Approved March 14, 1990
Date

MINUTES OF THE HOUSE COMMITTEE ON ENERGY AND NATURAL RESOURCES.

The meeting was called to order by Representative Dennis Spaniol at
Chairperson

3:30 ~~a.m.~~/p.m. on March 13, 1990 in room 526-S of the Capitol.

All members were present except:

Committee staff present:

Raney Gilliland, Principal Analyst, Legislative Research
Mary Torrence, Revisor of Statutes' Office
Pat Mah, Legislative Research
Maggie French, Committee Secretary

Conferees appearing before the committee:

Dr. Lee Gerhard, Director, Kansas Geological Survey
Dr. Robert Buddemeier, Geohydrology Department, Kansas Geological Survey
Mr. Tom McClain, Acting Deputy Director, Kansas Geological Survey
Mr. David Pope, Director, Division of Water Resources, Kansas Department of Agriculture
Mr. William R. Bryson, Kansas Corporation Commission

Chairman Dennis Spaniol called the meeting to order and remarked that he thought it would be helpful to the committee to have information regarding the depletion of the High Plains Aquifer (Ogallala) and other aquifers in the State of Kansas and to investigate any possible means of using water more wisely to insure that future generations may also have the availability of water. He stated he had received printed information compiled by Professors David E. Kromm and Stephen E. White, Kansas State University, pertinent to the conservation of water in the High Plains. Copies were distributed to members of the committee (Attachment 1).

The chairman recognized Dr. Lee Gerhard, Director, Kansas Geological Survey, who stated he had requested Dr. Robert Buddemeier, Geohydrology Department, Kansas Geological Survey, to present a briefing on the Ogallala Aquifer (Attachment 2). Dr. Buddemeier discussed aquifers and their distributions; groundwater; changes in water levels and water resources, etc. He outlined the contents of a publication entitled "January 89 Kansas water levels and data related to water level changes (Groundwater Series 10, Kansas Geological Survey)" (Attachment 3). Dr. Buddemeier and Mr. Tom McClain, Acting Deputy Director, Kansas Geological Survey, responded to questions from the committee regarding declining water levels; water levels which have dropped in domestic wells; the impact of irrigation on water levels, etc.

The chairman called on Mr. David Pope, Director, Division of Water Resources, Kansas Department of Agriculture, who commented depletion of the Ogallala Aquifer is continuing and the Kansas State Board of Agriculture works cooperatively with groundwater management districts and others to deal with this important long-term issue (Attachment 4). He discussed information contained in "The Kansas Handbook of Water Rights" (Attachment 5). Discussion following included questions from the committee relating to granting of new water rights in limited areas; irrigation out of the Ogallala Aquifer; moratorium on granting water rights; vesting of water rights; limitations on acreage expansions, etc. Mr. Pope stated Kansas probably has the most active and most effective program now in operation as compared to other states. Discussion continued including domestic water rights; market development of water rights; purchase of water rights for future use and the legal authority of the Kansas Department of Agriculture to deny permits for water use. Representative Patrick requested the committee be furnished with copies of petitions challenging the legal authority of the State Board of Agriculture. He initiated discussion on the eligibility of persons to serve on the boards of groundwater districts including questions pertaining to the prevalence of irrigators on the boards. Other questions related to excessive use of water by meat industries in Western Kansas cities; time taken for aquifers to recharge; lack of rights to drill additional wells to compensate for reduced output by wells in use and transfer of water rights by deed. Chairman Spaniol inquired if severance tax has been placed on sale of water rights in any state. Mr. Pope replied that some states in the west deal with large volumes of water by transferring from one state to another.

Mr. William R. Bryson, Kansas Corporation Commission, was recognized by the chair and presented his comments on how the depletion of the Ogallala Aquifer took place; the introduction of contaminants into groundwater, and concern about the loss of fresh water by downward drainage (Attachment 6). He provided committee members with information on the investigation plan for chloride contamination sites (Attachment 7). Discussion following included acceptable methods for plugging operations.

Meeting adjourned at 5:17 p.m.

The committee will continue hearings on the depletion of the High Plains Aquifer (Ogallala) at 3:30 p.m., March 14, 1990.

Date: 3-13-90

GUEST REGISTER

HOUSE

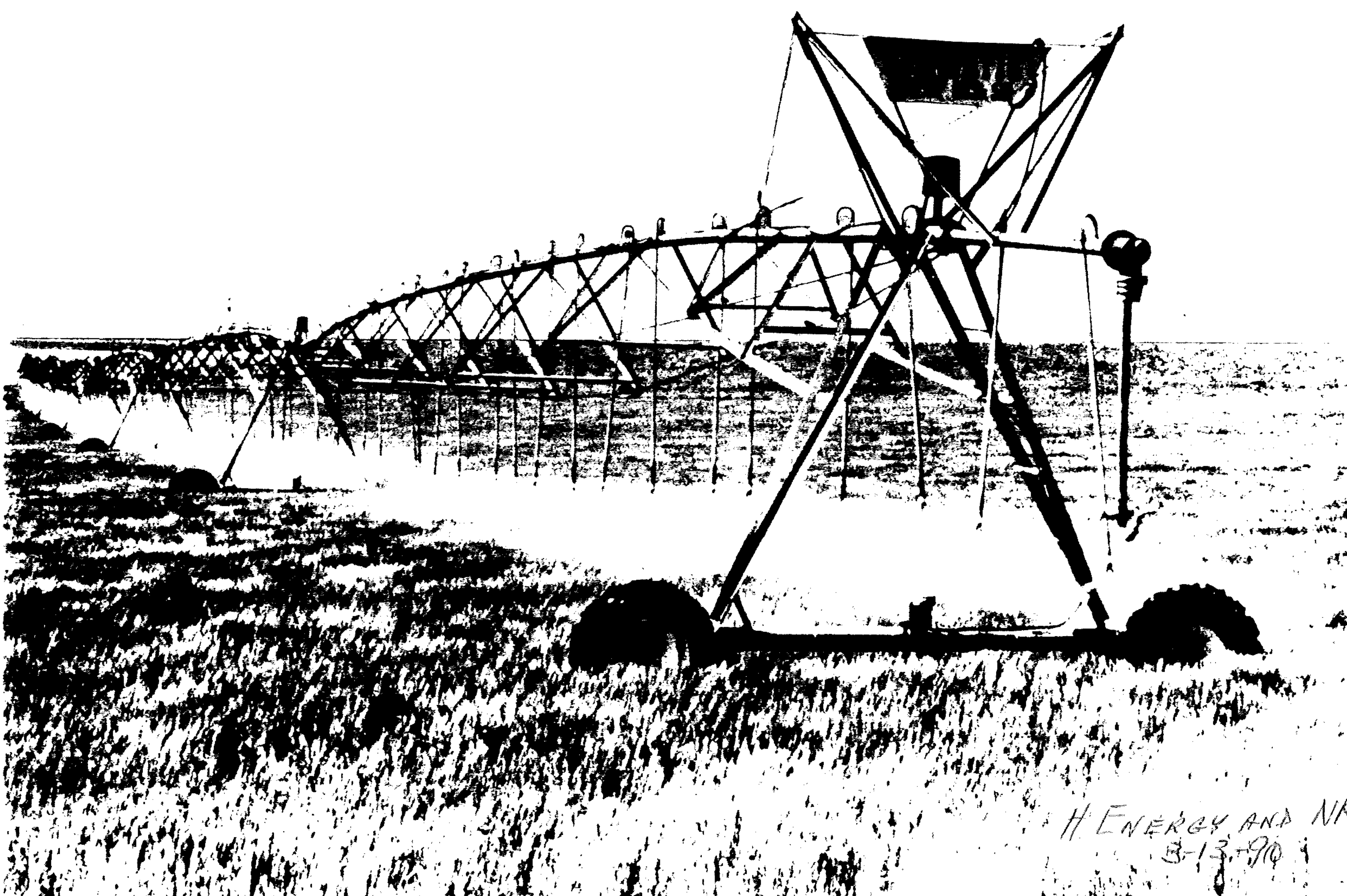
COMMITTEE ON ENERGY AND NATURAL RESOURCES

NAME	ORGANIZATION	ADDRESS	PHONE
C. Stinard	Ks Natural Rsc Council	Topeka	233-6707
Joyce Wolf	Ks. Audubon Council	LAWRENCE	749-3203
Rich McKee	KLA	Topeka	273-5115
Bill Bryson	KCC	Topeka	296-5113
F.A. McENROE		OVERLAND PARK	642-6387
WM BARR		Auburn Ks	641-2788
Tom Stiles	KWO	Topeka	296-3185
Hyde Jacobs	KSU	Manhattan	532-5729
Wayland J Anderson	KSBA-DWR	Topeka	296-3718
James Power	KDHE	Topeka	296-1535
RW Buddemeier	KGS	Lawrence	864-3965
Tom McClain	KGS	Lawrence	864-3965
[illegible]	KGS	Lawrence	864-3965
[illegible]	KP	Topeka	
Wendy Pettlow	Intern-Rep. Lynch	Lawrence	841-8365
[illegible]	DWR-KSBA	Topeka	296-3717

(Gary)

NSERVING WATER IN THE IGH PLAINS

DAVID E. KROMM AND STEPHEN E. WHITE



H Energy and NR
3-13-90
Attachment 1

INTRODUCTION

Irrigation in the High Plains is not a homogeneous activity. A wide variety of crops are grown, to include vast areas of cotton in the south and corn in the north, with much wheat, grain sorghum, and soybeans in between. Different methods of delivering water to the fields are employed. Both furrow and sprinkler irrigation are widespread. The techniques used to conserve water also vary. After observing conditions throughout the region for more than a decade, the writers wondered why certain water-saving practices were used in some areas and not others. We wondered also about the sources of information farmers relied on in deciding on how best to reduce water use. We were curious as to the patterns of diffusion for specific water-conserving practices. We were able to explore these issues with support from The Ford Foundation.

The High Plains study area extends over nearly 210,000 square miles in six states, ranging from Texas in the south to Nebraska in the north, and reaching into eastern New Mexico and Colorado (Figure 1). Some 10,400,000 acres are irrigated within the region, with most of the water coming from the High Plains aquifer (Figure 2). Sometimes this huge underground water supply, the continent's greatest, is termed the Ogallala, the name of its largest water-bearing formation. The High Plains aquifer refers to all the major groundwater sources in the region.

Depletion of the aquifer concerns residents and policymakers alike. High Plains farmers pump about 30 percent of all irrigation water pumped in the United States. As recharge is limited essentially to sandy areas and a few places where river water is applied to fields, for all practical purposes the aquifer is being mined. The water that is being taken out is not being replaced. The actual degree of depletion varies considerably because of great differences in amount pumped, recharge, and, most important of all, saturated thickness (Figure 3). As pumping reduces the saturated thickness, well yields can decline dramatically. Some wells go dry, and in others the remaining water is not economically recoverable. Overall, depletion is most advanced in Texas and least so in Nebraska, but individual farms throughout the entire region have had to abandon irrigation.

Figure 1

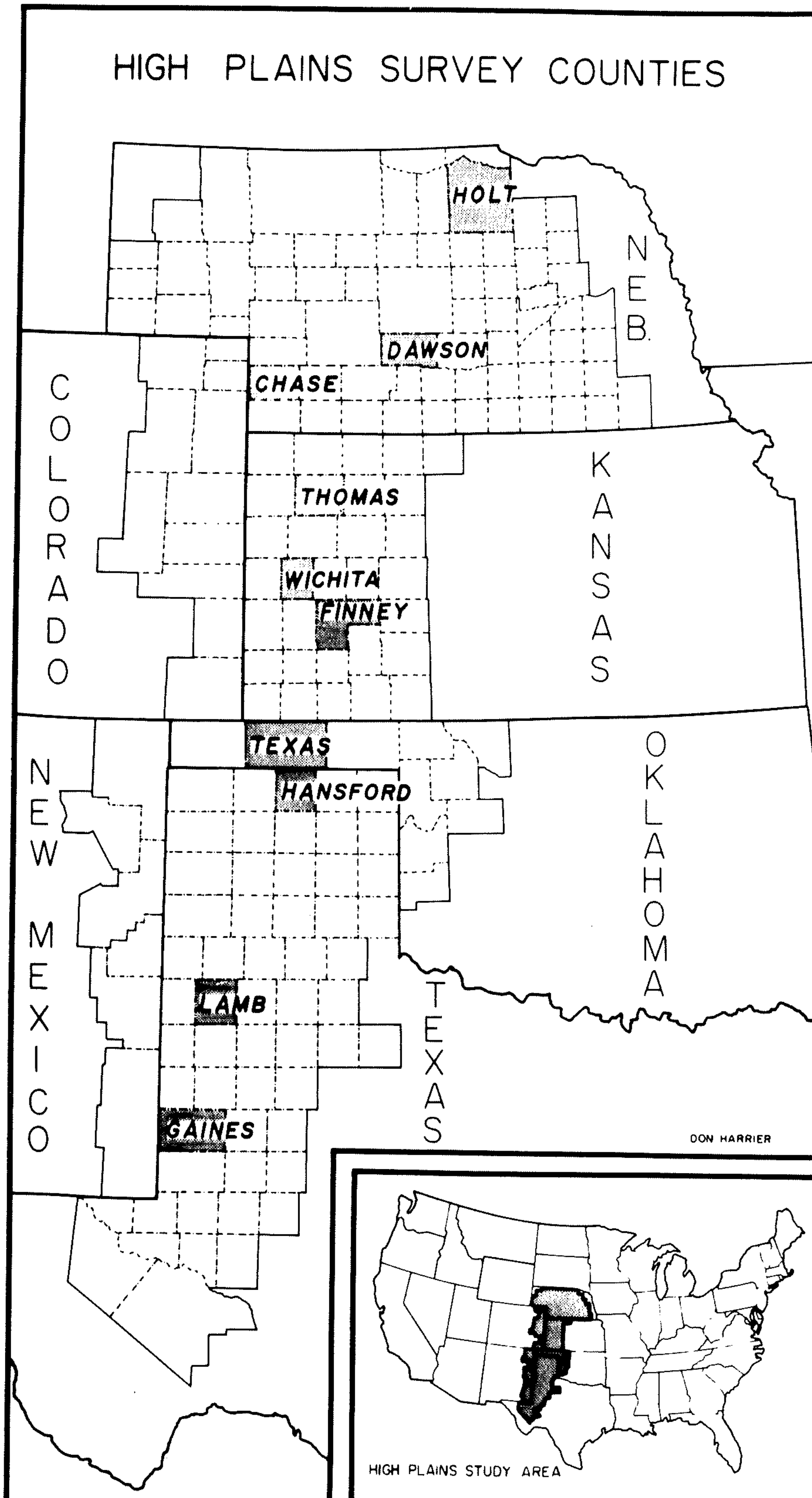


Figure 2

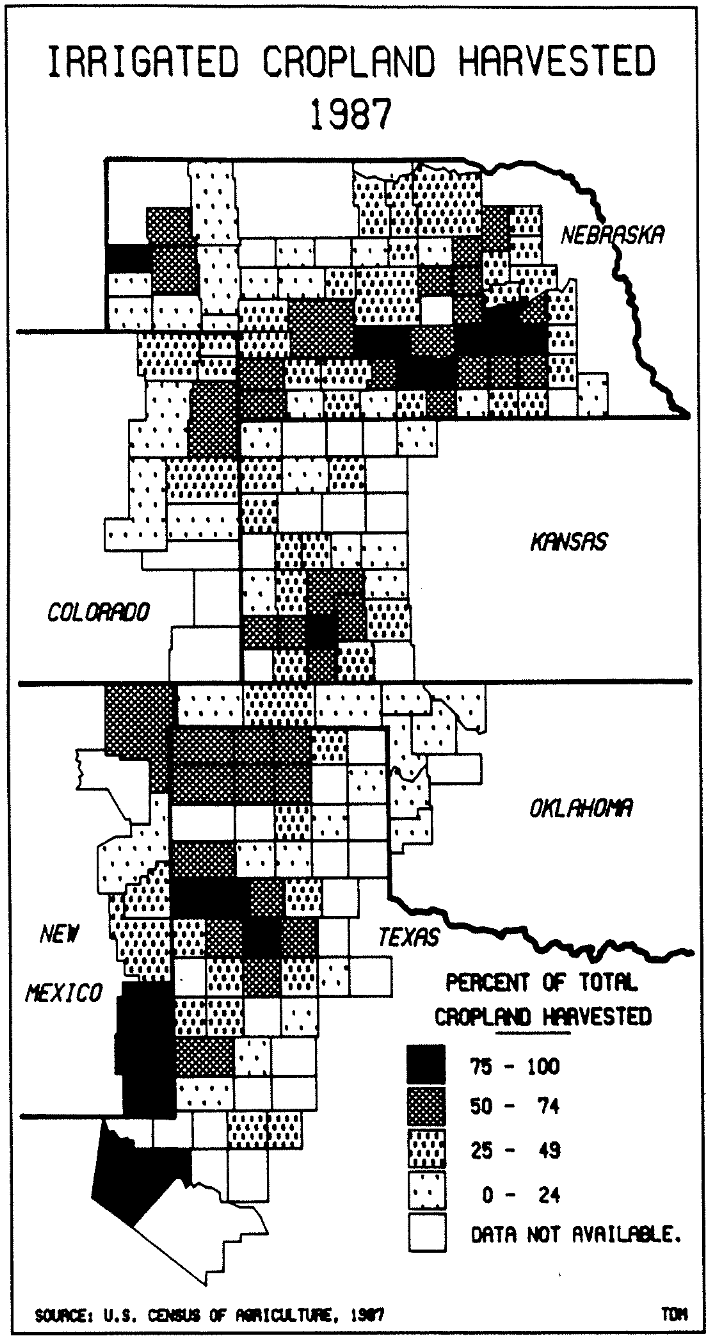
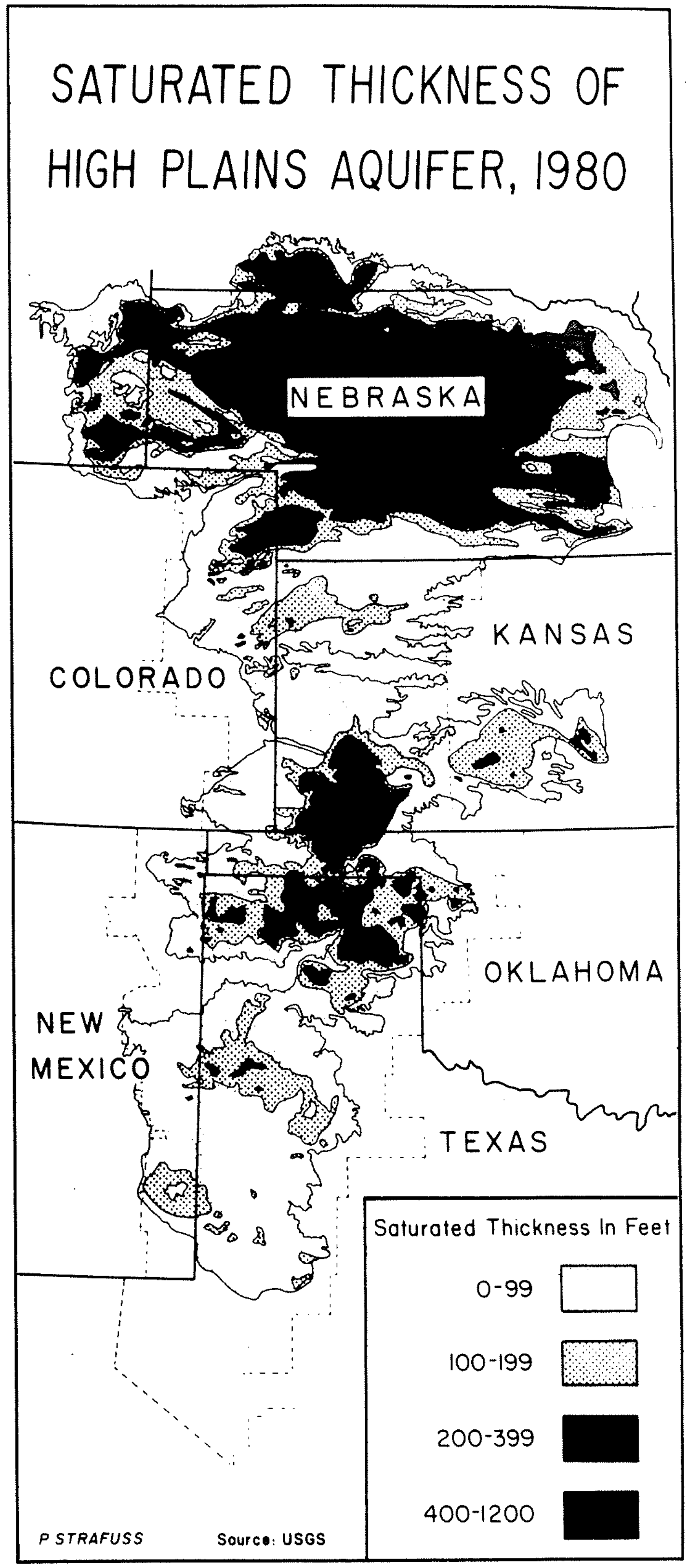


Figure 3



Map used with permission of the *Journal of Geography.*

Groundwater depletion is a critical issue in the High Plains because aquifers provide nearly all the water used by farmers and municipalities. There are very few rivers or lakes and precipitation is inadequate to support moisture-intensive crops or continuous cultivation. Aquifer depletion threatens the entire economy of the semiarid area. The irrigated feed grains are fed to cattle locally, and the cattle are processed regionally. It is an integrated agribusiness system based on irrigation. Take away the water and the whole economy would falter.

Four-fifths or more of the water goes for irrigation. If conservation to extend the life of the aquifer is to have any meaning it must occur in agriculture. Farmers are both the users of the water and the people most directly dependent on its continued availability. There is a built-in motivation to conserve. Fortunately, there are many practices, techniques, and devices that can be used to improve irrigation efficiency. Some are specific to the type of irrigation, such as surge flow, which is used in furrow irrigation, and drop tubes, which are employed with center pivot sprinkler systems. A few of the practices work best with certain soil or slope conditions or crops. Still, the adoption pattern for water-saving practices varies far more than these differences. Why is this so?

We focused our research on ten counties in four states. From south to north, the counties are Gaines, Lamb, and Hansford in Texas; Texas in Oklahoma; Finney, Wichita, and Thomas in Kansas; and Chase, Dawson, and Holt in Nebraska. They were chosen because of their high levels of irrigation, varied physical environments that are representative of the range of natural conditions in the High Plains, and familiarity because of previous research completed by the writers.

The data presented in this report were collected from published and unpublished materials, personal interviews, and a questionnaire that was completed by irrigators between September 1988 and March 1989. A sample of 1,750 irrigators, 175 from each one of the ten counties, was drawn systematically from lists prepared by local, state, and federal agencies operating within the area. A total of 709 farmers returned the completed survey instruments, giving an overall response rate of just over 40 percent.

The survey instrument asked questions to describe the respondents (age, sex, education, etc.), to determine the character of the farm (acres, tenancy, crops, livestock, etc.), water and irrigation (depth to water, saturated thickness, type of irrigation, number of wells, etc.), sources of information regarding irrigation management and specific water-saving practices, water conservation strategies adopted, and reasons for using or not using additional water conservation methods (Table 1). This publication reports on key findings from the questionnaire responses and provides a glossary of important terms related to groundwater and irrigation.

Table 1

Selected Characteristics of Respondents

Category	Frequency	Percent of Total
Age		
20–34 years	73	10.4
35–54 years	272	38.9
55 or more years	355	50.7
(missing 9)		
Education		
Less than high school diploma	89	12.8
High school diploma	240	34.5
Post high school training	177	25.5
College degree	189	27.2
(missing 14)		
Gender		
Male	648	95.0
Female	34	5.0
(missing 27)		
State		
Nebraska	254	35.8
Kansas	229	32.3
Texas	164	23.1
Oklahoma	62	8.7
County		
Dawson (NE)	101	14.2
Wichita (KS)	88	12.4
Holt (NE)	79	11.1
Thomas (KS)	79	11.1
Chase (NE)	74	10.4
Finney (KS)	62	8.7
Texas (OK)	62	8.7
Gaines (TX)	60	8.5
Lamb (TX)	57	8.0
Hansford (TX)	47	6.6
Irrigation system		
Gated pipe	272	39.4
Sprinkler	240	34.7
Gated pipe and sprinkler	153	22.1
Other	26	3.8
(missing 18)		
Number of irrigation wells		
1	109	16.0
2–4	270	39.7
5 or more	301	44.2
(missing 29)		
Depth to water table		
1–99 feet	223	36.1
100–199 feet	251	40.6
200 or more feet	144	23.3
(missing 91)		
Tenant		
Yes	227	36.4
No	396	63.6
(missing 86)		
Livestock		
Yes	349	51.1
No	334	48.9
(missing 31)		
Knowledge of water law		
Familiar	352	51.9
Somewhat familiar	285	42.0
Not familiar	41	6.1
(missing 31)		
Source of energy for pump engine		
Natural gas	307	46.9
Electric	93	14.2
Diesel	69	10.6
More than one source	185	28.3
(missing 55)		

WATER-SAVING PRACTICES

Thirty-nine water-saving practices were identified, and irrigators were asked to indicate each of the practices that they had adopted. The final list of practices included in the survey was based on a review of the research literature and field interviews with irrigators, water managers, and researchers throughout the High Plains. Preliminary lists were reviewed by county agricultural agents, SCS personnel, and water managers for completeness and accuracy of terminology, and several modifications were made.

The water-saving practices can be classified into three categories: field practices, management strategies, and system modifications. Field practices include actions that keep water in the field, more efficiently distribute a limited supply of water across the field, or encourage the retention of soil moisture. Examples include chiseling compacted soils and furrow diking to prevent runoff, leveling land to distribute water uniformly, and using ridge till or minimum till to retain soil moisture. Field practices are water-saving techniques that often do not require a large amount of capital for adoption.

Management strategies, unlike field practices that require modifications to the land, are attempts to monitor and gain information that helps in making decisions about scheduling water application or improving the efficiency of the irrigation system. Measuring rainfall, measuring soil moisture, checking pumping plant efficiency, utilizing agricultural consulting firms, and irrigation scheduling are management strategies designed to help an irrigator make the appropriate water application decisions.

System modifications are water-saving practices that require an addition to or an alteration of an existing irrigation system or the adoption of a new system. They require the purchase of equipment and usually cost more money than the adoption of field practices and management strategies. System modifications include adding drop tubes to a center pivot system, retrofitting a well with a smaller pump, the installation of a surge irrigation system, or the construction of a tailwater recovery system.

Presented with this wide range of water-saving methods, only three practices were adopted by at least 50 percent of the irrigators: chiseling compacted soils, irrigation scheduling, and reducing evaporation with crop residue (Table 2). Chiseling is also a soil conservation and residue management measure, so it is not clear just how important the water conservation motive is in its adoption. Eleven other practices were adopted by at least 25 percent of the irrigators. Focusing on the 15 most adopted water-saving practices, seven were management strategies, six were field practices, and only two were system modifications that required a greater level of investment.

