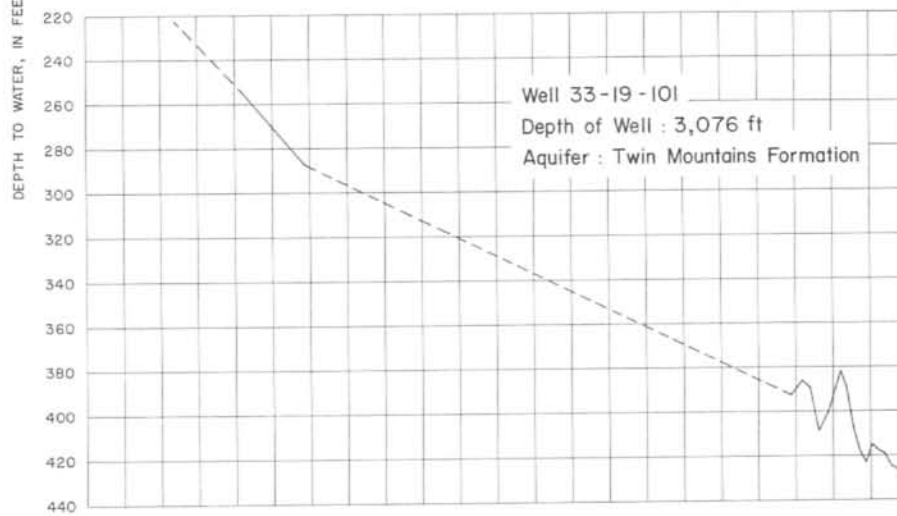
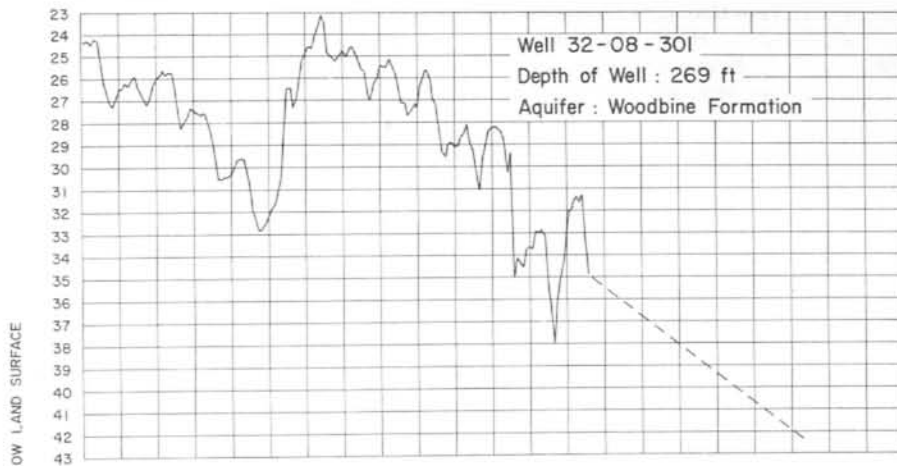
Tabulations of water-level measurements, chemical quality of ground water, and reported ground-water pumpage for municipal and industrial purposes are presented in the latter part of this report by county, and the counties are arranged alphabetically. The order in which the information is shown for each county is: (1) a map showing the location of all wells in that county from which the data were collected; (2) a table showing the water-level measurements collected from each well; (3) a table showing the results of chemical analyses of water samples collected from individual wells since 1969 (plus a few older analyses of some of these wells); (4) a table showing a summary of the chemical quality of the ground water in the important aquifers (in some counties) based on available chemical analyses from wells developed in the particular aquifers; and (5) a table of reported municipal and industrial pumpage. The following symbols are used for aquifers in the various tables:

SYMBOL	SYSTEM	UNIT
QUATERNARY		
QAL		Alluvium
TERTIARY		
TWI		Wilcox Group
TM		Midway Group
CRETACEOUS		
KGN		Navarro Group
KGNA		Nacatoch Sand
KGTT		Taylor Group
KGWC		Wolfe City Sand
KGA		Austin Group
KGAC		Austin Chalk
KGBL		Blossom Sand
KGEF		Eagle Ford Group
KGW		Woodbine Group
KCW		Washita Group
KCPP		Pawpaw Formation
KCA		Antlers Formation

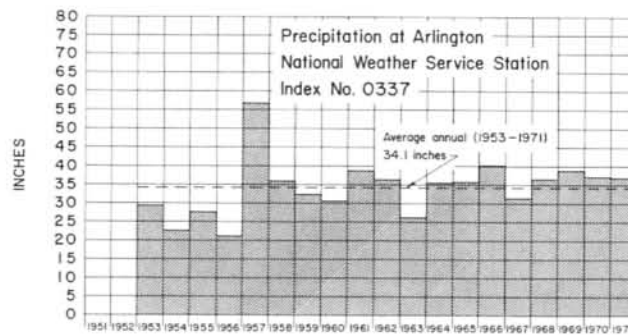
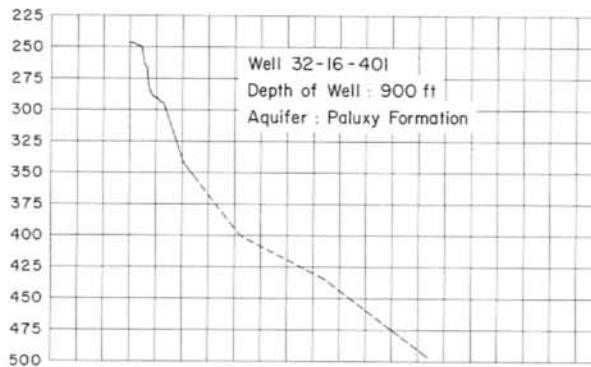
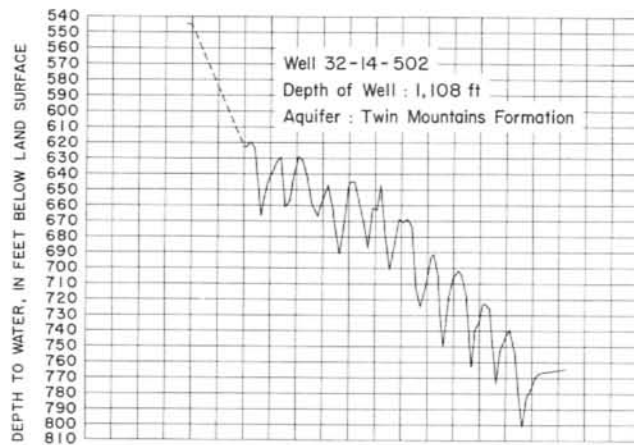
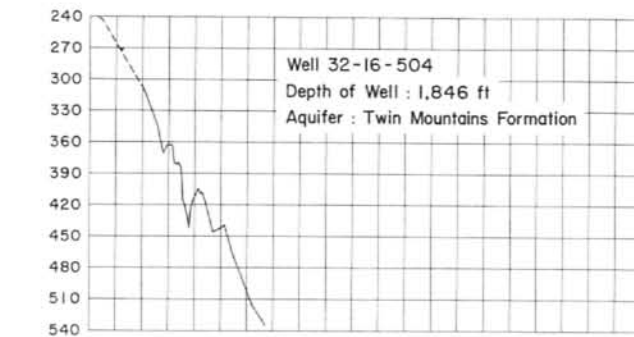
KCPA Paluxy Formation
KCTM Twin Mountains Formation
KCHO Hosston Formation
KCPA-KCGR-KCTM Paluxy, Glen Rose, and
. Twin Mountains Formations

PERMIAN

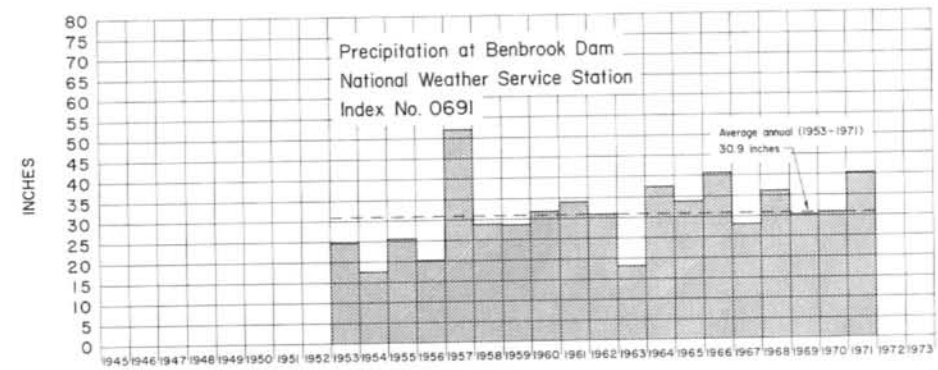
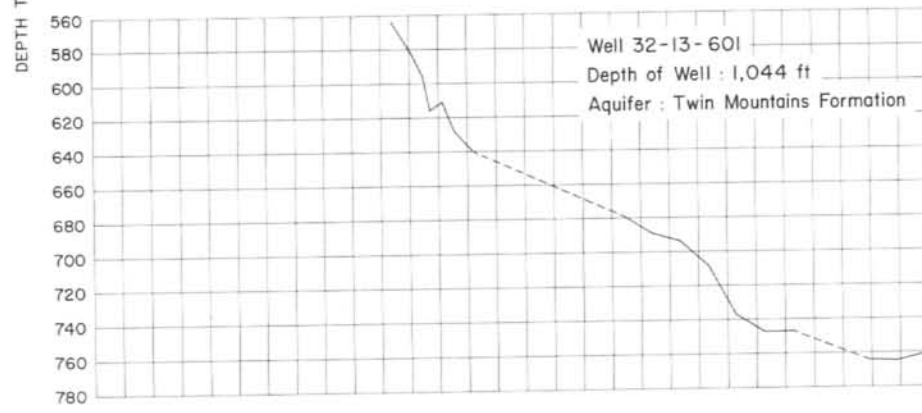
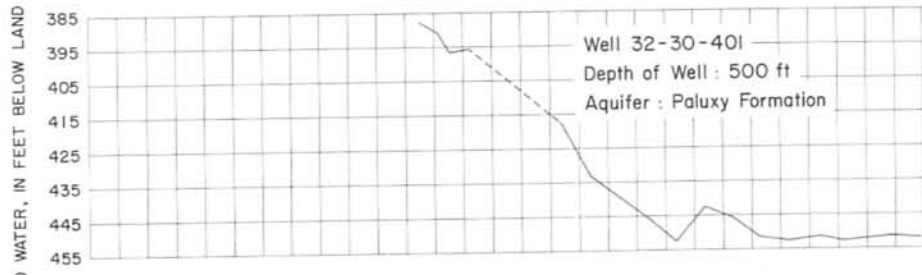
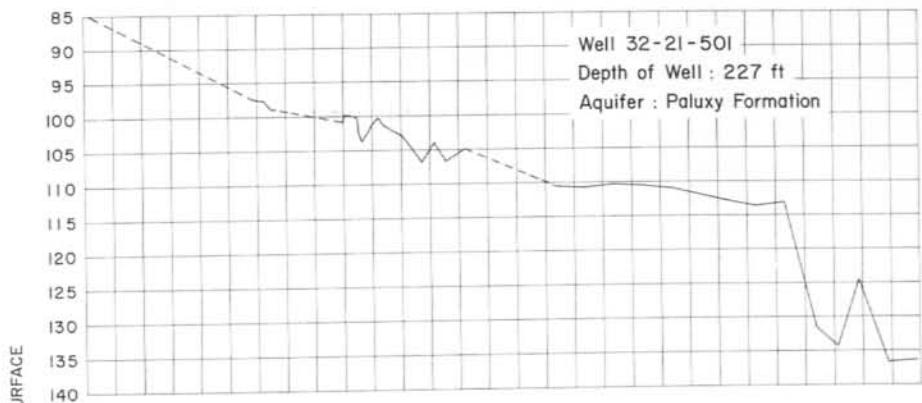
PLW Wichita Group



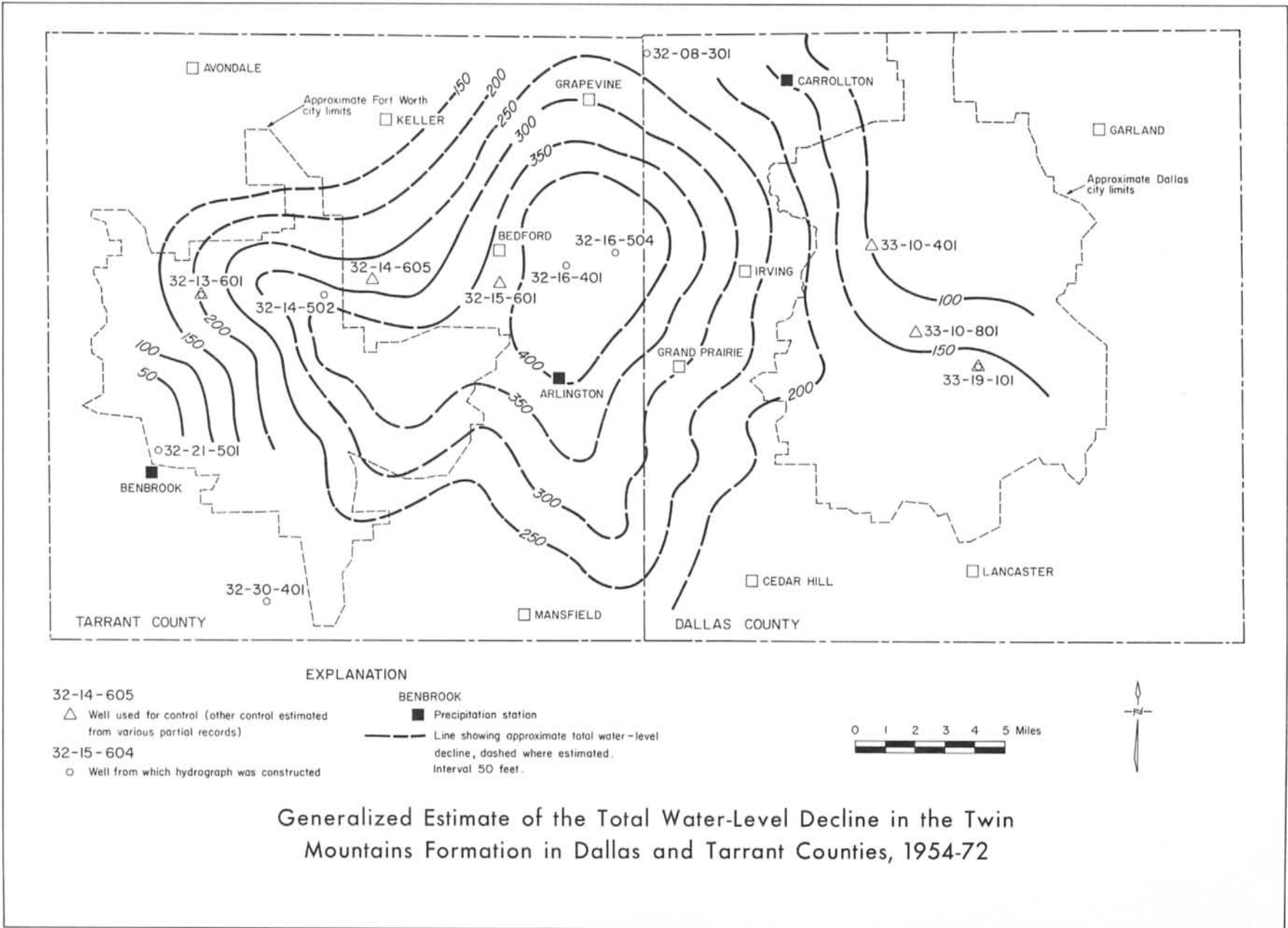
Hydrographs of Selected Wells in Dallas County and Precipitation at Carrollton



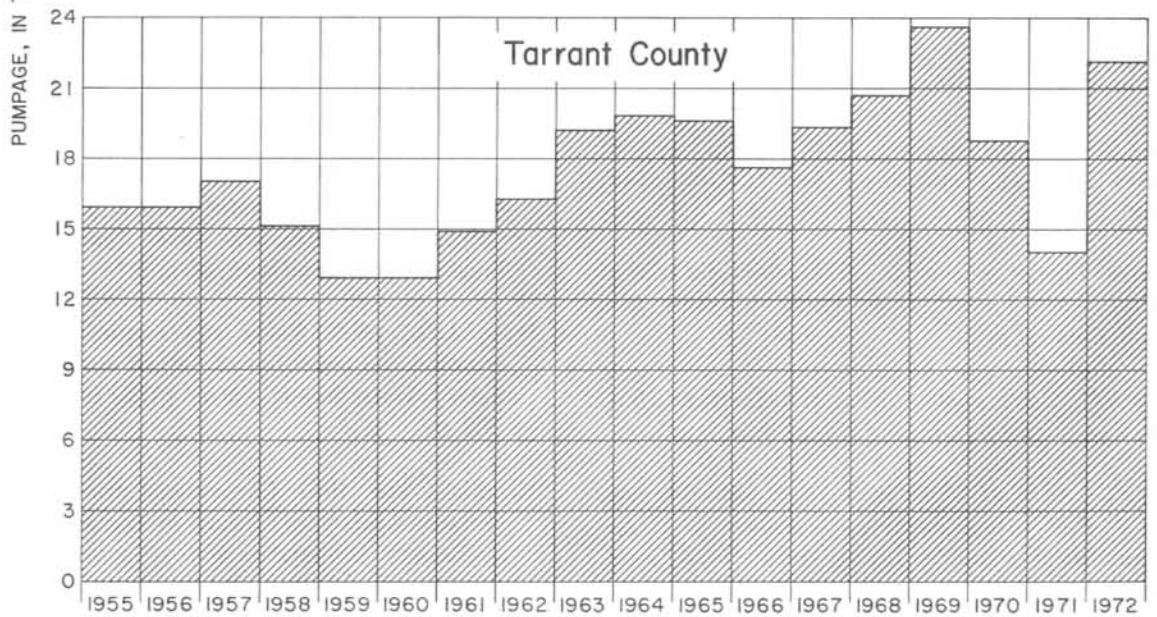
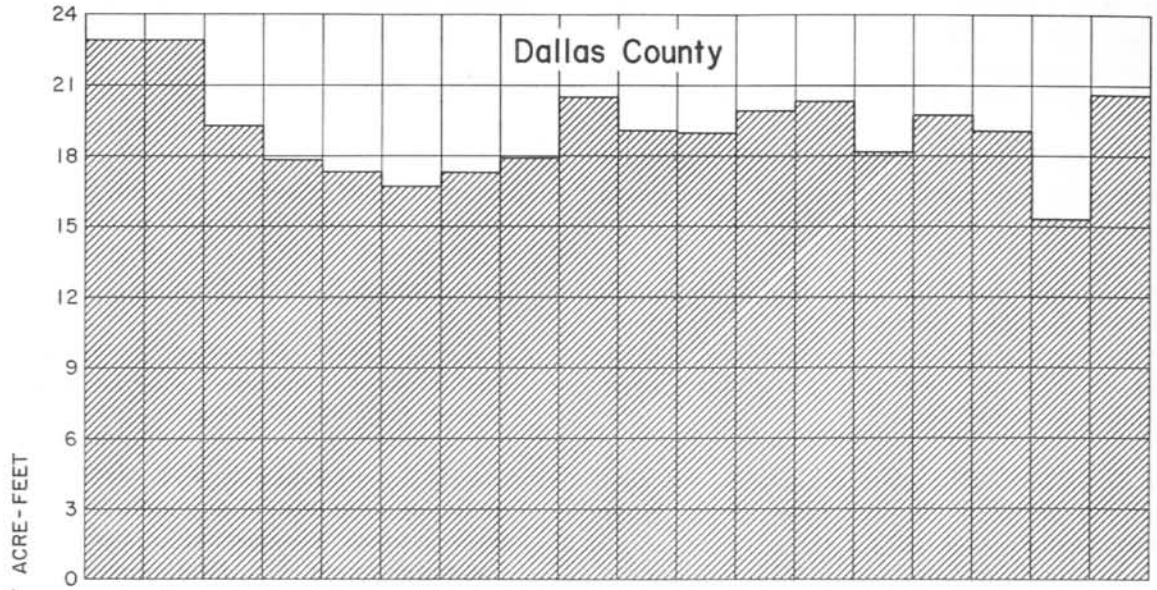
**Hydrographs of Selected Wells in Tarrant County
and Precipitation at Arlington**



**Hydrographs of Selected Wells in Tarrant County
and Precipitation at Benbrook Dam**







Reported Municipal and Industrial Ground-Water Pumpage in Dallas and Tarrant Counties, 1955-72

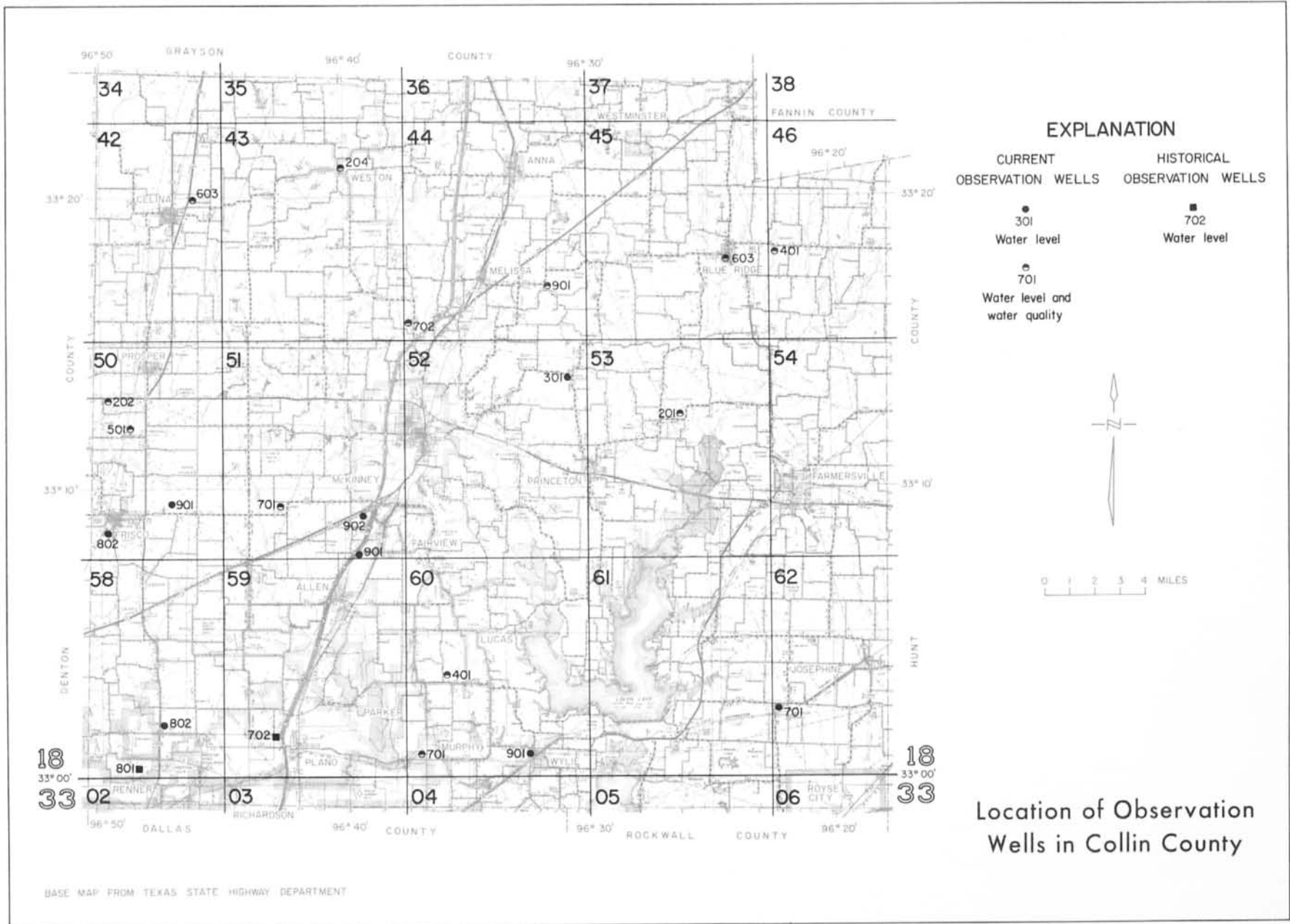
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WATER-LEVEL MEASUREMENTS IN COLLIN COUNTY