Table 2

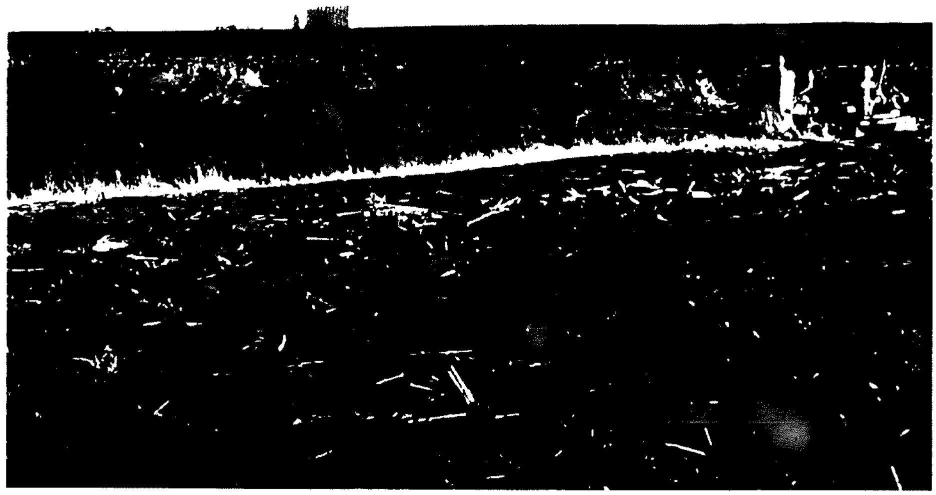
Water-Saving Practice Adoption Frequency

Rank	Water-Saving Practice	Percent Adoption	Practice Type
1.	Chisel compacted soils	66.8	Field
2.	Schedule irrigation based on moisture need	53.2	Management
3.	Reduce evaporation with stubble mulch	50.7	Field
4.	Employ minimum tillage	46.3	Field
5.	Monitor soil moisture	45.8	Management
6.	Practice preplant irrigation	44.4	Management
7.	Measure rainfall	44.0	Management
8.	Check pumping plant efficiency	44.0	Management
9.	Plant drought tolerant crops	43.5	Management
10.	Level land	42.2	Field
11.	Replace open ditch with underground pipe	37.5	System
12.	Use alternate furrow irrigation	36.7	Field
13.	Install tailwater recovery system	35.3	System
14.	Practice limited irrigation	27.8	Management
15.	Use inter-furrow ripping	23.9	Field
16.	Install low pressure heads on drop tubes	23.7	System
17.	Use private consulting firm	23.7	Management
18.	Retrofit well with smaller pump	23.4	System
19.	Meter water use	22.6	Management
20.	Compact furrows to speed stream advance	22.4	Field
21.	Reduce irrigation acreage	22.4	Management
22.	Replace old or leaking underground pipe	19.9	System
23.	Use low energy precision application (LEPA)	18.5	System
24.	Convert from furrow to sprinkler irrigation	17.9	System
25.	Use surge flow irrigation application	17.3	System
26.	Use ridge till	15.1	Field
27.	Use multi-function irrigation system	13.7	Management
28.	Use playas to supplement groundwater	13.5	System
29.	Use furrow diking	11.8	Field
30.	Build conservation bench terraces	10.7	Field
31.	Use no-tillage	10.2	Field
32.	Use skip row planting	9.3	Field
33.	Apply plant growth regulators	8.8	Field
34.	Use infrared canopy monitor	5.5	Management
35.	Use recharge well or basin	4.7	System
36.	Use drip irrigation	3.6	System
37.	Use hooded sprayers	2.6	System
38.	Use cablegation	1.7	System
39.	Recover water from air injection	1.5	System

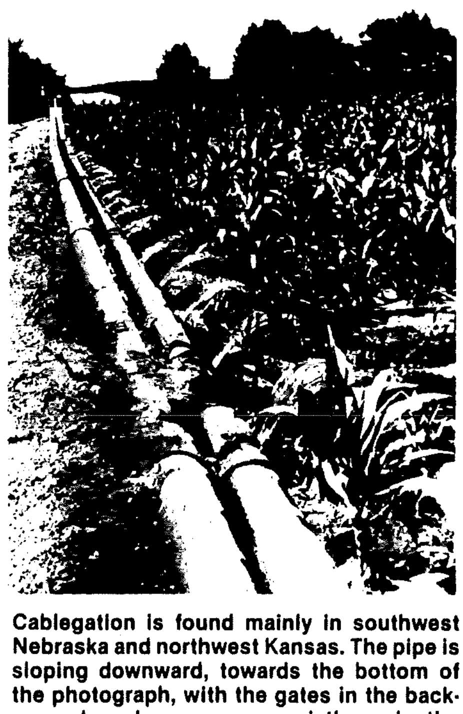
As seen in Table 2, system modifications are adopted much less frequently than either field practices or management strategy type water-saving practices, even though many of the system modifications have proven to be very cost effective. For example, drop tubes can be added to a center pivot system for approximately $4,000 and significantly reduce evaporation and improve water distribution throughout the field. Some percentages appear low because the practice may only apply to either sprinkler irrigation systems or furrow irrigation. However, many practices apply to more than one type of irrigation system, and their lack of adoption is more difficult to understand. For example, metering water usage is a low-cost practice that is used by less than 23 percent of irrigators. Although 45.8 percent of irrigators indicated that they monitor their soil moisture, 56 percent of those indicated that they actually use the "feel" method, while only about 2 percent use gypsum blocks, and 5.6 percent use tensiometers. Over 26 percent use the services of a private consulting firm.

The seven least adopted practices are often considered experimental, evolving technologies, and it is not surprising that their adoption rates are not higher. However, our field experiences suggest that the level of awareness for plant growth regulators, infrared canopy monitors, hooded sprayers, and cablegation vary greatly from place to place. The diffusion of information to irrigators is not a uniform process.

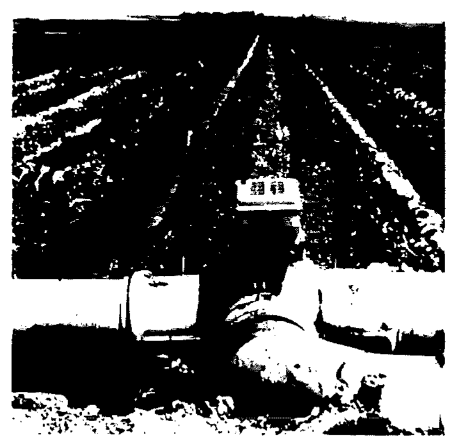
The survey results suggest that farmers have elected to adopt water-saving practices that are not system-oriented or as costly as more labor-intensive field practices. More important, system changes are often designed to encourage both greater yield and efficient water use. Because they are capital-intensive, irrigators must often increase yields to pay for the investment. Many management strategies and field practices, however, do not necessarily require greater yields to make water conservation pay. Perhaps the more interesting questions are why the pattern of adoption for specific practices is so varied from place to place and what factors can be identified to explain these adoption differences.



This tailwater recovery system, near Montezuma, Kansas, collects runoff from either irrigation or precipitation. The tailwater can then be reused to irrigate crops more cheaply than groundwater, which must be pumped from the aquifer, thus conserving both water and energy. About 35 percent of irrigators surveyed use tailwater recovery systems.



Cablegation is found mainly in southwest Nebraska and northwest Kansas. The pipe is sloping downward, towards the bottom of the photograph, with the gates in the background no longer open and those in the foreground not yet open. Chase County, Nebraska.



Surge flow system showing pipes carrying water, and a solar-powered control box, which is programmed to open the gates on an intermittent cycle. Chase County, Nebraska.

REGIONAL VARIATION OF WATER-SAVING PRACTICES

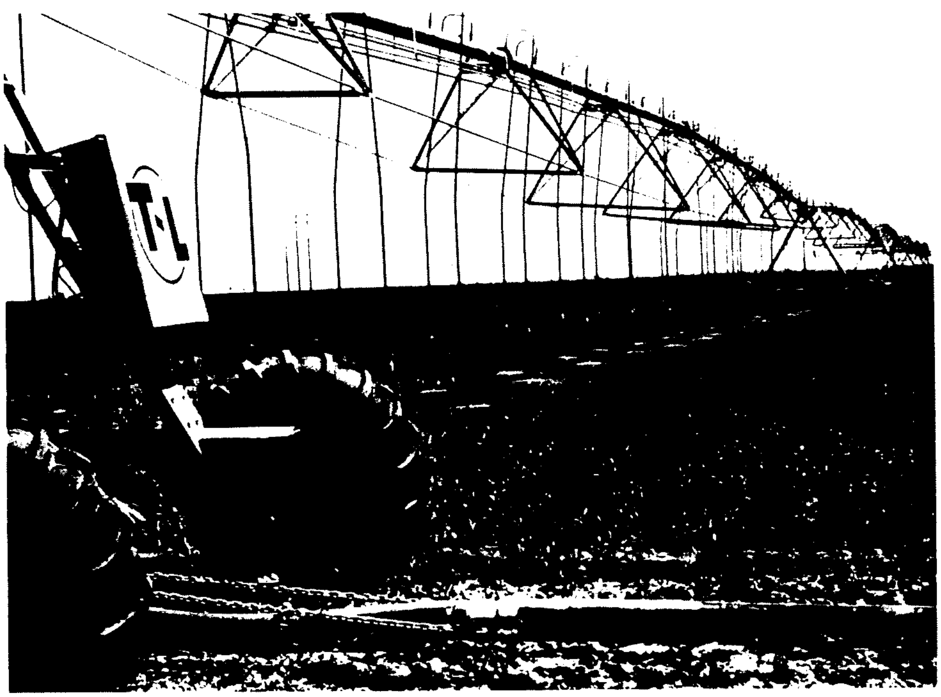
Location is the factor most associated with the variance of irrigator decisions to adopt water-saving practices. We knew from previous research that irrigators in different parts of the High Plains were adopting different technologies, but we assumed that many of these variations could be explained by differences in aquifer characteristics, types of irrigation systems used, and socioeconomic characteristics.

The level of adoption for each of the 39 water-saving practices was crossclassified with each of 15 other variables producing a total of 585 tables. Chi-squared values were examined for each table. The six least used practices had too few adoptions to assume that the chi-squared values were statistically meaningful, so we eliminated them from our statistical analysis. When the 33 remaining practices were each crossclassified by county, 28 practices had chi-squared values large enough to indicate that their rates of adoption varied significantly at the .01 probability level (Table 3). Interestingly, when practices were crossclassified by state, only 21 practices showed significantly different levels of adoption at the .01 level. This suggests that many water-saving practices may vary more within states than between states.

We looked closely at differences among counties. Four practices that did not vary significantly (chiseling, irrigation scheduling, measuring rainfall, and checking pumping plant efficiency) are some of the more widely adopted practices throughout the High Plains, and only small differences from county to county were expected. Several practices, however, have tremendous adoption rate disparities for different counties. For example, 81.8 percent of irrigators in Chase County, Nebraska, meter their water use, whereas only 1.9 percent (one responding irrigator) in Texas County, Oklahoma, did so. Chase County is within a groundwater control area, and farmers are required to meter water use. Most do. In Gaines County, Texas, 70.7 percent of irrigators indicated that they were using drop tubes on center pivot systems, yet in Holt County, Nebraska, a county with a high concentration of center pivots, only 18.1 percent had installed drop tubes. Fifty percent of irrigators in Wichita County, Kansas, use limited irrigation, while only 7.6 percent in Chase County do likewise. Most Thomas County, Kansas, irrigators (61 percent) monitor their soil moisture, whereas only 21 percent of Hansford County, Texas, irrigators find it worthwhile to do so.

To see if county-to-county differences in level of adoption for certain practices could be explained by other factors, we performed a series of three-way crossclassifications. Each water-saving practice was crossclassified by survey county while controlling for the influence of other variables. The variables controlled included type of irrigation system, depth to the water table, number of irrigation wells, level of educational attainment, and age. When controlling for type of irrigation system, 25 of 33 practices still varied among counties at the .01 probability level. For example, if we focus on just irrigators who use sprinklers, we still find that this specific group adopts water-saving practices at significantly different levels in different counties. Likewise, the other four control variables explained very little about why intercounty variations are so strong.

If counties are ranked 1 through 10 on the basis of the frequency with which irrigators adopted a specific water-saving practice, an aggregate adoption index can be determined for each county by simply computing its mean rank value for all 39 practices. Such an index permits us to compare counties on the basis of how frequently irrigators have adopted water-saving practices "across the board." On this basis, Finney County, Kansas, appears to be the highest adoption county followed by Thomas, Hansford, Lamb, Wichita, Chase, Dawson, Gaines, Texas, and Holt. One interesting generalization appears when counties are ranked in this fashion. The top five adoption counties are each within a groundwater management district or underground water conservation district. The objectives of these districts are focused exclusively on groundwater management and conservation issues, and they all have professional staff that work closely with irrigators and provide information about groundwater conservation practices. There is no one local agency that is primarily concerned about groundwater issues in two low adoption counties: Gaines and Texas. Chase, Dawson, and Holt counties all rank as relatively low adoption counties. Each of these counties is within a Nebraska Natural Resource District that is responsible for managing groundwater. However, the NRDs have many other responsibilities beyond groundwater management, and it is not clear if irrigators perceive NRDs as having a mission to educate and encourage the adoption of water-saving practices. Although Chase ranks sixth on the aggregate adoption index, it leads all counties in the adoption of seven specific practices. This suggests that irrigators in counties that ranked lower may still be very concerned about saving water but that they focus on specific practices rather than adopting a large number of techniques.



Drop tubes on a linear sprinkler system, at the Texas A&M research station, near Etter. The pipe in the foreground carries the water flow from the well and moves with the system. Moore County, Texas.

Table 3

County Water-Saving Practice Adoption Frequencies

Water-Saving Practice	Gaines	Lamb	Hansford	Texas	Finney	Wichita	Thomas	Chase	Dawson	Holt	Differences Among Counties Sig. at .01 level
	Percent Adoption by County										
Chisel compacted soils	50.0	61.9	88.6	58.6	60.0	67.7	67.2	81.0	73.1	53.8	
Schedule irrigation based on moisture need	53.4	48.0	55.8	54.7	53.6	45.2	59.4	54.5	54.6	52.8	
Reduce evaporation with stubble mulch	27.6	46.0	65.1	49.1	60.7	61.6	52.2	66.7	43.3	40.3	*
Employ minimum tillage	19.0	34.0	37.2	34.0	64.3	46.6	42.0	57.6	61.9	50.0	*
Monitor soil moisture	41.4	26.0	20.9	35.8	53.6	46.6	60.9	59.1	52.6	43.1	*
Practice pre-plant irrigation	72.4	70.0	65.1	58.5	57.1	74.0	60.9	15.2	6.2	4.2	*
Measure rainfall	50.0	36.0	37.2	32.1	46.4	39.7	36.2	50.0	49.5	54.2	
Check pumping plant efficiency	31.1	44.0	53.5	39.6	55.4	49.3	46.4	56.1	33.0	38.9	
Plant drought tolerant crops	36.2	36.0	55.8	39.6	60.7	64.4	52.2	28.8	32.0	36.1	*
Level land	39.7	28.0	67.4	56.6	44.6	42.5	40.6	33.3	63.9	6.9	*
Replace open ditch with underground pipe	6.9	64.0	65.1	49.1	51.8	71.2	31.9	27.3	26.8	2.8	*
Use alternate furrow irrigation	5.2	50.0	39.5	20.8	44.6	58.9	52.2	34.8	48.5	5.6	*
Install tailwater recovery system	3.4	28.0	69.8	43.4	33.9	35.6	52.2	43.9	46.4	1.4	*
Practice limited irrigation	32.8	28.0	37.2	28.3	50.0	45.2	36.2	7.6	8.2	19.4	*
Use inter-furrow ripping	9.8	11.1	11.1	15.4	25.7	14.6	36.0	61.0	40.3	2.0	*
Install low pressure heads on drop tubes	70.7	38.0	16.3	18.9	37.5	2.7	47.8	3.0	3.1	18.1	*
Use private consulting firm	7.3	--	13.9	23.1	34.3	6.3	54.0	34.1	36.1	14.0	*
Retrofit well with smaller pump	46.6	40.0	32.6	24.5	28.6	38.4	13.0	15.2	8.2	5.6	*
Meter water use	19.0	8.0	14.0	1.9	23.6	15.1	37.7	81.8	12.4	8.3	*
Compact furrows to speed stream advance	3.4	54.0	41.9	30.2	41.1	38.4	11.6	7.6	14.4	2.8	*
Reduce irrigation acreage	10.3	22.0	46.5	28.3	30.4	57.5	27.5	6.1	3.1	8.3	*
Replace old or leaking underground pipe	39.0	22.2	44.4	25.6	25.7	25.0	14.0	7.3	6.9	6.0	*
Use low energy precision application (LEPA)	27.6	26.0	16.3	9.4	37.5	2.7	21.7	25.8	8.2	19.4	*
Convert from furrow to sprinkler irrigation	12.1	42.0	18.6	18.9	30.4	1.4	37.7	24.2	5.2	4.2	*
Use surge flow irrigation application	--	20.0	23.3	30.2	26.8	56.2	11.6	9.1	3.1	1.4	*
Use ridge till	3.4	14.0	14.0	3.8	14.3	21.9	13.0	9.1	40.2	1.4	*
Use multi-function irrigation system	20.7	10.0	2.3	5.7	19.6	2.7	15.9	34.8	4.1	20.8	*
Use playas to supplement groundwater	--	32.0	44.2	13.2	7.1	6.8	13.0	9.1	19.6	1.4	*
Use furrow diking	8.6	34.0	14.0	13.2	8.9	16.4	11.6	7.6	10.3	--	*
Build conservation bench terraces	5.2	12.0	14.0	5.7	19.6	20.5	21.7	3.0	7.2	--	*
Use no-tillage	6.9	6.0	7.0	5.7	14.3	6.8	11.6	13.6	18.6	5.6	
Use skip row planting	24.1	28.0	4.7	1.9	23.2	6.8	1.4	4.5	5.2	1.4	*
Apply plant growth regulators	51.7	22.0	7.0	1.9	7.1	2.7	2.9	3.0	--	1.4	*
Use infrared canopy monitor	--	2.0	--	--	7.1	1.4	13.0	18.2	--	11.1	*
Use recharge well or basin	1.7	8.0	--	1.9	5.4	2.7	8.7	3.0	10.3	1.4	
Use drip irrigation	3.4	6.0	4.7	1.9	5.4	4.1	8.7	1.5	--	2.8	
Use hooded sprayers	3.6	--	--	3.4	6.0	--	3.4	3.2	2.6	1.9	
Use cablegation	1.7	4.0	2.3	--	--	1.4	--	4.5	--	4.2	
Recover water from air injection	3.6	4.8	--	3.3	--	3.1	1.7	1.6	--	--	

OTHER FACTORS THAT INFLUENCE ADOPTION OF WATER-SAVING PRACTICES

In addition to locational differences, five other variables also are associated with adoption differences. They are, in order of importance, number of wells, type of irrigation system, depth to water, irrigator age, and educational attainment. Other variables that were crossclassified with water-saving practices but showed very little adoption differences among irrigators included saturated thickness of the aquifer, year when irrigation was first begun, sex, tenancy, owner/operator status, familiarity with state water laws, and livestock.

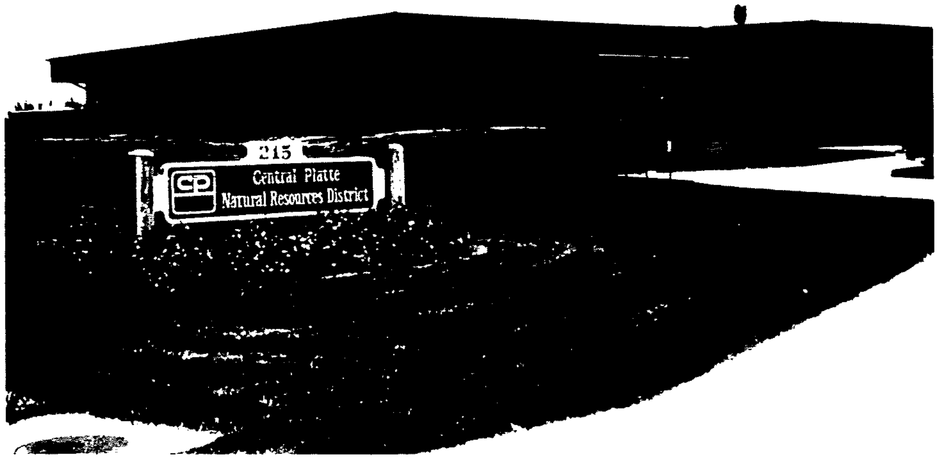
Water-saving practices were crossclassified with the number of wells operated by irrigators. Categories included one well, two to four wells, and more than five wells. Significant adoption differences emerged for 20 water-saving practices. Operators with more than five wells were much more likely to have become adopters for each of the 20 practices for which significant differences occurred.

Sixteen practices had significantly different adoption rates when crossclassified with type of irrigation system. This was not a surprising finding in that some practices such as surge and limited irrigation only apply to furrow irrigation while other practices like LEPA and drop tube installation are limited to sprinkler systems.

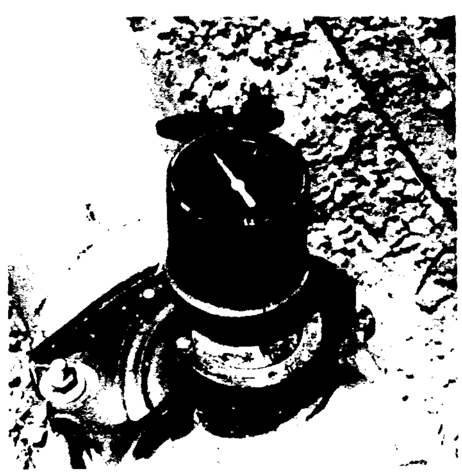
Depth to water equates to energy costs; the deeper the irrigator must drill to reach the water table, the higher are energy costs for pumping. Irrigators who had to lift water more than 200 feet to tap the aquifer were significantly more likely to adopt 13 practices than those who had better access to the water table. It appears that energy cost is a much more important consideration than the amount of water available to an irrigator as only three practices were significantly adopted more frequently by irrigators who had less saturated thickness than more fortunate respondents.

Younger respondents were significantly more likely to adopt 10 water-saving practices than were older irrigators. Likewise, irrigators with more educational attainment were more likely to adopt eight practices more frequently than those with less education. Interestingly, those practices that were adopted more frequently by irrigators with more education tended to be information-based management practices such as monitoring soil moisture, using private consulting firms, measuring rainfall, and checking pumping plant efficiency.

In summary, the variance in irrigator adoption of water-saving practices is primarily a function of location and secondarily influenced by number of wells, type of irrigation system, depth to water, age, and educational attainment of the irrigator. Locational differences remain strong even when the secondary factors are controlled. This suggests that adoption is not a uniform, easily generalizable process that can be quickly modeled and understood. Instead, it requires a greater understanding of the unique institutional and communication processes that exist at a local level. Likewise, efforts to encourage water conservation should be regionally specific. Broad-based programs designed to enhance water conservation at the interstate or perhaps even the state level must contend with a very complex mix of current water-saving practices.



The Central Platte Natural Resource District, headquartered in Grand Island, is one of 23 such districts in Nebraska responsible for managing local resources to include ground and surface waters. Districts are based on drainage basins. In Kansas, three groundwater management districts manage water use in the High Plains, whereas in Oklahoma, groundwater restrictions and policies are administered at the state level. Texas, like Oklahoma, has no legislative authority to manage groundwater at the local level; however, three underground water conservation districts conduct research and educational programs designed to help irrigators conserve water.



Metering water use is one effective and inexpensive management tool to control overwatering. Less than 23 percent of irrigators surveyed meter their water use. Texas A&M research station, Etter, Texas.

SOURCES OF INFORMATION

An important consideration in the use or nonuse of technology is the sources of information the potential adoptor relies on in making a decision. Innovations advocated by trusted sources are the most likely to be adopted. Who are the sources looked to for information in the High Plains? Three different items on the survey addressed this question. An open-ended question read "Identify your most reliable sources of information on how to most effectively manage your water use." Two later questions asked for the sources of information on the overall management of the irrigation system and the availability and practicality of specific water-saving practices and listed 13 possibilities. The percentage of irrigators selecting the 12 most preferred sources is given in Table 4.

The Soil Conservation Service ranks as the leading information source, with university research stations a close second. They were the only choices given as important by more than 40 percent of the respondents. For specific water-saving practices, they were followed by a group including University Extension Service, friends and neighbors, and local groundwater or resource district. For overall management, the secondary group was headed by local groundwater or resource district, private agricultural consulting firms, and University Extension Service. Interestingly, well drillers and fertilizer dealers were relatively important for overall system management, whereas irrigation equipment dealers were more important as an information source with respect to the availability and practicality of specific irrigation efficiency practices.

There was significant variation in the importance of information sources among the 10 counties. The Soil Conservation Service remained on top, ranking first or second for practices in seven counties and for overall management in five. University research stations were first or second in four counties for practices and three counties for management. Only the Soil Conservation Service was a leading information source in all four states. Local groundwater or resource districts, private consulting firms, and friends and neighbors round up the top five information sources in terms of county importance. Each ranked high in three counties for management and in two counties for practice.

The number of information sources indicated as important also varied significantly by county. In overall management, six different sources of information were used by 40 percent or more of the irrigators in Lamb and Dawson counties, with five sources having that level of preference in Texas and Holt counties. Only two sources of information for overall management were chosen by 40 percent or more of the farmers in Finney and Wichita Counties, and no source had that level of use in Gaines County. There was an even wider spread with respect to information sources for the availability and practicality of specific water-saving practices. Eight sources were widely used in Lamb County and five in Dawson County. Finney, Wichita, and Texas County farmers gave only two sources a high level of preference, and Gaines County again had none. About one-third of Gaines County farmers checked the Soil Conservation Service and irrigation equipment dealers for both overall management and specific practices. Overall, Lamb and Dawson County irrigators stood out as intense users of a wide range of information sources.

The reasons certain information sources are used more in one county than another are rooted in specific conditions almost unique to a given county. Local groundwater management districts established to promote water conservation are found in Kansas and Texas, where they are likely to assume some of the information-dissemination load met by state and federal agencies where local management agencies are not found. The natural resource districts in Nebraska have a broader mandate than groundwater alone, but they nonetheless also provide a local institution as a source of information and policy-making. The same agency frequently promotes different practices in different states and even counties. This is especially true of agricultural research stations and agricultural extension. Federal agencies are relatively more uniform in their programs.

Private firms offering consulting services and selling and repairing equipment are not evenly available throughout the High Plains. Access to a wide range of commercial agricultural services is best in more densely populated counties with at least one major town. Many counties have only the most basic of farm services. Individuals make a difference as well. An active, involved, friendly person who has the confidence of area farmers is likely to be sought out as an information source, irrespective of agency or firm affiliation.

Table 4
Important Sources of Information

Source	Irrigation System Management*	Water-Saving Practices*
Soil Conservation Service	45	45
University research stations	43	43
Local groundwater or resource district	35	34
Private agricultural consulting firm	35	33
University Extension Service	34	37
Friends and neighbors	33	36
Agricultural stabilization & conservation service	33	31
County agricultural agent	32	32
Well drillers	31	23
Fertilizer dealers	30	21
Irrigation equipment dealers	26	31
Trade magazines	22	24

*Percentage of respondents giving source as important.

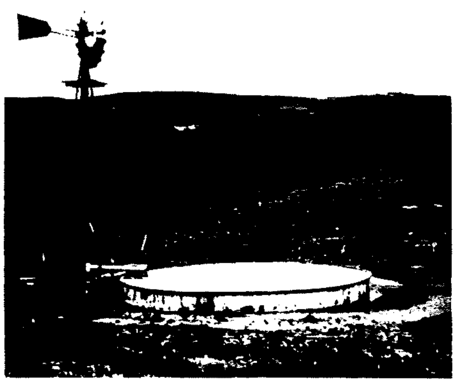
SUMMARY

The High Plains supports an integrated agribusiness economy based on pumping groundwater to irrigate more than 10,400,000 acres. Farmers in the region use about 30 percent of all irrigation water consumed in the United States. Most of the High Plains aquifer receives minimal recharge and groundwater depletion is taking place. As irrigators use more than four-fifths the regional water consumption, effective conservation of the aquifer begins with farmers. A wide range of water-saving devices and practices are available, and there are significant differences in the methods employed by farmers. This study reported the adoption patterns for water-saving techniques and information sources used by irrigators in Nebraska, Texas, Kansas, and Oklahoma.

Thirty-nine alternatives were identified and classified into three categories: field practices involving water retention and distribution, management strategies entailing monitoring moisture and collecting information to assist in achieving greater efficiency in water use, and system modifications that alter existing irrigation procedures or introduce new ones. Farmers significantly more preferred field practices and management strategies over system modifications. The 10 most widely adopted choices, all employed by more than 40 percent of the respondents, were field practices or management strategies. System modifications are generally more expensive and require the purchase of new equipment.