COLLIN COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 W MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASUREMENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
18-42-603	KGW	771	680.00	09-29-70	359.80W		
				02-25-71	362.20	2.40	
				11-19-74	336.40		25.80
18-43-204	KGW	1240	750.00	04-28-71	311.83		
				11-10-71	319.46	7.63	
				11-19-74	335.90	16.44	
18-44-702	KGW	1136	610.00	04-28-71	304.46		
				11-10-71	306.96	2.50	
				11-16-72	310.96	4.00	
				11-07-73	321.70*	10.74	
18-44-901	KGW	1783	670.00	09-29-70	368.00		
				11-11-71	374.00	6.00	
				11-06-73	400.00	26.00	
				11-05-74	380.00		20.00
18-45-603	KGW	1855	610.00	03-13-79	147.00		
				04-23-71	349.80	202.80	
				11-11-71	356.05*	6.25	
				11-16-72	355.13*		0.92
18-46-401	KGT	25	595.00	04-23-71	5.53		
				11-11-71	4.20		1.33
				11-16-72	7.11	2.91	
				11-07-73	3.17		3.94
				11-19-74	3.07		0.10
18-50-202	KGW	640	730.00	10-06-70	222.30		
				02-26-71	222.51W	0.21	
				11-10-71	219.19		3.32
				11-15-72	222.38	3.19	
				11-06-73	225.43	3.05	
18-50-501	KCTM	2525	630.00	11-14-72	397.00		
				11-06-73	395.00		2.00
				11-05-74	485.00	90.00	
18-50-802	KCPA	1632	695.00	11-06-73	443.00		
				11-05-74	440.00		3.00

COLLIN COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE - CONTINUED
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 W MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASUREMENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
18-50-901	KGR	1050	790.00	09-28-70	475.70		
				02-25-71	473.86		1.84
				11-15-72	462.73		11.13
				11-06-73	481.46	18.73	
				11-05-74	482.88	1.42	
18-51-701	KGR	1104	710.00	09-28-70	298.52		
				02-25-71	313.65	15.13	
				11-07-73	316.39	2.74	
				11-19-74	331.72	15.33	
18-51-901	KGR	1209	640.00	10-09-70	378.00W		
				02-26-71	381.14W	3.14	
				11-11-71	376.68		4.46
				11-15-72	383.96	7.28	
				11-07-73	383.02		0.94
11-19-74	391.66W	8.64					
18-51-902	KGR	1415	640.00	09-28-70	408.93		
				02-25-71	413.54	4.61	
				11-10-71	394.45		19.09
				11-15-72	399.60W	5.15	
				11-07-73	401.42W	1.82	
11-19-74	393.38W		8.04				
18-52-301	KGR	1577	610.00	09-29-70	343.00		
18-53-201	KGT	50	560.00	04-23-71	20.77		
				11-11-71	17.05		3.72
				11-16-72	22.55	5.50	
				11-07-73	12.24		10.31
11-19-74	10.13		2.11				
18-58-801	KCPA	1756	775.00	10-09-70	386.44		
18-58-802	KGR	36	695.00	10-09-70	5.53		
				02-26-71	7.25	1.72	
				11-10-71	2.85		4.40
				11-15-72	4.14	1.29	
				11-07-73	1.26		2.88
11-19-74	1.80	0.54					
18-59-702	KGR	980	600.00	10-08-70	306.60		
				02-26-71	294.00		12.60
				11-10-71	299.07	5.07	

COLLIN COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE - CONTINUED

* DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING

Q MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASURE- MENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
18-60-401	KGT	12	582.00	04-13-71	3.00		
				11-10-71	2.35		0.65
				11-15-72	2.64	0.29	
				11-07-73	2.05		0.59
				11-19-74	2.09	0.04	
18-60-701	KGAC	60	575.00	04-23-71	5.04		
				11-10-71	3.40		1.64
				11-15-72	4.99	1.59	
				11-07-73	2.37		2.62
				11-19-74	1.78		0.59
18-60-901	KCPA	2800	550.00	04-23-71	276.16		
				11-10-71	280.72	4.56	
				11-15-72	287.52	6.80	
				11-19-74	302.21	14.69	
18-62-701	KGT	50	635.00	04-23-71	10.65		
				11-10-71	9.86		0.79
				11-16-72	8.85		1.01
				11-07-73	3.22		5.63
				11-19-74	3.74	0.52	

COLLIN COUNTY
GROUND WATER QUALITY ANALYSES

STATE WELL NUMBER DATE OF COLLECTION	18-42-603 11/15/72	18-43-204 04/28/71	18-44-702 04/28/71	18-44-702 11/10/71
AQUIFER CODE	KGW	KGW	KGW	KGW
WELL DEPTH	771	1240	1136	1136
TEMPERATURE-F				
TEMPERATURE-C				
SILICA (MG/L)	11.0	11.0	12.0	12.0
CALCIUM (MG/L)	1.0	3.0	1.0	1.0
MAGNESIUM (MG/L)	2.0	2.0	1.0	1.0
SODIUM (MG/L)	422.0	530.0	211.0	212.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	800.0	780.0	378.0	376.0
SULFATE (MG/L)	73.0	396.0	112.0	115.0
CHLORIDE (MG/L)	117.0	80.0	31.0	32.0
FLUORIDE (MG/L)	2.6	3.1	1.2	1.3
NITRATE (MG/L)	.4	.4	1.9	4.5
IRON (MG/L)				
PH	8.5	8.4	8.3	7.9
DISSOLVED SOLIDS (MG/L)	1022.3	1409.0	556.0	563.0
PHENOL. ALK. CaCO3	12.0	1.0	.0	.0
TOTAL ALK. CaCO3	680.0	640.0	310.0	308.0
TOTAL HARD CaCO3	12.0	18.0	9.0	9.0
% SODIUM	98.84	98.65	98.58	98.58
SAR	56.0	58.1	35.7	35.8
RSC	12.8	12.4	6.0	6.0
SPECIFIC CONDUCTANCE	1630.0	2040.0	872.0	883.0

COLLIN COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER	18-44-901	18-45-603	18-45-603	18-45-603
DATE OF COLLECTION	11/14/72	02/29/43	04/23/71	11/11/71
AQUIFER CODE	KGW	KGW	KGW	KGW
WELL DEPTH	1783	1855	1855	1855
TEMPERATURE-F	85			90
TEMPERATURE-C				
SILICA (MG/L)	12.0	13.0	14.0	13.0
CALCIUM (MG/L)	1.0	1.0	2.0	1.0
MAGNESIUM (MG/L)	1.0	1.0	1.0	2.0
SODIUM (MG/L)	151.0	207.0	211.0	205.0
POTASSIUM (MG/L)		2.8		
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	306.0	306.0	359.0	357.0
SULFATE (MG/L)	55.0	109.0	109.0	105.0
CHLORIDE (MG/L)	17.0	34.0	53.0	40.0
FLUORIDE (MG/L)	.8	.7	.8	.8
NITRATE (MG/L)	.4	1.5	.4	.4
IRON (MG/L)				
PH	8.4	8.2	7.8	8.2
DISSOLVED SOLIDS (MG/L)	388.6	520.4	567.0	542.0
PHENOL, ALK. CaCO3	2.0		.0	.0
TOTAL ALK. CaCO3	255.0		294.0	293.0
TOTAL HARD CaCO3	7.0	5.0	11.0	11.0
% SODIUM	98.02	97.78	98.05	97.65
SAR	25.5	35.0	30.4	27.2
RSC	4.8	4.8	5.7	5.6
SPECIFIC CONDUCTANCE	615.0		890.0	891.0

COLLIN COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER DATE OF COLLECTION	18-45-603 11/07/73	18-46-401 04/23/71	18-50-202 02/26/71	18-50-501 11/10/71
AQUIFER CODE	KGW	KGT	KGW	KCTM
WELL DEPTH	1855	25	640	2525
TEMPERATURE-F	90			98
TEMPERATURE-C				
SILICA (MG/L)	13.0	41.0	10.0	17.0
CALCIUM (MG/L)	2.0	319.0	1.0	7.0
MAGNESIUM (MG/L)	1.0	53.0	1.0	2.0
SODIUM (MG/L)	220.0	620.0	169.0	590.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	362.0	317.0	388.0	304.0
SULFATE (MG/L)	104.0	1140.0	37.0	85.0
CHLORIDE (MG/L)	48.0	540.0	12.0	700.0
FLUORIDE (MG/L)	.9	1.2	1.1	.2
NITRATE (MG/L)	.4	242.0	.4	.4
IRON (MG/L)				
PH	8.3	7.6	8.4	8.1
DISSOLVED SOLIDS (MG/L)	567.2	3112.0	422.0	1551.0
PHENOL. ALK. CaCO3	.0	.0	1.0	.0
TOTAL ALK. CaCO3	297.0	260.0	320.0	249.0
TOTAL HARD CaCO3	8.0	1010.0	6.0	25.0
% SODIUM	98.13	57.08	98.23	98.03
SAR	31.7	8.4	28.6	50.6
RSC	5.7	.0	6.2	4.4
SPECIFIC CONDUCTANCE	920.0	3750.0	672.0	2690.0

COLLIN COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER	18-51-701	18-52-301 -	18-53-201	18-53-201
DATE OF COLLECTION	11/10/71	11/08/73	04/23/71	11/07/73
AQUIFER CODE	KGW		KGT	KGT
WELL DEPTH	1104	----	50	50
TEMPERATURE-F		76		63
TEMPERATURE-C				
SILICA (MG/L)	12.0	11.0	22.0	23.0
CALCIUM (MG/L)	3.0	3.0	153.0	171.0
MAGNESIUM (MG/L)	2.0	1.0	9.0	7.0
SODIUM (MG/L)	441.0	310.0	51.0	55.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	650.0	440.0	368.0	454.0
SULFATE (MG/L)	253.0	200.0	42.0	39.0
CHLORIDE (MG/L)	129.0	67.0	87.0	97.0
FLUORIDE (MG/L)	2.7	1.7	.3	.3
NITRATE (MG/L)	.4	3.3	64.0	38.0
IRON (MG/L)				
PH	8.4	8.4	7.3	7.3
DISSOLVED SOLIDS (MG/L)	1162.0	813.3	609.0	653.5
PHENOL. ALK. CaCO3	6.0	3.0	.0	.0
TOTAL ALK. CaCO3	550.0	367.0	302.0	372.0
TOTAL HARD CaCO3	18.0	13.0	423.0	457.0
% SODIUM	98.38	98.30	20.94	20.80
SAR	48.4	39.6	1.0	1.1
RSC	10.3	6.9	.0	.0
SPECIFIC CONDUCTANCE	1840.0	1260.0	955.0	1060.0

COLLIN COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER	18-60-401	18-60-701
DATE OF COLLECTION	06/13/71	04/23/71
AQUIFER CODE	KGT	KGAC
WELL DEPTH	12	60
TEMPERATURE-F		
TEMPERATURE-C		
SILICA (MG/L)	11.0	5.0
CALCIUM (MG/L)	125.0	86.0
MAGNESIUM (MG/L)	2.0	4.0
SODIUM (MG/L)	8.0	18.0
POTASSIUM (MG/L)		
MANGANESE (MG/L)		
BORON (MG/L)		
BICARBONATE (MG/L)	364.0	149.0
SULFATE (MG/L)	19.0	57.0
CHLORIDE (MG/L)	6.0	14.0
FLUORIDE (MG/L)	.4	.7
NITRATE (MG/L)	7.0	76.0
IRON (MG/L)		
PH	7.1	7.4
DISSOLVED SOLIDS (MG/L)	357.0	333.0
PHENOL. ALK. CaCO3	.0	.0
TOTAL ALK. CaCO3	298.0	122.0
TOTAL HARD CaCO3	322.0	231.0
% SODIUM	5.15	14.49
SAR	.1	.5
RSC	.0	.0
SPECIFIC CONDUCTANCE	592.0	507.0

COLLIN COUNTY

SUMMARY OF GROUND WATER QUALITY

AQUIFER KGW

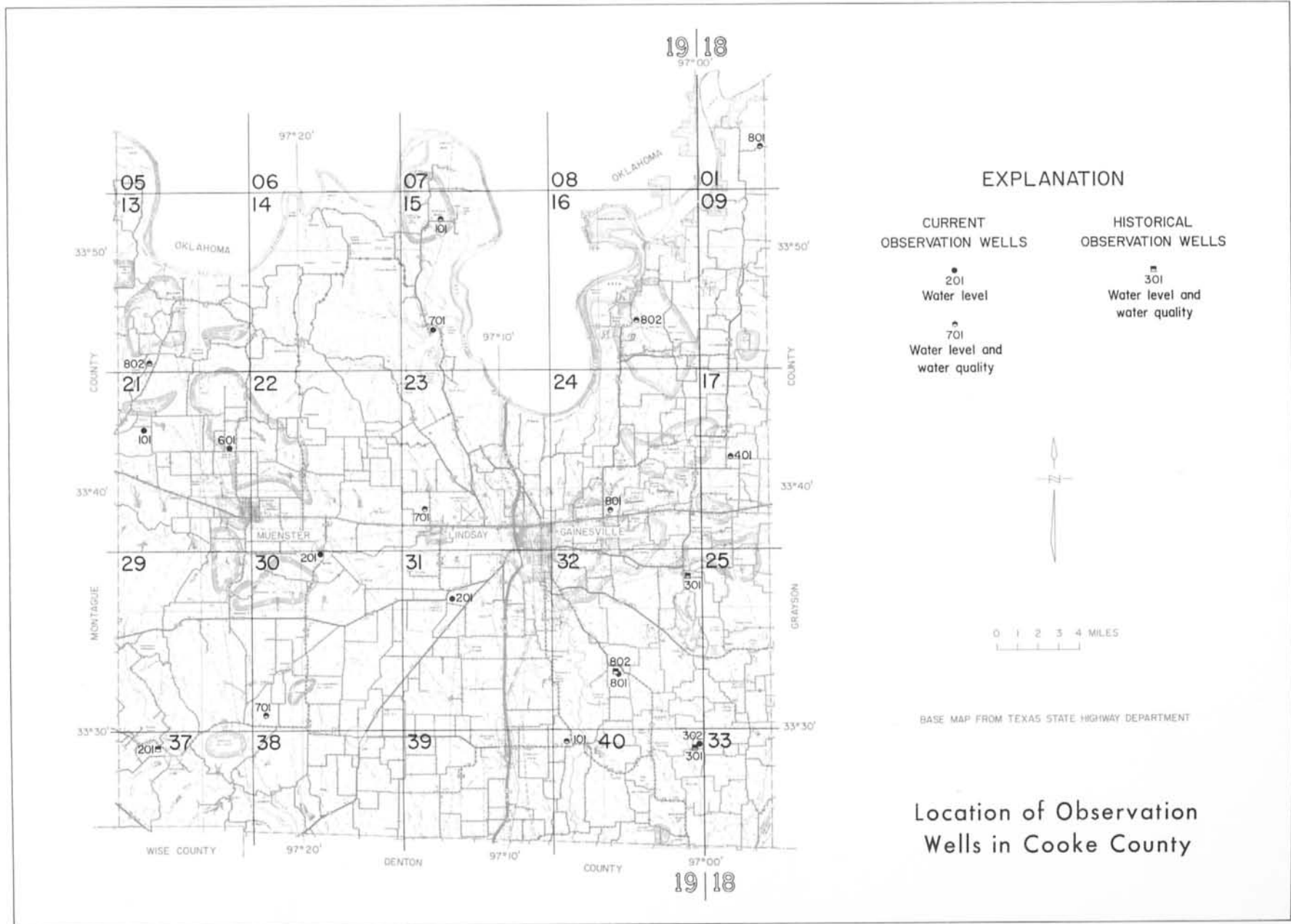
CONSTITUENT OR PROPERTY	MINIMUM CONCENTRATION MG/L	MAXIMUM CONCENTRATION MG/L	MEAN CONCENTRATION MG/L	MEDIAN CONCENTRATION MG/L	PERCENTAGE OF SAMPLES IN WHICH CONCENTRATION EXCEEDED AVERAGE	NUMBER OF SAMPLES FOR WHICH CONSTITUENT WAS PRESENT
SILICA (SI02)	10.00	14.00	12.36	12.00	45.45	11
CALCIUM (CA)	1.00	3.00	1.36	1.00	18.18	11
MAGNESIUM (MG)	0.00	2.00	1.18	1.00	18.18	11
SODIUM (NA)	151.00	441.00	244.27	211.00	9.09	11
BICARBONATE (HCO3)	306.00	800.00	425.81	376.00	9.09	11
SULFATE (SO4)	37.00	253.00	106.54	105.00	36.36	11
CHLORIDE (CL)	12.00	129.00	50.00	37.00	18.18	11
FLUORIDE (F)	0.70	2.80	1.42	1.10	18.18	11
NITRATE (NO3)	0.40	4.50	1.24	0.40	36.36	11
TOTAL DISSOLVED SOLIDS (TDS)	388.66	1162.00	627.75	563.00	9.09	11
HARDNESS (CAC03)	2.00	18.00	8.90	9.00	45.45	11
SPECIFIC CON- DUCTANCE	615.00	1840.00	1020.00	890.00	10.00*	10
PH	7.80	8.50	8.26	8.30	54.54	11
PERCENT SODIUM	97.65	99.25	98.31	98.23	36.36	11
SAR	25.55	65.56	38.20	35.03	18.18	11
RSC	4.88	12.89	6.80	6.03	9.09	11

COLLIN COUNTY

REPORTED MUNICIPAL AND INDUSTRIAL GROUND WATER PUMPAGE

YEAR	MUNICIPAL PUMPAGE (ACRE-FEET)	INDUSTRIAL PUMPAGE (ACRE-FEET)	MUNICIPAL AND INDUSTRIAL PUMPAGE (ACRE-FEET)
1955	2,088.27	1,903.63	3,991.90
1956	1,927.74	1,887.05	3,814.79
1957	683.32	1,871.71	2,555.03
1958	386.15	1,664.00	2,050.15
1959	355.97	1,079.33	1,435.30
1960	1,620.61	1,880.98	3,501.59
1961	1,630.36	1,808.78	3,439.14
1962	339.31	2,179.34	2,518.65
1963	401.84	2,012.00	2,413.84
1964	419.83	2,850.18	3,270.01
1965	424.18	2,185.57	2,609.75
1966	506.79	2,120.49	2,627.28
1967	631.69	1,968.51	2,600.20
1968	604.20	1,737.95	2,342.15
1969	1,012.36	2,069.72	3,082.08
1970	1,233.47	2,293.68	3,527.15
1971	1,000.64	2,344.08	3,344.72
1972	1,099.85	2,132.23	3,232.08
Total	16,366.58	35,989.23	52,355.81

WATER-LEVEL MEASUREMENTS IN COOKE COUNTY



COOKE COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE

* DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING

Q MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASUREMENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
18-01-801	KCA	200	750.00	09-07-70	181.30		
				02-25-71	179.33		
				11-04-71	186.02	6.69	1.97
				11-14-72	181.72		4.30
				11-06-73	184.76	3.06	
				11-12-74	182.90		1.88
18-17-401	KGR	235	802.00	09-07-70	80.40		
				11-04-71	94.98	14.58	
				11-14-72	96.25	1.27	
				11-06-73	96.33	0.08	
				11-12-74	95.30		1.03
19-13-802	KCA	113	878.00	09-09-70	76.68		
				02-27-71	76.15 _Q		0.53
				11-03-71	78.10	1.95	
				11-15-72	77.75		0.35
				11-05-73	77.92	0.17	
				11-13-74	77.20		0.72
19-15-101	KCA	342	862.00	09-08-70	209.32		
				02-27-71	209.45 _Q		
				11-04-71	213.13	3.68	
				11-14-72	217.88	4.75	
				11-06-73	216.43		1.45
				11-13-74	221.84	5.41	
19-15-701	KCA	356	763.00	09-09-70	155.93		
				02-27-71	140.85		15.08
				11-04-71	152.60	11.75	
				11-14-72	159.27	6.67	
				11-06-73	160.30	1.03	
11-13-74	166.41	6.11					
19-16-802	KCA	400	860.00	09-07-70	119.60		
				02-26-71	157.20 _Q	37.60	
				11-04-71	171.00	13.80	
				11-06-73	180.96 _Q	9.96	
				11-12-74	178.90 _Q		2.06
19-21-101	KCA	----	1212.00	09-09-70	144.80		
				02-27-71	143.89		0.91
				11-03-71	137.18		6.71
				11-15-72	132.78		4.40

COOKE COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE - CONTINUED

* DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING

Q MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASURE- MENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
				11-05-73	133.45 _Q	0.67	
19-21-601	KCA	220	1110.00	09-09-70	174.65		
				02-27-71	170.54		4.11
				11-03-71	170.97	0.43	
				11-15-72	157.67		13.30
				11-05-73	171.56	13.89	
19-23-701	KCA	380	818.00	09-09-70	196.27		
				02-26-71	197.27 _Q	1.00	
				11-15-72	199.47	2.20	
				11-06-73	200.70	1.23	
				11-13-74	206.11	5.41	
19-24-801	KCA	580	790.00	09-07-70	265.00		
				02-26-71	251.00 _Q		14.00
				11-04-71	257.10	6.10	
				11-14-72	255.81		1.29
				11-06-73	264.22	8.41	
				11-12-74	264.60	0.38	
19-30-201	KCA	305	940.00	09-08-70	185.64		
				02-26-71	185.99	0.35	
				11-03-71	160.60		25.39
				11-15-72	147.99		12.61
				11-05-73	138.08 _Q		9.91
				11-13-74	147.99	9.91	
19-30-701	KCA	250	973.00	09-08-70	139.77		
				11-05-71	167.40 _Q	27.63	
				11-05-73	151.45*		15.95
				11-12-74	161.01	9.56	
19-31-201	KCA	350	854.00	09-08-70	245.92		
				02-26-71	236.20		9.72
				11-05-71	242.80	6.60	
				11-15-72	247.65*	4.85	
				11-05-73	242.69		4.96
				11-12-74	249.70	7.01	
19-32-301	KCA	680	765.00	09-07-70	200.00		
19-32-801	KCA	550	680.00	11-06-73	260.88		
				11-12-74	275.50	14.62	
19-32-802	KCW	60	680.00	09-07-70	11.80		

COOKE COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE - CONTINUED
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 Q MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASUREMENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
				11-04-71	11.10		0.7
				11-15-72	14.40	3.30	
19-37-201	KCA	248	855.00	09-08-70	147.84		
				02-26-71	110.49		37.3
				11-05-71	114.39	3.90	
19-40-101	KCW	70	657.00	09-08-70	20.27		
				02-26-71	21.00	0.73	
				11-04-71	21.70	0.70	
				11-15-72	22.88	1.18	
				11-06-73	20.46		2.4
				11-12-74	20.75	0.29	
19-40-301	KGW	105	690.00	09-07-70	60.46		
				02-26-71	55.67		4.7
				11-04-71	56.03	0.36	
				11-15-72	56.21	0.18	
19-40-302	KGW	----	685.00	09-07-70	60.46		
				02-26-71	59.00Q		1.4
				11-04-71	60.44	1.44	
				11-15-72	60.50	0.06	
				11-06-73	59.56		0.9
				11-12-74	61.10	1.54	

20 WELLS IN COOKE COUNTY

COOKE COUNTY

GROUND WATER QUALITY ANALYSES

STATE WELL NUMBER DATE OF COLLECTION	18-01-801 02/25/71	18-17-401 02/25/71	19-13-802 02/27/71	19-15-101 02/27/71
AQUIFER CODE	KCA	KGW	KCA	KCA
WELL DEPTH	200	235	113	342
TEMPERATURE-F				
TEMPERATURE-C				
SILICA (MG/L)	10.0	12.0	21.0	12.0
CALCIUM (MG/L)	1.0	2.0	127.0	1.0
MAGNESIUM (MG/L)	1.0	1.0	14.0	2.0
SODIUM (MG/L)	250.0	145.0	10.0	233.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	500.0	317.0	372.0	411.0
SULFATE (MG/L)	62.0	28.0	52.0	41.0
CHLORIDE (MG/L)	22.0	29.0	18.0	78.0
FLUORIDE (MG/L)	1.8	.4	.3	.3
NITRATE (MG/L)	1.5	.4	6.5	1.5
IRON (MG/L)				
PH	8.9	8.2	7.3	8.9
DISSOLVED SOLIDS (MG/L)	595.0	373.0	431.0	570.0
PHENOL. ALK. CaCO3	27.0	.0	.0	17.0
TOTAL ALK. CaCO3	465.0	260.0	305.0	371.0
TOTAL HARD CaCO3	8.0	9.0	374.0	11.0
% SODIUM	98.79	97.19	5.48	97.92
SAR	42.3	20.9	.2	30.9
RSC	8.0	5.0	.0	6.5
SPECIFIC CONDUCTANCE	960.0	595.0	659.0	957.0

COOKE COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER DATE OF COLLECTION	19-16-802 02/26/71	19-23-701 02/26/71	19-24-801 11/14/72	19-30-701 02/26/71
AQUIFER CODE	KCA	KCA	KCA	KCA
WELL DEPTH	400	380	580	250
TEMPERATURE-F				
TEMPERATURE-C				
SILICA (MG/L)	12.0	10.0	10.0	15.0
CALCIUM (MG/L)	3.0	1.0	1.0	4.0
MAGNESIUM (MG/L)	1.0	1.0	1.0	3.0
SODIUM (MG/L)	312.0	225.0	258.0	150.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	640.0	434.0	500.0	384.0
SULFATE (MG/L)	85.0	62.0	67.0	23.0
CHLORIDE (MG/L)	17.0	5.0	11.0	6.0
FLUORIDE (MG/L)	1.8	.3	.7	.1
NITRATE (MG/L)	.4	1.5	1.0	.4
IRON (MG/L)				
PH	8.8	9.2	9.2	8.1
DISSOLVED SOLIDS (MG/L)	746.0	519.0	595.5	390.0
PHENOL. ALK. CaCO3	28.0	37.0	39.0	.0
TOTAL ALK. CaCO3	580.0	430.0	490.0	315.0
TOTAL HARD CaCO3	8.0	6.0	8.0	23.0
% SODIUM	98.32	98.66	98.83	93.59
SAR	39.8	38.0	43.6	13.8
RSC	10.2	6.9	8.0	5.8
SPECIFIC CONDUCTANCE	1172.0	846.0	1018.0	600.0

COOKE COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER DATE OF COLLECTION	19-32-301 02/26/71	19-32-802 11/15/72	19-37-201 11/05/71	19-40-101 02/26/71
AQUIFER CODE	KCA	KCW	KCA	KCW
WELL DEPTH	680	60	248	70
TEMPERATURE-F		56		
TEMPERATURE-C				
SILICA (MG/L)	12.0	28.0	11.0	17.0
CALCIUM (MG/L)	1.0	224.0	3.0	119.0
MAGNESIUM (MG/L)	1.0	84.0	2.0	9.0
SODIUM (MG/L)	254.0	179.0	171.0	46.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	471.0	267.0	368.0	323.0
SULFATE (MG/L)	81.0	426.0	36.0	24.0
CHLORIDE (MG/L)	15.0	457.0	12.0	91.0
FLUORIDE (MG/L)	.6	.7	.1	.1
NITRATE (MG/L)	2.0	.4	.4	6.5
IRON (MG/L)				
PH	9.1	6.7	8.9	7.3
DISSOLVED SOLIDS (MG/L)	598.0	1530.3	416.0	471.0
PHENOL, ALK. CaCO3	33.0	.0	15.0	.0
TOTAL ALK. CaCO3	452.0	219.0	332.0	265.0
TOTAL HARD CaCO3	8.0	910.0	17.0	334.0
% SODIUM	98.81	30.09	95.94	23.05
SAR	42.9	2.5	18.7	1.0
RSC	7.5	.0	5.7	.0
SPECIFIC CONDUCTANCE	956.0	2300.0	685.0	777.0

COOKE COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER	19-40-301
DATE OF COLLECTION	02/26/71
AQUIFER CODE	KGW
WELL DEPTH	105
TEMPERATURE-F	
TEMPERATURE-C	
SILICA (MG/L)	10.0
CALCIUM (MG/L)	6.0
MAGNESIUM (MG/L)	2.0
SODIUM (MG/L)	154.0
POTASSIUM (MG/L)	
MANGANESE (MG/L)	
BORON (MG/L)	
BICARBONATE (MG/L)	298.0
SULFATE (MG/L)	60.0
CHLORIDE (MG/L)	39.0
FLUORIDE (MG/L)	.2
NITRATE (MG/L)	1.8
IRON (MG/L)	
PH	7.6
DISSOLVED SOLIDS (MG/L)	419.0
PHENOL, ALK, CaCO ₃	.0
TOTAL ALK, CaCO ₃	244.0
TOTAL HARD CaCO ₃	24.0
% SODIUM	93.52
SAR	13.9
RSC	4.4
SPECIFIC CONDUCTANCE	660.0

COOKE COUNTY

SUMMARY OF GROUND WATER QUALITY

AQUIFER KCA

CONSTITUENT OR PROPERTY	MINIMUM CONCENTRATION MG/L	MAXIMUM CONCENTRATION MG/L	MEAN CONCENTRATION MG/L	MEDIAN CONCENTRATION MG/L	PERCENTAGE OF SAMPLES IN WHICH CONCENTRATION EXCEEDED AVERAGE	NUMBER OF SAMPLES FOR WHICH CONSTITUENT WAS PRESENT
SILICA (SI02)	8.00	37.00	13.00	12.00	14.28	21
CALCIUM (CA)	1.00	127.00	8.90	2.00	9.52	21
MAGNESIUM (MG)	0.00	14.00	2.04	1.00	14.28	21
SODIUM (NA)	10.00	312.00	194.09	201.00	47.61	21
BICARBONATE (HCO3)	315.00	640.00	407.28	396.00	38.09	21
SULFATE (SO4)	23.00	85.00	42.85	38.00	38.09	21
CHLORIDE (CL)	3.00	85.00	28.23	15.00	28.57	21
FLUORIDE (F)	0.00	1.80	0.35	0.20	14.28	21
NITRATE (NO3)	0.00	6.50	1.24	1.00	33.33	21
TOTAL DISSOLVED SOLIDS (TDS)	388.28	746.00	492.94	469.37	47.61	21
HARDNESS (CAC03)	1.00	374.00	30.57	9.00	9.52	21
SPECIFIC CON- DUCTANCE	23.00	1172.00	784.57	845.00	50.00	14
PH	7.20	9.20	8.36	8.40	52.38	21
PERCENT SODIUM	5.48	99.45	92.15	97.71	85.71	21
SAR	0.22	60.05	29.21	26.10	28.57	21
RSC	0.00	10.25	6.12	6.38	47.61	21

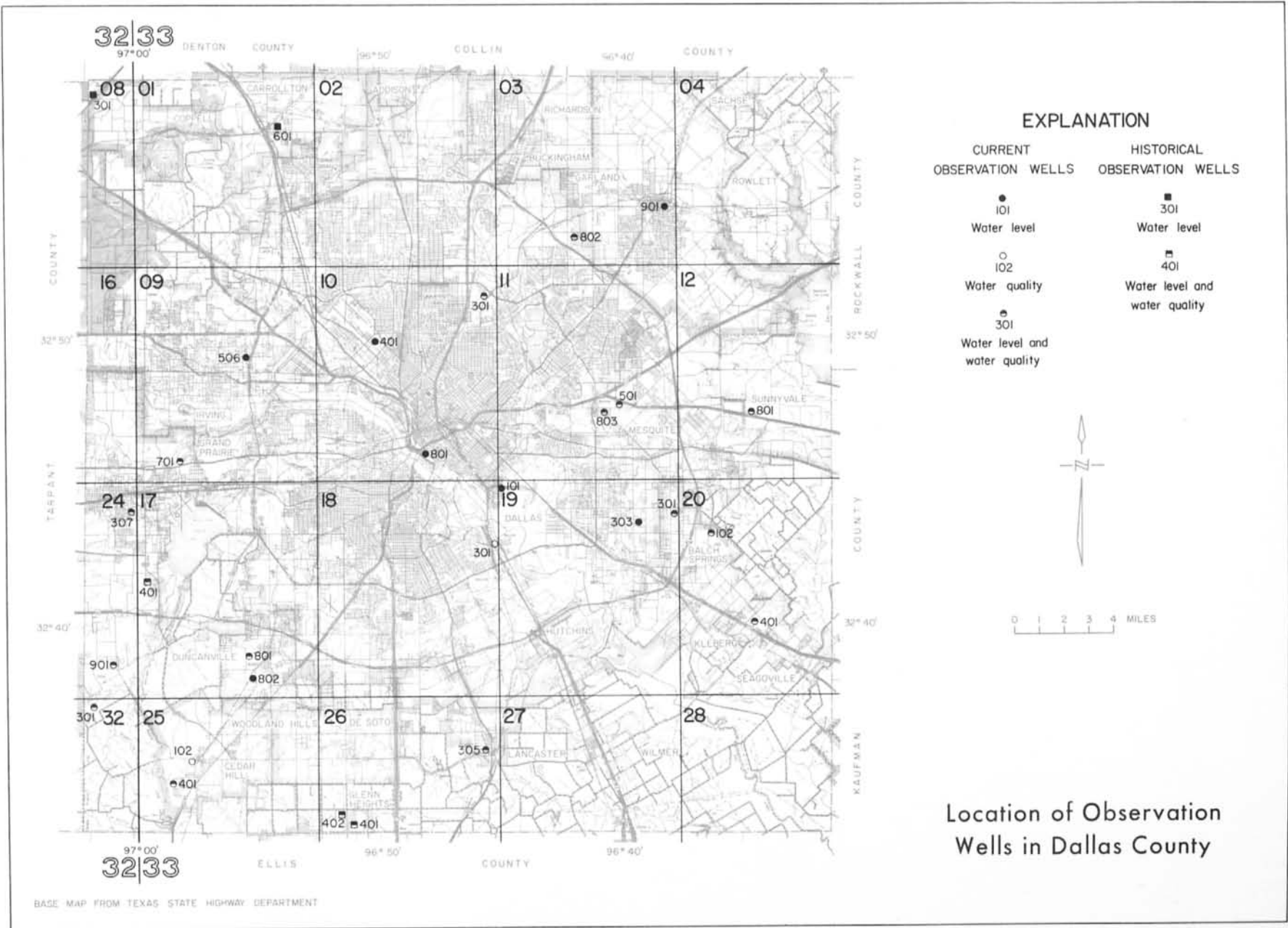
COOKE COUNTY

REPORTED MUNICIPAL AND INDUSTRIAL GROUND WATER PUMPAGE

YEAR	MUNICIPAL PUMPAGE (ACRE-FEET)	INDUSTRIAL PUMPAGE (ACRE-FEET)	MUNICIPAL AND INDUSTRIAL PUMPAGE (ACRE-FEET)
1955	2,609.20	422.81	3,032.01
1956	2,642.46	422.81	3,065.27
1957	2,289.37	422.81	2,712.18
1958	2,073.64	202.89	2,276.53
1959	2,052.69	655.95	2,708.64
1960	1,891.76	144.44	2,036.20
1961	2,014.78	153.92	2,168.70
1962	2,765.91	152.28	2,918.19
1963	2,727.25	108.22	2,835.47
1964	2,119.64	78.75	2,198.39
1965	1,799.38	55.43	1,854.81
1966	1,991.44	55.44	2,046.88
1967	2,047.24	55.73	2,102.97
1968	2,001.97	45.63	2,047.60
1969	2,389.09	45.47	2,434.56
1970	2,845.54	66.63	2,912.17
1971	2,854.23	146.71	3,000.94
1972	3,288.31	152.77	3,441.08
Total	42,403.90	3,388.69	45,792.59



WATER-LEVEL MEASUREMENTS IN DALLAS COUNTY



DALLAS COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 W MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASURE- MENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
32-08-301	KGW	269	484.60	10-08-51	24.20		
				11-01-51	24.35	0.15	
				12-01-51	24.12		0.23
				01-18-52	24.40	0.28	
				02-01-52	24.33		0.07
				03-01-52	24.19		0.14
				04-04-52	24.48	0.29	
				05-01-52	24.22		0.26
				06-01-52	24.34	0.12	
				07-16-52	25.78	1.44	
				08-01-52	26.14	0.36	
				09-01-52	26.62	0.48	
				10-01-52	27.11	0.49	
				11-01-52	27.30	0.19	
				12-01-52	26.83		0.47
				01-01-53	26.41		0.42
				02-01-53	26.44	0.03	
				03-01-53	26.20		0.24
				04-01-53	26.35	0.15	
				05-01-53	26.09		0.26
				06-01-53	25.93		0.16
				07-01-53	26.34	0.41	
				08-01-53	26.61	0.27	
				09-01-53	26.91	0.30	
				10-01-53	27.21	0.30	
				11-01-53	26.90		0.31
				12-01-53	26.28		0.62
				01-01-54	26.00		0.28
				02-16-54	25.80		0.20
				03-01-54	25.66		0.14
				04-01-54	25.86	0.20	
				05-01-54	25.76		0.10
				06-01-54	25.76		
				07-01-54	26.56	0.80	
				08-01-54	27.56	1.00	
				09-01-54	28.26	0.70	
				10-01-54	27.96		0.30
				11-01-54	27.76		0.20
				12-01-54	27.36		0.40
				01-01-55	27.46	0.10	
02-01-55	27.50	0.04					
03-08-55	27.64	0.14					
04-01-55	27.58		0.06				
05-01-55	27.75	0.17					

DALLAS COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE - CONTINUED
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 † MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASURE- MENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
				06-25-55	28.50	0.75	
				07-01-55	28.62	0.12	
				08-01-55	29.72	1.10	
				09-01-55	30.57	0.85	
				10-01-55	30.57		
				11-01-55	30.48		0.09
				12-01-55	30.42		0.06
				01-01-56	30.33		0.09
				02-01-56	29.97		0.36
				03-01-56	29.65		0.32
				04-01-56	29.62		0.03
				05-01-56	29.65	0.03	
				06-01-56	30.17	0.52	
				07-01-56	30.82	0.65	
				08-01-56	31.92	1.10	
				09-04-56	32.58	0.66	
				10-01-56	32.82	0.24	
				11-01-56	32.73		0.09
				12-03-56	32.51		0.22
				01-01-57	32.20		0.31
				02-01-57	31.90		0.30
				03-01-57	31.65		0.25
				04-01-57	31.18		0.47
				05-01-57	30.53		0.65
				06-11-57	27.34		3.19
				07-01-57	26.44		0.90
				08-01-57	26.46	0.02	
				09-01-57	27.35	0.89	
				10-01-57	26.98		0.37
				11-01-57	26.00		0.98
				12-01-57	25.17		0.83
				01-01-58	24.85		0.32
				02-01-58	24.59		0.26
				03-01-58	24.62	0.03	
				04-01-58	24.01		0.61
				05-01-58	23.71		0.30
				06-01-58	23.14		0.57
				07-01-58	23.60	0.46	
				08-01-58	24.85	1.25	
				10-15-58	25.28	0.43	
				11-01-58	25.15		0.13
				12-11-58	24.88		0.27
				01-01-59	24.73		0.15
				02-01-59	25.06	0.33	
				03-04-59	24.66		0.40
				04-01-59	24.58		0.08

DALLAS COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE - CONTINUED

* DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING

W MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASURE- MENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
				05-01-59	24.82	0.24	
				06-01-59	25.19	0.37	
				07-01-59	25.60	0.41	
				08-01-59	25.71	0.11	
				09-14-59	26.93	1.22	
				10-01-59	26.91		0.02
				11-01-59	26.32		0.59
				12-01-59	26.05		0.27
				01-01-60	25.44		0.61
				02-01-60	25.54	0.10	
				03-01-60	25.49		0.05
				04-01-60	25.18		0.31
				05-01-60	25.49	0.31	
				06-01-60	25.81	0.32	
				07-15-60	26.90	1.09	
				08-01-60	27.14	0.24	
				09-01-60	27.14		
				10-01-60	27.65	0.51	
				12-14-60	27.18		0.47
				01-01-61	27.35	0.17	
				02-01-61	26.44		0.91
				03-01-61	26.06		0.38
				04-01-61	25.64		0.42
				05-01-61	25.97	0.33	
				06-01-61	26.88	0.91	
				07-01-61	27.16	0.28	
				08-11-61	28.69	1.53	
				09-01-61	29.32	0.63	
				10-01-61	29.55	0.23	
				11-01-61	28.97		0.58
				12-01-61	28.90		0.07
				01-01-62	29.11	0.21	
				02-01-62	29.01		0.10
				03-01-62	28.68		0.33
				04-01-62	28.48		0.20
				05-01-62	28.04		0.44
				06-01-62	28.96	0.92	
				07-01-62	29.26	0.30	
				08-01-62	30.46	1.20	
				09-01-62	31.05	0.59	
				10-01-62	29.67		1.38
				11-01-62	28.97		0.70
				12-01-62	28.44		0.53
				01-01-63	28.25		0.19
				02-01-63	28.23		0.02
				03-01-63	28.31	0.08	

DALLAS COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE - CONTINUED
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 Q MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASURE- MENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
				04-01-63	28.49	0.18	
				05-01-63	28.80	0.31	
				06-01-63	30.24	1.44	
				07-01-63	29.37		0.87
				08-09-63	34.97	5.60	
				09-01-63	34.10		0.87
				10-01-63	34.33	0.23	
				11-04-63	34.55	0.22	
				12-01-63	33.79		0.76
				01-01-64	33.60		0.19
				02-01-64	33.75	0.15	
				03-01-64	32.96		0.79
				04-01-64	32.98	0.02	
				05-01-64	32.88		0.10
				06-01-64	33.18	0.30	
				07-01-64	35.55	2.37	
				08-01-64	36.45	0.90	
				09-01-64	38.00	1.55	
				10-01-64	35.98		2.02
				11-01-64	35.05		0.93
				12-01-64	34.34		0.71
				01-01-65	32.95		1.39
				02-01-65	32.02		0.93
				03-01-65	31.77		0.25
				04-01-65	31.35		0.42
				05-01-65	31.63	0.28	
				06-01-65	31.15		0.48
				07-01-65	33.28	2.13	
				08-01-65	34.90	1.62	
				04-20-71	42.30	7.40	
32-24-307	KCPA	1151	507.00	09-20-66	565.00		
				09-17-70	608.00	43.00	
				11-12-71	758.00*	150.00	
				09-29-73	745.00*		13.00
				08-27-74	749.00*	4.00	
32-24-901	KGN	356	522.00	07-12-71	189.89		
				11-09-71	182.75w		7.14
				11-15-72	185.20	2.45	
				11-08-73	191.30	6.10	
				11-14-74	194.40	3.10	
32-32-301	KGN	314	525.00	10-22-70	157.98		
				07-12-71	156.34		1.64
				11-09-71	152.90		3.44

DALLAS COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE - CONTINUED
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 † MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASUREMENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
				11-15-72	155.20	2.30	
				11-08-73	155.88	0.68	
				11-14-74	157.89	2.01	
33-01-401	KCTM	2338	500.00	10-30-70	434.00		
33-03-802	KGAC	50	590.00	02-16-71	8.89		
				11-08-71	4.05		4.84
				11-15-72	8.18	4.13	
				11-08-73	5.92		2.26
				11-15-74	3.97		1.95
33-03-901	KCTM	3689	545.00	10-29-70	416.00		
				11-08-71	386.00		30.00
				11-15-72	395.00	9.00	
				11-08-73	410.00	15.00	
				11-07-74	434.30	24.30	
33-09-506	KGW	325	485.00	02-16-71	5.35		
				11-09-71	2.69		2.66
				11-15-72	1.34		1.35
				11-08-73	1.83	0.49	
				11-14-74	1.16		0.67
33-09-701	KCTM	2100	460.00	07-30-65	653.00		
				05-21-71	719.00	66.00	
				11-12-71	806.00*	87.00	
				06-06-73	836.00*	30.00	
				09-21-73	784.00		52.00
				08-27-74	864.00*	80.00	
33-10-301	KGW	1154	580.00	10-22-70	349.51		
				11-08-71	358.91	9.40	
				11-15-72	366.10	7.19	
				11-15-74	364.39		1.71
33-10-401	KCTM	2689	472.22	10-22-56	447.00*		
				12-06-65	440.00		7.00
				07-05-66	435.00		5.00
				06-29-70	525.00	90.00	
				02-16-71	525.00		
				11-12-71	510.00		15.00
				11-15-72	580.00*	70.00	
				06-11-73	543.00		37.00
				11-09-73	560.00	17.00	
				11-07-74	610.00*	50.00	

DALLAS COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE - CONTINUED
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 Q MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASURE- MENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
33-10-801	KCTM	2790	399.00	05-05-53	209.50		
				03-14-56	318.00	108.50	
				11-11-70	455.06	137.06	
				11-08-71	453.73		1.33
				11-15-72	455.26	1.53	
				11-15-74	509.00	53.74	
33-11-501	KGAC	35	570.00	02-19-71	0.66		
				11-08-71	4.17	3.51	
				11-16-72	2.30		1.87
				11-09-73	2.48	0.18	
				11-15-74	2.10		0.38
33-11-803	KGAC	17	575.00	02-19-71	9.70		
				07-26-71	10.41	0.71	
				11-08-71	8.03		2.38
				11-16-72	9.70	1.67	
				11-09-73	3.70		6.00
33-12-801	KGT	40	550.00	02-19-71	1.39		
				11-08-71	4.27	2.88	
				11-16-72	3.70		0.57
				11-15-74	2.93		0.77
33-17-401	KGV	250	500.00	10-22-70	176.32		
				07-12-71	178.29	1.97	
				11-09-71	173.75		4.54
33-17-801	KCTM	2622	730.00	05-22-70	670.00		
				07-29-71	892.00	222.00	
				04-21-72	876.00		16.00
				05-30-72	982.00*	106.00	
				11-08-73	903.00		79.00
				11-07-74	882.00		21.00
33-17-802	KCTM	2555	720.00	07-29-71	889.09		
				05-30-72	986.00*	96.91	
				11-16-72	838.00		148.00
				11-08-73	909.88	71.88	
				11-07-74	900.00		9.88
33-19-101	KCTM	3076	405.00	05-07-54	222.50		
				03-14-56	254.50	32.00	
				11-19-57	286.00		31.50
				11-06-70	393.39	107.39	
				11-17-70	391.85		1.54

DALLAS COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE - CONTINUED

* DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING

Q MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASUREMENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
				12-18-70	391.24		0.61
				03-15-71	385.77		5.47
				04-28-71	387.73	1.96	
				05-17-71	389.03	1.30	
				08-31-71	408.70	19.67	
				11-08-71	399.65		9.05
				03-01-72	381.55		18.10
				05-03-72	389.60	8.05	
				07-12-72	407.60	18.00	
				09-12-72	418.00	10.40	
				11-15-72	423.34	5.34	
				01-23-73	415.08		8.26
				03-28-73	417.70	2.62	
				05-23-73	419.41	1.71	
				07-16-73	425.04	5.63	
				09-18-73	426.32	1.28	
				11-08-73	431.81	5.49	
				02-04-74	430.17		1.64
				05-13-74	440.10	9.93	
				08-14-74	455.79	15.69	
				11-04-74	454.37		1.42
33-19-301	KGW	1600	515.00	02-09-56	317.00		
				07-26-71	454.00	137.00	
				11-08-71	468.00	14.00	
				11-15-72	476.00	8.00	
				11-16-72	474.22		1.78
				11-07-74	332.00		142.22
33-19-303	KCP#	2297	500.00	-----48	193.00		
				11-05-70	333.90	140.90	
				11-08-71	340.26	6.36	
				11-16-72	344.36	4.10	
				11-09-73	354.45	10.09	
				11-15-74	365.60	11.15	
33-20-102	KCTH	4080	503.00	-----49	250.00Q		
				07-26-71	374.42	124.42	
				11-08-71	362.52		11.90
				11-16-72	368.10	5.58	
				11-09-73	382.60	14.50	
				11-15-74	386.35Q	3.75	
33-20-401	KCTH	4110	473.00	11-----70	290.00		
				11-16-72	327.70	37.70	
				11-09-73	367.10	39.40	

DALLAS COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE - CONTINUED
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 Q MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASURE- MENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
33-25-401	KCTM	2507	780.00	07-01-69	790.00		
				09-03-71	825.00	35.00	
				07-02-72	853.00	28.00	
				06-25-74	930.00	77.00	
33-26-305	KGW	1183	520.00	09-01-50	268.00		
				12-05-61	330.00	62.00	
				11-09-71	507.00*	177.00	
				11-16-72	436.00		71.00
				11-06-73	400.00*		36.00
11-07-74	433.00	33.00					
33-26-401	KGW	946	700.00	10-22-70	521.00		
33-26-402	KGW	958	690.00	10-22-70	490.740		

DALLAS COUNTY
GROUND WATER QUALITY ANALYSES

STATE WELL NUMBER	32-24-307	32-24-901	32-32-301	33-03-802
DATE OF COLLECTION	07/13/71	07/12/71	07/12/71	02/16/71
AQUIFER CODE	KCPA-QAL	KGW	KGW	KGAC
WELL DEPTH	1151	356	314	50
TEMPERATURE-F			70	
TEMPERATURE-C				
SILICA (MG/L)	13.0	10.0	8.0	7.0
CALCIUM (MG/L)	5.0	3.0	3.0	74.0
MAGNESIUM (MG/L)	1.0	1.0	1.0	6.0
SODIUM (MG/L)	274.0	223.0	244.0	17.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	471.0	479.0	590.0	207.0
SULFATE (MG/L)	182.0	87.0	44.0	45.0
CHLORIDE (MG/L)	20.0	10.0	10.0	15.0
FLUORIDE (MG/L)	1.3	1.2	1.6	.4
NITRATE (MG/L)	1.0	.4	.4	.4
IRON (MG/L)				
PH	8.5	8.0	8.3	7.5
DISSOLVED SOLIDS (MG/L)	728.8	571.0	602.0	266.0
PHENOL, ALK. CaCO3	5.0	.0	.0	.0
TOTAL ALK. CaCO3	396.0	393.0	486.0	170.0
TOTAL HARD CaCO3	15.0	14.0	14.0	208.0
% SODIUM	97.29	97.66	97.86	15.01
SAR	29.2	28.4	31.1	.5
RSC	7.3	7.6	9.4	.0
SPECIFIC CONDUCTANCE	1050.0	885.0	930.0	442.0