Location is the factor most closely associated with variance in adoption of water-saving practices. More than four-fifths of the widely adopted techniques varied significantly in terms of county. Other factors associated with adoption differences are number of irrigation wells, type of irrigation system, depth to water, age of irrigators, and educational attainment. The sources of information used by a farmer are important in the use or nonuse of a specific technology. Most relied on are the Soil Conservation Service and university research stations. With regard to choosing specific water-saving practices, university extension services, friends and neighbors, and local groundwater or resource districts are also important. For overall irrigation management other sources include local groundwater or resource districts, private agricultural consulting firms, and university extension services.

Irrigated agriculture in the High Plains is not a homogeneous activity. There are significant differences in the crops grown, the methods of applying water to the fields, the techniques used to conserve water, and the sources of information. The diversity is hidden because emphasis is placed on irrigation in a semiarid area as a source of regional unity. More revealing of the character of the area is the diverse way in which farmers manage the land and water resources. The High Plains is a region of striking contrasts.



The Nebraska Sandhills overlie the Ogallala aquifer where water is most abundant. Saturated thickness often exceeds 800 feet. Although rangeland is the dominant land use, irrigated agriculture occurs in some areas and is expanding.

Siphoning water from ditches to water corn is a labor intensive form of irrigation. Much water is lost by seepage through unlined ditches before the water reaches the field. Lamb County, Texas.

GLOSSARY

Acre-Foot: Volume of water required to cover one acre of land (43,560 square feet) to a depth of one foot; equivalent to 325,851 gallons.

Alternate furrow irrigation: Introduction of irrigation water into every other furrow between rows of a planted crop. Irrigation can remain in the same furrow, or furrows can be switched on subsequent irrigation. Alternate furrow irrigation can improve irrigation efficiency.

Aquifer: A water-saturated zone from which groundwater within can be obtained.

Base flow: Sustained low flow of a stream. In most places, base flow is groundwater inflow to the stream channel.

Cablegation: An irrigation method designed to save water that utilizes a plug pushed through gated pipe by water pressure that regulates the flow of water from the gates. Water is distributed to the field sequentially, several gates at a time, with watering time controlled by the rate at which the plug moves through the pipeline. Cablegation requires uniform side slope in the field.

Center pivot irrigation system: A sprinkler irrigation lateral that is mounted on wheeled structures (towers), anchored at one end (pivot point), and which automatically rotates in a circle when irrigating. The lateral can be equipped with any of a variety of sprinkler and spray nozzle configurations. Tower movement can be driven by water pressure, hydraulic pressure, or electricity. A typical center pivot has a one-quarter-mile radius and waters approximately 130 acres.

Chemigation: Injection of agricultural chemicals or fertilizer into irrigation water for distribution to farmlands through irrigation systems.

Compacted furrows: Soil compaction in furrows from tractor wheels or compacting implement attachments that smooth and firm furrows resulting in increased water stream advance rates, reduced infiltration, and improved irrigation application efficiency for furrow irrigation.

Cone of depression: A depression of the water level around a well or group of wells resulting from water being withdrawn.

Confined aquifer: An aquifer in which groundwater is confined under pressure by impermeable formations. Direct recharge from the surface is prevented by the impermeable layer. Also known as an artesian aquifer.

Conservation bench terracing: A series of earthen embankments spaced across the downhill slope of a field to contain runoff from the field and designed to spread water from natural slopes over levelled field areas behind the terraces.

Depth to water: The depth of the water table below the earth's surface.

Ditch irrigation: Providing water for irrigation by transporting it to the fields through canals.

Drip irrigation: A method of irrigation in which water is allowed to drip or trickle from perforations in a low pressure pipe (usually plastic and double-walled) placed alongside the base of a row of plants. The spacing of the perforations is designed to produce a wetted strip along the crop row or a wetted area at the base of each plant.

Drop tubes; drop nozzles: Flexible or rigid hoses or pipe that lower the discharge point of a nozzle below the main lateral of a center pivot to distribute water usually at low pressure between crop rows in order to reduce evaporation.

Dryland farming: A method of farming practiced in subhumid regions that incorporates various techniques of water-saving practices such as minimum tillage and summer fallowing. Dryland farming relies solely on growing season precipitation or water from precipitation stored in the soil profile during noncrop production periods.

Evapotranspiration: Water discharged to the atmosphere as a result of evaporation from the soil and plant surfaces and by plant transpiration.

Furrow diking: Installation of mounds of soil (dikes) in a furrow or installation of small depressions in the furrows to retain precipitation or irrigation water for crop use. It is a form of micro-catchment.

Furrow irrigation: Surface irrigation in which water is introduced at the high end of a field and flows downslope in furrows (small ditches) that are between crop rows.

Gated pipe irrigation: An irrigation system that delivers water to crops through a series of openings in a pipe placed at the upper end of a field. Gates are used to control the volume of water that flows from end openings into furrows.

Groundwater: Subsurface water in a saturated zone.

Gypsum block: A device used to measure soil moisture. It consists of a permeable ceramic gypsum cylinder about one inch long that is buried in the soil profile and connected to a resistance meter by a wire lead. Electrical resistance readings are related to soil water content.

High Plains Aquifer: A system of acquifers that underlies 174,000 square miles of the High Plains. It serves as the major source of water for irrigation in the High Plains of New Mexico, Texas, Oklahoma, Colorado, Kansas, and Nebraska, and extends into southeast Wyoming and southwest South Dakota.

Infrared canopy monitor: A sensor used to determine plant stress by measuring crop canopy temperatures.

Interfurrow ripping: A method of deep tilling in furrows using a chisel. The purpose is to break up the soil to allow better infiltration of water.

Irrigation scheduling: Procedure used in determining when to irrigate and how much water to apply to meet specific management objectives. There are several methods used to determine water needs, including: (1) water balance method, (2) stress-day index, (3) optimal sequencing of evapotranspiration deficits, and (4) measurements of leaf temperatures.

Irrigation withdrawals: Withdrawal of water for application on land to assist in the growing of crops and pastures or to maintain land for recreational use.

Limited irrigation: Irrigation scheduling method in which planned water deficits are allowed to occur generally on crops that are drought tolerant or with stages of growth that are less sensitive to water deficits. One example is fully irrigating only the upper half of a field. The next 25 percent is a tailwater runoff section that receives limited irrigation, and the lower one-fourth is a dryland section which may receive runoff from the upstream sections.

Low energy precision application (LEPA): Center pivot irrigation system that distributes water from an overhead lateral pipeline directly into furrows at very low pressure through drop tubes and orifice-controlled emitters. The purpose of this system is to apply water directly onto or near the soil to improve irrigation efficiency for systems with limited irrigation capacity.

Minimum tillage (limited tillage): Cultural practice that minimizes soil water loss, retains crop residuals to minimize soil erosion, and reduces tillage energy and labor requirements.

Multi-function irrigation system: Application of water-conserving chemicals such as antitranspirants, growth regulators, and soil surface evaporation suppressants. It is also used to apply fertilizer and pesticides and saves energy by requiring less tractor use.

Neutron probe: An instrument that measures soil water content by emitting "fast neutrons" from a radioactive source lowered into a tube placed in the soil. Neutrons colliding with hydrogen atoms in soil water are slowed and counted by the probe. This count is calibrated with soil water content.

No-tillage: Farming practice in which the soil is not tilled as a means of reducing soil water loss and soil erosion.

Ogallala Aquifer: The major aquifer within the High Plains aquifer system. It underlies 134,000 square miles of the High Plains and is comprised of alluvium deposited by ancient streams flowing east-southeast from the Rocky Mountains; consists of clay, silt, sand, and gravel capped by caliche.

Overdraft (mining of groundwater): Groundwater withdrawals in excess of recharge.

Plant growth regulators: Chemicals used to alter plant growth characteristics.

Playa: A depression in the soil surface without an outlet for runoff. It is covered with relatively impervious surface layers that inhibit water infiltration. A playa can be used to store runoff water for irrigation purposes.

Preplant (offseason) irrigation: Irrigation that occurs in the non-growing season of a crop to increase soil water availability.

Prior appropriation: A concept in water law under which users who demonstrate earlier use of water from a particular source are said to have rights over all later users of water from the same source.

Pumping plant efficiency: A measure of the actual amount of energy used for pumping water versus the theoretically required energy consumption.

Recharge: Addition of water to groundwater storage by natural processes or artificial methods.

Recharge dam: Dam built to capture surface runoff so water can percolate into an aquifer.

Recharge well: Well used to inject surface water into an aquifer.

Ridge tillage: Cultural practice of permanent ridge formation by tillage implements on which crops are grown. The purpose of ridge tillage is to maximize moisture retention while minimizing soil erosion.

Riparian rights: Concept of water law under which authorization to use water in a stream is based on ownership of the land adjacent to the stream.

Safe yield: Amount of groundwater that can be withdrawn from an aquifer without reducing the volume of water in the aquifer. Safe yield of an aquifer is equal to the recharge rate.

Saturated thickness: Vertical extent of the saturated zone as measured from its top to bottom.

Saturated zone: Subsurface zone in which all the interstices or voids are filled with water.

Skip row planting: One or more unplanted strips remain between planted rows in order to reduce crop water requirements.

Soil water monitoring: Various technologies that include tensiometers, neutron soil water meters, and soil water blocks that measure how much water is available in the soil profile. Soil water monitoring is required for irrigation scheduling.

Specific capacity: Discharge rate per unit of drawdown. Normally expressed as gallons per minute (gpm) per foot of drawdown.

Specific yield: The quantity of water that a unit volume of a material will give up when drained by gravity.

Stubble mulch: Residue left on the surface in order to control erosion and increase precipitation storage.

Surge flow: The intermittent application of irrigation water to irrigation pathways, creating a series of on and off periods of constant or variable duration in an attempt to improve irrigation efficiency. A microprocessor control unit temporarily opens and closes valves in gated pipe in order to discharge water in surges that achieve relatively even watering along entire length of row.

Tailwater recovery system: System to collect, store, and reuse irrigation and surface runoff. Water is collected in a tailwater pit where it can be stored and used to irrigate crops.

Tensiometer: Instrument that measures soil water tension. It consists of a tube with a porous tip that is filled with water and has an attached vacuum gauge. The tube is placed in the soil, and as water is lost from the soil, water is removed from the tube through the porous tip until equilibrium between soil water suction and tensiometer vacuum is obtained. The vacuum gauge then indicates soil water tension.

Unsaturated zone: Subsurface zone in which interstices are not filled with water; usually the interval between the land surface and the water table.

Water table: Top of the saturated zone in an unconfined aquifer. The water level in wells that penetrate the uppermost part of an unconfined aquifer marks the position of the water table.

BRIEFING ON THE OGALLALA AQUIFER

Prepared for the

House Energy and Natural Resources Committee
The Honorable Dennis Spaniol, Chairman

by the

Kansas Geological Survey

March 13, 1990

H ENERGY AND NR
3-13-90
ATTACHMENT 2

AQUIFERS AND THEIR DISTRIBUTIONS

An aquifer is a geologic formation that is both porous (that is, it has void spaces filled with water) and permeable (meaning that the pores are interconnected so that water can readily flow through the material). Impermeable formations prevent the movement of groundwater, and are known as aquitards.

The Ogallala Formation is an extensive deposit of sand, gravel and porous rock that was laid down about 5 million years ago during the Tertiary Period. Hydrologically it is interconnected with similar but younger (Quaternary: less than 2 million years old) formations; the combination of the two is known as the High Plains aquifer, and is usually studied as a single hydrologic unit.

The High Plains aquifer and its Ogallala component span much of the mid-continent region. Figure 1 shows the location of the High Plains aquifer. In Kansas, the Great Bend Prairie and the Equus beds are Quaternary deposits, but most of the aquifer west of eastern Ford County is part of the Ogallala Formation. The whole area also contains stream-bed (alluvial) aquifers associated with rivers and streams. These are locally important sources of water, but their total area and volume is small compared to the High Plains aquifer system, and they may or may not be hydrologically well-connected to the major regional aquifers. Figure 2 shows the boundary of the Kansas High Plains aquifer.

It is important that the aquifers are not uniform in thickness or permeability over the area of their occurrence. They vary in thickness from a few feet to hundreds of feet; they may appear at or near the surface or be buried under thick layers of soil; and they may be hydrologically connected with or separated by aquitards from other nearby aquifer units.

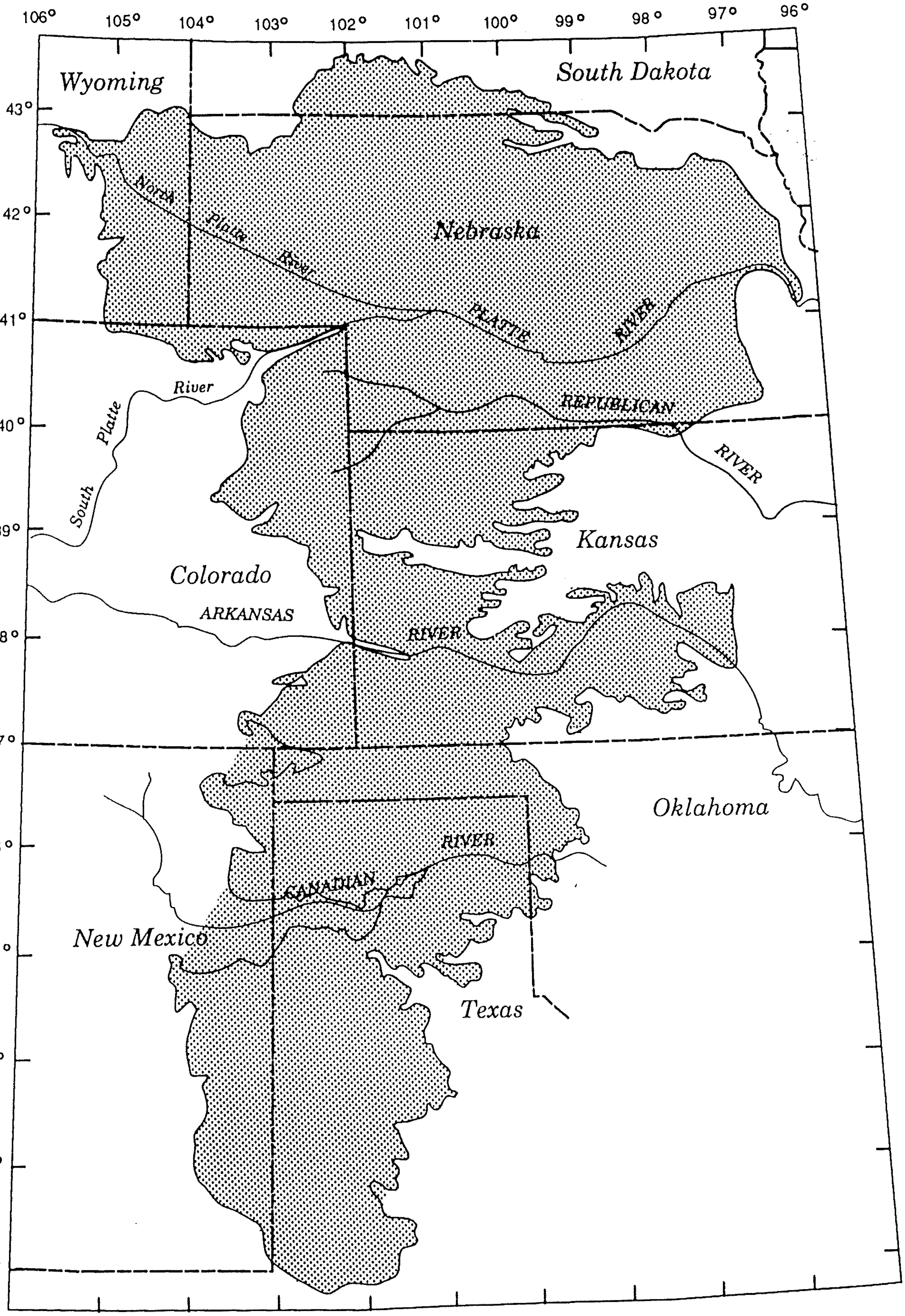


FIGURE 1: LOCATION OF HIGH PLAINS AQUIFER

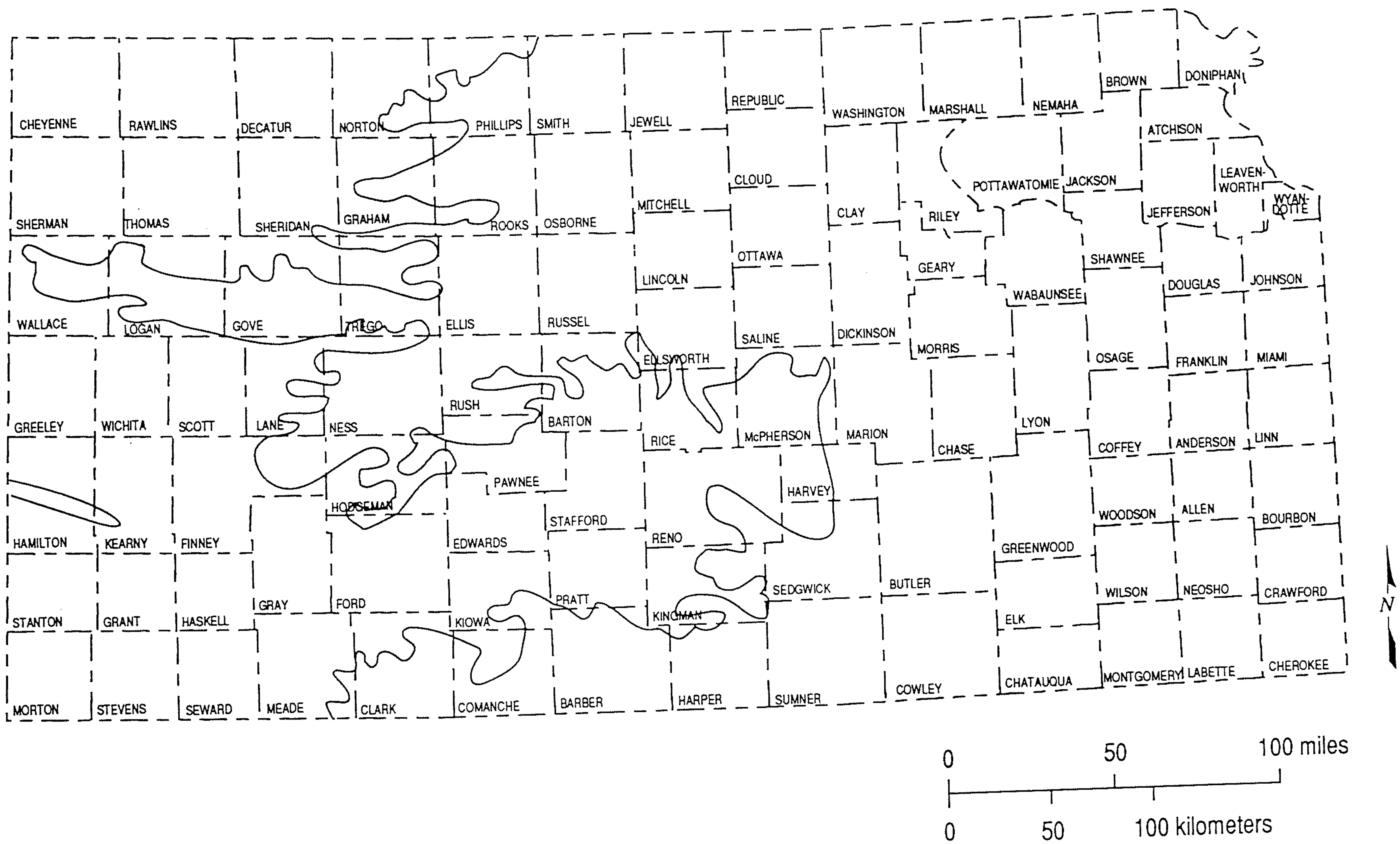


FIGURE 2: APPROXIMATE BOUNDARIES OF THE HIGH PLAINS AQUIFER IN KANSAS

GROUNDWATER -- A HYDROLOGIC SYSTEM

As part of the natural hydrologic cycle, water falls as rain or snow, some fraction of it runs off the surface and leaves the area as stream flow, a large portion re-enters the atmosphere as moisture resulting from evaporation or transpiration (plant respiration), and a relatively small amount percolates through the soil and stream beds to recharge the groundwater body. These processes are shown schematically in Figure 3. In the Great Bend Prairie region, KGS studies indicate that 9-10% of the precipitation (a bit more than 2"/year) may reach the groundwater. However, in much of Western Kansas, recharge is no more than a few percent of the relatively low annual precipitation, and may be essentially zero in some areas. Recharge is one of the most difficult hydrologic factors to measure or estimate accurately.

Hydrologists and managers try to balance the groundwater budget through identification and measurement of input and output terms. Groundwater increases through recharge, either via the soil zone or below stream beds. When this happens, the water table rises and the depth to water decreases. Under natural conditions the budget is balanced by groundwater discharge into streams, springs or wetlands where the water table intersects the land surface. When humans extract groundwater by pumping for irrigation or municipal and industrial uses, they add an output term that can easily exceed natural recharge and result in a lowering of the water table. Figure 4 depicts these terms in more detail.

Figure 4 also shows two key measures of groundwater resources and their changes -- depth to water and the saturated thickness of the aquifer. As the decline in saturated thickness approaches 100%, the groundwater resource is exhausted. Even when a significant saturated thickness remains, lowering of the water table may cause problems by increasing pumping costs, decreasing well yields, and reducing stream flow that is dependent on groundwater discharge.

Like surface water, groundwater does flow -- but at much slower rates. In most of the Kansas High Plains aquifer, groundwater flow rates average about a foot per day, or a mile in 10-20 years. To put this in perspective, the period since the beginning of large-scale irrigation would correspond to a natural groundwater movement of a few miles.

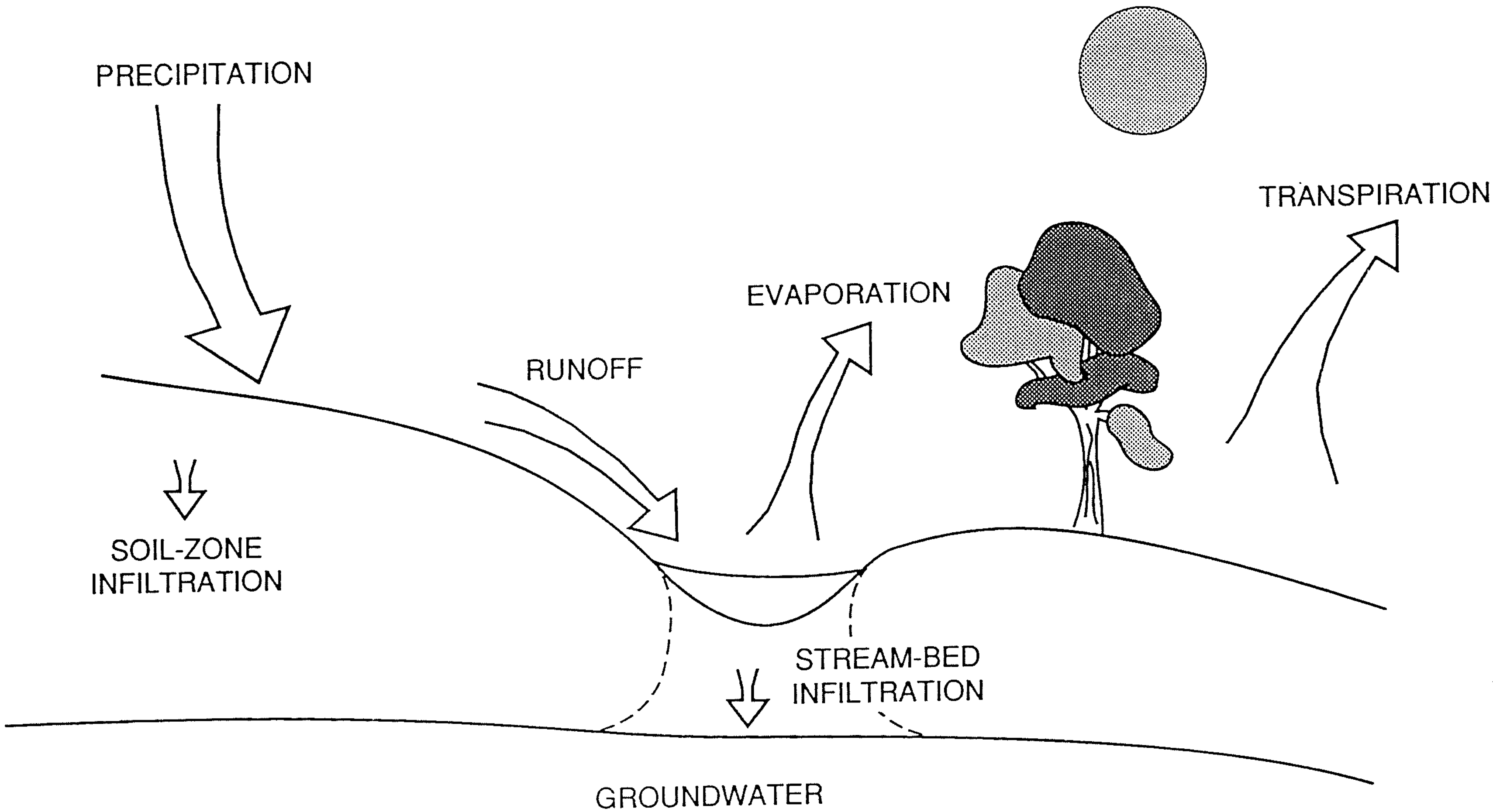


FIGURE 3: THE HYDROLOGIC SYSTEM

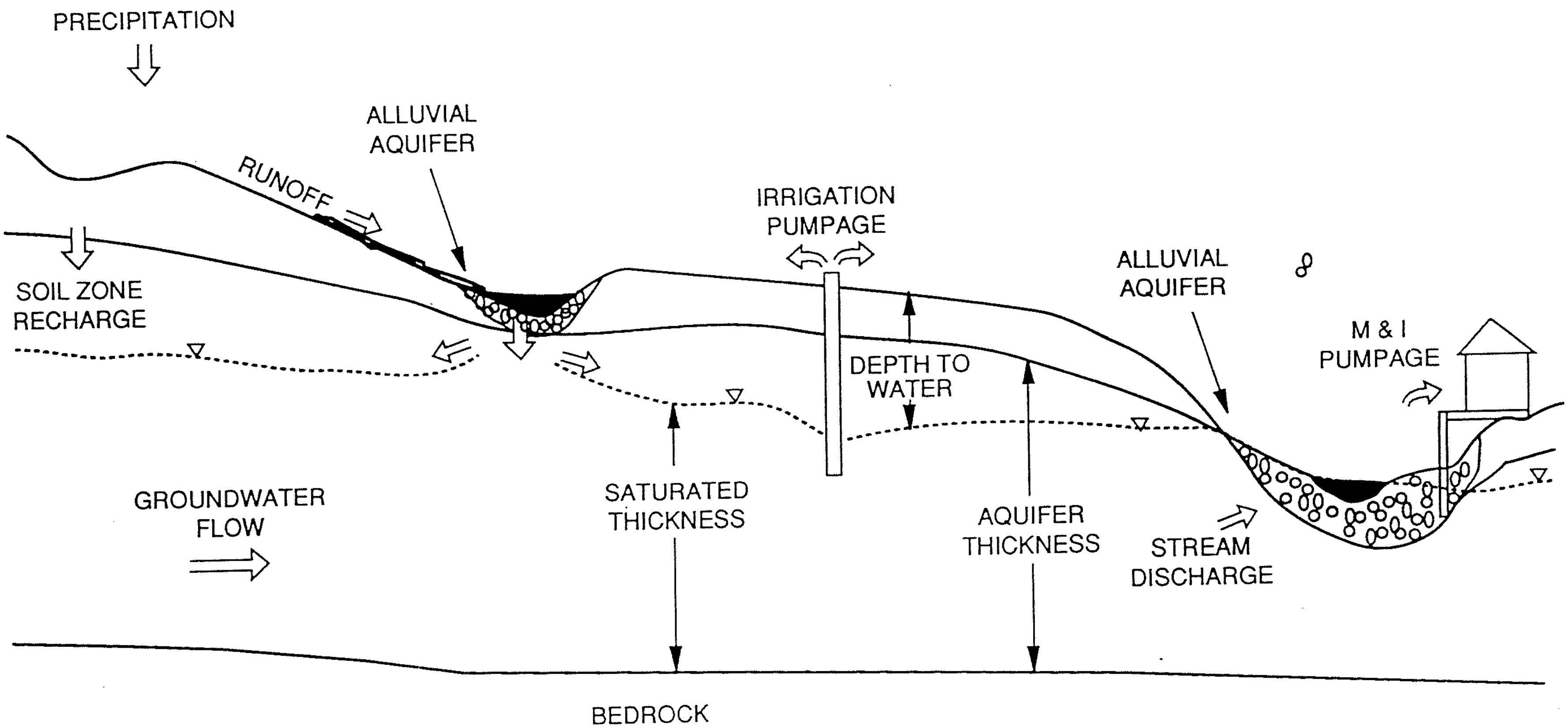


FIGURE 4: GROUNDWATER CHARACTERISTICS AND BUDGET TERMS

2-7

CHANGES IN WATER LEVELS AND WATER RESOURCES

In Western Kansas, irrigation pumping has resulted in a significant decline in groundwater levels, especially in the Ogallala portions of the High Plains Aquifer. Figure 5 shows the increase in depth to water from estimated predevelopment levels through January 1989, and Figure 6 shows the change in saturated thickness over the same period. The patterns generally match, but changes in depth to water are greatest in SW Kansas where the aquifer is relatively thick, while percent reductions in saturated thickness are greatest in W Central Kansas, where the aquifer is thinner and has been essentially dewatered in places. Because very few wells have been measured continuously since pre-development times, our water level data for that period are estimates based on a variety of sources, and are necessarily somewhat imprecise. That's why the legends of Figures 5 and 6 indicate that the smallest decrease and increase categories may not actually represent a significant change.