DALLAS COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER DATE OF COLLECTION	33-09-701 07/13/71	33-10-301 07/12/71	33-11-501 02/19/71	33-11-803 07/26/71
AQUIFER CODE	KCTM	KGW	KGAC	KGAC
WELL DEPTH	2100	1154	35	17
TEMPERATURE-F	94			
TEMPERATURE-C				
SILICA (MG/L)	14.0	12.0	9.0	18.0
CALCIUM (MG/L)	8.0	9.0	40.0	100.0
MAGNESIUM (MG/L)	2.0	2.0	2.0	6.0
SODIUM (MG/L)	317.0	550.0	2.0	138.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	540.0	720.0	118.0	386.0
SULFATE (MG/L)	152.0	415.0	7.0	69.0
CHLORIDE (MG/L)	83.0	161.0	4.0	119.0
FLUORIDE (MG/L)	2.4	3.8	.1	.6
NITRATE (MG/L)	.4	.4	2.5	15.0
IRON (MG/L)				
PH	8.0	8.0	7.4	7.4
DISSOLVED SOLIDS (MG/L)	844.0	1507.0	124.0	655.0
PHENOL. ALK. CAC03	.0	.0	.0	.0
TOTAL ALK. CAC03	446.0	590.0	97.0	316.0
TOTAL HARD CAC03	28.0	32.0	108.0	274.0
% SODIUM	96.07	97.49	3.87	52.26
SAR	25.9	43.2	.0	3.6
RSC	8.2	11.1	.0	.8
SPECIFIC CONDUCTANCE	1280.0	2230.0	209.0	1029.0

DALLAS COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER	33-12-801	33-17-401	33-17-801	33-17-801
DATE OF COLLECTION	02/19/71	07/12/71	12/06/60	07/13/71
AQUIFER CODE	KGT	KGW	KCTM	KCTM
WELL DEPTH	40	250	2622	2622
TEMPERATURE-F				106
TEMPERATURE-C				
SILICA (MG/L)	21.0	10.0		18.0
CALCIUM (MG/L)	129.0	2.0	3.0	6.0
MAGNESIUM (MG/L)	24.0	1.0	1.0	1.0
SODIUM (MG/L)	164.0	317.0	316.0	299.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)			.1	
BORON (MG/L)				
BICARBONATE (MG/L)	368.0	640.0	527.0	520.0
SULFATE (MG/L)	399.0	98.0	109.0	131.0
CHLORIDE (MG/L)	43.0	40.0	84.0	80.0
FLUORIDE (MG/L)	1.1	2.7	1.6	1.7
NITRATE (MG/L)	.4	.4	.4	.4
IRON (MG/L)				
PH	7.8	8.5	8.3	8.1
DISSOLVED SOLIDS (MG/L)	962.0	785.0	774.0	792.0
PHENOL, ALK. CAC03	.0	8.0		.0
TOTAL ALK. CAC03	302.0	540.0	432.0	426.0
TOTAL HARD CAC03	423.0	12.0	8.0	20.0
% SODIUM	45.89	98.69	98.34	97.14
SAR	3.4	45.7	40.3	29.7
RSC	.0	10.3	8.4	8.1
SPECIFIC CONDUCTANCE	1300.0	1200.0	1370.0	1230.0

DALLAS COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER	33-18-301	33-19-301	33-20-102	33-20-102
DATE OF COLLECTION	05/05/70	07/26/71	07/03/56	07/26/71
AQUIFER CODE	QAL	KGW	KCTM	KCTM
WELL DEPTH	30	1600	4080	4080
TEMPERATURE-F				135
TEMPERATURE-C				
SILICA (MG/L)	22.0	9.0	11.0	11.0
CALCIUM (MG/L)	159.0	3.0	7.0	16.0
MAGNESIUM (MG/L)	9.0	2.0	1.0	3.0
SODIUM (MG/L)	113.0	207.0	532.0	182.0
POTASSIUM (MG/L)	1.0			
MANGANESE (MG/L)	.1			
BORON (MG/L)				
BICARBONATE (MG/L)	339.0	276.0	551.0	222.0
SULFATE (MG/L)	219.0	109.0	190.0	81.0
CHLORIDE (MG/L)	117.0	78.0	355.0	124.0
FLUORIDE (MG/L)	.5	1.9		1.2
NITRATE (MG/L)	7.0	1.0		.4
IRON (MG/L)				
PH	7.4	7.9	8.2	8.5
DISSOLVED SOLIDS (MG/L)	814.0	546.0	1366.0	527.0
PHENOL. ALK. CAC03	.0	.0		3.0
TOTAL ALK. CAC03	270.0	226.0		188.0
TOTAL HARD CAC03	435.0	16.0	22.0	51.0
% SODIUM	36.10	96.62	98.16	88.33
SAR	2.3	22.7	49.8	10.9
RSC	.0	4.2	8.5	2.5
SPECIFIC CONDUCTANCE	1150.0	880.0		880.0

DALLAS COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER	33-20-401	33-20-401	33-25-102	33-25-401
DATE OF COLLECTION	11/30/59	07/26/71	07/13/71	07/13/71
AQUIFER CODE	KCTM	KCTM	KGW	KCTM
WELL DEPTH	4110	4110	892	2507
TEMPERATURE-F		120	86	106
TEMPERATURE-C				
SILICA (MG/L)		23.0	12.0	17.0
CALCIUM (MG/L)	6.0	7.0	8.0	3.0
MAGNESIUM (MG/L)	1.0	2.0	2.0	2.0
SODIUM (MG/L)	470.0	484.0	308.0	299.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)	.1			
BORON (MG/L)				
BICARBONATE (MG/L)	611.0	620.0	472.0	520.0
SULFATE (MG/L)	175.0	200.0	262.0	108.0
CHLORIDE (MG/L)	278.0	270.0	21.0	85.0
FLUORIDE (MG/L)	3.0	3.0	1.1	1.6
NITRATE (MG/L)	.4	.4	.4	.4
IRON (MG/L)				
PH	8.1	8.1	7.8	8.0
DISSOLVED SOLIDS (MG/L)	1233.0	1294.0	846.0	771.0
PHENOL, ALK. CaCO3		.0	.0	.0
TOTAL ALK. CaCO3	501.0	510.0	387.0	426.0
TOTAL HARD CaCO3	20.0	27.0	27.0	15.0
% SODIUM	98.16	97.61	95.96	97.64
SAR	46.8	41.5	25.2	32.8
RSC	9.6	9.6	7.1	8.2
SPECIFIC CONDUCTANCE	2350.0	2020.0	1250.0	1200.0

DALLAS COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER	33-26-305	33-26-401	33-26-402
DATE OF COLLECTION	11/09/71	07/12/71	07/12/71
AQUIFER CODE	KGW	KGW	KGW
WELL DEPTH	1183	946	958
TEMPERATURE-F			
TEMPERATURE-C			
SILICA (MG/L)	12.0	13.0	12.0
CALCIUM (MG/L)	3.0	3.0	3.0
MAGNESIUM (MG/L)	3.0	1.0	2.0
SODIUM (MG/L)	460.0	399.0	448.0
POTASSIUM (MG/L)			
MANGANESE (MG/L)			
BORON (MG/L)			
BICARBONATE (MG/L)	540.0	550.0	520.0
SULFATE (MG/L)	449.0	327.0	410.0
CHLORIDE (MG/L)	72.0	63.0	97.0
FLUORIDE (MG/L)	2.0	1.5	1.7
NITRATE (MG/L)	.4	.4	1.0
IRON (MG/L)			
PH	8.5	7.8	7.5
DISSOLVED SOLIDS (MG/L)	1266.0	1078.0	1230.0
PHENOL, ALK. CaCO ₃	.0	.0	.0
TOTAL ALK. CaCO ₃	456.0	449.0	423.0
TOTAL HARD CaCO ₃	18.0	15.0	17.0
% SODIUM	98.05	98.68	98.41
SAR	44.9	50.9	49.1
RSC	8.4	8.7	8.2
SPECIFIC CONDUCTANCE	1900.0	1600.0	1830.0

DALLAS COUNTY

SUMMARY OF GROUND WATER QUALITY

AQUIFER KCPA

CONSTITUENT OR PROPERTY	MINIMUM CONCENTRATION MG/L	MAXIMUM CONCENTRATION MG/L	MEAN CONCENTRATION MG/L	MEDIAN CONCENTRATION MG/L	PERCENTAGE OF SAMPLES IN WHICH CONCENTRATION EXCEEDED AVERAGE	NUMBER OF SAMPLES FOR WHICH CONSTITUENT WAS PRESENT
SILICA (SI02)	3.00	19.00	11.75	11.00	50.00	8
CALCIUM (CA)	2.00	47.00	8.91	4.00	25.00	12
MAGNESIUM (MG)	1.00	55.00	6.41	1.00	16.66	12
SODIUM (NA)	30.00	546.00	318.15	330.00	46.15	13
BICARBONATE (HCO3)	122.00	558.00	403.00	439.00	61.53	13
SULFATE (SO4)	12.00	700.00	215.92	163.00	38.46	13
CHLORIDE (CL)	22.00	330.00	104.46	86.00	30.76	13
FLUORIDE (F)	0.10	16.00	3.07	1.40	12.50	8
NITRATE (NO3)	0.20	0.50	0.38	0.40	85.71	7
TOTAL DISSOLVED SOLIDS (TDS)	257.00	1757.00	860.18	888.00	46.15	13
HARDNESS (CACO3)	8.00	230.00	49.16	20.00	16.66	12
SPECIFIC CONDUCTANCE	451.00	1904.00	1384.42	1594.00	71.42	7
PH	7.20	9.20	8.35	8.30	50.00	12
PERCENT SODIUM	29.35	98.86	90.69	97.77	81.81	11
SAR	1.06	52.78	32.11	35.66	63.63	11
RSC	0.00	8.91	6.22	7.53	63.63	11

DALLAS COUNTY

SUMMARY OF GROUND WATER QUALITY--Continued

AQUIFER KCTM

CONSTITUENT OR PROPERTY	MINIMUM CONCENTRATION MG/L	MAXIMUM CONCENTRATION MG/L	MEAN CONCENTRATION MG/L	MEDIAN CONCENTRATION MG/L	PERCENTAGE OF SAMPLES IN WHICH CONCENTRATION EXCEEDED AVERAGE	NUMBER OF SAMPLES FOR WHICH CONSTITUENT WAS PRESENT
SILICA (SI02)	4.00	43.00	18.64	16.00	21.42	14
CALCIUM (CA)	2.00	233.00	14.91	5.00	8.33	24
MAGNESIUM (MG)	0.00	58.00	3.87	1.00	8.33	24
SODIUM (NA)	182.00	1137.00	433.79	362.00	25.00	24
BICARBONATE (HCO3)	222.00	628.00	519.60	537.00	60.00	25
SULFATE (SO4)	19.00	2832.00	326.64	181.00	12.00	25
CHLORIDE (CL)	64.00	355.00	148.16	124.00	36.00	25
FLUORIDE (F)	1.20	10.80	2.56	2.00	21.05	19
NITRATE (NO3)	0.20	2.00	0.62	0.40	16.66	18
TOTAL DISSOLVED SOLIDS (TDS)	527.00	4497.00	1177.29	938.00	24.00	25
HARDNESS (CAC03)	8.00	824.00	53.83	18.00	4.16	24
SPECIFIC CON- DUCTANCE	880.00	2385.00	1607.20	1470.00	26.66	15
PH	8.00	8.70	8.30	8.30	36.36	22
PERCENT SODIUM	75.10	99.17	96.61	98.00	79.16	24
SAR	10.95	66.00	41.34	41.66	54.16	24
RSC	0.00	9.87	7.93	8.28	79.16	24

DALLAS COUNTY

SUMMARY OF GROUND WATER QUALITY--Continued

AQUIFER KGW

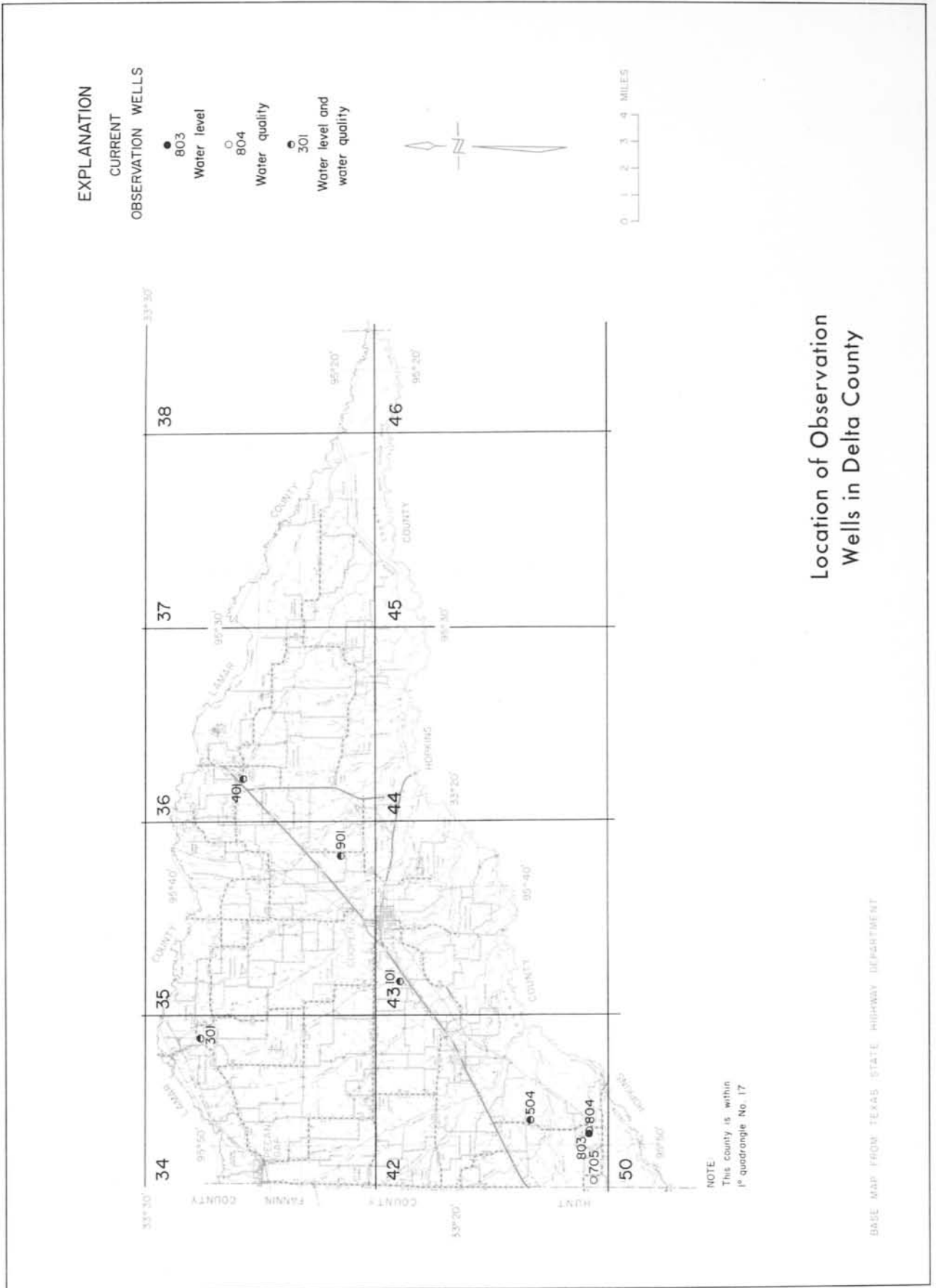
CONSTITUENT OR PROPERTY	MINIMUM CONCENTRATION MG/L	MAXIMUM CONCENTRATION MG/L	MEAN CONCENTRATION MG/L	MEDIAN CONCENTRATION MG/L	PERCENTAGE OF SAMPLES IN WHICH CONCENTRATION EXCEEDED AVERAGE	NUMBER OF SAMPLES FOR WHICH CONSTITUENT WAS PRESENT
SILICA (SI02)	8.00	32.00	12.75	12.00	31.25	16
CALCIUM (CA)	1.00	25.00	4.43	3.00	17.39	23
MAGNESIUM (MG)	0.00	4.00	1.42	1.00	33.33	21
SODIUM (NA)	207.00	922.00	467.39	465.00	43.47	23
BICARBONATE (HCO3)	276.00	1013.00	619.56	561.00	34.78	23
SULFATE (SO4)	44.00	504.00	320.30	380.00	65.21	23
CHLORIDE (CL)	10.00	572.00	127.52	97.00	34.78	23
FLUORIDE (F)	1.10	4.50	2.40	2.00	31.81	22
NITRATE (NO3)	0.00	1.00	0.48	0.40	26.31	19
TOTAL DISSOLVED SOLIDS (TDS)	546.00	2418.00	1236.70	1257.00	52.17	23
HARDNESS (CAC03)	3.00	75.00	17.39	14.00	21.73	23
SPECIFIC CON- DUCTANCE	880.00	3130.00	1855.26	1900.00	47.36	19
PH	7.50	8.60	8.11	8.10	42.10	19
PERCENT SODIUM	93.47	99.57	98.18	98.68	61.90	21
SAR	22.72	105.19	56.63	54.48	47.61	21
RSC	4.20	16.02	9.98	9.10	38.09	21

DALLAS COUNTY

REPORTED MUNICIPAL AND INDUSTRIAL GROUND WATER PUMPAGE

YEAR	MUNICIPAL PUMPAGE (ACRE-FEET)	INDUSTRIAL PUMPAGE (ACRE-FEET)	MUNICIPAL AND INDUSTRIAL PUMPAGE (ACRE-FEET)
1955	14,041.47	8,910.47	22,951.94
1956	14,041.47	8,910.47	22,951.94
1957	10,340.51	8,910.47	19,250.98
1958	11,057.99	6,799.42	17,857.41
1959	9,850.09	7,533.53	17,383.62
1960	9,797.23	6,957.67	16,754.90
1961	10,455.60	6,846.05	17,301.65
1962	10,216.52	7,720.42	17,936.94
1963	11,182.21	9,320.45	20,502.66
1964	11,343.87	7,798.07	19,141.94
1965	11,154.07	7,847.96	19,002.03
1966	11,885.51	8,056.71	19,942.22
1967	12,483.72	7,864.20	20,347.92
1968	11,818.44	6,301.64	18,120.08
1969	13,061.41	6,697.54	19,758.95
1970	12,951.28	6,504.85	19,096.13
1971	10,485.36	4,816.04	15,301.40
1972	13,734.22	6,926.95	20,661.17
Total	209,540.97	134,722.91	344,263.88

WATER-LEVEL MEASUREMENTS IN DELTA COUNTY



EXPLANATION

CURRENT

OBSERVATION WELLS

● 803

Water level

○ 804

Water quality

⊙ 301

Water level and water quality



Location of Observation Wells in Delta County

NOTE:
This county is within
1° quadrangle No. 17

BASE MAP FROM TEXAS STATE HIGHWAY DEPARTMENT

DELTA COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 @ MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASUREMENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
17-34-301	KCPA	3333	540.00	05-19-71	126.96		
				11-10-71	129.89	2.93	
				11-13-72	130.28	0.39	
				11-08-74	137.65	7.37	
17-35-901	KGVA	30	470.00	05-24-71	15.93		
				11-10-71	15.27		0.66
				11-13-72	14.68		0.59
				11-13-73	11.37		3.31
				11-08-74	12.16	0.79	
17-36-401	KGT	75	445.00	05-24-71	3.08		
				11-10-71	1.83		1.25
				11-13-73	0.70		1.13
				11-08-74	0.12		0.58
17-42-504	KGVA	281	477.00	02-05-71	184.80		
				11-13-72	189.98	5.18	
				11-13-73	186.70		3.28
				11-08-74	194.30	7.60	
17-42-803	KGVA	460	481.00	02-04-71	281.70		
				05-19-71	191.93		89.77
				11-10-71	189.89		2.04
				11-13-72	213.40	23.51	
				11-13-73	202.32		11.08
11-08-74	193.40		8.92				
17-43-101	KGVA	50	490.00	05-19-71	19.79		
				11-10-71	17.42		2.37
				11-13-72	20.62	3.20	
				11-13-73	14.21		6.41
				11-08-74	13.44		0.77

DELTA COUNTY

GROUND WATER QUALITY ANALYSES

STATE WELL NUMBER DATE OF COLLECTION	17-34-301 05/19/71	17-35-901 05/24/71	17-36-401 05/24/71	17-42-504 05/18/71
AQUIFER CODE	KCPA	KGNA	KGT	KGNA
WELL DEPTH	3333	30	75	281
TEMPERATURE-F				
TEMPERATURE-C				
SILICA (MG/L)	20.0	36.0	20.0	12.0
CALCIUM (MG/L)	3.0	78.0	35.0	3.0
MAGNESIUM (MG/L)	2.0	5.0	3.0	1.0
SODIUM (MG/L)	386.0	88.0	39.0	413.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	710.0	399.0	133.0	510.0
SULFATE (MG/L)	177.0	56.0	54.0	4.0
CHLORIDE (MG/L)	72.0	15.0	9.0	349.0
FLUORIDE (MG/L)	3.5	.6	1.5	1.9
NITRATE (MG/L)	.4	5.0	1.0	.4
IRON (MG/L)				
PH	8.4	7.5	8.0	7.9
DISSOLVED SOLIDS (MG/L)	1013.0	479.0	227.0	1035.0
PHENOL, ALK, CaCO3	1.0	.0	.0	.0
TOTAL ALK. CaCO3	580.0	327.0	109.0	415.0
TOTAL HARD CaCO3	16.0	218.0	100.0	12.0
% SODIUM	98.16	47.07	45.97	98.72
SAR	42.3	2.6	1.6	52.7
RSC	11.3	2.2	.1	8.1
SPECIFIC CONDUCTANCE	1540.0	702.0	358.0	1730.0

DELTA COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER	17-42-705	17-42-804	17-42-804	17-43-101
DATE OF COLLECTION	05/18/71	05/19/71	11/10/71	05/19/71
AQUIFER CODE	KGNA	KGNA	KGNA	KGNA
WELL DEPTH	460	460	460	50
TEMPERATURE-F				
TEMPERATURE-C				
SILICA (MG/L)	11.0	11.0	11.0	36.0
CALCIUM (MG/L)	3.0	7.0	5.0	570.0
MAGNESIUM (MG/L)	5.0	9.0	4.0	56.0
SODIUM (MG/L)	217.0	444.0	474.0	367.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	468.0	464.0	467.0	427.0
SULFATE (MG/L)	43.0	42.0	32.0	1930.0
CHLORIDE (MG/L)	17.0	408.0	446.0	53.0
FLUORIDE (MG/L)	.6	1.1	1.1	1.0
NITRATE (MG/L)	.4	.4	.4	.4
IRON (MG/L)				
PH	8.9	8.2	8.4	7.4
DISSOLVED SOLIDS (MG/L)	527.0	1150.0	1203.0	3223.0
PHENOL. ALK. CaCO3	19.0	.0	1.0	.0
TOTAL ALK. CaCO3	422.0	380.0	385.0	350.0
TOTAL HARD CaCO3	28.0	55.0	28.0	1660.0
% SODIUM	94.39	94.66	97.27	32.57
SAR	17.8	26.1	38.3	3.9
RSC	7.1	6.5	7.0	.0
SPECIFIC CONDUCTANCE	861.0	1930.0	2140.0	3300.0

DELTA COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER	17-43-101
DATE OF COLLECTION	11/13/73
AQUIFER CODE	KGNA
WELL DEPTH	50
TEMPERATURE-F	
TEMPERATURE-C	
SILICA (MG/L)	27.0
CALCIUM (MG/L)	373.0
MAGNESIUM (MG/L)	28.0
SODIUM (MG/L)	197.0
POTASSIUM (MG/L)	
MANGANESE (MG/L)	
BORON (MG/L)	
BICARBONATE (MG/L)	275.0
SULFATE (MG/L)	1180.0
CHLORIDE (MG/L)	32.0
FLUORIDE (MG/L)	.9
NITRATE (MG/L)	1.9
IRON (MG/L)	
PH	7.3
DISSOLVED SOLIDS (MG/L)	1975.0
PHENOL. ALK. CaCO3	.0
TOTAL ALK. CaCO3	225.0
TOTAL HARD CaCO3	1050.0
% SODIUM	29.06
SAR	2.6
RSC	.0
SPECIFIC CONDUCTANCE	2250.0

DELTA COUNTY

REPORTED MUNICIPAL AND INDUSTRIAL GROUND WATER PUMPAGE

YEAR	MUNICIPAL PUMPAGE (ACRE-FEET)	INDUSTRIAL PUMPAGE (ACRE-FEET)	MUNICIPAL AND INDUSTRIAL PUMPAGE (ACRE-FEET)
1955	.00	.00	.00
1956	.00	.00	.00
1957	.00	.00	.00
1958	.00	.00	.00
1959	.00	.00	.00
1960	.00	.00	.00
1961	.00	.00	.00
1962	.00	.00	.00
1963	.00	.00	.00
1964	.00	.00	.00
1965	.00	.00	.00
1966	.00	.00	.00
1967	.00	.00	.00
1968	.00	.00	.00
1969	.00	.00	.00
1970	.00	.00	.00
1971	.00	.00	.00
1972	71.59	.00	71.59
Total	71.59	.00	71.59

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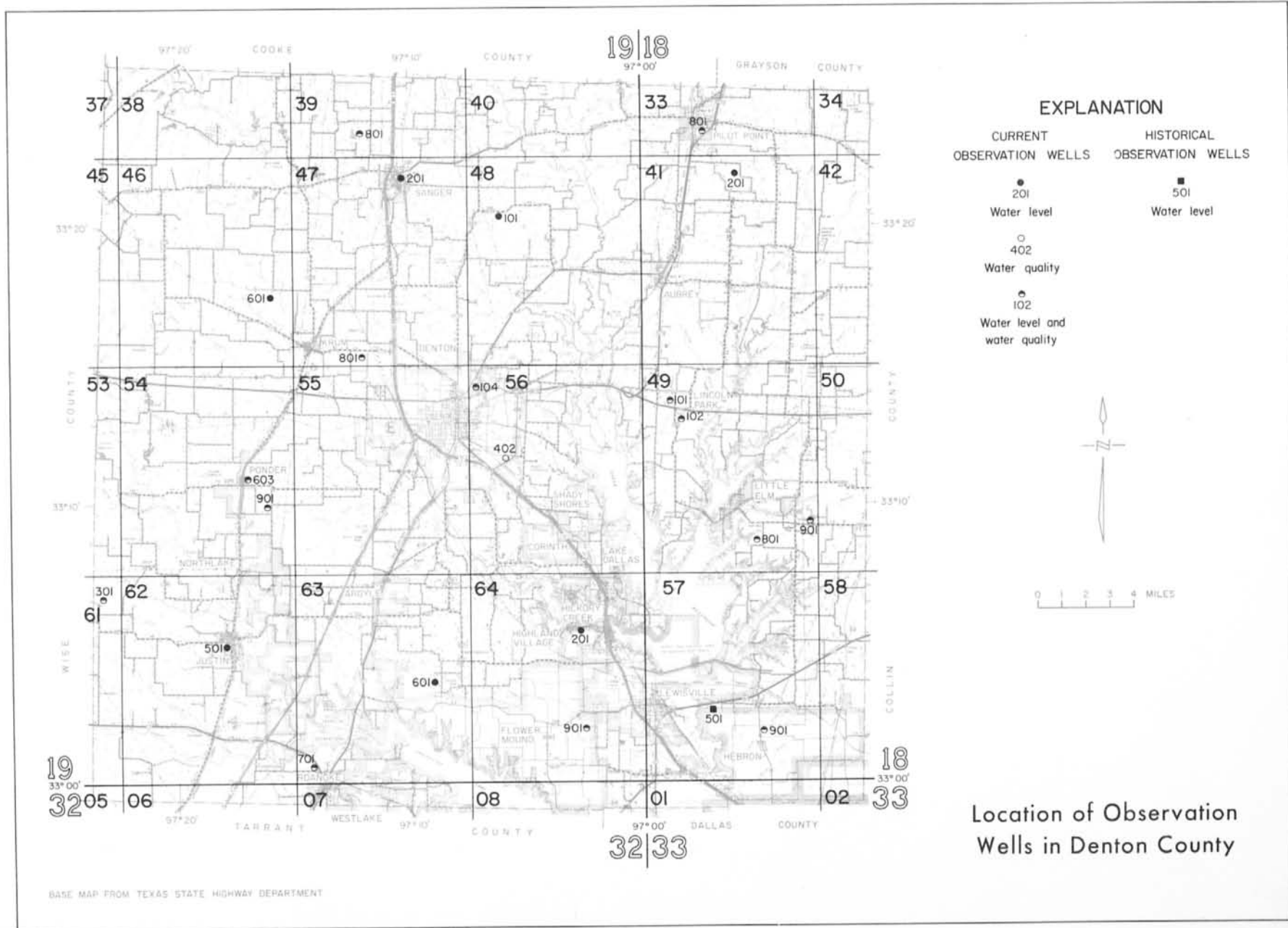
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WATER-LEVEL MEASUREMENTS IN DENTON COUNTY



EXPLANATION

- | | |
|---|---------------------------------|
| CURRENT
OBSERVATION WELLS | HISTORICAL
OBSERVATION WELLS |
| ● 201
Water level | ■ 501
Water level |
| ○ 402
Water quality | |
| ● 102
Water level and
water quality | |



Location of Observation Wells in Denton County

BASE MAP FROM TEXAS STATE HIGHWAY DEPARTMENT

DENTON COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 W MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	ARTIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASUREMENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
18-33-801	KCA	1545	710.00	11-11-71	241.73		
				11-19-74	267.11	25.38	
18-41-201	KGW	210	625.00	09-29-70	58.76		
				02-26-71	55.72		3.04
				11-09-71	62.12	6.40	
				11-14-72	63.85	1.73	
				11-06-73	66.12	2.27	
18-49-101	KCPA	915	590.00	10-06-70	190.80		
				02-26-71	189.76		1.04
				11-09-71	212.12	22.36	
				11-14-72	223.60	11.48	
				11-06-73	225.22	1.62	
18-49-102	KCTM	1542	590.00	10-06-70	270.51		
				02-26-71	272.35	1.84	
				11-14-72	168.80		103.55
				11-06-73	169.68	0.88	
				11-14-74	185.29	15.61	
18-49-801	KGW	420	540.00	10-06-70	137.38		
				02-26-71	126.54		10.84
				11-09-71	141.43	14.89	
				11-14-72	145.10W	3.67	
				11-06-73	147.84W	2.74	
18-49-901	KGW	275	585.00	10-06-70	136.35		
				02-26-71	129.70W		6.65
				11-14-74	111.60W		18.10
18-57-501	KGW	160	480.00	09-30-70	94.76		
18-57-901	KCPA	1308	510.00	09-30-70	273.12		
				02-26-71	277.58	4.46	
				11-09-71	291.50	13.92	
				11-13-72	311.47	19.97	
				11-06-73	314.36	2.89	
				11-14-74	318.78	4.42	
19-39-801	KCA	360	714.00	10-01-70	169.10		

DENTON COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE - CONTINUED
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 Q MEASUREMENT QUESTIONED DUE TO BOREHOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASURE- MENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
				02-25-71	173.33	4.23	
				11-08-71	177.12	3.79	
				11-14-72	178.54	1.42	
				11-06-73	179.34	0.80	
				11-13-74	181.17	1.83	
19-46-601	KCPA	249	760.00	09-30-70	180.91		
				02-25-71	182.21	1.30	
				11-08-71	184.95	2.74	
				11-14-72	190.38	5.43	
				11-06-73	191.93	1.55	
19-47-201	KCA	968	666.00	10-01-70	202.55		
				11-14-72	179.97		22.58
				11-13-74	203.51	23.54	
19-47-801	KCPA	552	715.00	09-30-70	189.50		
				02-25-71	196.29 _w	6.79	
				11-14-72	230.80	34.51	
				11-06-73	235.02	4.22	
				11-14-74	239.56	4.54	
19-48-101	KCA	----	700.00	10-01-70	212.97		
				02-25-71	211.87		1.10
				11-08-71	215.89	4.02	
				11-14-72	221.55	5.66	
				11-06-73	225.38	3.83	
				11-14-74	230.74	5.36	
19-54-603	KC1N	980	735.00	07-23-49	360.00		
				07-23-71	434.00	74.00	
				11-10-71	415.00		19.00
				11-15-72	495.00 _w	80.00	
				11-06-73	406.00		89.00
				11-06-74	385.00		21.00
19-54-901	KCPA	450	722.00	10-02-70	267.86		
				02-25-71	272.59	4.73	
				11-14-74	283.70*	11.11	
19-56-104	KCPA-KCGK- KC1N	1200	633.00	06-22-57	362.00 _w		
				07-22-60	180.00		182.00
				10-22-62	179.00		1.00
				06-22-65	183.00	4.00	
				05-22-68	185.00	2.00	
				01-22-70	188.00	3.00	

DENTON COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE - CONTINUED
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 W MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASUREMENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
				09-01-71	197.00*	9.00	
				11-14-72	210.24	13.24	
				11-05-73	217.44	7.20	
				11-19-74	248.08	30.64	
19-61-301	KCPA	415	832.00	10-02-70	236.210		
				02-25-71	236.040		0.17
				11-09-71	192.36		43.68
				11-13-72	194.48	2.12	
				11-05-73	194.88	0.40	
				11-17-74	196.75	1.87	
19-62-501	KCTM	1003	660.00	10-07-70	371.20		
				02-24-71	370.96		0.24
				11-18-74	400.30	29.34	
19-63-601	KCPA	870	880.00	10-05-70	356.49		
				02-25-71	360.230	3.74	
				11-09-71	378.490	18.26	
				11-13-72	405.50*	27.01	
				11-05-73	410.760	5.26	
				11-18-74	413.78	3.02	
19-63-701	KCPA	626	887.00	10-05-70	347.60		
				02-25-71	348.97	1.37	
				11-09-71	364.76	15.79	
				11-13-72	376.42	11.66	
				11-18-74	371.10		5.32
19-64-201	KCTM	1748	560.00	10-07-70	313.90		
				02-26-71	317.04	3.14	
				11-09-71	338.63	21.59	
				11-13-72	358.60	19.97	
				11-06-73	363.87	5.27	
19-64-901	KGR	260	562.00	10-05-70	98.92		
				02-25-71	90.64		8.28
				11-09-71	96.39	5.75	
				11-13-72	98.65	2.26	
				11-05-73	96.01		2.64
				11-18-74	95.37		0.64

DENTON COUNTY

GROUND WATER QUALITY ANALYSES

STATE WELL NUMBER	18-33-801	18-49-101	18-49-102	18-49-801
DATE OF COLLECTION	07/23/71	02/26/71	02/26/71	02/26/71
AQUIFER CODE	KCA	KCPA	KCTM	KGW
WELL DEPTH	1565	915	1542	420
TEMPERATURE-F				
TEMPERATURE-C				
SILICA (MG/L)	13.0	13.0	15.0	10.0
CALCIUM (MG/L)	2.0	1.0	1.0	2.0
MAGNESIUM (MG/L)	1.0	1.0	1.0	2.0
SODIUM (MG/L)	196.0	258.0	233.0	250.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	361.0	497.0	421.0	486.0
SULFATE (MG/L)	107.0	97.0	95.0	73.0
CHLORIDE (MG/L)	14.0	17.0	20.0	32.0
FLUORIDE (MG/L)	.4	.9	.8	2.1
NITRATE (MG/L)	1.0	2.0	1.5	.4
IRON (MG/L)				
PH	8.8	8.9	8.9	8.8
DISSOLVED SOLIDS (MG/L)	511.0	634.0	574.0	610.0
PHENOL. ALK. CAC03	11.0	22.0	21.0	18.0
TOTAL ALK. CAC03	318.0	451.0	387.0	434.0
TOTAL HARD CAC03	10.0	10.0	9.0	13.0
% SODIUM	97.90	98.83	98.71	97.62
SAR	28.2	43.6	39.4	29.9
RSC	5.7	8.0	6.7	7.7
SPECIFIC CONDUCTANCE	814.0	1024.0	935.0	989.0

DENTON COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER	18-49-801	18-49-901	18-57-901	19-39-801
DATE OF COLLECTION	11/09/71	03/26/71	02/26/71	02/25/71
AQUIFER CODE	KGW	KGW	KCPA	KCA
WELL DEPTH	420	275	1308	360
TEMPERATURE-F	60			
TEMPERATURE-C				
SILICA (MG/L)	10.0	10.0	14.0	12.0
CALCIUM (MG/L)	2.0	6.0	1.0	1.0
MAGNESIUM (MG/L)	2.0	2.0	1.0	1.0
SODIUM (MG/L)	250.0	710.0	247.0	233.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	510.0	750.0	468.0	454.0
SULFATE (MG/L)	77.0	408.0	110.0	52.0
CHLORIDE (MG/L)	32.0	370.0	15.0	12.0
FLUORIDE (MG/L)	2.3	3.4	.8	.6
NITRATE (MG/L)	.4	3.3	.4	2.0
IRON (MG/L)				
PH	8.4	8.0	8.7	9.2
DISSOLVED SOLIDS (MG/L)	626.0	1881.0	619.0	536.0
PHENOL. ALK. CAC03	4.0	.0	13.0	38.0
TOTAL ALK. CAC03	426.0	620.0	410.0	448.0
TOTAL HARD CAC03	12.0	23.0	9.0	9.0
% SODIUM	97.62	98.52	98.78	98.71
SAR	29.9	64.1	41.8	39.4
RSC	8.0	11.8	7.5	7.3
SPECIFIC CONDUCTANCE	990.0	2820.0	985.0	898.0

DENTON COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER DATE OF COLLECTION	19-39-801 11/08/71	19-47-801 11/14/72	19-54-603 07/23/71	19-54-901 02/25/71
AQUIFER CODE	KCA	KCA	KCA	KCPA
WELL DEPTH	360	----	980	450
TEMPERATURE-F	56			
TEMPERATURE-C				
SILICA (MG/L)	12.0	10.0	12.0	13.0
CALCIUM (MG/L)	1.0	1.0	4.0	2.0
MAGNESIUM (MG/L)	2.0	1.0	2.0	1.0
SODIUM (MG/L)	229.0	242.0	178.0	198.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	472.0	500.0	318.0	403.0
SULFATE (MG/L)	51.0	72.0	68.0	38.0
CHLORIDE (MG/L)	12.0	11.0	51.0	8.0
FLUORIDE (MG/L)	.6	.8	.2	.3
NITRATE (MG/L)	1.5	.4	1.0	.4
IRON (MG/L)				
PH	9.0	8.9	8.6	9.1
DISSOLVED SOLIDS (MG/L)	541.0	584.0	472.0	458.0
PHENOL. ALK. CaCO3	30.0	.0	6.0	27.0
TOTAL ALK. CaCO3	447.0	453.0	273.0	384.0
TOTAL HARD CaCO3	11.0	9.0	18.0	7.0
% SODIUM	97.89	98.76	95.51	97.93
SAR	30.4	40.9	18.1	28.5
RSC	7.5	8.0	4.8	6.4
SPECIFIC CONDUCTANCE	916.0	945.0	765.0	780.0

DENTON COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER DATE OF COLLECTION	19-56-104 07/23/71	19-56-402 07/23/71	19-61-301 02/25/71	19-63-701 02/25/71
AQUIFER CODE	KCPA-KCGR	KCPA	KCPA	KCPA
WELL DEPTH	1200	765	415	626
TEMPERATURE-F				
TEMPERATURE-C				
SILICA (MG/L)	12.0	11.0	16.0	3.0
CALCIUM (MG/L)	2.0	3.0	55.0	32.0
MAGNESIUM (MG/L)	2.0	1.0	18.0	4.0
SODIUM (MG/L)	196.0	253.0	42.0	8.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	387.0	560.0	322.0	105.0
SULFATE (MG/L)	89.0	80.0	28.0	12.0
CHLORIDE (MG/L)	14.0	12.0	9.0	8.0
FLUORIDE (MG/L)	.6	1.1	.1	.2
NITRATE (MG/L)	.4	.4	2.5	3.5
IRON (MG/L)				
PH	8.8	8.6	7.4	7.2
DISSOLVED SOLIDS (MG/L)	506.0	636.0	328.0	122.0
PHENOL. ALK. CaCO3	11.0	10.0	.0	.0
TOTAL ALK. CaCO3	339.0	476.0	264.0	86.0
TOTAL HARD CaCO3	13.0	12.0	214.0	94.0
% SODIUM	96.99	97.93	30.18	15.30
SAR	23.4	32.3	1.2	.3
RSC	6.0	8.9	1.0	.0
SPECIFIC CONDUCTANCE	805.0	994.0	540.0	215.0

DENTON COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER	19-63-701	19-64-901
DATE OF COLLECTION	11/09/71	02/25/71
AQUIFER CODE	KCPA	KGW
WELL DEPTH	626	260
TEMPERATURE-F	61	
TEMPERATURE-C		
SILICA (MG/L)	13.0	9.0
CALCIUM (MG/L)	1.0	2.0
MAGNESIUM (MG/L)	2.0	1.0
SODIUM (MG/L)	196.0	188.0
POTASSIUM (MG/L)		
MANGANESE (MG/L)		
BORON (MG/L)		
BICARBONATE (MG/L)	420.0	348.0
SULFATE (MG/L)	31.0	67.0
CHLORIDE (MG/L)	7.0	31.0
FLUORIDE (MG/L)	.3	1.4
NITRATE (MG/L)	1.5	.4
IRON (MG/L)		
PH	9.0	8.6
DISSOLVED SOLIDS (MG/L)	458.0	470.0
PHENOL. ALK. CAC03	29.0	7.0
TOTAL ALK. CAC03	402.0	299.0
TOTAL HARD CAC03	12.0	9.0
% SODIUM	97.54	97.82
SAR	26.0	27.1
RSC	6.6	5.5
SPECIFIC CONDUCTANCE	785.0	748.0

DENTON COUNTY

SUMMARY OF GROUND WATER QUALITY

AQUIFER KCPA

CONSTITUENT OR PROPERTY	MINIMUM CONCENTRATION MG/L	MAXIMUM CONCENTRATION MG/L	MEAN CONCENTRATION MG/L	MEDIAN CONCENTRATION MG/L	PERCENTAGE OF SAMPLES IN WHICH CONCENTRATION EXCEEDED AVERAGE	NUMBER OF SAMPLES FOR WHICH CONSTITUENT WAS PRESENT
SILICA (SI02)	3.00	14.00	11.00	13.00	42.85	7
CALCIUM (CA)	1.00	32.00	6.00	2.00	14.28	7
MAGNESIUM (MG)	0.00	4.00	1.28	1.00	28.57	7
SODIUM (NA)	8.00	253.00	191.28	207.00	57.14	7
BICARBONATE (HCO3)	105.00	560.00	391.42	420.00	57.14	7
SULFATE (SO4)	12.00	110.00	60.14	67.00	57.14	7
CHLORIDE (CL)	7.00	31.00	13.71	12.00	42.85	7
FLUORIDE (F)	0.20	1.40	0.65	0.60	42.85	7
NITRATE (NO3)	0.40	3.50	1.21	0.80	28.57	7
TOTAL DISSOLVED SOLIDS (TDS)	122.00	636.00	477.71	470.00	42.85	7
HARDNESS (CAC03)	2.00	94.00	21.00	9.00	14.28	7
SPECIFIC CONDUCTANCE	84.00	994.00	685.00	785.00	71.42	7
PH	7.20	9.00	8.44	8.60	71.42	7
PERCENT SODIUM	15.30	99.50	86.41	97.93	71.42	7
SAR	0.35	66.11	33.43	32.32	28.57	7
RSC	0.00	8.94	6.03	6.66	57.14	7

DENTON COUNTY

SUMMARY OF GROUND WATER QUALITY--Continued

AQUIFER KCA

CONSTITUENT OR PROPERTY	MINIMUM CONCENTRATION MG/L	MAXIMUM CONCENTRATION MG/L	MEAN CONCENTRATION MG/L	MEDIAN CONCENTRATION MG/L	PERCENTAGE OF SAMPLES IN WHICH CONCENTRATION EXCEEDED AVERAGE	NUMBER OF SAMPLES FOR WHICH CONSTITUENT WAS PRESENT
SILICA (SI02)	9.00	21.00	13.00	12.00	22.22	18
CALCIUM (CA)	0.00	2.00	1.11	1.00	38.88	18
MAGNESIUM (MG)	0.00	1.00	0.16	0.00	16.66	18
SODIUM (NA)	179.00	289.00	221.77	223.00	61.11	18
BICARBONATE (HCO3)	278.00	536.00	383.27	354.00	38.88	18
SULFATE (SO4)	47.00	126.00	89.00	95.00	61.11	18
CHLORIDE (CL)	7.00	34.00	19.55	18.00	44.44	18
FLUORIDE (F)	0.10	1.50	0.56	0.50	46.66	15
NITRATE (NO3)	0.00	3.00	1.17	1.50	58.82	17
TOTAL DISSOLVED SOLIDS (TDS)	435.00	697.00	536.22	520.00	44.44	18
HARDNESS (CAC03)	2.00	10.00	6.72	7.00	55.55	18
SPECIFIC CON- DUCTANCE	84.00	1140.00	773.11	837.00	66.66	18
PH	7.90	8.90	8.52	8.60	57.14	14
PERCENT SODIUM	96.99	100.00	98.88	98.83	44.44	18
SAR	32.59	75.75	48.17	44.02	30.76	13
RSC	4.50	8.73	6.20	5.80	38.88	18

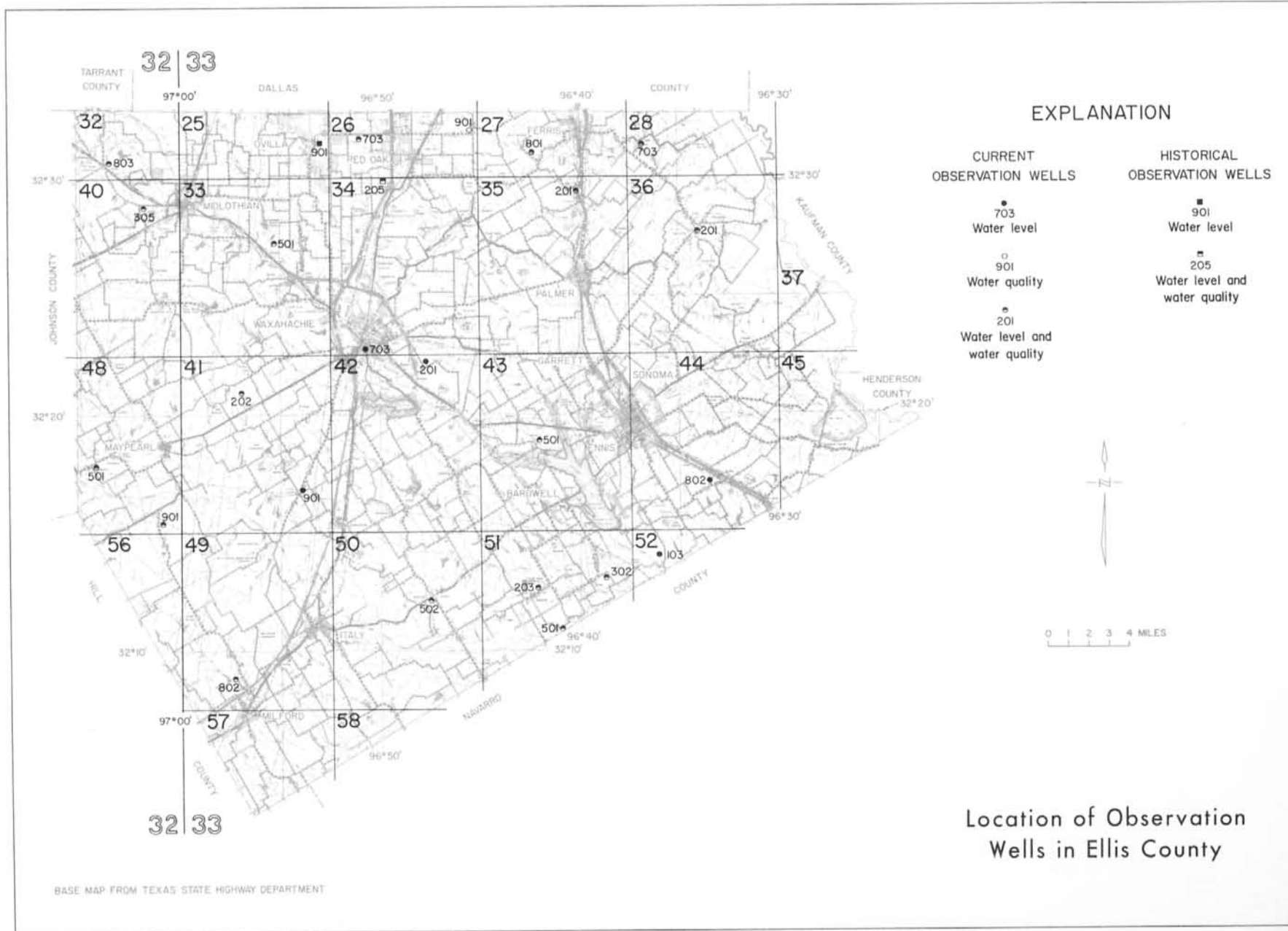
DENTON COUNTY

REPORTED MUNICIPAL AND INDUSTRIAL GROUND WATER PUMPAGE

YEAR	MUNICIPAL PUMPAGE (ACRE-FEET)	INDUSTRIAL PUMPAGE (ACRE-FEET)	MUNICIPAL AND INDUSTRIAL PUMPAGE (ACRE-FEET)
1955	3,661.99	8.46	3,670.45
1956	4,190.52	9.20	4,199.72
1957	4,030.36	9.20	4,039.56
1958	1,130.12	46.34	1,176.46
1959	838.45	10.03	848.48
1960	879.73	60.07	939.80
1961	890.29	48.06	938.35
1962	952.74	55.62	1,008.36
1963	1,120.53	41.42	1,161.95
1964	1,074.76	45.26	1,120.02
1965	1,017.91	44.97	1,062.88
1966	1,145.69	60.32	1,206.01
1967	1,473.34	61.31	1,534.65
1968	1,679.85	56.71	1,736.56
1969	1,990.24	40.06	2,030.30
1970	2,265.93	.00	2,265.93
1971	2,684.25	.00	2,684.25
1972	3,572.84	4.39	3,577.23
Total	34,599.54	601.42	35,200.96