Maps such as these give a picture of total change and its distribution, but in order to look at the details of change over time we customarily use well hydrographs -- plots of water level in a specific well over time. Some examples of these are presented in Figure 7; these have been selected from areas of significant decline in order to illustrate some of the features both of the hydrographs and of the groundwater trends. Measurements in the specific well are shown as connected points; the predevelopment water table estimates are shown as isolated earlier points.

Several features can be seen in the hydrographs. One very important thing to note is the year-to-year variability. For many reasons, the change in water level over any one year may have little relationship to the overall trend, and for this reason hydrologists base their interpretations and management recommendations on multi-year trends rather than on short-term changes. The period of most rapid decline was generally from the late 1960's to the late 1970's, with declines continuing at a slower rate thereafter. Several factors probably combined to cause this change in trend: higher energy prices, lower crop prices, and federal programs contributed to reduced irrigation; the early 1980's were wetter than the preceding decade; and this is the period during which groundwater management programs were put into effect. However, the overall trend is still one of declining water levels.

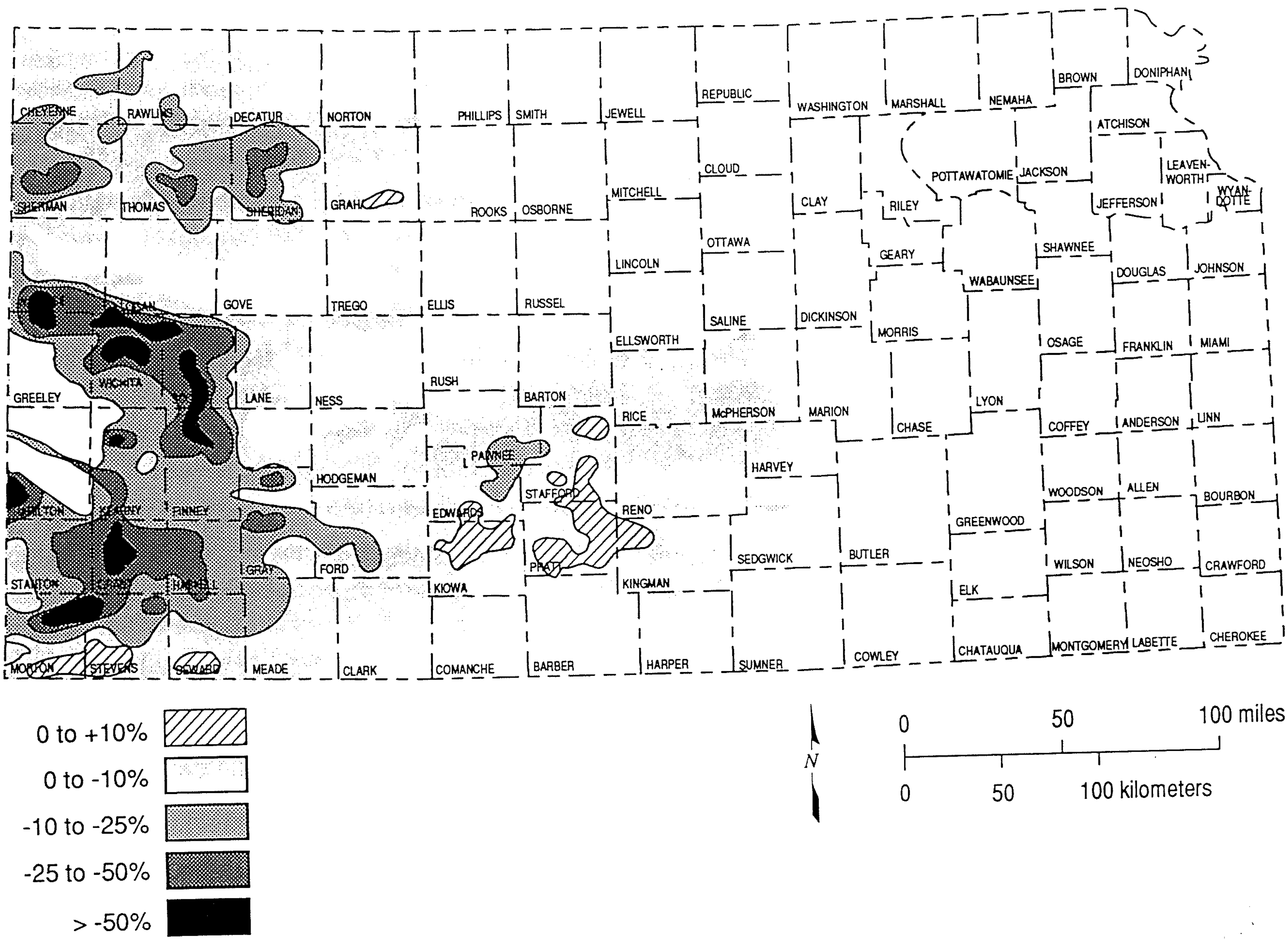


FIGURE 5: PERCENT CHANGE IN SATURATED THICKNESS: PRE-DEVELOPMENT TO JANUARY, 1989

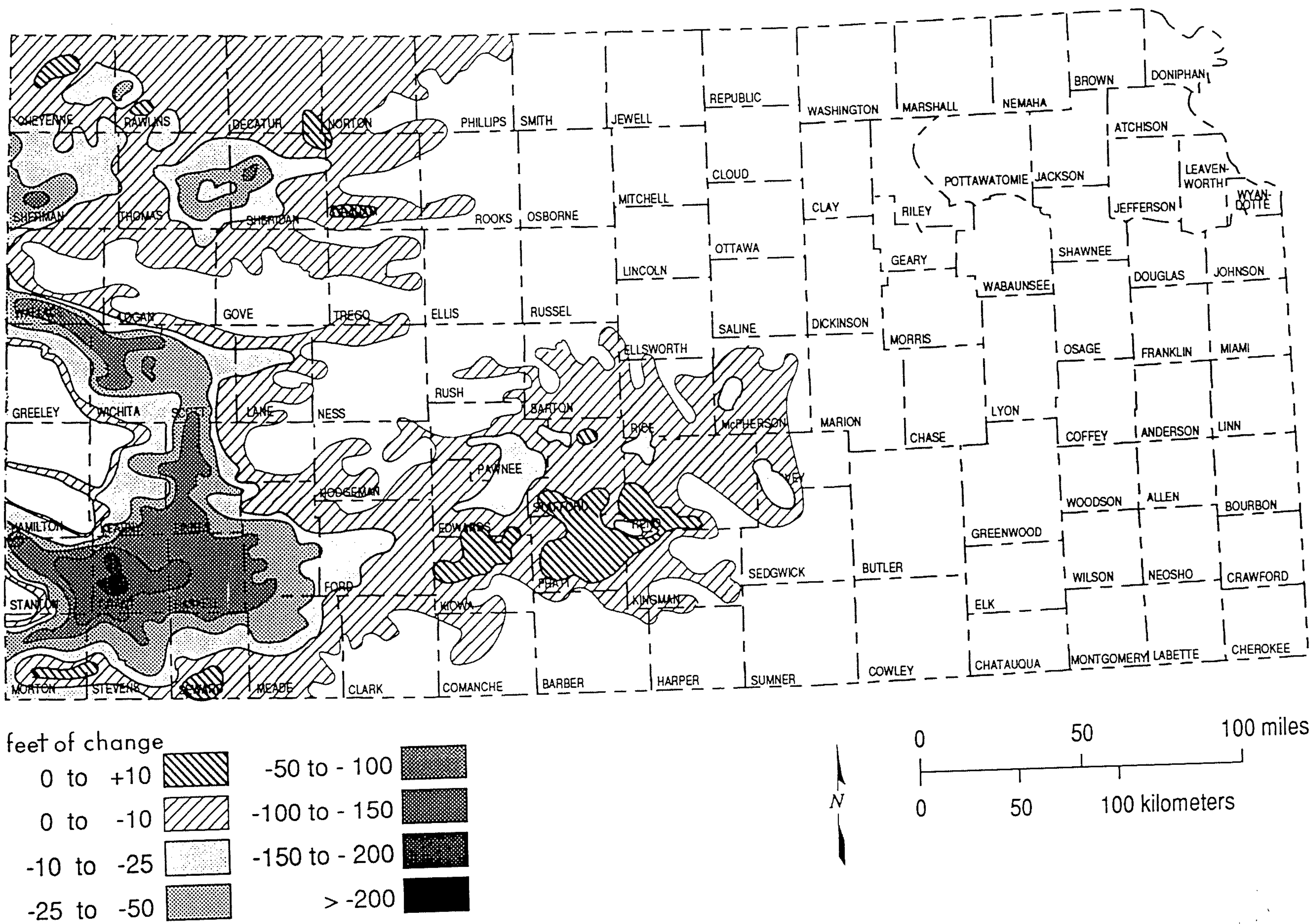


FIGURE 6: CHANGE IN ELEVATION OF GROUNDWATER: PREDEVELOPMENT TO JANUARY 1989

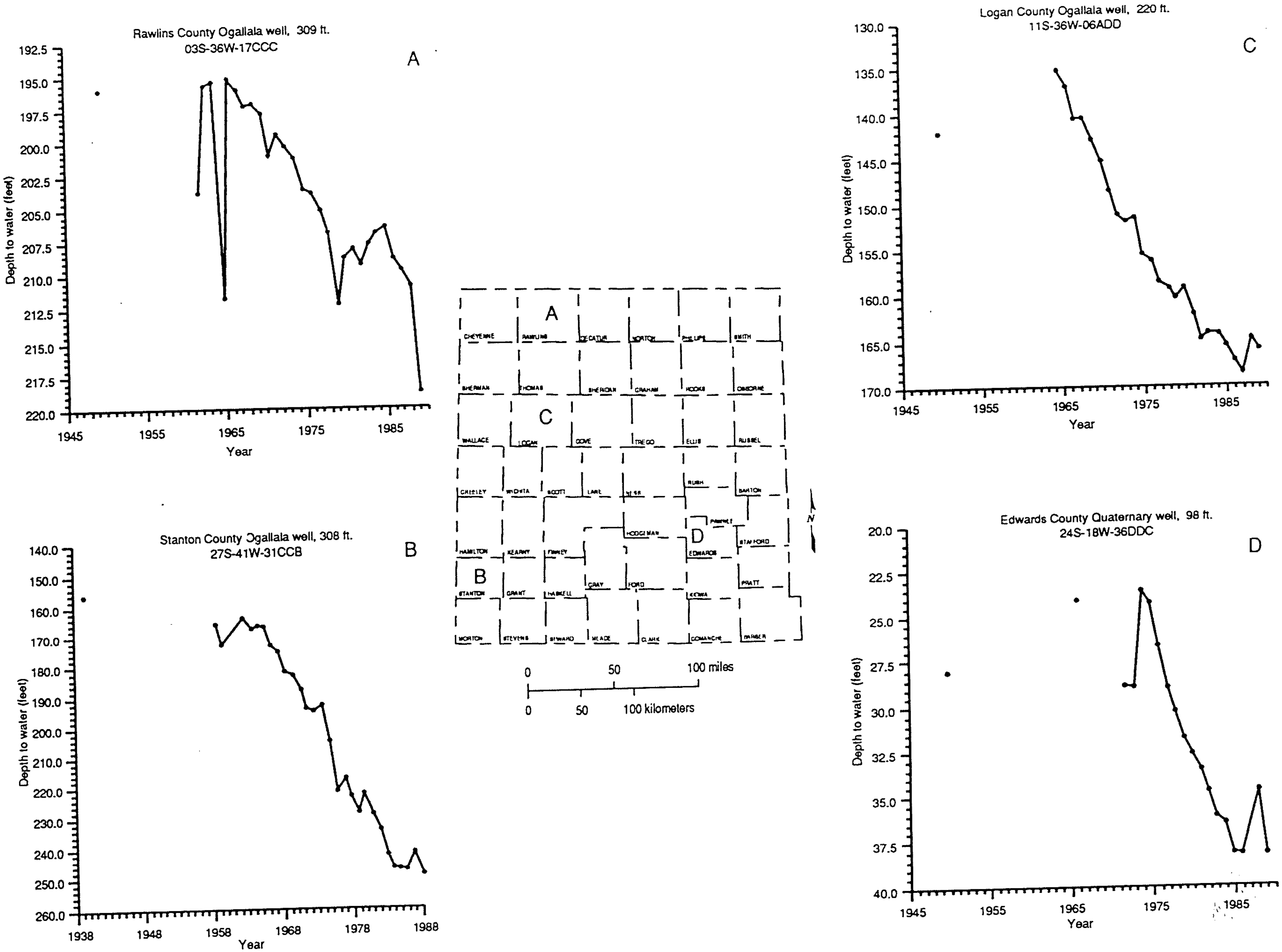


FIGURE 7: WELL HYDROGRAPHS FROM SELECTED SITES

H Energy and NR 3-13-90
Attachment 3

Ground-water Series 10
Kansas Geological Survey

January 1989 Kansas water levels and data related to water-level changes

Margaret Townsend, Nadeem Shaukat,
John Healey, and Tom McClain

Lawrence, Kansas
1989

House Energy
3/13/90 Attach. 3

Kansas Geological Survey Ground-water Series 10

January 1989 Kansas water levels and data related to water-level changes

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1989

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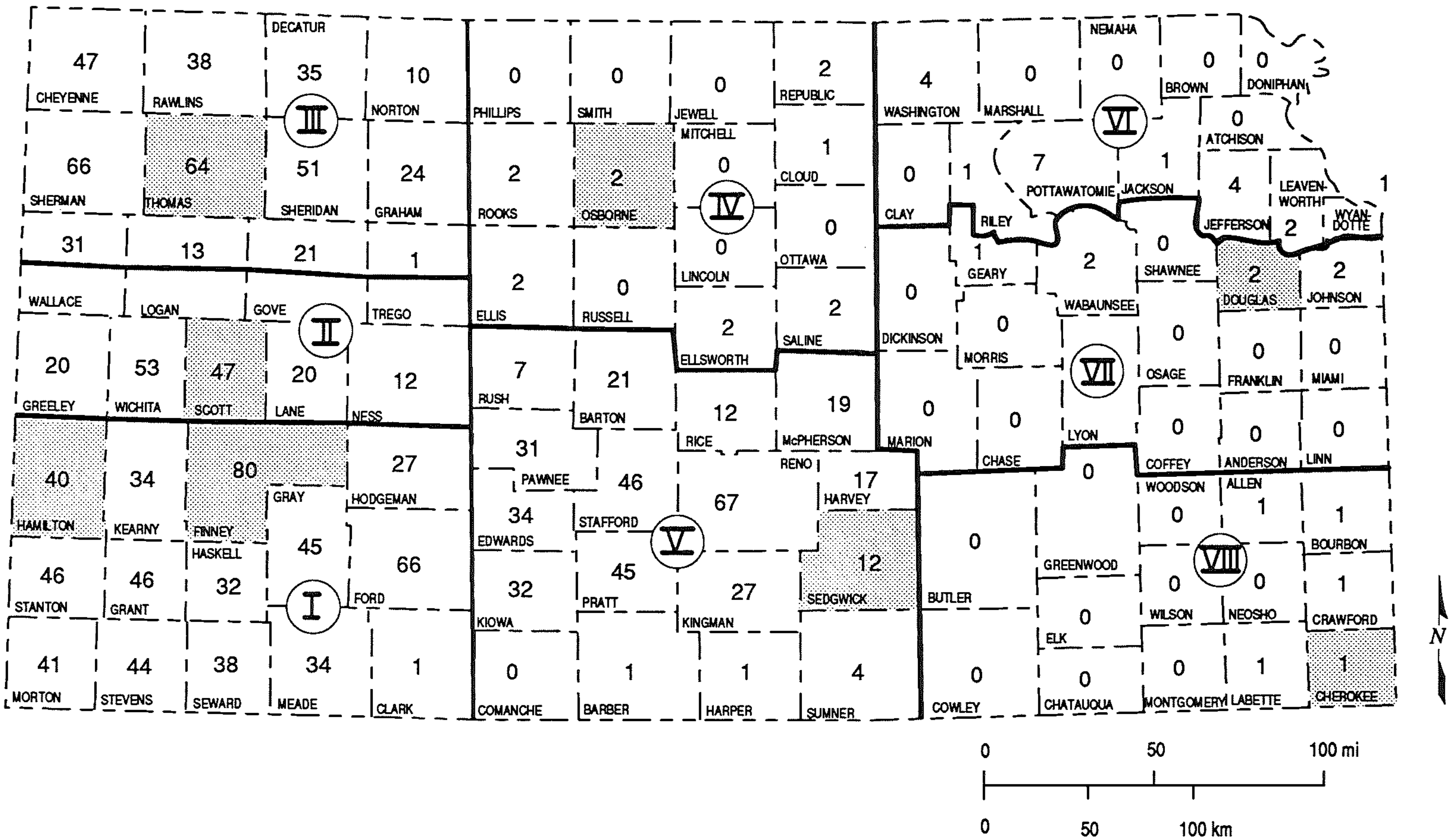

FIGURE 1—Number of ground-water-level observation wells per county, 1987 water year. Shaded areas show counties with hydrograph locations.

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Summary of January 1989 water-level measurement program

In this report we provide a hydrologic data summary of the annual ground-water-level measurements for Kansas. There are approximately 1,500 wells in the monitoring-well network, which is funded by the Kansas Geological Survey, the Division of Water Resources, and the U.S. Geological Survey.

Beginning this year, the report will be published by the Kansas Geological Survey in cooperation with the U.S. Geological Survey and the Division of Water Resources. To maintain consistency with past publications by the U.S. Geological Survey, we will use the same format for tables and basic information. Because the U.S. Geological Survey has done the basic data manipulation over the past years, parts of this report are quoted from previous editions written by B. J. Pabst née Dague and M. E. Pabst (1977–1988). This report contains water-level information from observation wells across the state in addition to wells in central and western Kansas. Other wells in the state are measured by other agencies, but they are not included in this report.

The annual water-level measurement program takes place in mid-winter to maximize the recovery of water levels in irrigation wells from seasonal pumping. However, a few of the measurements may represent the effects of recent pumping of the measured well or by nearby wells or the effects of barometric pressure changes. Thus a significant change in water levels for a particular well during a one-year period may be only a temporary condition, and any indication of a developing trend should be based on a comparison of changes that occur over a period of several years.

The state is divided into eight regions for this report (fig. 1). Included are regional maps depicting ground-water-level declines for the central and western part of the state and eight hydrographs with precipitation data to illustrate the variation of recharge to the aquifers throughout the state. Maps of regions I–III and V show the ground-water decline for the major aquifer in those areas. Maps are not included in this report for areas of eastern Kansas in which there are fewer wells.

Wells in this report are numbered according to a modification of the U.S. Bureau of Land Management system of land subdivision (fig. 2). The location is composed of the township, range, and section numbers followed by letters indicating the subdivison of the section in which the well is located. The first letter denotes the 160-acre tract; the second, the 40-acre tract; and the third, the 10-acre tract. The letters A, B, C, and D designate the tract in a counterclockwise manner. Therefore a location denoted as SWNWNW sec. 7, T. 18 S., R. 39 W., of Greeley County is expressed as 18S, 39W, 07BBC, of the same county.

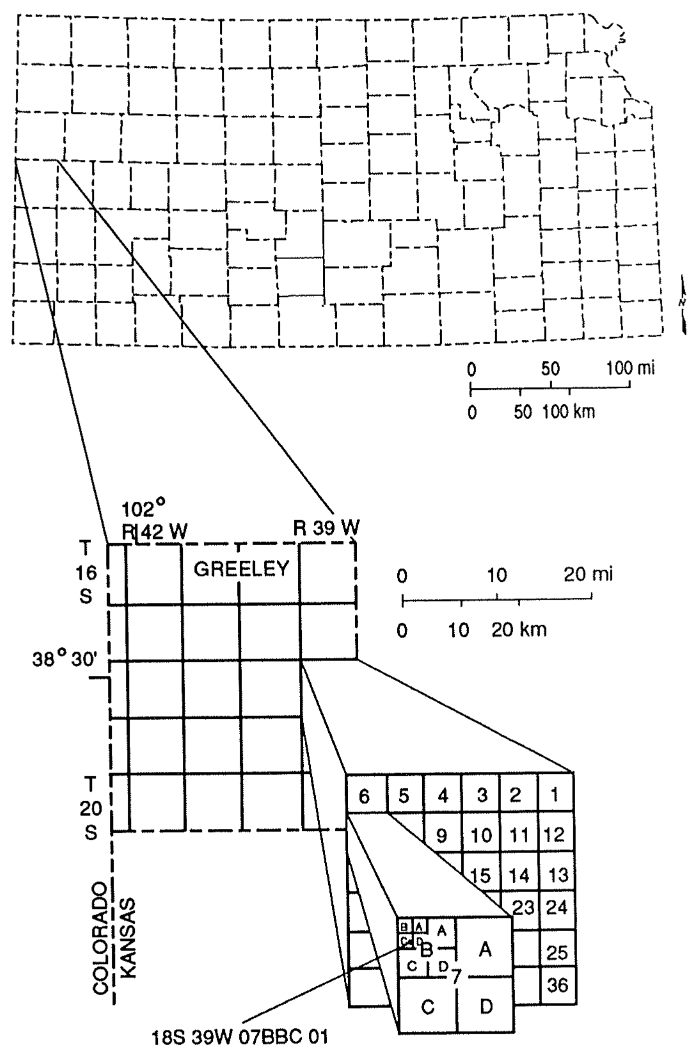

FIGURE 2 (right)—WELL-LOCATION DIAGRAM.

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Hydrographs and precipitation graphs

The rate of recharge to the ground-water reservoir varies with the pattern of precipitation, surface runoff, and streamflow. It also varies with the permeability of the soil and other earth materials through which the water must percolate to reach the zone of saturation. The rate of infiltration varies greatly with the condition of the soil at the time of precipitation. The drainage within the watershed and the topography also control infiltration rates. In general, steep slopes favor rapid surface runoff, and more gentle slopes retain water longer, favoring infiltration. However, extremely flat terrain often develops tight surface soils that impede infiltration.

The intensity and duration of precipitation will affect the rate of water infiltration. Moderate rainfall over an extended period of time favors infiltration. Heavy rain in a short time overpowers the soil's ability to transmit water, thereby increasing runoff to streams.

The hydrographs in figs. 3–10 contain historical information regarding water-table fluctuations and precipitation in Cherokee, Douglas, Finney, Hamilton, Osborne, Scott, Sedgwick, and Thomas counties. The increase in ground-water usage and the associated decline in the water table in some counties is known and demonstrated on several of the graphs. Several factors control the fluctuations of the water table of the aquifer (upper graph), for example, the depth to the water table, the volume of ground-water pumping in the area, and the amount of precipitation in different parts of the state. Precipitation (lower graph) may directly affect the water-level change in shallow alluvial aquifers.

We have indicated in this brief discussion several of the factors that control the infiltration and natural recharge to ground-water reservoirs. The figures demonstrate the infiltration effects on various aquifer systems. Deeper aquifers, such as the Ogallala, do not show recharge events clearly because of the thickness of the unsaturated zones and the low recharge rate. Water levels in a shallow aquifer, however, respond rapidly to recharge.

Summary of hydrographs and precipitation graphs

The abbreviations used in the descriptions of the aquifers are KU, Cretaceous undifferentiated; KJ, Upper Jurassic; KD, Dakota Formation (Cretaceous); TO, Tertiary Ogallala; QA, Quaternary alluvium; and QU, Quaternary undifferentiated.

Cherokee County, Roubidoux Formation (Lower Ordovician)

The single observation well in Cherokee County is drilled into the Roubidoux Formation. This well (34S, 25E, 13BAC) has a total depth of 1,150 ft (351 m). The water level of the formation rises to within 75 ft (23 m) of the land surface and fluctuates between 65 ft and 75 ft (20 m and 23 m). The hydrograph (fig. 3) shows minimal correlation between precipitation and water-level response because of the depth of the well and the corresponding long time for recharge to reach the aquifer.

Douglas County, Pleistocene terrace deposits (QU)

The two observation wells in Douglas County are in alluvial aquifers. In Douglas County alluvial deposits are the primary geologic unit for water usage; they yield water of moderate quality and quantity. The alluvium consists of unconsolidated clay, sand, and gravel located along major stream courses. The thickness of the alluvial deposits varies because the streams downcut into the substrata before depositing their sediment load.

The hydrograph (fig. 4) of the alluvial well in 12S, 20E, 17CCB, illustrates the effects of time lags on the recharge of precipitation to the water table. As the vertical lines in the graph show, there is some time lag between a major precipitation event and the response of the water table. This is probably due to the depth of the well, the types of sediment the water moves through, and the volume of water used in the area. In times of low precipitation (such as 1951–55), there is a dramatic drop in the water level, indicating more use and less recharge as a result of low rainfall during that time period.

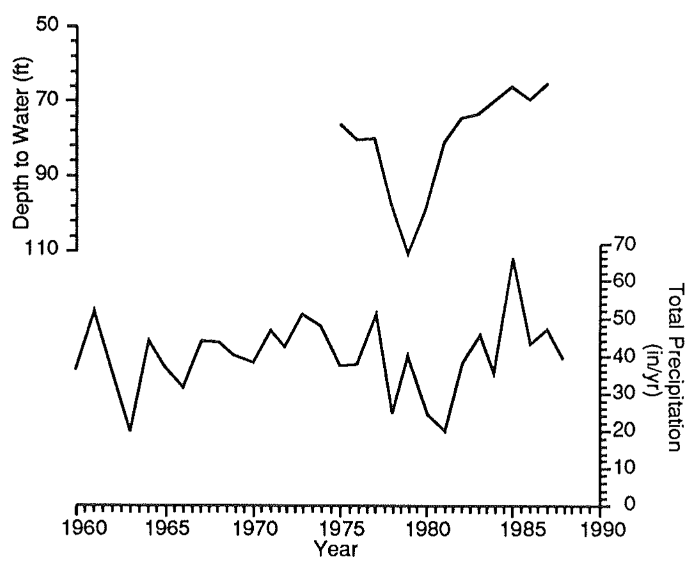

FIGURE 3—Hydrograph for well 34S, 25E, 13BAC [1150 ft (351 m)], Cherokee County, Roubidoux aquifer.

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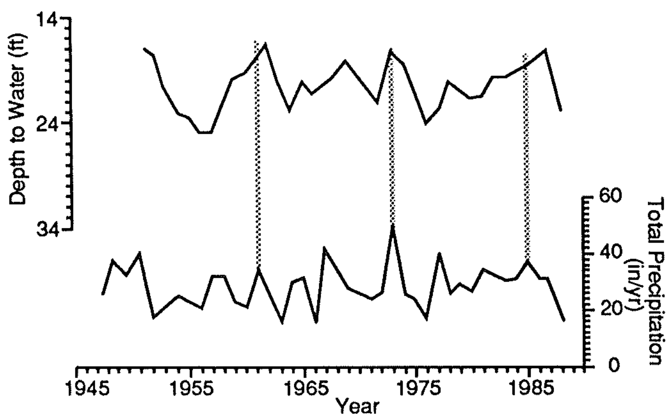

FIGURE 4—Hydrograph for well 12S, 20E, 17CCB [50 ft (15 m); Douglas County, Pleistocene well] showing effect of precipitation recharge on water levels.

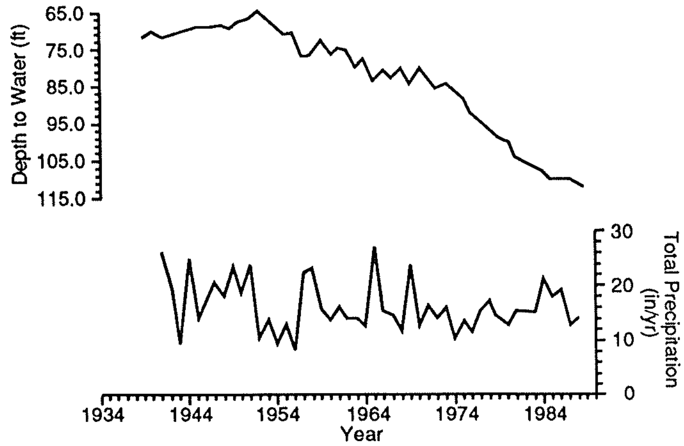

FIGURE 5—Hydrograph for well 24S, 32W, 03DAC [185 ft (56.4 m)], Finney County, Pleistocene well.

Finney County, deposits of Pleistocene age (QU)

Most of the observation wells in Finney County are within the Ogallala Formation (Tertiary) and in undifferentiated Pleistocene deposits. Of the 80 observation wells, 24S, 32W, 03DAC, is used for the hydrograph (fig. 5). This well is 185 ft (56.4 m) deep, and the formation consists of poorly consolidated sand and gravel of Pleistocene age.

The depth to water was 112.5 ft (34.3 m) in 1989. When compared to the 1950 water level [67.4 ft (20.5 m); table 1], the decline of the water level is 45 ft (14 m), or a 67% decline in saturated thickness. This percent change in saturated thickness for the period 1950–1989 is typical of both the Pleistocene and the Ogallala aquifers in Finney County.

Figure 5 illustrates the slow effect of precipitation recharge on the water table in the Pleistocene aquifer and the much more prominent effect of ground-water pumping on the decline of the water table. As the precipitation graph indicates, there is a fluctuation of precipitation over time with an average of 14–16 inches/yr (36–41 cm/yr). As can also be seen from the graph, there is no obvious correlation between the amount of rainfall and the response of the water table.

Hamilton County, alluvial well (QA)

Various aquifers are used in Hamilton County (KU, KJ, TO, QA, QU). There are 41 observation wells in this county. The hydrograph (fig. 6) of 23S, 43W, 21ABA, is in the Quaternary alluvial aquifer of the Arkansas River valley. Alluvial aquifer systems consist of unconsolidated sand and gravel at relatively shallow depths. The total depth of the well is 29 ft (8.8 m), with a depth to water of 15 ft (4.6 m) in 1950 and 12.9 ft (3.9 m) in 1989. This rise is typical for an alluvial aquifer because the water level fluctuates in response to rainfall events and recharge by the Arkansas River. However, aquifer systems such as the Ogallala and Cretaceous of Hamilton County show steady declines in the water level as a result of ground-water pumping and low recharge. A well within the Ogallala Formation (TO) shows a decline of 91 ft (28 m), whereas another well penetrating into Cretaceous units shows a decline of 69 ft (21 m) (table 1).

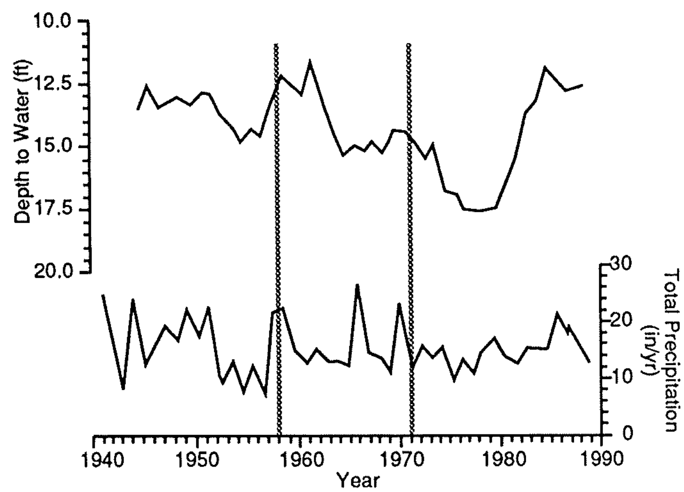

FIGURE 6—Hydrograph for well 23S, 43W, 21ABA [29 ft (8.8 m)], Hamilton County, alluvial well.

The hydrograph (fig. 6) for well 23S, 43W, 21ABA, shows the effects of precipitation on recharge of a shallow well. As can be seen from the graph, periods of high rainfall yield a rapid response in the water level; conversely, times of drought (indicated by low rainfall) result in depleted water levels. This graph shows little time lag between the precipitation events and the water-level response. This is probably because the water table is close to the land surface and because porous overlying sediments allow rapid recharge.

Osborne County, terrace deposits of Pleistocene age (QU)

Osborne County contains few observation wells for data collection. Geologic units such as the Dakota Formation (KD) and alluvium (QA) are the major aquifers in this county. The hydrograph of the observation well located at 06S, 12W, 23CDC, is presented (fig. 7). The well is in the alluvium of the north fork of the Solomon River.

This well is 30 ft (9.1 m) deep. The hydrograph (fig. 7) illustrates the effect of recharge on changes in water level on a yearly basis. As shown by the vertical lines, there is a time lag between the recharge event (heavy rainfall) and the response of the water table. Because this well is shallow, located in alluvial terrace deposits composed of sands, gravels, and clays, and has a shallow water table [18–25 ft (5.5–7.6 m) on average], it is susceptible to fairly rapid recharge effects on the water table.

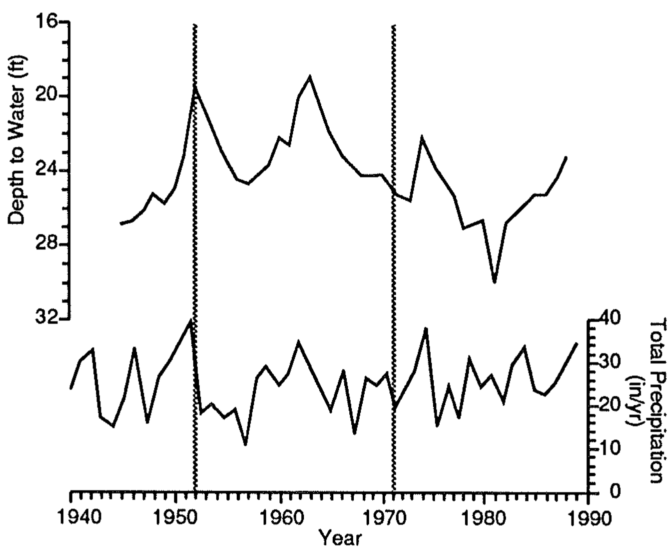

FIGURE 7—HYDROGRAPH FOR WELL 06S, 12W, 23CDC [30 FT (9.1 M)], OSBORNE COUNTY, TRRC WELL.

Scott County, Ogallala aquifer of Tertiary age (TO)

All the observation wells in Scott County are within the Ogallala Formation (TO). Of the 46 observation wells, 20S, 33W, 09BBB, is used for the hydrograph (fig. 8). This observation well consists of 128 ft (39.0 m) of the Ogallala Formation. The Ogallala is composed of coarse-grained sand and gravel and is overlain by Pleistocene loess deposits of sand, silt, and clay.

The depth to water was 101.6 ft (31.0 m) in 1989. When compared to the 1950 water level [60 ft (18 m); table 1], the decline of the water level is 42 ft (13 m), or a 62% decline in saturated thickness. This percent change in saturated thickness for the period 1950–1989 is typical of the Ogallala aquifer in Scott County.

The hydrograph (fig. 8) illustrates the slow and small [0.25 in/yr (0.6 cm/yr)] effect of precipitation recharge to the water table in the Ogallala aquifer and the much more prominent effect of ground-water pumping on the decline in the water table. As the precipitation graph indicates, there is a fluctuation of precipitation over time, with an average of 14–16 inches/yr (36–41 cm/yr). As can also be seen, there is no obvious correlation between the amount of rainfall and the response of the water table.

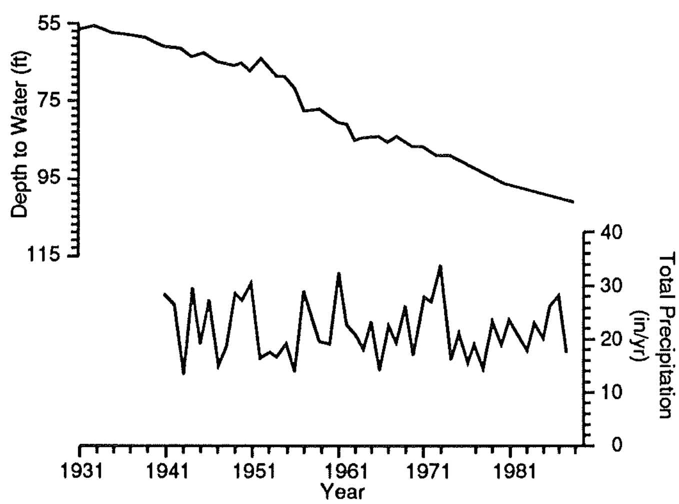

FIGURE 8—HYDROGRAPH FOR WELL 20S, 33W, 09BBB [128 FT (39.0 M)], SCOTT COUNTY, OGALLALA FORMATION.

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Sedgwick County, Quaternary alluvial deposit (QA)

Sedgwick County contains 12 observation wells for data collection. The hydrograph (fig. 9) of the observation well located at 25S, 01W, 26DBD, is representative of ground-water conditions in Sedgwick County. The well is in the alluvium of the Arkansas River.

This well is 54 ft (16 m) deep and is in unconsolidated clay, silt, sand, and gravel. The hydrograph (fig. 9) illustrates the effect of recharge on changes in water level on a yearly basis. As shown by the vertical lines, there is a time lag between the recharge event (heavy rainfall) and the response of the water table. Because this well is shallow, located in alluvial terrace deposits, and has a shallow water table [18–25 ft (5.5–7.6 m) on average], it is susceptible to fairly rapid recharge effects on the water table.

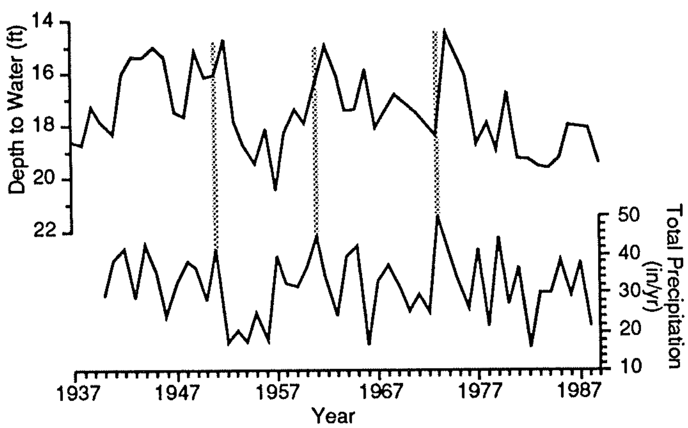

FIGURE 9—Hydrograph for well 25S, 01W, 26DAD [54 ft (16 m); Sedgwick County, Pleistocene well] showing effect of precipitation recharge on water levels.

Thomas County, Ogallala Formation of Tertiary age

There are 62 observation wells in Thomas County. The primary aquifer in Thomas County is the Ogallala Formation. The Ogallala is composed of coarse-grained sand and gravel and is overlain by Pleistocene loess. The depth of one observation well in the Ogallala aquifer is 270 ft (82 m) at location 08S, 34W, 01BAC. The depth to water in this well has declined from 113 ft (34.4 m) in 1950 to 127.6 ft (38.9 m) in 1989, a drop of nearly 15 ft (4.6 m), or 10% of the total thickness (table 1).

The hydrograph (fig. 10) illustrates the slow and small effect of precipitation recharge to the water table in the Ogallala aquifer and the much more prominent effect of ground-water pumping on the decline in the water table. As the precipitation graph indicates, there is a fluctuation of precipitation over time with an average of 14–16 inches/yr (36–41 cm/yr). As can also be seen from the graph, there is no obvious correlation between the amount of rainfall and the response of the water table.

The Ogallala water table is very deep in this part of Kansas. The combination of a deep water table with thick overlying unsaturated sediments leads to a slow rate of precipitation recharge to the aquifer. This is evident from the yearly decline of water levels over a 40-year period with a relatively steady amount of precipitation.

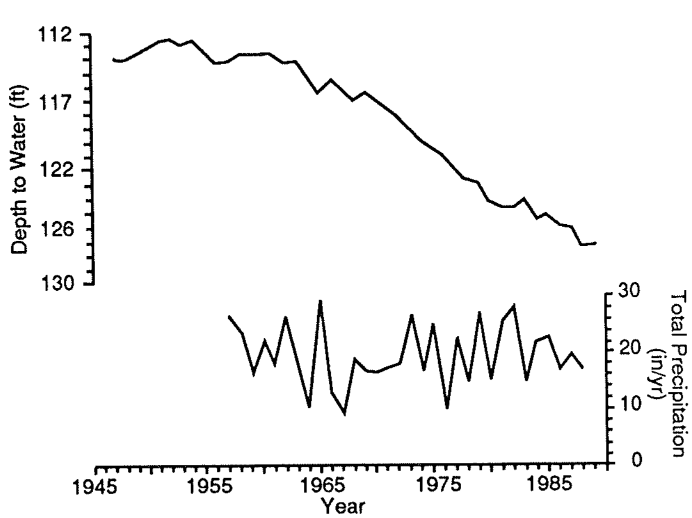

FIGURE 10—Hydrograph for well 08S, 34W, 01BAC [160 ft (48.8 m); Thomas County, Ogallala well] showing effect of precipitation recharge on water levels.

Regional decline maps

The state of Kansas has been divided into eight regions (see fig. 1). The following maps (figs. 11–14) show the generalized water-level change from January 1988 to January 1989. In most cases the water table has dropped, but some wells did not change and a few rose.

Region I: Southwestern Kansas

As the regional decline map (fig. 11) shows, there is a general decline in ground-water levels in the western part of the area and a smaller decline in the eastern part. Areas with declines greater than 12 ft (3.7 m) indicate concentrations of wells with high pumping capacity and large water use. The primary aquifers in this part of the state are in Cretaceous, Ogallala, and alluvial units. The hydrograph from Finney County (fig. 5) illustrates the steady decline of the water table in this area as a result of increased irrigation.

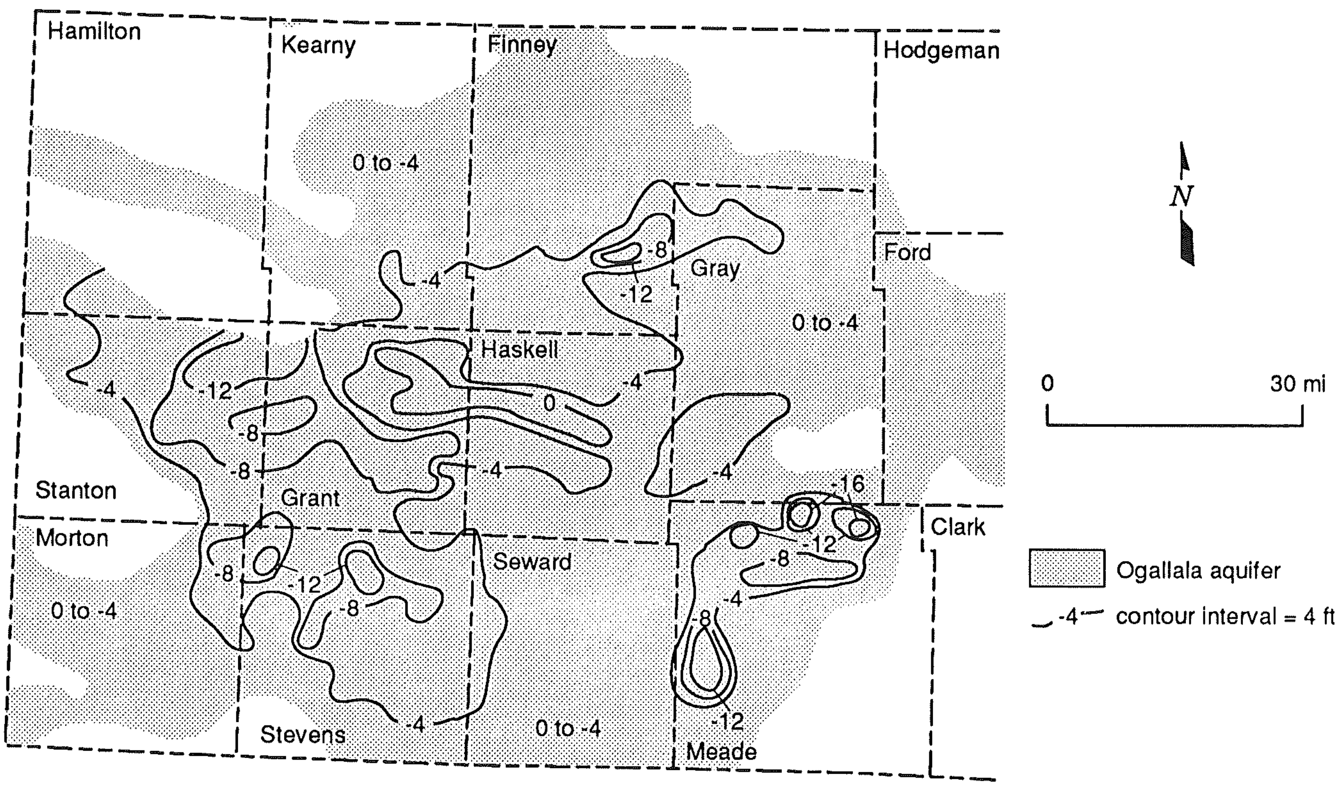

FIGURE 11—MAP OF GENERALIZED WATER-LEVEL DECLINE FOR REGION I, SOUTHWEST KANSAS, 1988–89.

Region II: West-central Kansas

The west-cental region of Kansas contains 1.5 tiers of counties along the Kansas–Colorado border. Within this region the primary aquifer is the Ogallala Formation of Tertiary age. The Ogallala water-level changes for the period 1988–89 range from 4 ft (1 m) in Logan County to 5 ft (2 m) in Scott County (fig. 12). These changes from 1989 are directly related to the density of irrigation wells in the two counties. The rise in the water table in the southern half of Logan County is due to the minimal number of wells that are used for irrigation, whereas in Scott County a higher number of wells results in the dewatering of the productive aquifer. The recharge rates for Scott and Logan counties are similar; however, water withdrawal is greater in Scott County. The hydrograph for Scott County (fig. 8) illustrates the general decline in the region.

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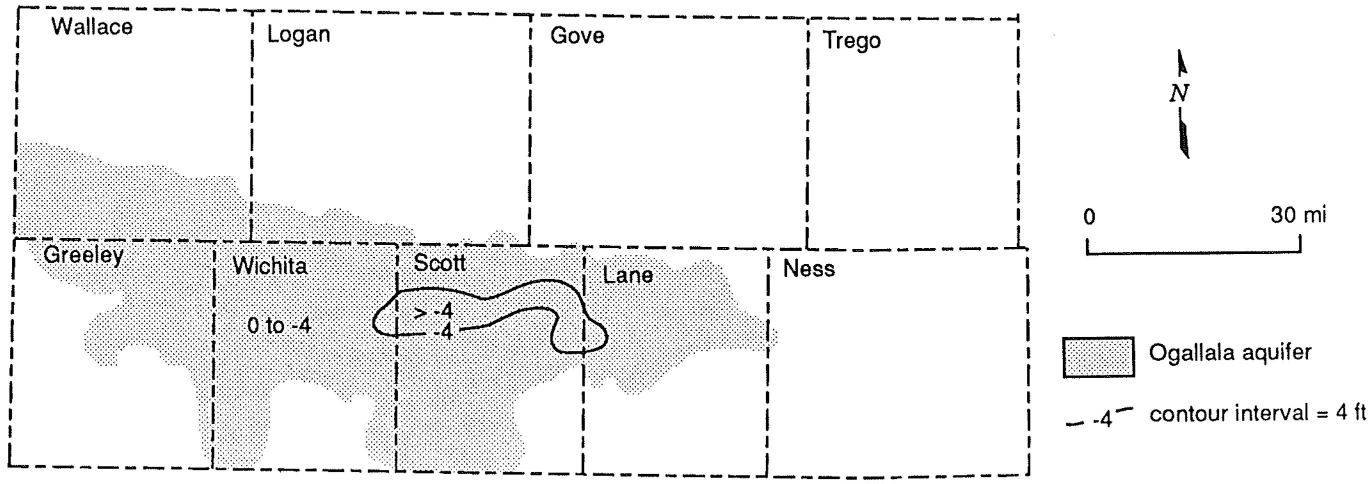

FIGURE 12—Map of generalized water-level decline for region II, west-central Kansas, 1988–89.

Region III: Northwest Kansas

In the northwest part of the state the primary aquifer is the Ogallala Formation. Counties in the region have the highest number of observation wells; therefore abundant information concerning the declining water level of the Ogallala exists (fig. 13). The hydrograph for Thomas County (fig. 10) illustrates the continued water table decline, which is typical for the entire region.

The decline of the water table for 1988–89 is shown on the regional map as –4 ft (–1 m). Some areas show little decline throughout the year, and no rise has occurred in the northwest region.

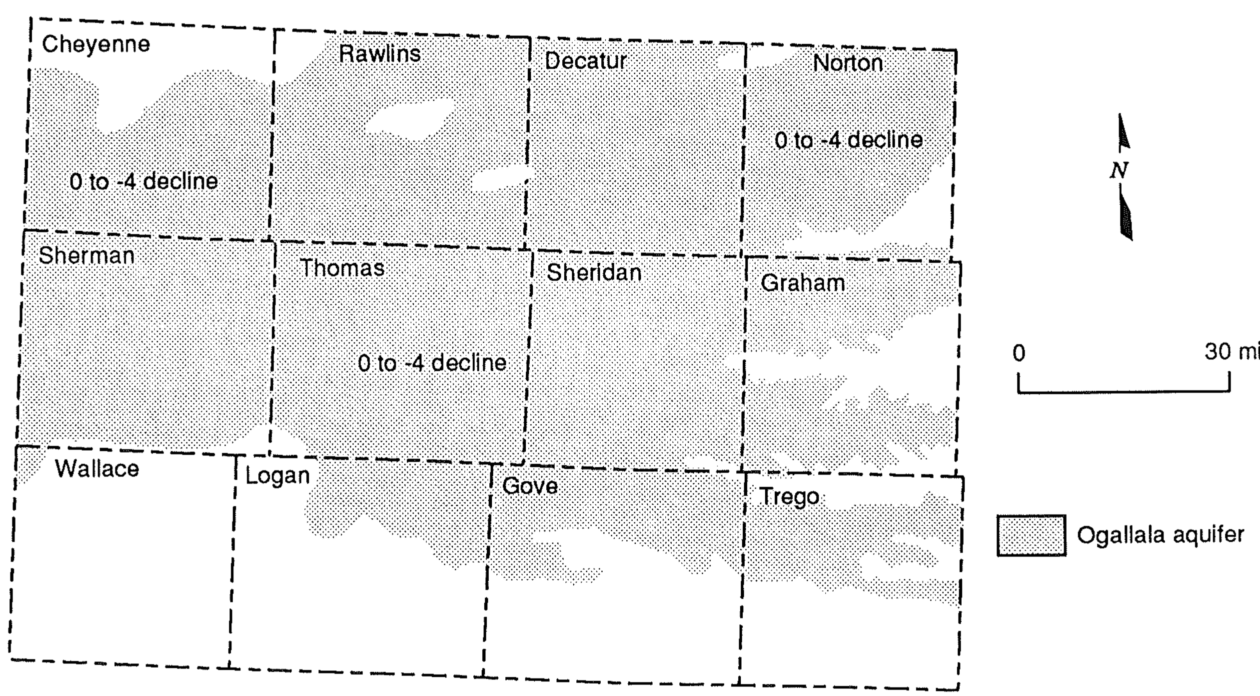

FIGURE 13—Map of generalized water-level decline for region III, northwest Kansas, 1988–89.

Region V: South-central Kansas

The south-central region is located east of the easternmost extension of the Ogallala Formation. In this region the primary aquifer is the Quaternary alluvium, with agriculture being the leading consumer of ground water. Stafford County has experienced a decline of up to 4 ft (1 m) throughout the county.

Water-level decline is minimal if the earliest dates (1940's) are excluded from the interpretation. The initial period of pumping for irrigation has suppressed the high water table and it has remained relatively unchanged for the last 30 yrs (fig. 14).

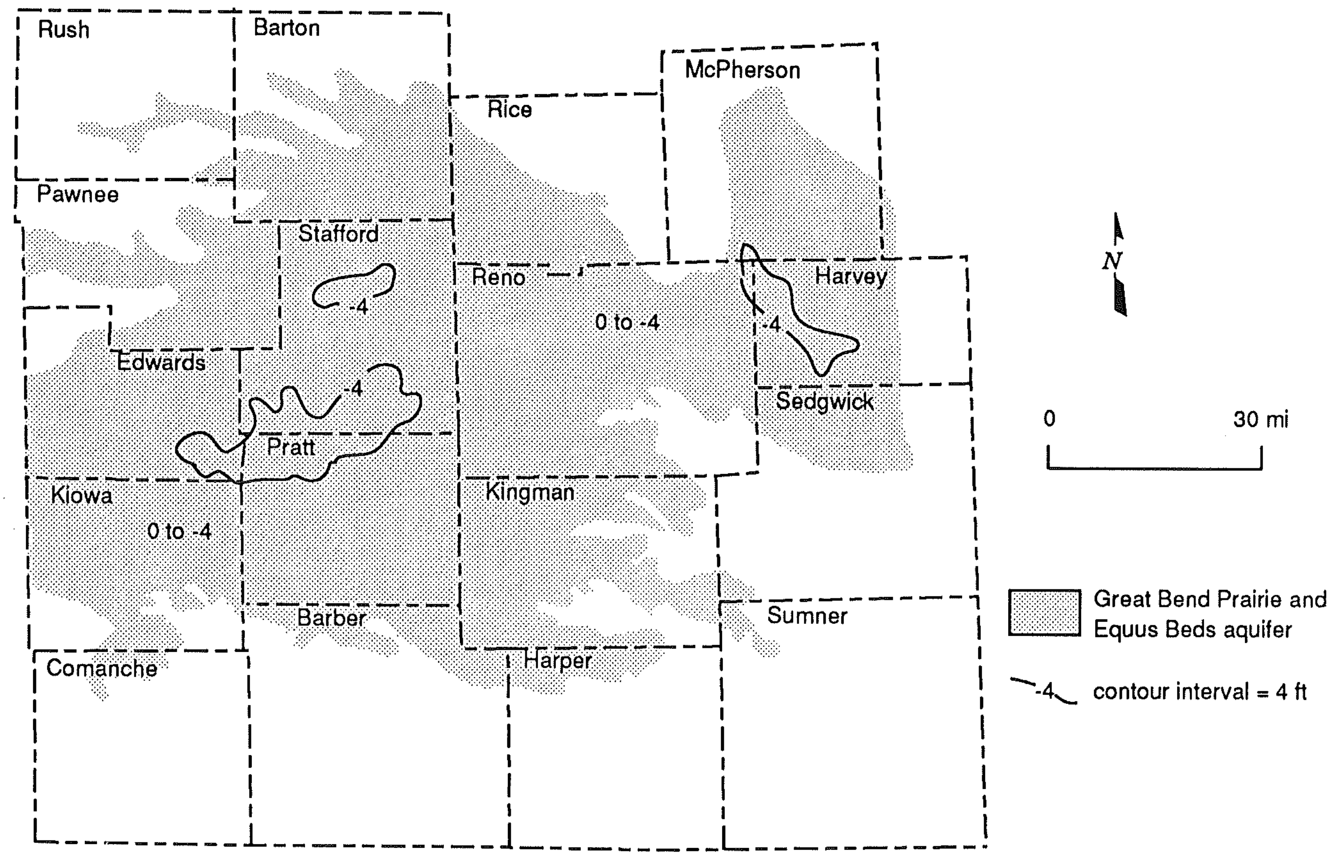

FIGURE 14—Map of generalized water-level decline for region V, south-central Kansas, 1988–89.