WATER-LEVEL MEASUREMENTS IN ELLIS COUNTY



ELLIS COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 W MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASUREMENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
32-32-803	KGN	355	550.00	03-18-71	162.54		
				11-10-71	164.64	2.10	
				11-14-72	175.40	10.76	
				11-14-74	182.25	6.85	
32-40-305	KGN	543	645.00	06-22-68	307.00		
				03-19-71	323.71	16.71	
				11-10-71	328.04	4.33	
				11-14-72	347.00	18.96	
				11-07-73	375.97	28.97	
11-14-74	377.98	2.01					
32-44-501	KGN	367	592.00	06-22-65	132.70		
				11-20-69	154.73	22.03	
				02-23-71	159.70	4.97	
				11-10-71	164.57	4.87	
				11-13-72	166.00	1.43	
				11-06-73	174.20	8.20	
11-14-74	179.14	4.94					
32-48-901	KGN	384	528.00	06-22-64	168.60		
				11-19-69	194.90	26.30	
				11-19-69	195.45	0.55	
				02-23-71	202.23	6.78	
				11-10-71	204.40 _w	2.17	
				11-13-72	214.62	10.42	
				11-06-73	216.42	1.60	
11-14-74	221.95 _w	5.53					
33-25-901	KGN	735	630.00	03-23-59	348.00		
				05-21-70	444.40	96.40	
				11-10-71	441.90		2.50
33-26-703	KGN	26	605.00	03-19-71	13.64		
				11-09-71	9.99		3.65
				11-14-72	12.45	2.46	
				11-07-73	7.52		4.93
				11-14-74	6.44		1.08
33-27-801	KGN	1447	480.00	06-21-65	253.10		
				05-18-70	264.75	11.65	
				02-23-71	268.97	4.22	
				11-14-72	286.65 _Q	17.68	

ELLIS COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE - CONTINUED
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 Q MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	ARTIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASURE- MENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
33-28-703	KGW	1350	445.00	04-29-71	312.60		
				11-11-71	312.90	0.30	
				11-14-72	313.44	0.54	
				11-07-73	316.28	2.84	
				11-14-74	319.41	3.13	
33-32-501	KGW	780	650.00	09-21-68	380.00		
				03-18-71	372.85		7.15
				11-10-71	374.26	1.41	
				11-14-72	372.63		1.63
				11-07-73	393.70	21.07	
11-14-74	400.70	7.00					
33-34-205	KGW	967	590.00	04-09-70	440.00		
33-34-703	KCHU	2653	540.00	05-22-73	443.25		
				07-14-73	448.00	4.75	
				11-07-73	455.49	7.49	
				02-04-74	457.25	1.76	
				05-13-74	465.82	8.57	
				08-14-74	480.43	14.61	
11-04-74	477.46		2.97				
33-35-201	KGT	30	530.00	04-29-71	9.09		
				11-11-71	8.94		0.15
				11-14-72	10.15	1.21	
				11-14-74	1.43		8.72
33-36-201	KGW	1982	505.00	04-30-71	359.28		
				11-11-71	387.30	28.02	
				11-14-72	384.10		3.20
				11-07-73	392.24	8.14	
				11-14-74	408.80	16.56	
33-41-202	KGW	727	680.00	06-16-65	343.35		
				03-19-71	382.76	39.41	
				11-10-71	385.87	3.11	
				11-13-72	381.00		4.87
33-41-901	KGW	620	610.00	07-19-65	277.59		
				11-18-69	301.75	24.16	
				02-22-71	305.24	3.49	
				11-10-71	316.58	11.34	
				11-13-72	314.44		2.14
33-42-201	KGW	1285	557.00	08-12-65	325.28		

ELLIS COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE - CONTINUED
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 W MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASUREMENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
				05-21-70	349.20	23.92	
				02-22-71	354.17	4.97	
				11-10-71	357.48 _W	3.31	
				11-13-72	355.20 _W		2.28
				11-07-73	371.06	15.86	
				11-15-74	377.20 _G	6.14	
33-43-501	DAL	32	473.00	08-10-65	28.70		
				05-21-70	21.12		7.58
				02-22-71	25.50	4.38	
				11-11-71	28.36	2.86	
				11-13-72	27.10		1.26
				11-07-73	24.86		2.24
				11-15-74	26.59	1.73	
33-44-802	KGT	45	472.00	08-12-65	18.65		
				05-18-70	7.14		11.51
				02-22-71	10.10	2.96	
				11-11-71	11.90	1.80	
				11-13-72	13.02	1.12	
				11-06-73	7.59		5.43
				11-14-74	4.30		3.29
33-49-802	KGAL	----	635.00	11-19-69	5.73		
				02-22-71	5.48		0.25
				11-10-71	7.05	1.57	
				11-13-72	6.26		0.77
				11-06-73	5.58		0.70
				11-14-74	4.68		0.90
33-50-502	KGW	1238	460.00	06-29-65	311.24		
				11-11-71	380.85*	69.61	
				11-13-72	368.02		12.83
				11-06-73	375.29	7.27	
				11-14-74	385.40	10.11	
33-51-203	KGI	28	463.00	08-11-65	13.23		
				05-18-70	4.75		8.48
				02-22-71	9.35	4.60	
				11-11-71	10.27	0.92	
				11-13-72	7.24		3.03
				11-06-73	4.73		2.51
				11-14-74	5.90	1.17	
33-51-302	KGT	35	430.00	08-11-65	24.60		
				05-18-70	16.34		8.26

ELLIS COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE - CONTINUED

* DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING

W MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASURE- MENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
				02-22-71	20.58	4.24	
				11-11-71	23.12	2.54	
				11-13-72	21.27		1.85
				11-06-73	20.68		0.59
				11-14-74	20.85	0.17	
33-51-501	KGT	37	455.00	05-18-70	16.42		
				02-22-71	20.60	4.18	
				11-11-71	22.13	1.53	
				11-13-72	20.46		1.67
				11-06-73	18.27		2.19
				11-14-74	18.34	0.07	
33-52-103	KGT	----	400.00	05-18-70	4.34		
				02-22-71	5.96	1.62	
				11-11-71	7.59	1.63	
				11-13-72	5.46		2.13
				11-06-73	4.78		0.68
				11-14-74	4.86	0.08	

ELLIS COUNTY

GROUND WATER QUALITY ANALYSES

STATE WELL NUMBER DATE OF COLLECTION	32-32-803 03/18/71	32-40-305 03/19/71	32-40-305 11/14/72	32-48-501 06/22/65
AQUIFER CODE	KGW	KGW	KGW	KGW
WELL DEPTH	355	543	543	367
TEMPERATURE-F			70	75
TEMPERATURE-C				
SILICA (MG/L)	11.0	12.0	8.0	11.0
CALCIUM (MG/L)	3.0	4.0	3.0	.0
MAGNESIUM (MG/L)	1.0	2.0	1.0	.0
SODIUM (MG/L)	258.0	310.0	309.0	290.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	448.0	416.0	401.0	576.0
SULFATE (MG/L)	168.0	314.0	295.0	118.0
CHLORIDE (MG/L)	17.0	24.0	21.0	25.0
FLUORIDE (MG/L)	.7	.8	.7	1.3
NITRATE (MG/L)	.4	2.5	.4	.2
IRON (MG/L)				
PH	8.6	8.3	8.4	8.2
DISSOLVED SOLIDS (MG/L)	679.0	873.0	835.2	728.0
PHENOL. ALK. CAC03	7.0	.0	5.0	
TOTAL ALK. CAC03	381.0	341.0	339.0	
TOTAL HARD CAC03	12.0	17.0	11.0	4.0
% SODIUM	97.97	97.37	98.30	100.00
SAR	32.9	31.6	39.4	
RSC	7.1	6.4	6.3	9.4
SPECIFIC CONDUCTANCE	1049.0	1300.0	1320.0	1200.0

ELLIS COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER DATE OF COLLECTION	32-48-501 11/10/71	32-48-901 11/13/72	33-26-703 03/19/71	33-26-901 08/04/65
AQUIFER CODE	KGW	KGW	KGAC	KGW
WELL DEPTH	367	384	26	950
TEMPERATURE-F		70		82
TEMPERATURE-C				
SILICA (MG/L)	11.0	10.0	14.0	13.0
CALCIUM (MG/L)	2.0	3.0	146.0	2.0
MAGNESIUM (MG/L)	2.0	2.0	4.0	1.0
SODIUM (MG/L)	304.0	418.0	29.0	520.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	530.0	600.0	344.0	628.0
SULFATE (MG/L)	161.0	332.0	60.0	414.0
CHLORIDE (MG/L)	29.0	53.0	46.0	134.0
FLUORIDE (MG/L)	1.4	2.6	.4	2.4
NITRATE (MG/L)	3.0	2.5	31.0	
IRON (MG/L)				
PH	8.7	8.4	7.5	8.0
DISSOLVED SOLIDS (MG/L)	774.0	1118.1	499.0	1395.0
PHENOL. ALK. CaCO3	13.0	5.0	.0	
TOTAL ALK. CaCO3	464.0	498.0	282.0	
TOTAL HARD CaCO3	13.0	15.0	385.0	10.0
% SODIUM	98.04	98.30	14.21	99.20
SAR	36.3	45.8	.6	75.0
RSC	8.4	9.5	.0	10.1
SPECIFIC CONDUCTANCE	1200.0	1680.0	782.0	2190.0

ELLIS COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER DATE OF COLLECTION	33-26-901 05/20/70	33-27-801 02/23/71	33-28-703 04/29/71	33-33-501 03/18/71
AQUIFER CODE	KGW	KGW	KGW	KGW
WELL DEPTH	950	1447	1350	780
TEMPERATURE-F		68		
TEMPERATURE-C				
SILICA (MG/L)	12.0	20.0	15.0	12.0
CALCIUM (MG/L)	3.0	7.0	5.0	4.0
MAGNESIUM (MG/L)	3.0	2.0	4.0	1.0
SODIUM (MG/L)	500.0	461.0	690.0	339.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	610.0	630.0	920.0	464.0
SULFATE (MG/L)	398.0	142.0	319.0	329.0
CHLORIDE (MG/L)	135.0	266.0	338.0	30.0
FLUORIDE (MG/L)	2.4	2.8	4.9	.8
NITRATE (MG/L)	.4	1.5	.4	.4
IRON (MG/L)				
PH	8.4	8.3	8.3	8.4
DISSOLVED SOLIDS (MG/L)	1353.0	1212.0	1828.0	944.0
PHENOL. ALK. CACO3	5.0	.0	.0	3.0
TOTAL ALK. CACO3	510.0	513.0	760.0	386.0
TOTAL HARD CACO3	19.0	27.0	30.0	17.0
% SODIUM	98.21	97.50	98.10	98.12
SAR	48.8	39.5	55.8	39.2
RSC	9.6	9.8	14.5	7.3
SPECIFIC CONDUCTANCE	1980.0	1900.0	2710.0	1410.0

ELLIS COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER	33-34-205	33-35-201	33-36-201	33-36-201
DATE OF COLLECTION	03/18/71	04/29/71	08/03/65	04/30/71
AQUIFER CODE	KGW	KCGR	KGW	KGW
WELL DEPTH	967	30	1982	1982
TEMPERATURE-F			102	
TEMPERATURE-C				
SILICA (MG/L)	13.0	17.0	18.0	17.0
CALCIUM (MG/L)	3.0	93.0	4.0	4.0
MAGNESIUM (MG/L)	2.0	7.0	.0	3.0
SODIUM (MG/L)	420.0	141.0	729.0	680.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	560.0	459.0	944.0	920.0
SULFATE (MG/L)	374.0	51.0	448.0	435.0
CHLORIDE (MG/L)	77.0	94.0	234.0	229.0
FLUORIDE (MG/L)	1.5	.8	3.8	5.1
NITRATE (MG/L)	.4	7.5	.2	3.6
IRON (MG/L)				
PH	8.3	7.4	7.9	8.3
DISSOLVED SOLIDS (MG/L)	1166.0	636.0	1901.0	1829.0
PHENOL. ALK. CAC03	.0	.0		.0
TOTAL ALK. CAC03	456.0	376.0		760.0
TOTAL HARD CAC03	16.0	260.0	13.0	21.0
% SODIUM	98.30	54.04	99.37	98.51
SAR	46.1	3.7	100.3	62.6
RSC	8.8	2.3	15.2	14.6
SPECIFIC CONDUCTANCE	1760.0	1012.0	2990.0	2640.0

ELLIS COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER DATE OF COLLECTION	33-36-201 11/07/73	33-41-202 06/16/65	33-41-202 03/19/71	33-43-501 02/22/71
AQUIFER CODE	KGW	KGW	KGW	GAL
WELL DEPTH	1982	727	727	32
TEMPERATURE-F		81		68
TEMPERATURE-C				
SILICA (MG/L)	15.0	13.0	12.0	21.0
CALCIUM (MG/L)	3.0	.0	3.0	236.0
MAGNESIUM (MG/L)	2.0	.0	1.0	9.0
SODIUM (MG/L)	710.0	269.0	270.0	38.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	920.0	552.0	550.0	312.0
SULFATE (MG/L)	414.0	93.0	104.0	71.0
CHLORIDE (MG/L)	240.0	25.0	33.0	132.0
FLUORIDE (MG/L)	5.4	1.2	1.2	.3
NITRATE (MG/L)	8.0	.2	1.5	231.0
IRON (MG/L)				
PH	8.3	8.0	8.5	7.1
DISSOLVED SOLIDS (MG/L)	1849.7	672.0	696.0	891.0
PHENOL. ALK. CaCO3	.0		5.0	.0
TOTAL ALK. CaCO3	750.0		462.0	256.0
TOTAL HARD CaCO3	16.0	4.0	12.0	630.0
% SODIUM	98.99	100.00	98.06	11.66
SAR	77.9		34.4	.6
RSC	14.7	9.0	8.7	.0
SPECIFIC CONDUCTANCE	2730.0	1100.0	1094.0	1300.0

ELLIS COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER	33-43-501	33-43-501	33-49-802	33-50-502
DATE OF COLLECTION	11/11/71	11/07/73	11/10/71	06/29/65
AQUIFER CODE	QAL	QAL	KGAC	KGW
WELL DEPTH	32	32	----	1238
TEMPERATURE-F				86
TEMPERATURE-C				
SILICA (MG/L)	22.0	21.0	9.0	14.0
CALCIUM (MG/L)	208.0	157.0	107.0	3.0
MAGNESIUM (MG/L)	12.0	7.0	3.0	1.0
SODIUM (MG/L)	37.0	33.0	11.0	693.0
POTASSIUM (MG/L)				2.5
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	318.0	337.0	264.0	952.0
SULFATE (MG/L)	77.0	64.0	28.0	498.0
CHLORIDE (MG/L)	98.0	53.0	9.0	172.0
FLUORIDE (MG/L)	.3	.5	.4	5.7
NITRATE (MG/L)	200.0	82.0	54.0	
IRON (MG/L)				
PH	7.1	7.5	7.4	8.0
DISSOLVED SOLIDS (MG/L)	810.0	583.2	351.0	1857.0
PHENOL. ALK. CaCO3	.0	.0	.0	
TOTAL ALK. CaCO3	261.0	276.0	216.0	
TOTAL HARD CaCO3	570.0	421.0	282.0	15.0
% SODIUM	12.40	14.58	7.89	99.02
SAR	.6	.7	.2	88.5
RSC	.0	.0	.0	15.3
SPECIFIC CONDUCTANCE	1173.0	902.0	547.0	2920.0

ELLIS COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER DATE OF COLLECTION	33-50-502 04/30/71	33-50-502 11/06/73	33-51-203 02/22/71	33-51-203 11/11/71
AQUIFER CODE	KGW	KGW	KGT	KGT
WELL DEPTH	1238	1238	28	28
TEMPERATURE-F			68	
TEMPERATURE-C				
SILICA (MG/L)	13.0	12.0	21.0	24.0
CALCIUM (MG/L)	3.0	3.0	119.0	120.0
MAGNESIUM (MG/L)	2.0	2.0	5.0	6.0
SODIUM (MG/L)	600.0	610.0	51.0	53.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	860.0	850.0	372.0	364.0
SULFATE (MG/L)	391.0	389.0	45.0	47.0
CHLORIDE (MG/L)	141.0	149.0	40.0	51.0
FLUORIDE (MG/L)	5.0	5.2	.8	.8
NITRATE (MG/L)	.4	7.0	13.0	20.0
IRON (MG/L)				
PH	8.3	8.3	7.4	7.4
DISSOLVED SOLIDS (MG/L)	1578.0	1595.1	477.0	500.0
PHENOL. ALK. CAC03	.0	.0	.0	.0
TOTAL ALK. CAC03	700.0	700.0	305.0	298.0
TOTAL HARD CAC03	17.0	14.0	319.0	322.0
% SODIUM	98.81	98.83	25.89	26.23
SAR	65.8	66.9	1.2	1.2
RSC	13.7	13.6	.0	.0
SPECIFIC CONDUCTANCE	2290.0	2350.0	751.0	786.0

ELLIS COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER DATE OF COLLECTION	33-51-302 02/22/71	33-51-302 11/11/71	33-51-302 11/06/73	33-51-501 02/22/71
AQUIFER CODE	KGT	KGT	KGT	KGT
WELL DEPTH	35	35	35	37
TEMPERATURE-F	67			68
TEMPERATURE-C				
SILICA (MG/L)	18.0	24.0	20.0	22.0
CALCIUM (MG/L)	144.0	127.0	119.0	86.0
MAGNESIUM (MG/L)	14.0	12.0	10.0	7.0
SODIUM (MG/L)	52.0	49.0	50.0	91.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	368.0	370.0	375.0	398.0
SULFATE (MG/L)	21.0	23.0	20.0	22.0
CHLORIDE (MG/L)	94.0	63.0	57.0	55.0
FLUORIDE (MG/L)	.8	.8	1.0	.6
NITRATE (MG/L)	77.0	68.0	47.0	11.0
IRON (MG/L)				
PH	7.7	7.5	7.6	7.3
DISSOLVED SOLIDS (MG/L)	601.0	548.0	508.3	490.0
PHENOL, ALK. CaCO3	.0	.0	.0	.0
TOTAL ALK. CaCO3	302.0	303.0	307.0	326.0
TOTAL HARD CaCO3	418.0	368.0	340.0	247.0
% SODIUM	21.34	22.54	24.34	44.85
SAR	1.1	1.1	1.1	2.5
RSC	.0	.0	.0	1.6
SPECIFIC CONDUCTANCE	977.0	864.0	820.0	781.0

ELLIS COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER	33-51-501
DATE OF COLLECTION	11/11/71
AQUIFER CODE	KGT
WELL DEPTH	37
TEMPERATURE-F	
TEMPERATURE-C	
SILICA (MG/L)	22.0
CALCIUM (MG/L)	80.0
MAGNESIUM (MG/L)	7.0
SODIUM (MG/L)	93.0
POTASSIUM (MG/L)	
MANGANESE (MG/L)	
BORON (MG/L)	
BICARBONATE (MG/L)	388.0
SULFATE (MG/L)	21.0
CHLORIDE (MG/L)	55.0
FLUORIDE (MG/L)	.6
NITRATE (MG/L)	15.0
IRON (MG/L)	
PH	7.4
DISSOLVED SOLIDS (MG/L)	484.0
PHENOL. ALK. CaCO3	.0
TOTAL ALK. CaCO3	318.0
TOTAL HARD CaCO3	230.0
% SODIUM	46.96
SAR	2.6
RSC	1.7
SPECIFIC CONDUCTANCE	777.0

ELLIS COUNTY

SUMMARY OF GROUND WATER QUALITY

AQUIFER KCTM

CONSTITUENT OR PROPERTY	MINIMUM CONCENTRATION	MAXIMUM CONCENTRATION	MEAN CONCENTRATION	MEDIAN CONCENTRATION	PERCENTAGE OF SAMPLES IN WHICH CONCENTRATION EXCEEDED AVERAGE	NUMBER OF SAMPLES FOR WHICH CONSTITUENT WAS PRESENT
SILICA (SI02)	15.00	20.00	18.62	20.00	62.50	8
CALCIUM (CA)	2.00	26.00	6.60	3.00	10.00	10
MAGNESIUM (MG)	0.00	11.00	2.50	1.00	10.00	10
SODIUM (NA)	241.00	461.00	338.40	300.00	40.00	10
BICARBONATE (HCO3)	467.00	556.00	505.80	492.00	30.00	10
SULFATE (SO4)	75.00	440.00	149.30	86.00	20.00	10
CHLORIDE (CL)	69.00	315.00	130.60	84.00	30.00	10
FLUORIDE (F)	1.10	2.00	1.59	1.60	50.00	10
NITRATE (NO3)	0.20	1.60	0.90	0.80	40.00	5
TOTAL DISSOLVED SOLIDS (TDS)	630.00	1225.27	894.42	778.00	30.00	10
HARDNESS (CA03)	10.00	110.00	29.00	14.00	10.00	10
SPECIFIC CONDUCTANCE	1069.00	2100.00	1494.87	1310.00	37.50	8
PH	7.90	8.40	8.12	8.10	33.33	9
PERCENT SODIUM	89.12	98.59	96.57	97.86	70.00	10
SAR	17.20	49.49	36.56	38.33	70.00	10
RSC	5.55	8.93	7.75	7.75	50.00	10