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Publications containing ground-water-level data for Kansas

Records of ground-water-level data for Kansas were published in U.S. Geological Survey Water-Supply Papers for 1935–1971. These Water-Supply Papers are:

Year	Water-Supply Paper Number[1]	Year	Water-Supply Paper Number[1]
1935	777	1948	1128
1936	817	1949	1158
1937	840	1950	1167
1938	845	1951	1193
1939	886	1952	1223
1940	908	1953	1267
1941	938	1954	1323
1942	946	1955	1406
1943	988	1956	1456
1944	1018	1957–1961	1781
1945	1025	1962–1966	1976
1946	1073	1966–1971	2090
1947	1098		

[1]May be purchased from the U.S. Geological Survey, Books and Open-File Reports, Federal Center, Box 25425, Denver, CO 80225

A series of annual reports that contain records of water-level measurements made in Kansas during 1956–1965 were published in the following Kansas Geological Survey Bulletins:

Year	Bulletin Number[1]	Year	Bulletin Number[1]
1956	125	1961	159
1957	131	1962	167
1958	141	1963	173
1959	146	1964	177
1960	153	1965	184

[1]May be purchased from the Publications Sales Office, Kansas Geological Survey, University of Kansas, 1930 Constant Avenue, Lawrence, KS 66047

In addition to the publications listed, records of annual water-level measurements in Kansas are presented in the following publications:

Broeker, M. E., and McNellis, J. M., 1973, Ground-water levels in observation wells in Kansas, 1966–70: Kansas Geological Survey, Basic Data Series, Ground-water Release 3, 373 p.

Broeker, M. E., McIntrye, H. J., Jr., and McNellis, J. M., 1977, Ground-water levels in observation wells in Kansas, 1971–75: Kansas Geological Survey, Basic Data Series, Ground-water Release 6, 526 p.

Dague, B. J., 1985, January 1985 water levels and data related to water-level changes, western and south-central Kansas: U.S. Geological Survey, Open-file Report 85–423, 162 p.

__________, 1986, January 1986 water levels and data related to water-level changes, western and south-central Kansas: U.S. Geological Survey, Open-file Report 86–317, 165 p.

__________, 1987, January 1987 water levels and data related to water-level changes, western and south-central Kansas: U.S. Geological Survey, Open-file Report 87–241, 161 p.

Faust, B. J., 1988, January 1988 water levels and data related to water-level changes, western and south-central Kansas: U.S. Geological Survey, Open-file Report 88–342, 158 p.
Pabst, M. E., 1977, January 1977 water levels and data related to water-level changes since 1950, western Kansas: U.S. Geological Survey, Open-file Report 77–264, 209 p.
__________, 1978, January 1978 water levels, and data related to water-level changes since 1940 or 1950, western Kansas: U. S. Geological Survey Open-File Report 78-409, 179 p.
__________, 1979, January 1979 water levels and data related to water-level changes, western and south-central Kansas: U.S. Geological Survey, Open-file Report 79–925, 213 p.
__________, 1980, January 1980 water levels and data related to water-level changes, western and south-central Kansas: U.S. Geological Survey, Hydrologic Data, Open-file Report 80–958, 166 p.
__________, 1981, January 1981 water levels and data related to water-level changes, western and south-central Kansas: U.S. Geological Survey, Open-file Report 81–1001, 168 p.
__________, 1982, January 1982 water levels and data related to water-level changes, western and south-central Kansas: U.S. Geological Survey, Open-file Report 82–649, 167 p.
__________, 1983, January 1983 water levels and data related to water-level changes, western and south-central Kansas: U.S. Geological Survey, Open-file Report 83–762, 164 p.
Pabst, M. E., and Dague, B. J., 1984, January 1984 water levels and data related to water-level changes, western and south-central Kansas: U.S. Geological Survey, Open-file Report 84–613, 162 p.
Pabst, M. E., and Gutentag, E. D., 1977, Water-level changes in west-central Kansas, 1950–77: Kansas Geological Survey, Journal, October 1977, 18 p.
__________, 1979, Water-level changes in southwestern Kansas, 1940–78: Kansas Geological Survey, Journal, May 1979, 29 p.
Pabst, M. E., and Jenkins, E. D., 1973, Water-level changes in northwestern Kansas, 1950–73: Kansas Geological Survey, Journal, October 1973, 14 p.
__________, 1974, Water-level changes in west-central Kansas, 1950–74: Kansas Geological Survey, Journal, October 1974, 15 p.
__________, 1976a, Water-level changes in northwestern Kansas, 1940–76: Kansas Geological Survey, Journal, May 1976, 26 p.
__________, 1976b, Water-level changes in northwestern Kansas, 1950–76: Kansas Geological Survey, Journal, December 1976, 20 p.

Water-level-data tables

The data presented in tables 1 and 2 are listed alphabetically by county. Table 1 lists well number, principal geologic unit, land-surface altitude of well, depth to bedrock, and depths to water during the base-reference years of 1940, 1944, or 1950 (predevelopment years), the reference year of either 1966 or 1974, and each year from 1983 through 1989.

Table 2 lists water-level changes from the base-reference year and the reference year to 1989; the saturated thickness of the water-bearing deposits during the base-reference year and during 1989; and the percentage change in saturated thickness from the base-reference year to 1989.

Letter designations for the geologic units in the tables are KJ, undifferentiated Lower Cretaceous and Upper Jurassic rocks; KD, Dakota Formation (Cretaceous); KN, Niobrara Chalk (Cretaceous); KU, undifferentiated Lower Cretaceous rocks; TO, Ogallala Formation (Tertiary); QA, Quaternary alluvium; and QU, undifferentiated Quaternary deposits.

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Allen County

TABLE 1. WATER LEVELS BY YEAR, ALLEN COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
24S 18E 28CDD 01		948.				8.2	13.9	4.1	9.3	4.0	7.9	14.2

TABLE 2. DERIVED HYDROLOGIC DATA, ALLEN COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
24S 18E 28CDD 01		14.2			-6.3					

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Barber County

TABLE 1. WATER LEVELS BY YEAR, BARBER COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1940 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
32S 12W 04DBC 01		1480.		18	16.4	15.3	15.1	13.0	13.7	13.4	14.6	

TABLE 2. DERIVED HYDROLOGIC DATA, BARBER COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
32S 12W 04DBC 01										

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Barton County

TABLE 1. WATER LEVELS BY YEAR, BARTON COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1944 (Feet)	Depth to Water 1974 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
18S 14W 27CDD 01		1896.								45.2	43.1	47.1
18S 15W 28CCC 03	QA	1912.		9		20.7	22.7	22.4	22.2	23.5	17.7	21.7
19S 11W 19BDD 01		1791.		13				19.6	20.4	20.4	19.8	20.5
19S 11W 26BDA 01		1772.		7				13.9	12.8	13.4	12.5	14.2
19S 12W 06ADA 01		1800.						6.7	4.1	4.7	3.4	
19S 13W 08BAD 01		1855.		11		20.4	20.4	20.6	20.4	19.9	17.2	19.8
19S 13W 33DDB 01	QA	1847.		4	4.4	9.8	10.6	9.6	9.0	9.5	8.8	10.4
19S 14W 06BBB 01		1895.		13		19.3	20.6	21.4	20.7	20.5	17.4	20.0
19S 14W 23BBD 01		1873.								19.5	17.7	20.1
19S 14W 29DDB 01		1895.		20		27.5	28.1	28.7	29.2	29.2	28.5	30.1
19S 14W 36BBC 01		1868.		8				11.7	11.2	11.8	10.2	12.1
20S 11W 06CCC 01	QA	1788.	138	9	5.6	10.5	11.9	10.9	9.8	10.4	9.5	11.0
20S 11W 26AAC 01	QU	1752.	112	3	1.6	10.6	11.0	11.0	7.8	10.0	9.1	11.4
20S 12W 03DAC 01		1799.	144	2	1.3	7.8	8.0		7.0	7.6	6.6	
20S 12W 06AAC 01	QU	1822.	117	7	5.1	9.8	10.0	9.6	9.2	9.8		9.7
20S 12W 23CCA 01	QU	1814.	159	11	3.7	15.7	16.8	17.8	13.3	14.4	12.7	16.0
20S 13W 17DDC 01	QU	1876.	126	11	7.2	16.3	16.6	17.7	16.3	16.8	14.9	17.4
20S 13W 24DCB 01	QU	1850.	140	12	9.6	20.9	22.0	23.3	20.5	20.7	18.9	20.9
20S 14W 22DCB 01		1897.	152	6	6.5	13.7	14.4	15.0	14.2	14.3	12.6	15.3
20S 15W 24DBD 01		1915.		10		13.8	14.4	14.8	14.6	14.5	12.3	14.7
20S 15W 33ADD 01		1945.		15				20.3	19.9	19.9	17.6	19.7

TABLE 2. DERIVED HYDROLOGIC DATA, BARTON COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1944-89 (Feet)	Water-Level Change 1974-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1944-89 (Feet/year)	Average Annual Water-Level Change 1974-89 (Feet/year)	Saturated Thickness in 1944 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1944-89
18S 14W 27CDD 01		47.1			-4.0					
18S 15W 28CCC 03	QA	21.7	-13		-4.0	-.3				
19S 11W 19BDD 01		20.5	-8		-.7	-.2				
19S 11W 26BDA 01		14.2	-7		-1.7	-.2				
19S 12W 06ADA 01										
19S 13W 08BAD 01		19.8	-9		-2.6	-.2				
19S 13W 33DDB 01	QA	10.4	-6	-6.0	-1.6	-.2	-.3			
19S 14W 06BBB 01		20.0	-7		-2.6	-.2				
19S 14W 23BBD 01		20.1			-2.4					
19S 14W 29DDB 01		30.1	-10			-.3				
19S 14W 36BBC 01		12.1	-4		-1.9	-.1				
20S 11W 06CCC 01	QA	11.0	-2	-5.4	-1.5	-.1	-.2	129	127	-2
20S 11W 26AAC 01	QU	11.4	-8	-9.8	-2.3	-.2	-.4	109	101	-7
20S 12W 03DAC 01										
20S 12W 06AAC 01	QU	9.7	-3	-4.6		-.1	-.2	110	107	-3
20S 12W 23CCA 01	QU	16.0	-5	-12.3	-3.3	-.1	-.5	148	143	-3
20S 13W 17DDC 01	QU	17.4	-6	-10.2	-2.5	-.2	-.4	115	109	-5
20S 13W 24DCB 01	QU	20.9	-9	-11.3	-2.0	-.2	-.5	128	119	-7
20S 14W 22DCB 01		15.3	-9	-8.8	-2.7	-.2	-.4	146	137	-6
20S 15W 24DBD 01		14.7	-5		-2.4	-.1				
20S 15W 33ADD 01		19.7	-5		-2.1	-.1				

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Bourbon County

TABLE 1. WATER LEVELS BY YEAR, BOURBON COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
25S 24E 36AAC 01		916.				178.2	185.7	186.0	196.0	223.0	222.6	229.9

TABLE 2. DERIVED HYDROLOGIC DATA, BOURBON COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
25S 24E 36AAC 01		229.9			-7.3					

Cherokee County

TABLE 1. WATER LEVELS BY YEAR, CHEROKEE COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1940 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
34S 25E 13BAC 01		890.				73.4	75.1	66.3	69.3	65.5		

TABLE 2. DERIVED HYDROLOGIC DATA, CHEROKEE COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
34S 25E 13BAC 01										

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TABLE 1. WATER LEVELS BY YEAR, CHEYENNE COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
01S 38W 02CDC 01	TO	3034.	41	23	22.6	23.6	24.3	24.1	24.1	24.2	24.0	24.1
01S 38W 08DCC 01	QA	3057.	33	12	12.3	13.3	13.9	13.9	13.4	13.6	13.8	13.7
01S 38W 30BDC 01	QA	3090.	28	7	8.0	8.5	8.8	9.1	9.1	9.6	8.9	9.0
01S 39W 25CBC 01	QA	3102.	26	7	8.5	9.3	9.6	9.7	9.5	10.2	9.5	9.7
02S 37W 33DCC 01		3420.						215.9	212.7	213.3	213.1	218.0
02S 39W 27BBB 01	QA	3235.	28	18	17.8	18.0	17.9	17.7	17.9	18.2	18.2	18.1
02S 40W 28DBA 01	TO	3452.	140	112	112.5	110.9	112.3	112.1	116.5	115.8	111.2	110.9
02S 40W 32BCB 01	TO	3492.						130.6	130.5	130.4	130.4	132.2
02S 41W 27BBD 01	TO	3620.	242	200	198.6	200.5		207.5	200.8	207.4	200.5	201.5
02S 41W 33DBC 01	TO	3650.	288	235	235.2	236.8	236.8	238.5	236.5	236.3	236.8	236.5
03S 37W 19BBC 01	TO	3468.	325	215	219.8	229.3	230.5	228.5	229.7	230.2	230.3	230.8
03S 37W 21DDD 01	TO	3422.	312	194		222.7	218.5		218.3	218.6	217.8	218.2
03S 37W 36ADB 01	TO	3381.	300	175	182.0	199.1	200.0	201.2	199.9	201.7	201.4	204.5
03S 38W 04BCC 01	TO	3479.						230.7	217.9	217.9	217.6	217.6
03S 38W 21BCB 01	TO	3512.						237.0	240.1	240.1	239.7	243.5
03S 38W 25BBB 01		3479.						226.7	227.0	227.2	227.0	232.7
03S 39W 04CCC 01	TO	3351.						67.5	65.6	66.4	66.8	67.9
03S 39W 20DAC 01	TO	3450.	199	130	140.4	139.3	144.1	143.2	140.2	140.2	139.4	141.0
03S 39W 24DDD 01	TO	3505.	275	205		220.3	220.7	221.5	221.5	222.0	221.7	222.7
03S 39W 32BDB 01	TO	3490.	223	150	153.6	153.4	153.5	154.5	153.5	153.6		158.4
03S 40W 09BAA 02	QA,TO	3358.	22	20	19.9	20.1	20.6	20.4	19.9	19.9	19.8	19.7
03S 40W 35AAC 01	TO	3445.	144	95	96.1	99.5	98.8	98.5	97.9	96.6	97.8	96.9
03S 41W 33ABB 01		3594.	184	164		164.8	165.4	164.1	163.5	165.0	162.1	161.8
03S 42W 04AAA 01	TO	3727.	255	230		230.8	231.0	231.0	231.3	230.9	231.0	230.9
03S 42W 26CCD 01		3702.						206.2	205.2	205.0	205.2	212.0
04S 37W 17AAC 01	TO	3446.	325	187	187.9	195.9	195.7	196.3	197.3	197.5	197.6	197.0
04S 37W 25DCA 01	TO	3374.	284	147	141.5	151.4	151.1	151.2	151.9	151.8		152.4
04S 38W 04BAC 01	TO	3509.	327	207	207.0	216.6	216.9	217.7	218.6	218.9	218.7	228.3
04S 38W 20CCC 01	TO	3485.	297	151	149.5	156.2	156.6	156.9	157.0	157.2	157.3	160.4
04S 38W 21ADC 01	TO	3491.	316	178	188.0	184.3	184.8	185.1	185.4	185.9	187.6	186.1
04S 40W 22BCB 01	TO	3520.	215	123	123.9	125.2	125.0	124.9	124.6	124.3	124.3	124.4
04S 41W 16DAA 01	QA	3403.	38	13	14.2	15.0	15.3	15.2	15.5	15.6	15.7	15.8
04S 41W 23AAA 01		3526.						121.0	120.9	120.5	120.9	120.6
04S 41W 25BCB 01	TO	3571.	211	141	139.6			142.7	142.8	142.8	142.8	142.9
04S 41W 31ACA 01	TO	3552.	142	94	94.0	96.9	98.3	96.0	96.6	96.4	97.1	97.0
04S 42W 02BCC 01		3704.						213.4	213.1	214.6	213.6	213.7
04S 42W 16CCD 01		3590.							87.4	86.2	88.9	89.2
05S 37W 15DBB 01	TO	3397.	297	137	136.4	148.5	149.3	150.1	150.1	145.7	143.9	151.3
05S 38W 13BAD 01	TO	3390.	220	74	72.5	77.9	77.7	77.9	78.1	78.7	78.0	78.1
05S 38W 22ACB 01	TO	3437.	270	90	90.6	94.4	98.1	97.7	97.7	97.8	99.9	103.5
05S 39W 06DAA 01						210.2	210.8	211.4	212.1	214.5	218.1	213.0
05S 39W 11CBC 01	TO	3530.	291	140	140.1	149.2		151.1	150.1	150.5	149.2	149.0
05S 39W 18CCC 01	TO	3630.	325	185		214.7	212.9	220.0	218.9	218.9	216.9	218.7
05S 39W 25CDA 01	TO	3533.	295	127	125.0	132.5	132.6	133.1	132.1	132.6	134.7	135.1
05S 40W 14BCD 01	TO	3645.	325	187		221.5	222.1	221.4	221.9	220.8	220.7	221.9
05S 41W 20DAA 01	TO	3742.	309	207	211.6	228.0	224.1	227.7	227.4	225.8	226.1	226.3
05S 42W 14DCC 01			215								131.3	132.7

TABLE 2. DERIVED HYDROLOGIC DATA, CHEYENNE COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
01S 38W 02CDC 01	TO	24.1	-1	-1.5	-.1		-.1	18	17	-6
01S 38W 08DCC 01	QA	13.7	-2	-1.4	.1	-.1	-.1	21	19	-10
01S 38W 30BDC 01	QA	9.0	-2	-1.0	-.1	-.1		21	19	-10
01S 39W 25CBC 01	QA	9.7	-3	-1.2	-.2	-.1	-.1	19	16	-16
02S 37W 33DCC 01		218.0			-4.9					
02S 39W 27BBB 01	QA	18.1	0	-.3	.1			10	10	0
02S 40W 28DBA 01	TO	110.9	1	1.6	.3		.1	28	29	4
02S 40W 32BCB 01	TO	132.2			-1.8					
02S 41W 27BBD 01	TO	201.5	-2	-2.9	-1.0	-.1	-.1	42	41	-2
02S 41W 33DBC 01	TO	236.5	-2	-1.3	.3	-.1	-.1	53	52	-2
03S 37W 19BBC 01	TO	230.8	-16	-11.0	-.5	-.4	-.5	110	94	-15
03S 37W 21DDD 01	TO	218.2	-24		-.4	-.6		118	94	-20
03S 37W 36ADB 01	TO	204.5	-30	-22.5	-3.1	-.8	-1.0	125	96	-23
03S 38W 04BCC 01	TO	217.6			.0					
03S 38W 21BCB 01	TO	243.5			-3.8					
03S 38W 25BBB 01		232.7			-5.7					
03S 39W 04CCC 01	TO	67.9			-1.1					
03S 39W 20DAC 01	TO	141.0	-11	-.6	-1.6	-.3		69	58	-16
03S 39W 24DDD 01	TO	222.7	-18		-1.0	-.5		70	52	-26
03S 39W 32BDB 01	TO	158.4	-8	-4.8		-.2	-.2	73	65	-11
03S 40W 09BAA 02	QA,TO	19.7	0	.2	.1			2	2	0
03S 40W 35AAC 01	TO	96.9	-2	-.8	.9	-.1		49	47	-4
03S 41W 33ABB 01		161.8	2		.3	.1		20	22	10
03S 42W 04AAA 01	TO	230.9	-1		.1			25	24	-4
03S 42W 26CCD 01		212.0			-6.8					
04S 37W 17AAC 01	TO	197.0	-10	-9.1	.6	-.3	-.4	138	128	-7
04S 37W 25DCA 01	TO	152.4	-5	-10.9		-.1	-.5	137	132	-4
04S 38W 04BAC 01	TO	228.3	-21	-21.3	-9.6	-.5	-.9	120	99	-18
04S 38W 20CCC 01	TO	160.4	-9	-10.9	-3.1	-.2	-.5	146	137	-6
04S 38W 21ADC 01	TO	186.1	-8	1.9	1.5	-.2	.1	138	130	-6
04S 40W 22BCB 01	TO	124.4	-1	-.5	-.1			92	91	-1
04S 41W 16DAA 01	QA	15.8	-3	-1.6	-.1	-.1	-.1	25	22	-12
04S 41W 23AAA 01		120.6			.3					
04S 41W 25BCB 01	TO	142.9	-2	-3.3	-.1	-.1	-.1	70	68	-3
04S 41W 31ACA 01	TO	97.0	-3	-3.0	.1	-.1	-.1	48	45	-6
04S 42W 02BCC 01		213.7			-.1					
04S 42W 16CCD 01		89.2			-.3					
05S 37W 15DBB 01	TO	151.3	-14	-14.9	-7.4	-.4	-.6	160	146	-9
05S 38W 13BAD 01	TO	78.1	-4	-5.6	-.1	-.1	-.2	146	142	-3
05S 38W 22ACB 01	TO	103.5	-14	-12.9	-3.6	-.4	-.6	180	167	-7
05S 39W 06DAA 01		213.0			5.1					
05S 39W 11CBC 01	TO	149.0	-9	-8.9	.2	-.2	-.4	151	142	-6
05S 39W 18CCC 01	TO	218.7	-34		-1.8	-.9		140	106	-24
05S 39W 25CDA 01	TO	135.1	-8	-10.1	-.4	-.2	-.4	168	160	-5
05S 40W 14BCD 01	TO	221.9	-35		-1.2	-.9		138	103	-25
05S 41W 20DAA 01	TO	226.3	-19	-14.7	-.2	-.5	-.6	102	83	-19
05S 42W 14DCC 01		132.7			-1.4				82	

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Clark County

TABLE 1. WATER LEVELS BY YEAR, CLARK COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1940 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
30S 23W 06AAA 01		2556.			140.6	141.5	140.9	142.0	144.6	146.7	143.1	

TABLE 2. DERIVED HYDROLOGIC DATA, CLARK COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1940-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1940-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1940 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1940-89
30S 23W 06AAA 01										

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Cloud County

TABLE 1. WATER LEVELS BY YEAR, CLOUD COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1944 (Feet)	Depth to Water 1974 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
05S 02W 01BAC 01		1380.			43.9	43.8	43.6	43.7	42.5	40.7	40.0	41.6

TABLE 2. DERIVED HYDROLOGIC DATA, CLOUD COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1944-89 (Feet)	Water-Level Change 1974-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1944-89 (Feet/year)	Average Annual Water-Level Change 1974-89 (Feet/year)	Saturated Thickness in 1944 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1944-89
05S 02W 01BAC 01		41.6		2.3	-1.6		.2			

Crawford County

TABLE 1. WATER LEVELS BY YEAR, CRAWFORD COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
29S 23E 24DBA 01		995.				302.1	304.4	306.4	305.0	305.3	305.6	306.9

TABLE 2. DERIVED HYDROLOGIC DATA, CRAWFORD COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
29S 23E 24DBA 01		306.9			-1.3					

TABLE 1. WATER LEVELS BY YEAR, DECATUR COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
01S 26W 18DDB 01	QA	2413.	59	28	26.4	30.4		26.8	27.8	28.1	28.0	27.9
01S 29W 03DDB 01	QA	2539.	45	23	23.0	30.4		28.8	28.6	28.0	28.4	27.6
01S 29W 19BDD 01	QA	2572.	53	10	10.9	21.4	18.1	17.2	17.0	17.4	17.4	17.9
01S 30W 34DDD 01	QA	2610.	60	20	21.5	27.4	26.2	25.8	26.1	27.5	28.3	29.5
02S 26W 11BBA 01	TO	2509.	110	85	87.3	86.1	86.3	86.2	87.8	85.7	87.2	85.4
02S 28W 13ABA 01		2487.		27	26.2	27.9	26.3	26.6	28.2	29.1	28.7	26.8
02S 30W 23ADD 01		2835.									139.8	136.3
03S 26W 30CBB 02	TO	2610.	142	119	119.4	125.0	125.9	125.8	125.5	125.3	125.1	
03S 27W 32ABA 01	TO	2637.	120	74	74.8	73.0	73.4	72.6	72.1	69.9	71.1	70.6
03S 28W 06DCB 01	QA	2571.	55	34	25.6	47.5		37.7	37.1	30.6	35.4	35.4
03S 28W 32BCA 01	TO	2749.	180	133	133.6			130.6	135.3	130.8		130.5
03S 29W 12BBA 01	QA	2556.	55	26	24.9	28.4	25.3	24.4	25.0	25.4	25.3	22.4
03S 29W 17DCB 01	QA,TO	2587.	50	19	20.0	22.3	21.8	21.9	21.8	20.4	19.1	21.6
03S 29W 31DCC 01	QA	2633.	38	20	20.3	25.5	25.3	24.4	24.1	23.4	22.5	23.2
03S 30W 03CBA 01	TO	2807.	177	96	98.6	95.4		93.6			93.5	96.4
03S 30W 26BBB 01	QA	2629.	49	7	10.2	5.8		6.7	4.8	4.1	3.0	3.9
04S 26W 08DDD 01	QA	2455.	70	26	28.7	29.7	30.4	31.7	29.4	29.7	30.6	29.4
04S 26W 19DCA 01	QA	2464.	37	14	14.0	17.0		17.5	16.2	16.1	16.6	15.3
04S 27W 17DAC 01	TO	2648.	162	105	103.8	105.7		105.5	103.6	103.8		105.6
04S 27W 33BBB 01	QA	2528.	54	13	16.0	19.0	19.2	18.3	17.9	17.4	17.1	18.0
04S 28W 15AAA 01	TO	2700.	130	92	94.1						91.7	91.8
04S 28W 30DDD 01	TO	2726.	110	92	92.7	92.6	91.9	91.0	90.9	90.6	92.5	91.1
04S 30W 07BBB 01	QA	2697.	21	7	7.3	12.1		12.1		12.0	12.8	13.2
05S 26W 05ADD 01	TO	2607.	170	128	128.9	128.2	127.8	127.7	126.9	127.2	126.9	127.1
05S 26W 26DDA 01	QA	2437.	74	26	22.4	23.1	24.1	23.6	23.8	23.1	22.6	24.0
05S 26W 33DCC 01	QA	2475.	60	20	18.2	19.4	19.3	18.6	18.3	18.5	18.3	18.3
05S 27W 21CCA 01	TO	2675.		103	104.2				103.6	103.3	103.4	103.5
05S 28W 07BBC 01	QA	2644.	52	19	19.9	21.2	20.4	20.1	19.1	17.9	16.2	18.0
05S 28W 10BBB 01	QA	2600.	47	12	8.0	9.6	9.0	8.8	9.0	8.7	8.2	9.7
05S 28W 14ADD 01	TO	2723.	160	133	135.0	137.5	136.0	133.9	133.9	135.8	136.1	134.3
05S 28W 17DAC 01	TO	2734.	124	102	102.3			102.0	101.9	95.6	104.3	101.7
05S 29W 11BAA 01	QA	2670.	42	10	12.3	12.7	12.6	12.5	12.6	12.6	11.9	
05S 29W 22CBB 01	QA	2686.	46	11	12.6	14.1	13.1	13.8	12.4	13.1	13.9	
05S 30W 15CCB 01		2878.						95.1	97.3	99.0	90.5	93.7
05S 30W 35BCB 01	TO	2891.	200	112	111.6	119.6	118.9	119.3	124.7	125.8	122.7	118.8

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TABLE 2. DERIVED HYDROLOGIC DATA, DECATUR COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
01S 26W 18DDB 01	QA	27.9	0	-1.5	.1		-.1	31	31	0
01S 29W 03DDB 01	QA	27.6	-5	-4.6	.8	-.1	-.2	22	17	-23
01S 29W 19BDD 01	QA	17.9	-8	-7.0	-.5	-.2	-.3	43	35	-19
01S 30W 34DDD 01	QA	29.5	-10	-8.0	-1.2	-.3	-.3	40	31	-23
02S 26W 11BBA 01	TO	85.4	0	1.9	1.8		.1	25	25	0
02S 28W 13ABA 01		26.8	0	-.6	1.9					
02S 30W 23ADD 01		136.3			3.5					
03S 26W 30CBB 02	TO									
03S 27W 32ABA 01	TO	70.6	3	4.2	.5	.1	.2	46	49	7
03S 28W 06DCB 01	QA	35.4	-1	-9.8	.0		-.4	21	20	-5
03S 28W 32BCA 01	TO	130.5	3	3.1		.1	.1	47	50	6
03S 29W 12BBA 01	QA	22.4	4	2.5	2.9	.1	.1	29	33	14
03S 29W 17DCB 01	QA,TO	21.6	-3	-1.6	-2.5	-.1	-.1	31	28	-10
03S 29W 31DCC 01	QA	23.2	-3	-2.9	-.7	-.1	-.1	18	15	-17
03S 30W 03CBA 01	TO	96.4	0	2.2	-2.9		.1	81	81	0
03S 30W 26BBB 01	QA	3.9	3	6.3	-.9	.1	.3	42	45	7
04S 26W 08DDD 01	QA	29.4	-3	-.7	1.2	-.1		44	41	-7
04S 26W 19DCA 01	QA	15.3	-1	-1.3	1.3		-.1	23	22	-4
04S 27W 17DAC 01	TO	105.6	-1	-1.8			-.1	57	56	-2
04S 27W 33BBB 01	QA	18.0	-5	-2.0	-.9	-.1	-.1	41	36	-12
04S 28W 15AAA 01	TO	91.8	0	2.3	-.1		.1	38	38	0
04S 28W 30DDD 01	TO	91.1	1	1.6	1.4		.1	18	19	6
04S 30W 07BBB 01	QA	13.2	-6	-5.9	-.4	-.2	-.3	14	8	-43
05S 26W 05ADD 01	TO	127.1	1	1.8	-.2		.1	42	43	2
05S 26W 26DDA 01	QA	24.0	2	-1.6	-1.4	.1	-.1	48	50	4
05S 26W 33DCC 01	QA	18.3	2	-.1	.0	.1		40	42	5
05S 27W 21CCA 01	TO	103.5	-1	.7	-.1					
05S 28W 07BBC 01	QA	18.0	1	1.9	-1.8		.1	33	34	3
05S 28W 10BBB 01	QA	9.7	2	-1.7	-1.5	.1	-.1	35	37	6
05S 28W 14ADD 01	TO	134.3	-1	.7	1.8			27	26	-4
05S 28W 17DAC 01	TO	101.7	0	.6	2.6			22	22	0
05S 29W 11BAA 01	QA									
05S 29W 22CBB 01	QA									
05S 30W 15CCB 01		93.7			-3.2					
05S 30W 35BCB 01	TO	118.8	-7	-7.2	3.9	-.2	-.3	88	81	-8

Douglas County

TABLE 1. WATER LEVELS BY YEAR, DOUGLAS COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
12S 20E 07CBC 01		826.			14.0	12.9	13.5	10.4	10.2	8.4	13.6	15.8
15S 19E 15AAD 01		1120.				45.3	44.4	43.7	39.4	39.4	40.6	42.0

TABLE 2. DERIVED HYDROLOGIC DATA, DOUGLAS COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
12S 20E 07CBC 01		15.8		-1.8	-2.3		-.1			
15S 19E 15AAD 01		42.0		-1.4						

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TABLE 1. WATER LEVELS BY YEAR, EDWARDS COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
24S 16W 12CBC 01	QU	2055.	130	5	9.2	23.0	23.1	24.9	24.4	24.0	21.7	24.3
24S 17W 20ADC 01	QU	2126.	121	3	15.8	26.8	26.9	27.9	28.6	28.6		29.7
24S 17W 24DDD 01	QU	2100.	170	15	13.3	25.1	25.0	29.4	30.0	29.5	28.6	30.8
24S 18W 13DAC 01		2130.	115						28.1	28.7	27.9	29.6
24S 18W 17ABD 01	QU	2147.	92	27	18.8	28.7	28.7	30.1	29.8	29.7	28.4	
24S 18W 28DAC 01	QU	2158.	98	25	16.6	36.8	31.2	32.6	34.1	33.8	34.7	33.1
24S 18W 36DDC 01	QU	2149.	119	28	24.2	36.3	36.7	38.3	38.3		34.9	38.4
24S 19W 34ADD 01	QA	2160.		8	7.0	9.6	9.2	8.8	8.9	8.6	9.0	9.6
25S 16W 02BBB 01	QU	2069.	184	6	6.6	23.2	23.8	25.0	25.3	24.9	20.4	24.4
25S 16W 27AAC 01	QU	2063.	188	3	6.1	15.0	16.4	16.9	17.7	16.8	16.2	17.7
25S 16W 31DCC 01	TO					18.3	19.1	20.7	20.6	19.3	15.2	19.4
25S 17W 01DAB 01	QU	2102.	162	12	8.8	24.4	25.0	26.6	27.1	26.6	23.5	26.9
25S 17W 17AAC 01	QU	2129.	74	14	14.4	27.9	28.2	28.6	30.1	29.5	27.7	30.4
25S 17W 31BBD 01	QU	2148.	178	22	11.1		22.4		24.2	24.0	22.7	24.5
25S 18W 09AAA 01	QU	2161.	131	21	15.6	26.9	27.7	29.1	29.6	29.3	26.0	28.9
25S 18W 20AAB 01												36.8
25S 18W 33CDC 01	QU	2182.	172	29	23.2	28.2	28.9	28.0	30.5	30.6	30.2	31.4
25S 19W 08BDD 01								6.1	6.6	5.7	3.9	6.4
25S 19W 26DDB 01	QU	2206.	146	31	30.1	36.3	36.2	37.4	38.8	37.9		41.8
25S 19W 31CAB 01	QU	2220.		17	15.2	18.1		20.0	19.5	18.3	17.7	18.5
25S 20W 03BCD 01		2237.						29.5	28.0	28.9	27.4	26.9
25S 20W 34CCC 01		2219.							8.2	8.2	7.0	8.3
26S 16W 10CCC 01	QU	2065.	220	5	3.8	9.5	9.5	11.2	9.6	9.8	7.6	10.4
26S 16W 31CCA 01	QU	2110.	285	25	19.6	32.1	31.7	32.7	31.4	32.1	29.3	33.0
26S 16W 34ABC 01	QU	2079.	289	25	6.8	22.5	22.1	23.4	21.3	22.8	18.6	23.1
26S 17W 04AAC 01	QU	2146.	216	44		28.8		39.3	43.4		41.6	
26S 17W 14BAA 01	QU	2109.	194	16	20.7	22.4	24.0	24.4	25.6	24.6	20.5	26.9
26S 17W 33DDB 01	QU	2127.	227	22	12.4	23.3	23.1	23.9	22.7	23.5	20.2	23.6
26S 18W 15DCB 01	QU	2174.	229	33	22.0	28.2	28.8	30.3	30.5	30.4	28.9	30.6
26S 18W 31CCC 01		2215.	195	47	33.6	43.1	43.4	45.1	45.5	45.8	44.5	46.8
26S 19W 12ABB 02		2210.	155	38		48.4	49.1	52.1	50.3	49.9	42.5	44.5
26S 19W 16BCB 01	QU	2231.	176	35	29.4	35.6	35.6	37.2	37.8	38.3	36.9	38.7
26S 19W 31BAC 01		2257.	187						40.2	43.8		44.5
26S 19W 34BBD 01	QU	2232.	187	36	30.8	35.9	36.6	37.7	38.1	38.2	37.6	38.7
26S 20W 20BBC 01		2251.		19				23.5	11.4	11.4	10.0	12.5

TABLE 2. DERIVED HYDROLOGIC DATA, EDWARDS COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
24S 16W 12CBC 01	QU	24.3	-19	-15.1	-2.6	-.5	-.7	125	106	-15
24S 17W 20ADC 01	QU	29.7	-27	-13.9		-.7	-.6	118	91	-23
24S 17W 24DDD 01	QU	30.8	-16	-17.5	-2.2	-.4	-.8	155	139	-10
24S 18W 13DAC 01		29.6			-1.7				85	
24S 18W 17ABD 01	QU									
24S 18W 28DAC 01	QU	33.1	-8	-16.5	1.6	-.2	-.7	73	65	-11
24S 18W 36DDC 01	QU	38.4	-10	-14.2	-3.5	-.3	-.6	91	81	-11
24S 19W 34ADD 01	QA	9.6	-2	-2.6	-.6	-.1	-.1			
25S 16W 02BBB 01	QU	24.4	-18	-17.8	-4.0	-.5	-.8	178	160	-10
25S 16W 27AAC 01	QU	17.7	-15	-11.6	-1.5	-.4	-.5	185	170	-8
25S 16W 31DCC 01	TO	19.4			-4.2					
25S 17W 01DAB 01	QU	26.9	-15	-18.1	-3.4	-.4	-.8	150	135	-10
25S 17W 17AAC 01	QU	30.4	-16	-16.0	-2.7	-.4	-.7	60	44	-27
25S 17W 31BBD 01	QU	24.5	-3	-13.4	-1.8	-.1	-.6	156	154	-1
25S 18W 09AAA 01	QU	28.9	-8	-13.3	-2.9	-.2	-.6	110	102	-7
25S 18W 20AAB 01		36.8								
25S 18W 33CDC 01	QU	31.4	-2	-8.2	-1.2	-.1	-.4	143	141	-1
25S 19W 08BDD 01		6.4			-2.5					
25S 19W 26DDB 01	QU	41.8	-11	-11.7		-.3	-.5	115	104	-10
25S 19W 31CAB 01	QU	18.5	-2	-3.3	-.8	-.1	-.1			
25S 20W 03BCD 01		26.9			.5					
25S 20W 34CCC 01		8.3			-1.3					
26S 16W 10CCC 01	QU	10.4	-5	-6.6	-2.8	-.1	-.3	215	210	-2
26S 16W 31CCA 01	QU	33.0	-8	-13.4	-3.7	-.2	-.6	260	252	-3
26S 16W 34ABC 01	QU	23.1	2	-16.3	-4.5	.1	-.7	264	266	1
26S 17W 04AAC 01	QU									
26S 17W 14BAA 01	QU	26.9	-11	-6.2	-6.4	-.3	-.3	178	167	-6
26S 17W 33DDB 01	QU	23.6	-2	-11.2	-3.4	-.1	-.5	205	203	-1
26S 18W 15DCB 01	QU	30.6	2	-8.6	-1.7	.1	-.4	196	198	1
26S 18W 31CCC 01		46.8	0	-13.2	-2.3		-.6	148	148	0
26S 19W 12ABB 02		44.5	-7		-2.0	-.2		117	111	-5
26S 19W 16BCB 01	QU	38.7	-4	-9.3	-1.8	-.1	-.4	141	137	-3
26S 19W 31BAC 01		44.5							143	
26S 19W 34BBD 01	QU	38.7	-3	-7.9	-1.1	-.1	-.3	151	148	-2
26S 20W 20BBC 01		12.5	7		-2.5	.2				

Ellis County

TABLE 1. WATER LEVELS BY YEAR, ELLIS COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
13S 18W 29CCC 01		2000.				21.3	22.0	21.2	21.6	21.6	19.8	20.9
15S 19W 25CAB 01		1937.				16.1	16.1	16.2	16.1	16.4	16.0	16.1

TABLE 2. DERIVED HYDROLOGIC DATA, ELLIS COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
13S 18W 29CCC 01		20.9			-1.0					
15S 19W 25CAB 01		16.1			-.1					

Ellsworth County

TABLE 1. WATER LEVELS BY YEAR, ELLSWORTH COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1940 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
17S 09W 21BCC 01		1775.			92.2	71.6	78.1	78.4	73.8	76.1	73.3	77.7
17S 09W 31AAB 01		1762.			99.6	68.1	73.5	76.2	61.7	69.4	65.8	68.1

TABLE 2. DERIVED HYDROLOGIC DATA, ELLSWORTH COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
17S 09W 21BCC 01		77.7		14.5	-4.4		.6			
17S 09W 31AAB 01		68.1		31.4	-2.4		1.4			

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TABLE 1. WATER LEVELS BY YEAR, FINNEY COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1940 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
21S 29W 36CCB 01	QA	2611.	23	17	17.7	23.1	22.0	21.6				
21S 30W 05BBB 01	QU,TO	2863.	78	35	28.6		38.1	37.5	36.7	38.3	36.0	36.2
21S 31W 08ABB 01	QU,TO	2903.	73	55	48.5	47.2	47.4			47.8	47.6	
21S 31W 26CCC 01	QU,TO	2900.		75				73.8	73.9	74.2	74.3	75.2
21S 32W 08ABD 01	QU	2910.	150	36	41.3	95.8	97.2	100.3	100.6	103.8	104.5	115.6
21S 32W 20CBD 01	QU,TO	2898.	200	31	45.1	95.6		97.6	98.4		105.2	109.0
21S 32W 26DAA 01	QU,TO	2946.	171	96	98.8	106.9	105.6	107.0	105.7	107.3	108.6	108.5
21S 33W 07DDAA01	QU	2918.	95	33	48.3	74.4	76.3	77.2	79.2	80.0	81.4	82.5
21S 33W 29BBC 01		2891.	106	16				79.1	79.7	81.4	81.5	84.7
21S 34W 14DBB 01	KN	2947.	97	56	69.0	112.8	105.5	103.6	101.7	104.2	103.4	
21S 34W 16AADA02	QU,TO	2981.	120	80	95.3	93.0	94.7	92.8	93.2	93.0	92.8	93.2
22S 27W 14ADC 01	KJ	2458.				180.5	180.9	179.4	181.4	177.3	175.2	181.2
22S 31W 08CCC 01		2911.	171	81				99.7	98.2	99.0	99.1	100.8
22S 31W 16ADD 01	QU,TO	2904.	181	84	85.5	104.3	103.4	104.9	105.5	107.0	107.2	108.3
22S 31W 29DCC 01		2904.		85				108.2	105.5			
22S 32W 08ACB 01	QU,TO	2884.	224	33	40.0	83.1	84.3	85.9	87.5	90.4	94.8	95.5
22S 32W 21CDC 01	QU,TO	2903.	198	58	66.4	118.3	120.8	123.2	123.8	128.0	130.1	134.5
22S 33W 22BAA 01	QU,TO	2900.	190	40	47.1	96.1	94.8	98.6	105.8	114.3	114.2	117.7
22S 33W 36AAA 02	QU,TO	2860.	200	14	21.5	71.9	70.0	66.7	62.9	63.1	61.4	60.2
22S 34W 08BCB 01	KN	2987.	132	87	108.9	132.7	135.8	133.4	132.8	134.1	134.4	134.7
22S 34W 10AAA 01	QU,TO	2933.	153	43	59.2	107.8	110.3	112.0	110.7	107.9	109.1	107.5
22S 34W 18CDD 01		2984.	234	67				148.3	147.9	149.5	149.8	151.3
22S 34W 26CCC 01		2939.							165.4	167.7	168.0	171.0
23S 27W 12CCC 01	QU,TO	2618.	72	59	62.5	60.9	60.3	60.6	60.6	60.8		
23S 27W 22DAB 01	TO,TO	2654.		82		81.7	81.1	86.0	80.5	81.4	79.4	82.6
23S 28W 22DCD 01	QU,TO	2729.		74		75.2	74.8	75.0	75.0	75.1	74.9	75.6
23S 28W 34DDC 01	QU,TO	2738.		76		91.4	91.3	92.0	92.5	92.1	91.6	93.2
23S 29W 30BBB 01	QU,TO	2794.		75		78.2	78.1	78.2	78.5	78.8	79.0	79.0
23S 29W 34CDD 01	TO	2772.	147	84	84.0	90.0	89.3	90.2	90.3	90.5	89.4	91.0
23S 30W 04ACC 01	QU,TO	2846.		65		66.7	68.3	67.5	67.6	68.2	68.3	69.2
23S 30W 19CCB 01	QU,TO	2862.	142	89	82.2	86.0	86.3	86.9	87.4	87.9	88.5	89.1
23S 31W 03DCD 01	QU,TO	2877.	167	72	83.0	105.4		105.7	107.3	107.8	107.1	108.5
23S 31W 17ABA 01		2900.	210	90				106.3	107.3	108.5	108.6	109.9
23S 31W 35CCC 01	QU,TO	2875.	200	95	96.7	112.4		113.7	114.6	116.5	115.5	119.5
23S 32W 11ADC 01	QU,TO	2937.	242	117	122.7	145.5	145.8	146.7	147.9	149.8	150.7	
23S 32W 31CBD 01	QU,TO	2876.	324	41	49.4	106.9	99.1	94.5		90.2	84.8	85.5
23S 33W 17BBB 01	QU,TO	2904.	340	26	60.3	155.5	153.4	150.6	144.8	150.4	141.5	
23S 33W 26ABB 01	QU,TO	2890.	327	42	50.4		118.8	114.7	105.6	109.4	109.3	111.0
23S 33W 28CDC 01	TO,TO	2904.		46	61.2	151.1	127.2	118.5	109.6	111.6	104.9	112.4
23S 34W 17CCC 01	QU,TO	2974.	349	46	70.0	160.9	159.3	153.2	138.3	141.6	145.0	139.6
23S 34W 21DDC 01	QU,TO	2961.	356	41	71.6	153.5	151.5	141.9	130.2	128.6	122.9	131.6
24S 31W 27CCB 01	QU,TO	2883.	295	114	119.5	128.6	129.9	131.0	130.0	131.3	131.1	142.0
24S 32W 03DAC 01	QU,TO	2881.	299	70	80.9	106.6	107.8	109.7	110.0	110.9	111.2	112.5
24S 32W 35DD 01	QU,TO	2811.	256	21	27.2						39.2	43.4
24S 33W 09CCD 01	QU	2865.	355	11		75.1	72.7	66.7	57.2	55.1	47.7	52.1
24S 33W 09CCD 02	QA	2865.				37.7	36.2	27.5	16.5	15.1	11.8	12.5
24S 33W 09CCD 03	KD	2865.				72.6	71.4	71.3	62.7	65.8	56.5	60.2

TABLE 1. WATER LEVELS BY YEAR, FINNEY COUNTY, con't.

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1940 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
24S 33W 18BDB 02		2878.	338	8			93.0	94.2	67.4	71.3	60.7	70.3
24S 33W 19DBB 02		2927.	447	57		113.8	134.3	134.6	114.3	114.0	108.2	112.8
24S 33W 22BCC 01		2888.		38		83.6	82.3	80.9	73.7	73.2	71.2	70.7
24S 33W 22DCA 01	QU,TO	2905.	405	71		117.7	116.4	117.6		111.5	107.3	108.7
24S 33W 28DAA 01	QU,TO	2886.	386	34		98.7	98.6	103.8	99.7	100.0	96.0	96.2
24S 33W 34CAC 01	QU,TO	2910.	435	60		120.8	121.4	127.9	126.2	127.3	123.6	124.7
24S 34W 01BCBB01	QU,TO	2894.	316	12	24.7	88.8	81.6	76.7	65.6	66.4	58.9	62.5
25S 31W 21CAB 01	QU	2788.	228	27	20.4	37.9					35.1	45.5
25S 31W 35DBA 01	QU	2801.	256	52	49.9		72.5		77.0			75.4
25S 32W 22DBC 01	QU,TO	2865.	373	65	62.0	91.3	92.2	95.8	98.7	101.3	103.1	116.7
25S 32W 31DDC 01		2871.				98.5	99.8				111.5	115.7
25S 32W 35ADB 01	QU,TO	2857.	417	67	68.0	94.2	94.0	97.1	100.0	102.5	104.3	107.6
25S 33W 03BCC 01		2902.		47			51.6	52.4		52.9	53.0	54.8
25S 33W 05ABD 01	QU,TO	2920.	510	52		108.9	113.3	121.3	121.3	123.2	122.0	124.7
25S 33W 09ABD 01	QU,TO	2909.	514	50		108.9	109.6	118.1	118.4	120.5	119.4	120.7
25S 33W 15DAC 01	QU,TO	2915.	535	71		129.1	129.3	137.2	138.7	140.1	140.7	142.9
25S 33W 16DCC 01		2920.		62		88.8	87.7	89.4	90.1	90.2	92.5	92.5
25S 33W 17DBD 01	QU,TO	2940.	530	78		126.1	126.9	134.1	135.1	136.3	138.2	142.9
25S 33W 33CDA 01		2915.	460	65				113.6	117.6	122.8	124.1	131.7
25S 33W 35DBD 01	QU,TO	2894.	474	63		100.4		105.9	109.5	114.2		124.3
25S 34W 06AAA 01	QU,TO	2972.	397	52		101.3	102.3	107.2	109.3	110.0	111.4	113.4
25S 34W 10ABB 01	QU,TO	2962.	412	62		89.3	93.3	98.0	95.3	100.5	103.0	103.6
25S 34W 34DBD 01	QU,TO	2945.	440	65	70.0	107.1	108.8	114.7	117.4	126.7	122.4	128.1
26S 31W 01DDA 01	QU,TO	2811.	301	75	74.0	97.6	99.3	101.9	104.7	107.1	108.4	111.8
26S 31W 06BBBB01	QU,TO	2832.	327	55	55.6	91.2	82.4	85.3	88.0	90.4	92.3	95.6
26S 31W 31CDC 01	QU,TO	2841.	496	83	86.1	127.8	128.6	132.0	135.1	138.5	139.9	144.6
26S 31W 36CAB 01	QU,TO	2817.	332	82	80.3	117.9	120.1	123.1	126.0	127.4	128.7	131.8
26S 32W 22ABB 01	QU,TO	2899.	564	113	115.6	142.8	143.3	145.7	147.3	149.3	150.3	154.3
26S 33W 17DBD 01		2900.	520	60		101.7	104.1	107.6	111.0	114.4	117.0	121.4
26S 33W 26ABB 01	QU,TO	2929.	554	113	118.3	152.6	154.9	159.4	162.4	166.6	170.5	175.3
26S 34W 05ADC 01		2960.		72		108.4	110.9	116.4	114.7	123.2		130.6
26S 34W 21BBD 01		2955.		77		121.3	122.4	126.2	130.2	133.4	137.1	143.2
26S 34W 30BD 01	QU	3005.	455	115	132.6	166.3	169.4	172.5	177.7	182.1	187.1	

TABLE 2. DERIVED HYDROLOGIC DATA, FINNEY COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1940-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1940-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1940 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1940-89
21S 29W 36CCB 01	QA									
21S 30W 05BBB 01	QU,TO	36.2	-1	-7.6	-.2		-.3	43	42	-2
21S 31W 08ABB 01	QU,TO									
21S 31W 26CCC 01	QU,TO	75.2	0		-.9					
21S 32W 08ABD 01	QU	115.6	-80	-74.3	-11.1	-1.6	-3.2	114	34	-70
21S 32W 20CBD 01	QU,TO	109.0	-78	-63.9	-3.8	-1.6	-2.8	169	91	-46
21S 32W 26DAA 01	QU,TO	108.5	-13	-9.7	.1	-.3	-.4	75	63	-16
21S 33W 07DDAA01	QU	82.5	-50	-34.2	-1.1	-1.0	-1.5	62	13	-79
21S 33W 29BBC 01		84.7	-69		-3.2	-1.4		90	21	-77
21S 34W 14DBB 01	KN									
21S 34W 16AADA02	QU,TO	93.2	-13	2.1	-.4	-.3	.1	40	27	-33
22S 27W 14ADC 01	KJ	181.2			-6.0					
22S 31W 08CCC 01		100.8	-20		-1.7	-.4		90	70	-22
22S 31W 16ADD 01	QU,TO	108.3	-24	-22.8	-1.1	-.5	-1.0	97	73	-25
22S 31W 29DCC 01										
22S 32W 08ACB 01	QU,TO	95.5	-63	-55.5	-.7	-1.3	-2.4	191	129	-32
22S 32W 21CDC 01	QU,TO	134.5	-77	-68.1	-4.4	-1.6	-3.0	140	64	-54
22S 33W 22BAA 01	QU,TO	117.7	-78	-70.6	-3.5	-1.6	-3.1	150	72	-52
22S 33W 36AAA 02	QU,TO	60.2	-46	-38.7	1.2	-.9	-1.7	186	140	-25
22S 34W 08BCB 01	KN	134.7	-48	-25.8	-.3	-1.0	-1.1	45	-3	-107
22S 34W 10AAA 01	QU,TO	107.5	-65	-48.3	1.6	-1.3	-2.1	110	46	-58
22S 34W 18CDD 01		151.3	-84		-1.5	-1.7		167	83	-50
22S 34W 26CCC 01		171.0			-3.0					
23S 27W 12CCC 01	QU,TO									
23S 27W 22DAB 01	TO,TO	82.6	-1		-3.2					
23S 28W 22DCD 01	QU,TO	75.6	-2		-.7					
23S 28W 34DDC 01	QU,TO	93.2	-17		-1.6	-.3				
23S 29W 30BBB 01	QU,TO	79.0	-4		.0	-.1				
23S 29W 34CDD 01	TO	91.0	-7	-7.0	-1.6	-.1	-.3	63	56	-11
23S 30W 04ACC 01	QU,TO	69.2	-4		-.9	-.1				
23S 30W 19CCB 01	QU,TO	89.1	0	-6.9	-.6		-.3	53	53	0
23S 31W 03DCD 01	QU,TO	108.5	-37	-25.5	-1.4	-.8	-1.1	95	59	-38
23S 31W 17ABA 01		109.9	-20		-1.3	-.4		120	100	-17
23S 31W 35CCC 01	QU,TO	119.5	-25	-22.8	-4.0	-.5	-1.0	105	81	-23
23S 32W 11ADC 01	QU,TO									
23S 32W 31CBD 01	QU,TO	85.5	-45	-36.1	-.7	-.9	-1.6	283	239	-16
23S 33W 17BBB 01	QU,TO									
23S 33W 26ABB 01	QU,TO	111.0	-69	-60.6	-1.7	-1.4	-2.6	285	216	-24
23S 33W 28CDC 01	TO,TO	112.4	-66	-51.2	-7.5	-1.3	-2.2			
23S 34W 17CCC 01	QU,TO	139.6	-94	-69.6	5.4	-1.9	-3.0	303	209	-31
23S 34W 21DDC 01	QU,TO	131.6	-91	-60.0	-6.8	-1.9	-2.6	315	224	-29
24S 31W 27CCB 01	QU,TO	142.0	-28	-22.5	-10.9	-.6	-1.0	181	153	-15
24S 32W 03DAC 01	QU,TO	112.5	-43	-31.6	-1.3	-.9	-1.4	229	187	-18
24S 32W 35DD 01	QU,TO	43.4	-22	-16.2	-4.2	-.4	-.7	235	213	-9
24S 33W 09CCD 01	QU	52.1	-41		-5.4	-.8		344	303	-12
24S 33W 09CCD 02	QA	12.5			-.2					
24S 33W 09CCD 03	KD	60.2			-.6					

TABLE 2. DERIVED HYDROLOGIC DATA, FINNEY COUNTY, con't.