ELLIS COUNTY

SUMMARY OF GROUND WATER QUALITY--Continued

AQUIFER KGW

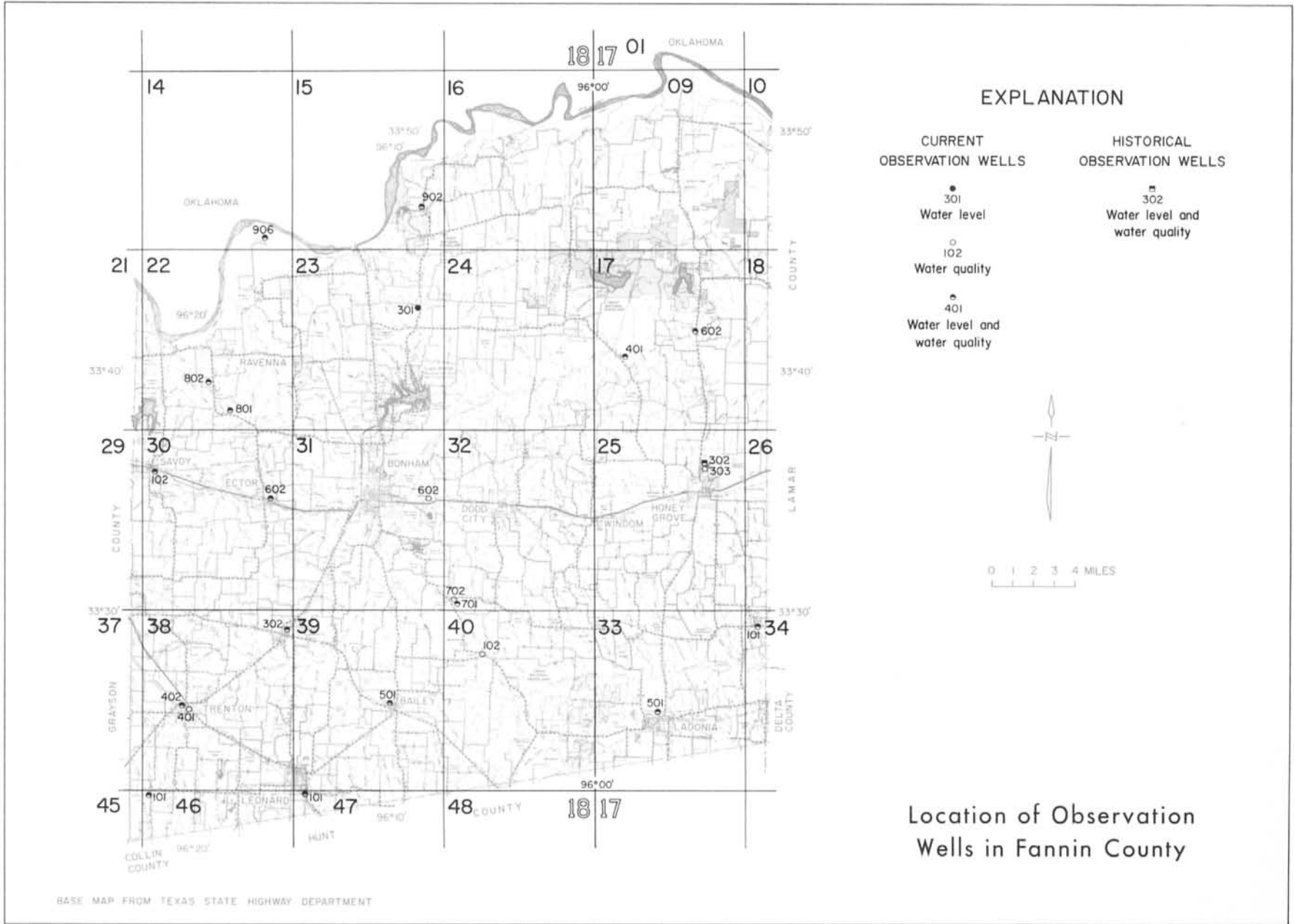
CONSTITUENT OR PROPERTY	MINIMUM CONCENTRATION MG/L	MAXIMUM CONCENTRATION MG/L	MEAN CONCENTRATION MG/L	MEDIAN CONCENTRATION MG/L	PERCENTAGE OF SAMPLES IN WHICH CONCENTRATION EXCEEDED AVERAGE	NUMBER OF SAMPLES FOR WHICH CONSTITUENT WAS PRESENT
SILICA (SI02)	8.00	23.00	13.31	13.00	39.34	61
CALCIUM (CA)	0.00	25.00	3.53	3.00	35.93	64
MAGNESIUM (MG)	0.00	4.00	1.35	1.00	37.50	64
SODIUM (NA)	222.00	1200.00	560.95	532.00	43.75	64
BICARBONATE (HCO3)	382.00	1060.00	711.59	671.00	43.75	64
SULFATE (SO4)	16.00	944.00	366.00	380.00	56.25	64
CHLORIDE (CL)	16.00	1310.00	189.67	112.00	29.68	64
FLUORIDE (F)	0.00	6.40	2.85	2.60	44.06	59
NITRATE (NO3)	0.00	10.00	1.83	0.80	35.71	56
TOTAL DISSOLVED SOLIDS (TDS)	611.00	3032.00	1489.89	1427.00	45.31	64
HARDNESS (CAC03)	4.00	32.00	15.17	14.00	39.06	64
SPECIFIC CON- DUCTANCE	975.00	4990.00	2226.34	2190.00	49.09	55
PH	7.30	8.70	8.07	8.00	45.31	64
PERCENT SODIUM	93.85	100.00	98.65	98.84	62.50	64
SAR	20.05	103.87	69.81	68.90	48.38	62
RSC	5.79	17.09	11.37	10.79	43.75	64

ELLIS COUNTY

REPORTED MUNICIPAL AND INDUSTRIAL GROUND WATER PUMPAGE

YEAR	MUNICIPAL PUMPAGE (ACRE-FEET)	INDUSTRIAL PUMPAGE (ACRE-FEET)	MUNICIPAL AND INDUSTRIAL PUMPAGE (ACRE-FEET)
1955	2,933.88	.97	2,934.85
1956	3,107.43	.97	3,108.40
1957	3,048.28	.97	3,049.25
1958	1,540.90	.61	1,541.51
1959	1,483.85	1.68	1,485.53
1960	1,439.76	215.48	1,655.24
1961	2,512.54	61.55	2,574.09
1962	1,420.13	269.00	1,689.13
1963	1,408.25	378.43	1,786.68
1964	3,119.17	448.71	3,567.88
1965	1,749.03	448.71	2,197.74
1966	1,545.53	540.01	2,085.54
1967	1,008.73	709.55	1,718.28
1968	939.29	646.97	1,586.26
1969	1,328.88	864.54	2,193.42
1970	1,470.79	1,135.00	2,605.79
1971	1,671.40	543.05	2,214.45
1972	2,026.31	1,457.44	3,483.75
Total	33,754.15	7,723.64	41,477.79

WATER-LEVEL MEASUREMENTS IN FANNIN COUNTY



EXPLANATION

- | CURRENT
OBSERVATION WELLS | HISTORICAL
OBSERVATION WELLS |
|---|---|
| ● 301
Water level | ■ 302
Water level and
water quality |
| ○ 102
Water quality | |
| ● 401
Water level and
water quality | |



Location of Observation Wells in Fannin County

BASE MAP FROM TEXAS STATE HIGHWAY DEPARTMENT

FANNIN COUNTY

WATER LEVEL MEASUREMENTS IN FEET BELOW LAND SURFACE
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 @ MEASUREMENT QUESTIONED DUE TO BURE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASUREMENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
17-17-401	KGW	1236	489.00	09-04-70	197.90		
				11-11-71	200.83@	2.93	
				11-15-72	209.06@	8.23	
				11-12-73	220.64@	11.58	
				11-06-74	216.02@		4.62
17-17-602	KGW	1100	620.00	07-15-71	280.00		
17-25-302	KGW	1673	668.00	-----48	282.00		
				-----63	367.00	85.00	
17-33-501	KCPA	3366	630.00	12-----70	192.25		
				11-11-71	193.50	1.25	
				11-14-72	255.00*	61.50	
				11-05-73	222.25*		32.75
				11-05-74	237.00*	14.75	
17-34-101	KCPA	3063	560.00	05-----65	140.00		
				11-05-73	235.00	95.00	
				11-05-74	290.00	55.00	
18-14-906	KGW	220	505.00	06-20-70	16.45		
				09-03-70	18.50	2.05	
				02-23-71	18.05		0.45
				11-10-71	17.58		0.47
				11-16-72	18.42	0.84	
				11-09-73	14.76		3.66
				11-06-74	14.09		0.67
18-15-902	KGW	489	558.00	09-04-70	73.70		
				02-23-71	73.87	0.17	
				11-10-71	76.79	2.92	
				11-15-72	77.55	0.76	
				11-09-73	74.76		2.79
				11-06-74	73.66		1.10
18-22-801	KGW	179	598.00	09-03-70	101.90		
				11-16-72	102.77	0.87	
				11-09-73	103.22	0.45	
				11-05-74	103.65	0.43	
18-22-802	KGW	70	610.00	07-16-71	24.78		
				11-11-71	21.97		2.81
				11-16-72	24.34	2.37	

FANNIN COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE - CONTINUED
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 † MEASUREMENT QUESTIONED DUE TO BURG HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AWOTFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASURE- MENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
				11-09-73	23.19		1.15
				11-05-74	23.90	0.71	
18-23-301	KGW	800	600.00	09-03-70	66.70		
				02-23-71	62.76		3.94
				11-10-71	64.98	2.22	
				11-15-72	62.30		2.68
				11-09-73	61.87		0.43
				11-06-74	61.74		0.13
18-30-102	KGW	528	685.00	10-14-59	283.50		
				09-03-70	380.78	97.28	
				02-23-71	333.65		47.13
				11-09-73	346.20	12.55	
				11-06-74	356.18	9.98	
18-30-602	KGW	461	630.00	09-03-70	390.00		
18-32-701	KGAC	35	715.00	07-14-71	12.47		
				11-11-71	4.67		7.80
				11-16-72	1.52		3.15
				11-12-73	1.65	0.13	
				11-06-74	1.41		0.24
18-38-302	KGW	1292	650.00	07-14-71	300.00		
				11-11-71	291.00		9.00
				11-14-72	295.00	4.00	
				11-05-73	292.00		3.00
				11-05-74	208.00		84.00
18-38-402	KGW	1600	760.00	07-14-71	497.00		
				11-11-71	544.00*	47.00	
				11-05-74	505.00		39.00
18-39-501	KGW	1595	720.00	10-14-59	437.50		
				09-02-70	481.05	43.55	
				02-22-71	454.56		26.49
				11-11-71	444.27		10.29
				11-12-73	465.00	20.73	
18-46-101	KGAC	11	670.00	07-14-71	3.47		
				11-11-71	1.21		2.26
				11-16-72 +	0.21		1.42
				11-08-73	1.15	1.36	
				11-05-74 +	0.66		1.81

FANNIN COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE - CONTINUED
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 @ MEASUREMENT QUESTIONED DUE TO BURE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASURE- MENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
18-47-101	KGW	1605	690.00	04-27-44	303.00		
				-----59	450.00	147.00	

FANNIN COUNTY

GROUND WATER QUALITY ANALYSES

STATE WELL NUMBER	17-17-401	17-17-602	17-25-302	17-25-303
DATE OF COLLECTION	02/22/71	07/15/71	07/15/71	07/15/71
AQUIFER CODE	KGW	KGW	KGW	KGW
WELL DEPTH	1236	1100	1673	1727
TEMPERATURE-F				
TEMPERATURE-C				
SILICA (MG/L)	13.0	14.0	15.0	15.0
CALCIUM (MG/L)	3.0	3.0	2.0	8.0
MAGNESIUM (MG/L)	1.0	1.0	1.0	3.0
SODIUM (MG/L)	344.0	356.0	351.0	341.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	493.0	530.0	520.0	550.0
SULFATE (MG/L)	224.0	221.0	217.0	196.0
CHLORIDE (MG/L)	84.0	96.0	82.0	73.0
FLUORIDE (MG/L)	1.5	1.7	1.8	1.9
NITRATE (MG/L)	.4	1.5	.4	.4
IRON (MG/L)				
PH	8.6	8.2	7.8	7.8
DISSOLVED SOLIDS (MG/L)	913.0	954.0	925.0	908.0
PHENOL, ALK. CaCO3	9.0	.0	.0	.0
TOTAL ALK. CaCO3	422.0	435.0	424.0	453.0
TOTAL HARD CaCO3	9.0	11.0	10.0	31.0
% SODIUM	98.47	98.52	98.82	95.82
SAR	43.9	45.4	50.6	26.1
RSC	7.8	8.4	8.3	8.3
SPECIFIC CONDUCTANCE	1420.0	1440.0	1400.0	1370.0

FANNIN COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER	17-33-501	17-33-501	17-34-101	18-14-906
DATE OF COLLECTION	09/24/70	07/15/71	07/15/71	02/23/71
AQUIFER CODE	KCPA	KCPA	KCPA	KGW
WELL DEPTH	3366	3366	3063	220
TEMPERATURE-F		120		
TEMPERATURE-C				
SILICA (MG/L)	22.0	23.0	22.0	11.0
CALCIUM (MG/L)	3.0	3.0	6.0	3.0
MAGNESIUM (MG/L)	2.0	1.0	1.0	1.0
SODIUM (MG/L)	354.0	342.0	357.0	439.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	710.0	730.0	760.0	890.0
SULFATE (MG/L)	128.0	117.0	119.0	133.0
CHLORIDE (MG/L)	40.0	36.0	31.0	69.0
FLUORIDE (MG/L)	2.8	2.7	2.9	2.4
NITRATE (MG/L)	.4	.4	.4	.4
IRON (MG/L)				
PH	8.5	8.0	8.1	8.5
DISSOLVED SOLIDS (MG/L)	901.3	884.0	912.0	1096.0
PHENOL. ALK. CaCO3	9.0	.0	.0	12.0
TOTAL ALK. CaCO3	600.0	600.0	630.0	750.0
TOTAL HARD CaCO3	16.0	13.0	20.0	13.0
% SODIUM	98.00	98.46	97.60	98.80
SAR	38.8	43.6	35.5	56.0
RSC	11.3	11.7	12.0	14.3
SPECIFIC CONDUCTANCE	1380.0	1340.0	1380.0	1670.0

FANNIN COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER DATE OF COLLECTION	18-15-902 02/23/71	18-15-902 11/10/71	18-15-902 11/09/73	18-22-801 07/16/71
AQUIFER CODE	KGW	KGW	KGW	KGW
WELL DEPTH	489	489	489	179
TEMPERATURE-F				
TEMPERATURE-C				
SILICA (MG/L)	10.0	11.0	10.0	11.0
CALCIUM (MG/L)	4.0	4.0	4.0	5.0
MAGNESIUM (MG/L)	2.0	2.0	3.0	2.0
SODIUM (MG/L)	710.0	710.0	730.0	276.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	1150.0	1140.0	1150.0	389.0
SULFATE (MG/L)	263.0	276.0	263.0	277.0
CHLORIDE (MG/L)	237.0	234.0	241.0	13.0
FLUORIDE (MG/L)	4.1	4.0	4.6	.9
NITRATE (MG/L)	.4	.4	7.0	.4
IRON (MG/L)				
PH	8.3	8.2	8.3	7.9
DISSOLVED SOLIDS (MG/L)	1795.0	1801.0	1828.0	776.0
PHENOL. ALK. CAC03	.0	.0	.0	.0
TOTAL ALK. CAC03	950.0	940.0	940.0	319.0
TOTAL HARD CAC03	19.0	20.0	23.0	21.0
% SODIUM	98.83	98.83	98.61	96.66
SAR	72.3	72.3	67.2	26.3
RSC	18.4	18.3	18.4	5.9
SPECIFIC CONDUCTANCE	2630.0	2650.0	2700.0	1140.0

FANNIN COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER DATE OF COLLECTION	18-22-802 07/16/71	18-22-802 11/11/71	18-22-802 11/09/73	18-30-102 09/16/43
AQUIFER CODE	KGW	KGW	KGW	KGW
WELL DEPTH	70	70	70	528
TEMPERATURE-F				
TEMPERATURE-C				
SILICA (MG/L)	19.0	19.0	17.0	16.0
CALCIUM (MG/L)	640.0	650.0	630.0	1.0
MAGNESIUM (MG/L)	242.0	259.0	246.0	.0
SODIUM (MG/L)	317.0	329.0	343.0	200.0
POTASSIUM (MG/L)				1.4
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	510.0	510.0	494.0	363.0
SULFATE (MG/L)	2310.0	2280.0	2160.0	75.0
CHLORIDE (MG/L)	357.0	394.0	400.0	26.0
FLUORIDE (MG/L)	1.9	1.2	2.0	.9
NITRATE (MG/L)	15.0	23.0	34.0	.8
IRON (MG/L)				
PH	7.3	6.9	7.1	8.4
DISSOLVED SOLIDS (MG/L)	4152.0	4205.0	4074.8	499.5
PHENOL. ALK. CaCO3	.0	.0	.0	
TOTAL ALK. CaCO3	415.0	415.0	405.0	
TOTAL HARD CaCO3	2600.0	2680.0	2580.0	4.0
% SODIUM	21.01	21.03	22.40	99.02
SAR	2.7	2.7	2.9	55.0
RSC	.0	.0	.0	5.8
SPECIFIC CONDUCTANCE	4160.0	4270.0	4350.0	86.0

FANNIN COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER	18-30-102	18-30-602	18-30-602	18-31-602
DATE OF COLLECTION	07/14/71	09/16/43	07/14/71	07/14/71
AQUIFER CODE	KGW	KGW	KGW	KGW
WELL DEPTH	528	461	461	----
TEMPERATURE-F	75			
TEMPERATURE-C				
SILICA (MG/L)	11.0	12.0	11.0	14.0
CALCIUM (MG/L)	4.0	3.0	2.0	2.0
MAGNESIUM (MG/L)	1.0	.0	1.0	1.0
SODIUM (MG/L)	188.0	375.0	362.0	278.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	387.0	706.0	810.0	429.0
SULFATE (MG/L)	77.0	74.0	80.0	202.0
CHLORIDE (MG/L)	23.0	46.0	32.0	47.0
FLUORIDE (MG/L)	1.2	2.5	2.7	1.4
NITRATE (MG/L)	.4	2.8	1.5	1.0
IRON (MG/L)				
PH	8.0	8.6	8.3	7.8
DISSOLVED SOLIDS (MG/L)	495.0	862.4	890.0	757.0
PHENOL. ALK. CaCO3	.0		.0	.0
TOTAL ALK. CaCO3	317.0		660.0	352.0
TOTAL HARD CaCO3	15.0	8.0	9.0	8.0
% SODIUM	96.66	99.09	98.85	98.51
SAR	21.7	59.6	52.2	40.0
RSC	6.0	11.4	13.0	6.8
SPECIFIC CONDUCTANCE	775.0	150.0	1350.0	1132.0

FANNIN COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER	18-32-701	18-32-701	18-32-702	18-38-302
DATE OF COLLECTION	11/11/71	11/12/73	07/14/71	07/14/71
AQUIFER CODE	KGAC	KGAC	KGW	KGW
WELL DEPTH	35	35	----	1292
TEMPERATURE-F		65		
TEMPERATURE-C				
SILICA (MG/L)	9.0	8.0	14.0	13.0
CALCIUM (MG/L)	113.0	107.0	2.0	3.0
MAGNESIUM (MG/L)	4.0	3.0	1.0	1.0
SODIUM (MG/L)	13.0	16.0	334.0	276.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	271.0	265.0	459.0	432.0
SULFATE (MG/L)	51.0	50.0	260.0	184.0
CHLORIDE (MG/L)	8.0	11.0	61.0	41.0
FLUORIDE (MG/L)	.3	.5	1.4	1.4
NITRATE (MG/L)	54.0	37.0	.4	1.0
IRON (MG/L)				
PH	7.3	7.4	7.9	8.0
DISSOLVED SOLIDS (MG/L)	385.0	362.8	899.0	732.0
PHENOL, ALK. CaCO3	.0	.0	.0	.0
TOTAL ALK. CaCO3	222.0	217.0	376.0	354.0
TOTAL HARD CaCO3	300.0	281.0	11.0	10.0
% SODIUM	8.65	11.07	98.76	98.10
SAR	.3	.4	48.1	35.2
RSC	.0	.0	7.3	6.8
SPECIFIC CONDUCTANCE	585.0	584.0	1400.0	1093.0

FANNIN COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER DATE OF COLLECTION	18-38-401 07/14/71	18-38-402 07/14/71	18-39-501 05/24/60	18-39-501 07/14/71
AQUIFER CODE	KGW	KGW	KGW	KGW
WELL DEPTH	1472	1600	1595	1595
TEMPERATURE-F				
TEMPERATURE-C				
SILICA (MG/L)	13.0	13.0	17.0	13.0
CALCIUM (MG/L)	2.0	2.0	1.0	3.0
MAGNESIUM (MG/L)	2.0	2.0	.0	1.0
SODIUM (MG/L)	286.0	299.0	312.0	296.0
POTASSIUM (MG/L)			1.4	
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	448.0	455.0	477.0	472.0
SULFATE (MG/L)	205.0	210.0	199.0	192.0
CHLORIDE (MG/L)	43.0	53.0	62.0	58.0
FLUORIDE (MG/L)	1.4	1.5	1.5	1.6
NITRATE (MG/L)	.4	.4	.2	1.1
IRON (MG/L)				
PH	7.7	8.5	8.2	8.0
DISSOLVED SOLIDS (MG/L)	773.0	804.0	828.6	797.0
PHENOL, ALK. CaCO3	.0	6.0		.0
TOTAL ALK. CaCO3	367.0	385.0		387.0
TOTAL HARD CaCO3	11.0	12.0	2.0	12.0
% SODIUM	97.92	98.00	99.37	98.23
SAR	34.2	35.7	85.9	37.8
RSC	7.0	7.1	7.7	7.5
SPECIFIC CONDUCTANCE	1180.0	1200.0	1310.0	1200.0

FANNIN COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER DATE OF COLLECTION	18-40-102 07/14/71	18-46-101 07/14/71	18-47-101 03/15/49	18-47-101 07/14/71
AQUIFER CODE	KGW	KGAC	KGW	KGW
WELL DEPTH	1800	11	1605	1605
TEMPERATURE-F		74	88	92
TEMPERATURE-C				
SILICA (MG/L)	17.0	18.0	15.0	13.0
CALCIUM (MG/L)	4.0	103.0	2.0	2.0
MAGNESIUM (MG/L)	1.0	7.0	1.0	1.0
SODIUM (MG/L)	314.0	49.0	301.0	279.0
POTASSIUM (MG/L)			12.0	
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	494.0	377.0	414.0	450.0
SULFATE (MG/L)	214.0	28.0	186.0	183.0
CHLORIDE (MG/L)	59.0	32.0	70.0	52.0
FLUORIDE (MG/L)	1.7	1.1	1.4	1.6
NITRATE (MG/L)	.4	.4	.2	1.0
IRON (MG/L)				
PH	7.5	7.3	8.5	8.1
DISSOLVED SOLIDS (MG/L)	854.0	423.0	792.1	753.0
PHENOL. ALK. CAC03	.0	.0		.0
TOTAL ALK. CAC03	405.0	309.0		369.0
TOTAL HARD CAC03	14.0	286.0	8.0	9.0
% SODIUM	97.97	27.16	96.40	98.52
SAR	36.3	1.2	43.4	40.2
RSC	7.8	.4	6.6	7.1
SPECIFIC CONDUCTANCE	1260.0	678.0	1300.0	1153.0

FANNIN COUNTY

SUMMARY OF GROUND WATER QUALITY

AQUIFER KGW

CONSTITUENT OR PROPERTY	MINIMUM CONCENTRATION MG/L	MAXIMUM CONCENTRATION MG/L	MEAN CONCENTRATION MG/L	MEDIAN CONCENTRATION MG/L	PERCENTAGE OF SAMPLES IN WHICH CONCENTRATION EXCEEDED AVERAGE	NUMBER OF SAMPLES FOR WHICH CONSTITUENT WAS PRESENT
SILICA (SI02)	10.00	17.00	13.03	13.00	38.46	26
CALCIUM (CA)	1.00	27.00	3.80	2.00	30.76	26
MAGNESIUM (MG)	0.00	9.00	1.56	1.00	32.00	25
SODIUM (NA)	188.00	2160.00	434.92	314.00	23.07	26
BICARBONATE (HCO3)	363.00	1150.00	601.23	472.00	30.76	26
SULFATE (SO4)	30.00	277.00	185.34	199.00	65.38	26
CHLORIDE (CL)	13.00	2960.00	187.42	59.00	15.38	26
FLUORIDE (F)	0.00	4.60	1.88	1.60	30.76	26
NITRATE (NO3)	0.20	7.00	1.16	0.40	26.92	26
TOTAL DISSOLVED SOLIDS (TDS)	495.00	5586.57	1126.31	854.00	19.23	26
HARDNESS (CAC03)	2.00	104.00	15.65	11.00	23.07	26
SPECIFIC CON- DUCTANCE	86.00	2700.00	1366.91	1300.00	39.13	23
PH	7.50	8.60	8.14	8.20	53.84	26
PERCENT SODIUM	95.82	99.37	98.13	98.52	56.00	25
SAR	21.79	91.97	49.90	45.48	44.00	25
RSC	5.89	18.48	9.63	7.76	32.00	25

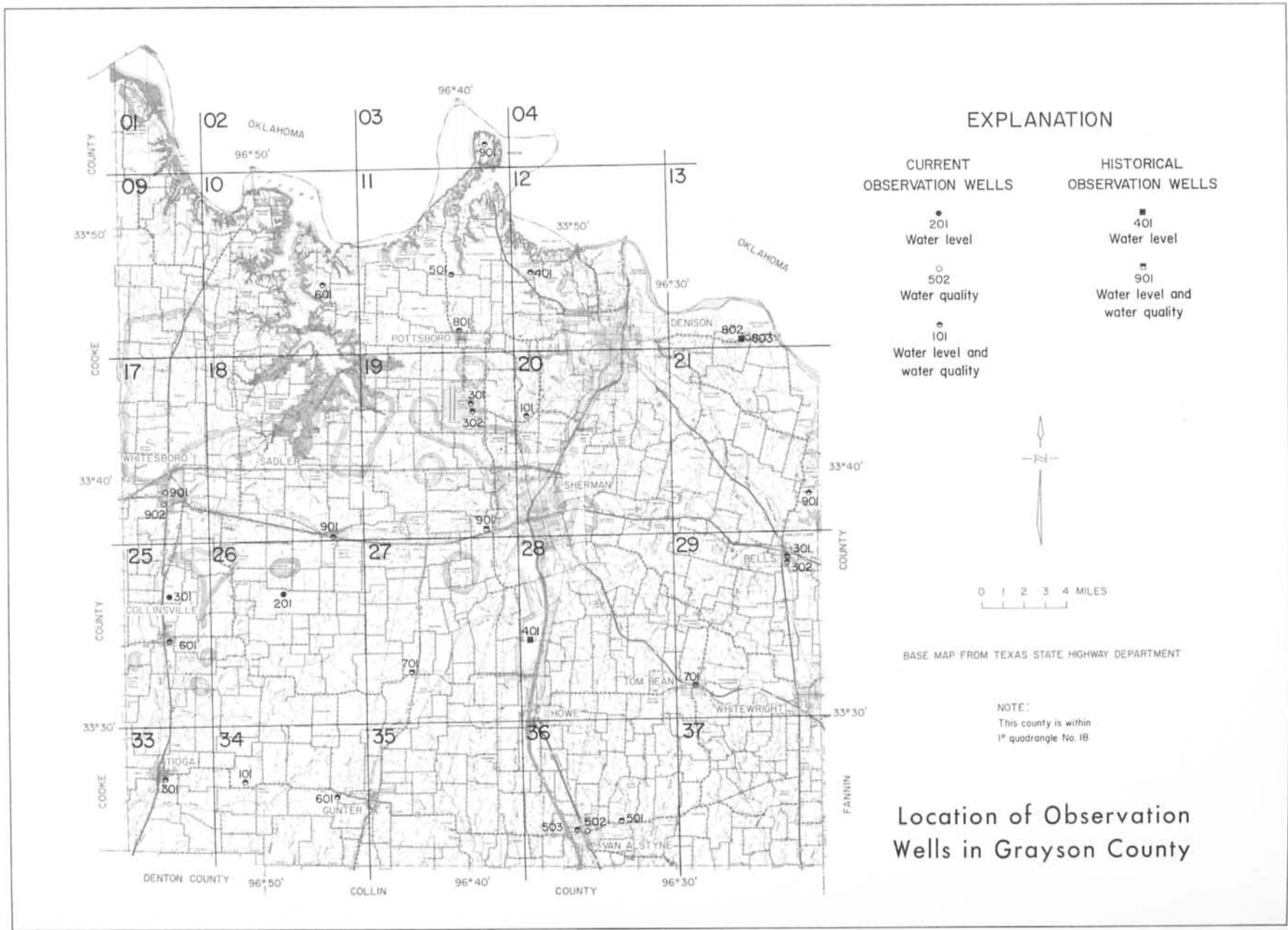
FANNIN COUNTY

REPORTED MUNICIPAL AND INDUSTRIAL GROUND WATER PUMPAGE

YEAR	MUNICIPAL PUMPAGE (ACRE-FEET)	INDUSTRIAL PUMPAGE (ACRE-FEET)	MUNICIPAL AND INDUSTRIAL PUMPAGE (ACRE-FEET)
1955	1,150.52	.00	1,150.52
1956	1,258.50	.00	1,258.50
1957	1,099.07	.00	1,099.07
1958	1,161.46	.00	1,161.46
1959	1,211.49	.00	1,211.49
1960	1,372.25	.00	1,372.25
1961	1,417.04	.00	1,417.04
1962	1,158.43	.00	1,158.43
1963	1,244.59	.00	1,244.59
1964	1,570.49	.00	1,570.49
1965	1,540.70	.00	1,540.70
1966	1,610.97	95.13	1,706.10
1967	1,555.80	159.58	1,715.38
1968	1,136.66	198.25	1,334.91
1969	2,032.88	83.78	2,116.66
1970	1,031.01	82.24	1,113.25
1971	1,321.69	143.73	1,465.42
1972	1,972.63	122.92	2,095.55
Total	24,846.18	885.63	25,731.81



WATER-LEVEL MEASUREMENTS IN GRAYSON COUNTY



GRAYSON COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 W MEASUREMENT QUESTIONED DUE TO BURE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASUREMENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
18-03-901	KCA	291	708.26	08-27-70	109.90		
				02-25-71	101.83		8.07
				11-11-71	112.59	10.76	
				11-17-72	110.11		2.48
				11-08-73	116.72*	6.61	
11-11-74	114.88*		1.84				
18-10-601	KGW	234	690.00	08-27-70	84.58		
				02-25-71	73.81		10.77
				11-11-71	60.96		12.85
				11-17-72	73.68	12.72	
				11-08-73	71.72		1.96
11-11-74	73.70	1.98					
18-11-501	KCA	317	715.00	08-27-70	155.55		
				02-25-71	155.06w		0.49
				11-11-71	159.39	4.33	
				11-17-72	161.15	1.76	
				11-08-73	165.94	4.79	
11-11-74	163.74		2.20				
18-11-801	KGW	375	740.00	08-27-70	109.07		
				02-25-71	97.71		11.36
				11-17-72	115.14	17.43	
				11-08-73	121.45	6.31	
11-11-74	125.36	3.91					
18-12-401	KCA	295	700.00	09-01-70	164.13		
				02-25-71	163.45		0.68
				11-11-71	166.55	3.10	
				11-17-72	169.63	3.08	
				11-08-73	173.04*	3.41	
11-11-74	170.64		2.40				
18-13-802	KCPP	100	640.00	07-19-71	62.58		
				11-11-71	62.73	0.15	
				11-20-72	63.30	0.57	
18-18-901	KGW	390	740.00	08-25-70	313.14		
				02-24-71	298.88w		14.26
				11-20-72	300.68	1.80	
				11-07-73	329.18	28.50	
				11-11-74	324.23		4.95

GRAYSON COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE - CONTINUED
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 @ MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASUREMENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
18-19-301	KGW	788	760.00	10-23-69	251.00		
				02-25-71	251.00		
				11-11-71	257.72	6.72	
				11-07-73	229.77		27.95
18-19-302	KGW	790	760.00	09-01-70	294.00		
				02-25-71	250.00		44.00
				11-11-71	261.00@	11.00	
				11-11-74	250.80@		10.20
18-19-901	KGW	872	690.00	08-25-70	449.10@		
18-20-101	KGW	630	790.00	08-27-70	128.20		
				02-25-71	126.60		1.60
				11-12-71	129.12	2.52	
18-21-901	KGW	301	590.00	10-06-65	175.00		
				08-26-70	210.98	35.98	
				02-23-71	208.50		2.48
				11-20-72	212.87	4.37	
				11-06-73	212.94	0.07	
11-11-74	215.38	2.44					
18-25-301	KGW	280	740.00	02-24-71	84.60		
				11-12-71	91.40	6.80	
				11-20-72	93.68	2.28	
				11-07-73	90.97		2.71
				11-11-74	93.90	2.93	
18-25-601	KCA	1522	735.00	05-07-57	188.80		
				08-25-70	226.85	38.05	
				11-07-73	321.50	94.65	
18-26-201	KGEF	----	740.00	08-25-70	29.37		
				02-24-71	24.44		4.93
				11-12-71	11.75		12.69
				11-07-73	23.38	11.63	
18-27-701	KGW	613	845.00	08-26-70	391.30		
				11-12-71	387.26@		4.04
				11-20-72	400.40	13.14	
				11-07-73	414.33@	13.93	
				11-11-74	410.00@		4.33
18-28-401	KGW	1004	770.00	09-11-70	476.60		
				02-24-71	469.46		7.14

GRAYSON COUNTY

GROUND WATER QUALITY ANALYSES

STATE WELL NUMBER	18-03-901	18-10-601	18-11-501	18-11-501
DATE OF COLLECTION	07/19/71	11/11/71	02/25/71	07/19/71
AQUIFER CODE	KCA	KGW	KCA	KCA
WELL DEPTH	291	234	317	317
TEMPERATURE-F				
TEMPERATURE-C				
SILICA (MG/L)	17.0	9.0	12.0	10.0
CALCIUM (MG/L)	98.0	11.0	3.0	4.0
MAGNESIUM (MG/L)	13.0	4.0	1.0	3.0
SODIUM (MG/L)	66.0	81.0	317.0	311.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	392.0	222.0	630.0	640.0
SULFATE (MG/L)	79.0	29.0	99.0	98.0
CHLORIDE (MG/L)	29.0	4.0	50.0	47.0
FLUORIDE (MG/L)	.2	.5	4.2	4.0
NITRATE (MG/L)	1.0	.4	1.6	.4
IRON (MG/L)				
PH	7.5	8.0	8.4	8.0
DISSOLVED SOLIDS (MG/L)	495.0	248.0	797.0	792.0
PHENOL, ALK. CaCO3	.0	.0	3.0	.0
TOTAL ALK. CaCO3	321.0	182.0	520.0	530.0
TOTAL HARD CaCO3	302.0	44.0	14.0	21.0
% SODIUM	32.51	80.05	98.34	96.80
SAR	1.6	5.3	40.4	28.6
RSC	.4	2.7	10.0	10.0
SPECIFIC CONDUCTANCE	760.0	415.0	1240.0	1200.0

GRAYSON COUNTY

WATER LEVEL MEASUREMENTS, IN FEET, BELOW LAND SURFACE - CONTINUED
 * DENOTES WELL PUMPED RECENTLY OR NEARBY WELL PUMPING
 W MEASUREMENT QUESTIONED DUE TO BORE HOLE OR WELL ENTRY CONDITIONS

STATE WELL NUMBER	AQUIFER CODE	DEPTH OF WELL	ELEVATION OF LAND SURFACE	DATE	MEASURE- MENT	CHANGE IN WATER LEVEL FROM PREVIOUS MEASUREMENT	
						DECLINE	RISE
				11-12-71	474.37	4.91	
18-29-301	KGR	700	690.00	08-26-70	294.78		
				02-23-71	289.50		5.28
				11-06-73	306.35	16.85	
18-29-302	KCA	1600	690.00	08-26-70	140.00		
				02-23-71	140.00		
				11-05-74	135.00		5.00
18-29-701	KGR	1180	810.00	08-26-70	450.33		
				11-08-73	425.30		25.03
18-33-301	KCA	923	670.00	11-12-71	194.00		
				11-20-72	182.57		11.43
				11-07-73	187.77	5.20	
				11-11-74	194.60	6.83	
18-34-101	KGR	400	670.00	08-26-70	144.35		
				02-24-71	144.31		0.04
				11-20-72	153.80	9.49	
				11-07-73	151.25		2.55
				11-11-74	153.46	2.21	
18-34-601	KGR	387	670.00	10-04-57	72.20		
				08-26-70	70.47		1.73
				02-24-71	70.58	0.11	
				11-12-71	71.09	0.51	
				11-20-72	71.38	0.29	
				11-07-73	71.59	0.21	
11-11-74	71.79	0.20					
18-36-501	KGR	36	670.00	08-26-70	10.99		
				02-23-71	10.10		0.89
				07-19-71	14.40	4.30	
				11-12-71	4.52		9.88
				11-16-72	7.78	3.26	
				11-08-73	1.32		6.46
11-12-74	0.57		0.75				
18-36-503	KCA	2300	790.00	07-20-71	609.00		
				11-11-71	605.00		4.00
				11-06-73	620.00	15.00	
				11-05-74	595.00		25.00

GRAYSON COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER DATE OF COLLECTION	18-17-902 07/20/71	18-18-901 07/20/71	18-19-301 07/19/71	18-19-302 07/19/71
AQUIFER CODE	KCA	KGW	KGW	KGW
WELL DEPTH	1512	390	788	790
TEMPERATURE-F	79		76	76
TEMPERATURE-C				
SILICA (MG/L)	11.0	10.0	13.0	13.0
CALCIUM (MG/L)	2.0	3.0	4.0	2.0
MAGNESIUM (MG/L)	2.0	2.0	1.0	1.0
SODIUM (MG/L)	223.0	213.0	129.0	156.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	418.0	420.0	248.0	251.0
SULFATE (MG/L)	46.0	109.0	73.0	124.0
CHLORIDE (MG/L)	76.0	12.0	9.0	11.0
FLUORIDE (MG/L)	.5	1.0	.7	.6
NITRATE (MG/L)	.4	.4	.4	.4
IRON (MG/L)				
PH	8.4	8.3	8.1	7.7
DISSOLVED SOLIDS (MG/L)	566.0	556.0	352.0	431.0
PHENOL, ALK. CaCO ₃	2.0	.0	.0	.0
TOTAL ALK. CaCO ₃	347.0	344.0	203.0	206.0
TOTAL HARD CaCO ₃	13.0	13.0	13.0	9.0
% SODIUM	97.34	96.72	95.21	97.38
SAR	26.6	23.3	14.9	22.5
MSC	6.5	6.5	3.7	3.9
SPECIFIC CONDUCTANCE	924.0	854.0	555.0	665.0

GRAYSON COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER	18-11-801	18-12-401	18-13-803	18-17-901
DATE OF COLLECTION	02/25/71	07/19/71	07/19/71	07/20/71
AQUIFER CODE	KGW	KCA	KCW	KCA
WELL DEPTH	350	295	200	1520
TEMPERATURE-F				79
TEMPERATURE-C				
SILICA (MG/L)	17.0	10.0	21.0	12.0
CALCIUM (MG/L)	36.0	15.0	57.0	2.0
MAGNESIUM (MG/L)	9.0	5.0	9.0	2.0
SODIUM (MG/L)	106.0	530.0	32.0	211.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	397.0	540.0	228.0	414.0
SULFATE (MG/L)	20.0	81.0	26.0	39.0
CHLORIDE (MG/L)	7.0	495.0	9.0	62.0
FLUORIDE (MG/L)	.2	1.9	.1	.5
NITRATE (MG/L)	4.0	.4	20.0	.4
IRON (MG/L)				
PH	7.7	7.9	7.1	8.5
DISSOLVED SOLIDS (MG/L)	394.0	1403.0	286.0	532.0
PHENOL. ALK. CAC03	.0	.0	.0	4.0
TOTAL ALK. CAC03	325.0	446.0	187.0	347.0
TOTAL HARD CAC03	125.0	58.0	180.0	13.0
% SODIUM	64.51	95.21	27.97	97.20
SAR	4.0	30.2	1.0	25.2
RSC	3.9	7.6	.1	6.5
SPECIFIC CONDUCTANCE	618.0	2330.0	446.0	876.0

GRAYSON COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER DATE OF COLLECTION	18-19-901 02/24/71	18-20-101 02/25/71	18-21-901 07/19/71	18-25-601 02/24/71
AQUIFER CODE	KGW	KGW	KGW	KCA
WELL DEPTH	872	630	301	1522
TEMPERATURE-F				
TEMPERATURE-C				
SILICA (MG/L)	11.0	12.0	12.0	13.0
CALCIUM (MG/L)	1.0	10.0	2.0	1.0
MAGNESIUM (MG/L)	1.0	3.0	1.0	1.0
SODIUM (MG/L)	142.0	115.0	120.0	206.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	331.0	254.0	194.0	377.0
SULFATE (MG/L)	30.0	36.0	92.0	41.0
CHLORIDE (MG/L)	11.0	30.0	16.0	46.0
FLUORIDE (MG/L)	1.0	.5	.2	.2
NITRATE (MG/L)	.4	.4	.4	.4
IRON (MG/L)				
PH	8.3	8.1	7.5	9.0
DISSOLVED SOLIDS (MG/L)	360.0	331.0	338.0	493.0
PHENOL, ALK. CAC03	.0	.0	.0	25.0
TOTAL ALK. CAC03	271.0	208.0	159.0	359.0
TOTAL HARD CAC03	7.0	36.0	10.0	9.0
% SODIUM	97.90	87.02	96.63	98.54
SAR	24.0	8.1	17.3	34.8
RSC	5.2	3.4	2.9	6.0
SPECIFIC CONDUCTANCE	585.0	535.0	534.0	848.0

GRAYSON COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER	18-27-701	18-29-301	18-29-302	18-29-701
DATE OF COLLECTION	02/24/71	07/19/71	07/19/71	07/19/71
AQUIFER CODE	KGW	KGW	KCA	KGW
WELL DEPTH	613	700	1600	1180
TEMPERATURE-F				82
TEMPERATURE-C				
SILICA (MG/L)	10.0	12.0	14.0	12.0
CALCIUM (MG/L)	5.0	1.0	3.0	2.0
MAGNESIUM (MG/L)	2.0	1.0	1.0	1.0
SODIUM (MG/L)	550.0	159.0	354.0	309.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	625.0	353.0	760.0	570.0
SULFATE (MG/L)	357.0	41.0	92.0	125.0
CHLORIDE (MG/L)	262.0	13.0	39.0	68.0
FLUORIDE (MG/L)	2.0	.9	2.2	1.8
NITRATE (MG/L)	.4	.4	.4	1.0
IRON (MG/L)				
PH	8.3	8.0	8.3	8.2
DISSOLVED SOLIDS (MG/L)	1495.0	401.0	879.0	800.0
PHENOL. ALK. CaCO3	.0	.0	.0	.0
TOTAL ALK. CaCO3	510.0	289.0	630.0	469.0
TOTAL HARD CaCO3	21.0	7.0	13.0	10.0
% SODIUM	98.29	98.12	98.51	98.66
SAR	52.5	26.9	45.2	44.5
RSC	9.8	5.6	12.2	9.1
SPECIFIC CONDUCTANCE	2290.0	629.0	1340.0	1240.0

GRAYSON COUNTY

GROUND WATER QUALITY ANALYSES--Continued

STATE WELL NUMBER	18-33-301	18-34-101	18-34-601	18-34-601
DATE OF COLLECTION	07/20/71	07/20/71	07/20/71	11/12/71
AQUIFER CODE	KCA	KGW	KGW	KGW
WELL DEPTH	923	400	387	387
TEMPERATURE-F				
TEMPERATURE-C				
SILICA (MG/L)	12.0	9.0	9.0	7.0
CALCIUM (MG/L)	2.0	5.0	11.0	11.0
MAGNESIUM (MG/L)	1.0	1.0	6.0	7.0
SODIUM (MG/L)	265.0	106.0	1040.0	1050.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	550.0	234.0	530.0	550.0
SULFATE (MG/L)	77.0	38.0	1460.0	1440.0
CHLORIDE (MG/L)	15.0	14.0	275.0	288.0
FLUORIDE (MG/L)	1.1	.5	2.4	2.4
NITRATE (MG/L)	.4	.4	.4	.4
IRON (MG/L)				
PH	8.9	7.7	7.8	8.3
DISSOLVED SOLIDS (MG/L)	643.9	288.0	3064.0	3076.0
PHENOL. ALK. CAC03	23.0	.0	.0	.0
TOTAL ALK. CAC03	496.0	192.0	431.0	449.0
TOTAL HARD CAC03	10.0	15.0	50.0	55.0
% SODIUM	98.44	93.28	97.74	97.59
SAR	38.2	11.3	62.6	60.9
RSC	8.8	3.5	7.6	7.8
SPECIFIC CONDUCTANCE	1035.0	459.0	3930.0	4020.0

GRAYSON COUNTY

GROUND WATER QUALITY ANALYSES---Continued

STATE WELL NUMBER DATE OF COLLECTION	18-34-601 11/07/73	18-36-501 07/19/71	18-36-502 07/20/71	18-36-503 07/20/71
AQUIFER CODE	KGW	KGAC	KGW	KCA
WELL DEPTH	387	36	1140	2300
TEMPERATURE-F	59			
TEMPERATURE-C				
SILICA (MG/L)	5.0	12.0	12.0	15.0
CALCIUM (MG/L)	9.0	134.0	2.0	3.0
MAGNESIUM (MG/L)	4.0	3.0	5.0	1.0
SODIUM (MG/L)	1000.0	6.0	217.0	346.0
POTASSIUM (MG/L)				
MANGANESE (MG/L)				
BORON (MG/L)				
BICARBONATE (MG/L)	570.0	372.0	475.0	790.0
SULFATE (MG/L)	1300.0	28.0	75.0	90.0
CHLORIDE (MG/L)	285.0	5.0	19.0	21.0
FLUORIDE (MG/L)	2.5	.4	1.2	2.7
NITRATE (MG/L)	11.0	17.0	1.0	.4
IRON (MG/L)				
PH	8.3	7.4	8.3	8.3
DISSOLVED SOLIDS (MG/L)	2896.7	388.0	565.0	867.0
PHENOL. ALK. CAC03	.0	.0	.0	.0
TOTAL ALK. CAC03	467.0	305.0	389.0	640.0
TOTAL HARD CAC03	37.0	347.0	25.0	11.0
% SODIUM	98.24	3.62	94.86	98.48
SAR	69.7	.1	18.6	44.2
RSC	8.5	.0	7.2	12.7
SPECIFIC CONDUCTANCE	3860.0	618.0	872.0	1300.0

GRAYSON COUNTY

SUMMARY OF GROUND WATER QUALITY

AQUIFER KGM

CONSTITUENT OR PROPERTY	MINIMUM CONCENTRATION MG/L	MAXIMUM CONCENTRATION MG/L	MEAN CONCENTRATION MG/L	MEDIAN CONCENTRATION MG/L	PERCENTAGE OF SAMPLES IN WHICH CONCENTRATION EXCEEDED AVERAGE	NUMBER OF SAMPLES FOR WHICH CONSTITUENT WAS PRESENT
SILICA (SiO2)	5.00	21.00	11.25	11.00	43.75	16
CALCIUM (CA)	1.00	134.00	18.75	5.00	18.75	16
MAGNESIUM (MG)	1.00	9.00	3.68	3.00	37.50	16
SODIUM (NA)	6.00	1050.00	327.87	142.00	25.00	16
BICARBONATE (HCO3)	194.00	625.00	395.31	372.00	43.75	16
SULFATE (SO4)	20.00	1460.00	325.37	41.00	25.00	16
CHLORIDE (CL)	4.00	288.00	82.37	14.00	25.00	16
FLUORIDE (F)	0.10	2.50	1.10	0.90	31.25	16
NITRATE (NO3)	0.40	20.00	3.62	0.40	25.00	16
TOTAL DISSOLVED SOLIDS (TDS)	248.00	3076.00	967.92	394.00	25.00	16
HARDNESS (CACO3)	7.00	347.00	61.37	25.00	18.75	16
SPECIFIC CONDUCTANCE	415.00	4020.00	1369.06	618.00	25.00	16
PH	7.10	8.30	7.95	8.00	56.25	16
PERCENT SODIUM	3.62	98.66	83.20	96.63	68.75	16
SAR	0.14	69.74	26.92	18.67	31.25	16
RSC	0.00	9.82	5.28	5.29	50.00	16

GRAYSON COUNTY

SUMMARY OF GROUND WATER QUALITY--Continued

AQUIFER KCA

CONSTITUENT OR PROPERTY	MINIMUM CONCENTRATION MG/L	MAXIMUM CONCENTRATION MG/L	MEAN CONCENTRATION MG/L	MEDIAN CONCENTRATION MG/L	PERCENTAGE OF SAMPLES IN WHICH CONCENTRATION EXCEEDED AVERAGE	NUMBER OF SAMPLES FOR WHICH CONSTITUENT WAS PRESENT
SILICA (SI02)	10.00	17.00	13.12	13.00	25.00	8
CALCIUM (CA)	2.00	98.00	16.12	3.00	12.50	8
MAGNESIUM (MG)	1.00	13.00	3.25	1.00	25.00	8
SODIUM (NA)	66.00	530.00	251.87	211.00	25.00	8
BICARBONATE (HCO3)	248.00	790.00	476.62	414.00	25.00	8
SULFATE (SO4)	39.00	124.00	78.00	79.00	50.00	8
CHLORIDE (CL)	9.00	495.00	92.75	29.00	12.50	8
FLUORIDE (F)	0.20	2.70	1.16	0.60	25.00	8
NITRATE (NO3)	0.40	1.00	0.47	0.40	12.50	8
TOTAL DISSOLVED SOLIDS (TDS)	352.00	1403.00	690.62	532.00	25.00	8
HARDNESS (CACO3)	9.00	302.00	54.00	13.00	25.00	8
SPECIFIC CON- DUCTANCE	555.00	2330.00	1093.75	876.00	25.00	8
PH	7.50	8.50	8.08	8.10	50.00	8
PERCENT SODIUM	32.51	98.51	88.98	97.20	75.00	8
SAR	1.66	45.22	26.34	25.25	37.50	8
RSC	0.46	12.71	6.73	6.52	25.00	8

GRAYSON COUNTY

REPORTED MUNICIPAL AND INDUSTRIAL GROUND WATER PUMPAGE

YEAR	MUNICIPAL PUMPAGE (ACRE-FEET)	INDUSTRIAL PUMPAGE (ACRE-FEET)	MUNICIPAL AND INDUSTRIAL PUMPAGE (ACRE-FEET)
1955	3,480.13	393.76	3,873.89
1956	4,058.41	393.76	4,452.17
1957	3,726.66	393.76	4,120.42
1958	3,782.06	919.57	4,701.63
1959	3,882.84	1,205.31	5,088.15
1960	3,702.81	730.10	4,432.91
1961	3,939.56	507.18	4,446.74
1962	4,251.38	493.78	4,745.16
1963	5,200.95	695.92	5,896.87
1964	5,177.01	729.49	5,906.50
1965	5,411.63	769.45	6,181.08
1966	5,713.90	758.42	6,472.32
1967	5,960.29	732.93	6,693.22
1968	6,366.92	734.81	7,101.73
1969	253,844.91	840.94	254,685.85
1970	14,887.33	850.17	15,737.50
1971	8,776.83	580.66	9,357.49
1972	9,097.95	706.21	9,804.16
Total	351,261.57	12,436.22	363,697.79