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1940-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1940-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1940 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1940-89
24S 33W 18BDB 02		70.3	-62		-9.6	-1.3		330	268	-19
24S 33W 19DBB 02		112.8	-56		-4.6	-1.1		390	334	-14
24S 33W 22BCC 01		70.7	-33		.5	-.7				
24S 33W 22DCA 01	QU,TO	108.7	-38		-1.4	-.8		334	296	-11
24S 33W 28DAA 01	QU,TO	96.2	-62		-.2	-1.3		352	290	-18
24S 33W 34CAC 01	QU,TO	124.7	-65		-1.1	-1.3		375	310	-17
24S 34W 01BCBB01	QU,TO	62.5	-51	-37.8	-3.6	-1.0	-1.6	304	254	-16
25S 31W 21CAB 01	QU	45.5	-19	-25.1	-10.4	-.4	-1.1	201	183	-9
25S 31W 35DBA 01	QU	75.4	-23	-25.5		-.5	-1.1	204	181	-11
25S 32W 22DBC 01	QU,TO	116.7	-52	-54.7	-13.6	-1.1	-2.4	308	256	-17
25S 32W 31DDC 01		115.7			-4.2					
25S 32W 35ADB 01	QU,TO	107.6	-41	-39.6	-3.3	-.8	-1.7	350	309	-12
25S 33W 03BCC 01		54.8	-8		-1.8	-.2				
25S 33W 05ABD 01	QU,TO	124.7	-73		-2.7	-1.5		458	385	-16
25S 33W 09ABD 01	QU,TO	120.7	-71		-1.3	-1.4		464	393	-15
25S 33W 15DAC 01	QU,TO	142.9	-72		-2.2	-1.5		464	392	-16
25S 33W 16DCC 01		92.5	-31		.0	-.6				
25S 33W 17DBD 01	QU,TO	142.9	-65		-4.7	-1.3		452	387	-14
25S 33W 33CDA 01		131.7	-67		-7.6	-1.4		395	328	-17
25S 33W 35DBD 01	QU,TO	124.3	-61			-1.2		411	350	-15
25S 34W 06AAA 01	QU,TO	113.4	-61		-2.0	-1.2		345	284	-18
25S 34W 10ABB 01	QU,TO	103.6	-42		-.6	-.9		350	308	-12
25S 34W 34DBD 01	QU,TO	128.1	-63	-58.1	-5.7	-1.3	-2.5	375	312	-17
26S 31W 01DDA 01	QU,TO	111.8	-37	-37.8	-3.4	-.8	-1.6	226	189	-16
26S 31W 06BBBB01	QU,TO	95.6	-41	-40.0	-3.3	-.8	-1.7	272	231	-15
26S 31W 31CDC 01	QU,TO	144.6	-62	-58.5	-4.7	-1.3	-2.5	413	351	-15
26S 31W 36CAB 01	QU,TO	131.8	-50	-51.5	-3.1	-1.0	-2.2	250	200	-20
26S 32W 22ABB 01	QU,TO	154.3	-41	-38.7	-4.0	-.8	-1.7	451	410	-9
26S 33W 17DBD 01		121.4	-61		-4.4	-1.2		460	399	-13
26S 33W 26ABB 01	QU,TO	175.3	-62	-57.0	-4.8	-1.3	-2.5	441	379	-14
26S 34W 05ADC 01		130.6	-59			-1.2				
26S 34W 21BBD 01		143.2	-66		-6.1	-1.3				
26S 34W 30BD 01	QU									

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Ford County

TABLE 1. WATER LEVELS BY YEAR, FORD COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1940 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
25S 22W 20AAA 01	TO	2437.		65	62.6	64.2	60.7	60.5	60.4	60.1	59.8	59.5
25S 22W 27CCD 01	KD	2432.				121.3	123.1	127.7	119.8	129.3	128.5	137.4
25S 23W 11CCC 01	KD	2424.				76.6	86.6	88.2	78.6	63.2	53.4	95.9
25S 23W 12BBB 01	KD	2390.				153.4	152.6	160.1	152.7	158.4	157.4	156.9
25S 23W 14ADD 01	KD	2452.				213.3	208.8		217.2	213.5		209.9
25S 25W 32CDD 01	QU,KD	2607.				183.7	186.9	189.0		188.2	187.9	193.4
25S 25W 32DAD 01		2593.						73.6	73.8	73.8	73.5	74.0
25S 26W 25CDD 01	TO	2623.	187	79		76.3	76.3		77.0	72.0	76.7	79.0
25S 26W 30ABC 01	TO	2679.	225	104		110.9		111.5	111.1	110.9	111.3	
26S 21W 17DBC 01	KD	2348.				60.4	60.8	61.5	60.7	58.7	60.8	63.6
26S 21W 23ADA 01	QA	2262.		6	7.3	7.5	8.7	8.7	8.2	7.4	7.0	8.2
26S 21W 25CCC 01		2270.						7.2	6.3	5.8	5.2	6.8
26S 22W 21DCD 01		2377.				54.2		44.1	40.6	41.5	38.1	43.6
26S 23W 02ABB 01		2451.						78.3	79.5	79.2	79.9	79.2
26S 23W 10DAD 01		2463.				177.2	178.8	183.2	177.8	180.0	176.9	176.5
26S 24W 29DDD 01	TO	2575.		130		132.2	134.7	138.4	137.3	137.2	139.9	142.5
26S 24W 31DDA 01	TO	2463.		11		17.4	14.9	17.1	17.0	16.1	14.0	18.3
26S 24W 32CBA 01	TO	2468.		20		23.2	22.4	24.5	24.1	23.3	21.7	23.8
26S 24W 33CDA 01	TO	2466.		26		28.3	30.3	32.1	31.2	27.8	25.6	32.6
26S 25W 16DCC 01		2619.					140.9	143.2		143.5	139.9	142.4
26S 26W 18CCB 01		2558.				9.9	9.6	9.6	9.4	10.1	8.9	11.9
26S 26W 32DCC 01		2616.		74			84.1	85.3	86.3	85.7	87.7	
26S 26W 36DCC 01	TO	2543.	168	31		38.5	39.0	41.5	42.3	47.4	41.7	41.8
27S 21W 10DBB 01		2291.						7.6	7.0		6.2	7.2
27S 22W 09DAB 01		2418.				55.7	55.9	58.3		59.5	59.5	64.6
27S 23W 24BCB 01	KD	2395.				32.6	30.3	48.1	41.1	38.6	43.6	42.0
27S 23W 28AAA 01		2421.				30.2	29.5	37.7	37.3	35.9	37.3	
27S 23W 36CCC 01	TO	2428.	147	46		45.3	44.0	45.4	45.5	45.5	45.5	
27S 24W 03BBD 01	TO	2455.		19		25.2	24.3	24.3	24.5	24.5	24.2	24.4
27S 24W 03CDD 01	TO	2445.				10.0	11.7	10.9	11.9	11.5	10.7	14.7
27S 24W 04BBC 01	TO	2453.		11		13.7	13.8	15.0	15.1	14.4	14.2	16.4
27S 24W 09AAD 01	TO	2448.		10		18.6	19.3	19.8	20.6	20.1	20.2	23.7
27S 24W 16BDB 01		2515.				75.6	74.5	74.9	76.1	75.8	76.2	78.1
27S 24W 26DAA 01	TO	2512.	191	79		88.8	89.5	90.1	90.7	91.1	92.4	92.4
27S 25W 09ACA 01		2546.				62.9	65.4		68.6	68.9	68.0	69.6
27S 25W 25BBB 01		2574.				114.5	114.2	115.8	116.4	117.2	117.9	119.6
28S 21W 10DDD 01		2349.		41		42.9	42.9	43.7	42.8	42.1	41.6	44.2
28S 21W 23DBC 01	TO					75.5	76.0	77.0		74.6	73.8	76.7
28S 21W 25ABB 01		2365.	149			71.3	71.4	72.3	71.1	70.5	70.1	72.1
28S 22W 05ADD 01		2370.				18.6		18.4	17.4	17.6	18.0	19.2
28S 22W 12CAC 01	TO	2405.	82	66		60.0	60.4	60.9	61.5	61.2	61.1	62.8
28S 22W 32BAB 01	TO	2485.	161	121		122.5	122.6	123.9	127.1	129.7	123.2	
28S 23W 18BAB 01		2547.	239			134.8	134.3	136.0		136.6	137.2	138.0
28S 23W 24ABB 01		2465.				94.0	94.1	94.5		94.7	94.9	95.3
28S 24W 08DCC 01		2578.		133		138.4	138.1	139.5	145.2	140.8	143.4	142.8
28S 24W 22CDA 01		2500.				103.8	104.1	104.8		106.4	106.7	107.7
28S 24W 35CAB 01		2528.	450			100.5		101.3	102.9	102.3	103.1	103.8

TABLE 1. WATER LEVELS BY YEAR, FORD COUNTY, con't.

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1940 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
28S 25W 06ABB 01		2643.		144		147.3	147.9	148.9	149.2	149.6	150.8	166.2
28S 25W 19BBB 01	TO	2635.	265	133		142.4	142.8	143.6	142.9	145.1	144.9	146.9
28S 26W 06ABB 01	TO	2685.	195	133		160.1			162.5	163.6		165.8
28S 26W 10BAA 01		2608.	192					98.0	98.5	99.3	99.9	101.6
28S 26W 13CAA 01		2635.				136.6	137.1	137.7	138.2	139.6	139.1	147.7
29S 21W 05BBB 01	TO	2418.		98	96.6	99.4	99.6	100.1	104.8	100.2	99.8	100.6
29S 21W 20CAD 01		2445.				134.1	134.1	134.3	134.2	133.8	134.1	135.0
29S 22W 17DAD 01	TO	2475.	240	119		129.3	129.1	129.9	128.4	127.8	127.8	129.7
29S 22W 36ACA 01		2445.	242			134.5	134.5	135.2		136.8	135.8	136.5
29S 23W 12BAC 01		2547.				178.4		179.0		178.3	178.5	179.9
29S 24W 01ABA 01	TO	2560.	220	140		142.4	142.3	143.3	143.5	144.3	144.4	145.3
29S 24W 13BCA 01		2530.	212			113.0	113.0	113.5	113.7	114.1	114.1	114.9
29S 24W 18BAA 01	TO	2610.	210	149		157.4	157.3	156.8	157.6	158.0	158.6	163.0
29S 25W 03ADA 01	TO	2630.	220	152		181.3	179.3	176.4	177.1	183.7	180.5	183.8
29S 25W 10BBBC01		2617.		139		154.7	154.9	155.9	157.7	161.5	158.4	164.4
29S 26W 01CDD 01	TO	2583.	163	78		92.3	91.0	93.4	91.9	92.5	94.3	98.5
29S 26W 20BDD 01		2575.	164					99.9	103.6	101.8	102.1	104.8
29S 26W 29ABB 01		2558.						84.2	84.3	88.7	86.9	89.9
29S 26W 36BBB 01	TO	2532.	212	26		24.9	23.5	23.9	23.6	28.5	26.5	30.4

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TABLE 2. DERIVED HYDROLOGIC DATA, FORD COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1940-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1940-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1940 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1940-89
25S 22W 20AAA 01	TO	59.5	6	3.1	.3	.1	.1			
25S 22W 27CCD 01	KD	137.4			-8.9					
25S 23W 11CCC 01	KD	95.9			-42.5					
25S 23W 12BBB 01	KD	156.9			.5					
25S 23W 14ADD 01	KD	209.9			3.6					
25S 25W 32CDD 01	QU,KD	193.4			-5.5					
25S 25W 32DAD 01		74.0			-.5					
25S 26W 25CDD 01	TO	79.0	0		-2.3			108	108	0
25S 26W 30ABC 01	TO									
26S 21W 17DBC 01	KD	63.6			-2.8					
26S 21W 23ADA 01	QA	8.2	-2	-.9	-1.2					
26S 21W 25CCC 01		6.8			-1.6					
26S 22W 21DCD 01		43.6			-5.5					
26S 23W 02ABB 01		79.2			.7					
26S 23W 10DAD 01		176.5			.4					
26S 24W 29DDD 01	TO	142.5	-13		-2.6	-.3				
26S 24W 31DDA 01	TO	18.3	-7		-4.3	-.1				
26S 24W 32CBA 01	TO	23.8	-4		-2.1	-.1				
26S 24W 33CDA 01	TO	32.6	-7		-7.0	-.1				
26S 25W 16DCC 01		142.4			-2.5					
26S 26W 18CCB 01		11.9			-3.0					
26S 26W 32DCC 01		87.7	-14			-.3				
26S 26W 36DCC 01	TO	41.8	-11		-.1	-.2		137	126	-8
27S 21W 10DBB 01		7.2			-1.0					
27S 22W 09DAB 01		64.6			-5.1					
27S 23W 24BCB 01	KD	42.0			1.6					
27S 23W 28AAA 01										
27S 23W 36CCC 01	TO	46.5	-1		-1.0			101	101	0
27S 24W 03BBD 01	TO	24.4	-5		-.2	-.1				
27S 24W 03CDD 01	TO	14.7			-4.0					
27S 24W 04BBC 01	TO	16.4	-5		-2.2	-.1				
27S 24W 09AAD 01	TO	23.7	-14		-3.5	-.3				
27S 24W 16BDB 01		78.1			-1.9					
27S 24W 26DAA 01	TO	92.4	-13		.0	-.3		112	99	-12
27S 25W 09ACA 01		69.6			-1.6					
27S 25W 25BBB 01		119.6			-1.7					
28S 21W 10DDD 01		44.2	-3		-2.6	-.1				
28S 21W 23DBC 01	TO	76.7			-2.9					
28S 21W 25ABB 01		72.1			-2.0				77	
28S 22W 05ADD 01		19.2			-1.2					
28S 22W 12CAC 01	TO	62.8	3		-1.7	.1		16	19	19
28S 22W 32BAB 01	TO									
28S 23W 18BAB 01		138.0			-.8				101	
28S 23W 24ABB 01		95.3			-.4					
28S 24W 08DCC 01		142.8	-10		.6	-.2				
28S 24W 22CDA 01		107.7			-1.0					
28S 24W 35CAB 01		103.8			-.7				346	

TABLE 2. DERIVED HYDROLOGIC DATA, FORD COUNTY, con't.

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1940-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1940-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1940 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1940-89
28S 25W 06ABB 01		166.2	-22		-15.4	-.4				
28S 25W 19BBB 01	TO	146.9	-14		-2.0	-.3		132	118	-11
28S 26W 06ABB 01	TO	165.8	-33			-.7		62	29	-53
28S 26W 10BAA 01		101.6			-1.7				90	
28S 26W 13CAA 01		147.7			-8.6					
29S 21W 05BBB 01	TO	100.6	-3	-4.0	-.8	-.1	-.2			
29S 21W 20CAD 01		135.0			-.9					
29S 22W 17DAD 01	TO	129.7	-11		-1.9	-.2		121	110	-9
29S 22W 36ACA 01		136.5			-.7				106	
29S 23W 12BAC 01		179.9			-1.4					
29S 24W 01ABA 01	TO	145.3	-5		-.9	-.1		80	75	-6
29S 24W 13BCA 01		114.9			-.8				97	
29S 24W 18BAA 01	TO	163.0	-14		-4.4	-.3		61	47	-23
29S 25W 03ADA 01	TO	183.8	-32		-3.3	-.7		68	36	-47
29S 25W 10BBBC01		164.4	-25		-6.0	-.5				
29S 26W 01CDD 01	TO	98.5	-21		-4.2	-.4		85	65	-24
29S 26W 20BDD 01		104.8			-2.7				59	
29S 26W 29ABB 01		89.9			-3.0					
29S 26W 36BBB 01	TO	30.4	-4		-3.9	-.1		186	182	-2

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TABLE 1. WATER LEVELS BY YEAR, GEARY COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
11S 06E 27CBB 01		1057.			20.7	13.6	13.6	19.2	17.6	15.2	15.7	16.9

TABLE 2. DERIVED HYDROLOGIC DATA, GEARY COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
11S 06E 27CBB 01		16.9		3.8	-1.2		.2			

TABLE 1. WATER LEVELS BY YEAR, GOVE COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
11S 26W 04CDC 01	TO	2583.	190	62	60.0	62.8	64.7	63.6	62.5	67.4	64.5	64.3
11S 27W 04CCD 01	TO	2708.				96.3	96.5.	93.7		97.9	98.5	100.1
11S 27W 13ABB 01		2671.						118.3	115.4	118.5	118.8	125.4
11S 27W 36BCC 01	TO	2676.	140	71		77.6	78.2	77.3	75.8	76.6	74.8	
11S 28W 08AAA 01		2797.						116.8	116.2	117.8	117.2	116.1
11S 28W 17DDC 01	TO	2784.						95.9	95.4	95.9	95.4	95.4
11S 28W 26ABA 01		2749.						92.0	91.9	92.6		92.9
11S 29W 04DAD 01	TO	2844.	170	109		112.9	113.4	113.0	112.9	113.2	113.0	114.3
11S 29W 33BBA 01		2857.						104.9	104.8	105.0	105.0	105.1
11S 30W 27ABB 01	TO	2922.	165	117		129.8	131.8	132.2	129.1	129.3	128.5	130.1
11S 30W 28CBA 01		2925.						125.0	124.1	124.8	124.9	126.7
11S 30W 36CBB 01		2885.						106.9	106.4	107.5	106.5	109.1
11S 31W 12AAB 01	TO	2959.						103.6	105.0		104.3	105.5
11S 31W 27ADC 01		2913.						49.5	51.8	50.7	50.2	49.7
11S 31W 35BDC 01		2951.						97.3	97.4	98.7		98.1
12S 26W 12BCC 01	TO	2573.						38.8	38.2	38.6	37.2	38.3
12S 27W 10CCB 01		2700.						78.7	77.9	79.7	77.8	77.8
12S 27W 12ABB 01	TO	2636.						50.4	50.5	52.1	50.1	49.7
12S 28W 07DDD 01		2742.						48.4	48.8	49.5	48.0	48.8
12S 28W 12DDD 01	TO	2741.						94.4	94.4	95.2	94.9	95.1
13S 26W 20CBC 01	QA	2432.	43		11.1	10.6	16.5	16.3	15.8	16.4	12.1	14.3

TABLE 2. DERIVED HYDROLOGIC DATA, GOVE COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
11S 26W 04CDC 01	TO	64.3	-2	-4.3	.2	-.1	-.2	128	126	-2
11S 27W 04CCD 01	TO	100.1			-1.6					
11S 27W 13ABB 01		125.4			-6.6					
11S 27W 36BCC 01	TO									
11S 28W 08AAA 01		116.1			1.1					
11S 28W 17DDC 01	TO	95.4			.0					
11S 28W 26ABA 01		92.9								
11S 29W 04DAD 01	TO	114.3	-5		-1.3	-.1		61	56	-8
11S 29W 33BBA 01		105.1			-.1					
11S 30W 27ABB 01	TO	130.1	-13		-1.6	-.3		48	35	-27
11S 30W 28CBA 01		126.7			-1.8					
11S 30W 36CBB 01		109.1			-2.6					
11S 31W 12AAB 01	TO	105.5			-1.2					
11S 31W 27ADC 01		49.7			.5					
11S 31W 35BDC 01		98.1								
12S 26W 12BCC 01	TO	38.3			-1.1					
12S 27W 10CCB 01		77.8			.0					
12S 27W 12ABB 01	TO	49.7			.4					
12S 28W 07DDD 01		48.8			-.8					
12S 28W 12DDD 01	TO	95.1			-.2					
13S 26W 20CBC 01	QA	14.3		-3.2	-2.2		-.1		29	

Graham County

TABLE 1. WATER LEVELS BY YEAR, GRAHAM COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
06S 21W 19CDC 01	TO	2305.	135			100.2		100.9	100.5	99.8		100.4
06S 22W 19CCC 01	TO	2395.	198			108.6	108.6	109.0	108.6	108.2	107.7	107.6
06S 22W 28ACA 01	TO	2360.	180			113.5	117.1		121.0	120.2	112.7	112.1
06S 23W 13BBB 01	TO	2340.	183	55		58.0	58.1	57.7	57.5	57.6	57.0	57.3
06S 23W 17CCA 01		2406.						70.0	74.0	74.2	73.8	74.2
06S 24W 14AAA 01		2527.						116.8	116.5	116.9	116.2	116.1
06S 24W 28BAB 01	TO	2478.		96		101.3		103.7	101.2	101.9	100.8	101.1
06S 24W 35DDD 01	TO	2492.		142		144.0	148.0	146.9	146.7	147.6	145.5	146.3
06S 25W 12CCC 01	TO	2538.	224	135		141.4	144.9	142.1	142.0	142.5	142.3	142.2
06S 25W 28CBC 01	TO	2540.	180	109	102.7	106.7	109.1	113.2	112.5	106.8	106.7	107.3
07S 22W 10BBC 01	TO	2217.	72	6		8.8	9.0	9.4	8.4	9.9	8.2	8.6
07S 22W 19BBB 01	TO	2295.	63	39		39.2	39.4	37.6	37.5	38.5	36.6	38.0
07S 23W 17BBC 01		2430.						103.8	103.3	103.0	102.2	102.0
07S 24W 08CBA 01	TO	2519.	244	126		126.3	128.4	127.8	127.2	127.7	127.4	128.0
07S 25W 24BBB 01	TO	2495.	210	85		86.9			87.7	88.1	88.0	88.4
07S 25W 33DDD 01		2502.						104.1	107.8	101.6	99.8	100.3
08S 21W 17ABB 01	QA	2035.					26.3	24.6	23.8	26.6	22.8	23.8
08S 22W 18CDC 01	QA						10.5	9.8	8.4	9.3	8.9	10.3
08S 24W 23ACC 01	QA						34.1	35.7	33.4	31.9	34.5	35.3
08S 25W 24BAB 01		2302.						29.0	30.6	31.7	29.9	30.1
09S 22W 19BBB 01	TO	2416.	134	95		96.6	96.2	96.4	95.8	91.1	93.8	94.6
09S 24W 12BCC 01		2461.						100.8	100.0	98.8		
09S 24W 22BAA 01	TO	2491.	110	94		93.0	93.9	93.7	94.5	97.2	92.1	92.2
09S 25W 14DDD 01	TO	2534.	134	90		91.6	91.9	92.2	92.0	92.2	91.8	91.8

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TABLE 2. DERIVED HYDROLOGIC DATA, GRAHAM COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
06S 21W 19CDC 01	TO	100.4							35	
06S 22W 19CCC 01	TO	107.6			.1				90	
06S 22W 28ACA 01	TO	112.1			.6				68	
06S 23W 13BBB 01	TO	57.3	-2		-.3	-.1		128	126	-2
06S 23W 17CCA 01		74.2			-.4					
06S 24W 14AAA 01		116.1			.1					
06S 24W 28BAB 01	TO	101.1	-5		-.3	-.1				
06S 24W 35DDD 01	TO	146.3	-4		-.8	-.1				
06S 25W 12CCC 01	TO	142.2	-7		.1	-.2		89	82	-8
06S 25W 28CBC 01	TO	107.3	2	-4.6	-.6	.1	-.2	71	73	3
07S 22W 10BBC 01	TO	8.6	-3		-.4	-.1		66	63	-5
07S 22W 19BBB 01	TO	38.0	1		-1.4			24	25	4
07S 23W 17BBC 01		102.0			.2					
07S 24W 08CBA 01	TO	128.0	-2		-.6	-.1		118	116	-2
07S 25W 24BBB 01	TO	88.4	-3		-.4	-.1		125	122	-2
07S 25W 33DDD 01		100.3			-.5					
08S 21W 17ABB 01	QA	23.8			-1.0					
08S 22W 18CDC 01	QA	10.3			-1.4					
08S 24W 23ACC 01	QA	35.3			-.8					
08S 25W 24BAB 01		30.1			-.2					
09S 22W 19BBB 01	TO	94.6	0		-.8			39	39	0
09S 24W 12BCC 01										
09S 24W 22BAA 01	TO	92.2	2		-.1	.1		16	18	13
09S 25W 14DDD 01	TO	91.8	-2		.0	-.1		44	42	-5

TABLE 1. WATER LEVELS BY YEAR, GRANT COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1940 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
27S 35W 17ADD 01	QU,TO	3086.	462	175	185.7	231.8	233.7	237.1	242.6	245.7	252.1	253.4
27S 35W 25BDC 01		3046.				218.7	220.6	223.4	229.2	229.9	233.0	238.2
27S 36W 18DCB 01	QU,TO	3065.	395	104	116.5	176.1	180.0	184.0	190.0	191.4	206.4	200.2
27S 36W 21DCC 01	QU,TO	3132.		199				270.3	275.8	279.7	282.4	278.0
27S 36W 25CC 01	QU,TO	3133.	438	216	253.6	296.7	299.7	311.0		312.8	315.1	
27S 37W 04ABB 01	QU,TO	3080.	316	70	86.4	159.0	164.9	163.0	168.9	171.4	181.0	185.9
27S 37W 11ABA 01	QU,TO	3093.	368	107	131.4	198.3	193.3	192.5	198.1	201.1	203.7	192.9
27S 37W 16AAD 01		3075.	324	54				233.1	228.9	221.2	222.3	225.4
27S 37W 21BDD 01		3058.	58			192.3	192.0	195.2	196.3	198.8	204.3	
27S 38W 12ADC 01	QU,TO	3076.	280	34	65.5	187.1	188.6	189.7	189.0	182.9	196.2	203.3
27S 38W 15BBB 01	KJ	3148.			132.9	176.3	176.9	173.3	171.3	171.7	173.1	185.6
27S 38W 22CBB 01	QU,TO	3110.	340	49	76.8	166.9	165.9	165.6	163.8	166.7		172.0
27S 38W 23CBB 01	QU,TO	3105.	335	50	98.2	152.9	154.0	160.6	163.2	161.7		166.4
27S 38W 32BCC 01	QU,TO	3131.	371	50	105.1	157.1	164.1	159.3	161.4	162.5	164.1	
28S 35W 03DBB 01		3079.						276.6	274.6	283.2		292.0
28S 35W 05BCC 01	QU,TO	3117.	457	237	253.2	309.1	309.7	312.8		320.6	327.0	329.4
28S 35W 15CBB 01	QU,TO	3064.	509	213	250.7	285.8	284.8	288.5	292.1	301.2	303.7	295.3
28S 35W 36ABC 01	QU,TO	3032.	572	222	236.4	303.1	305.1	307.4	312.3	315.0	317.8	322.3
28S 36W 02CDD 02	QU,TO,KJ	3111.			241.6	272.4	288.3	292.3	296.0	285.2	284.1	284.4
28S 36W 18ABC 01		3050.	345	95				223.8	228.7	234.5	237.7	239.9
28S 36W 21CDD 01	QU,TO	3066.	430	158	193.8	263.6	276.1	278.0	278.4	282.2	287.0	287.4
28S 37W 02BBB 04		3072.						240.0	247.3	250.4	254.0	258.0
28S 37W 10BCD 02	QU,TO	3057.	350	49	100.7	204.6	208.8	202.6	204.8	207.2	205.3	207.1
28S 38W 12DDD 01	QU,TO	3080.	365	40	78.6	169.2	172.4	181.5	186.1	191.9		
28S 38W 17AAA 01	QU,TO	3112.	422	41	118.1	204.7	200.2	206.3	209.1	223.0	210.0	227.2
28S 38W 33BDB 01		3125.				208.4	197.7	205.2	209.7	216.1	219.5	212.7
29S 35W 07CBD 01	QU,TO	3036.	441	168		275.8	275.4	275.1	277.4	275.2	279.5	289.2
29S 35W 24BAA 01	TO	3037.	562	239				326.0	325.4	334.2	335.3	342.6
29S 35W 28ACC 01	QU,TO	2975.	500	147	185.4	239.2	244.1	248.9	254.3	256.8	260.5	263.6
29S 36W 19BCB 01	QU,TO	2995.	405	44	118.0	190.0	192.9	203.1	204.8	207.1	208.1	218.9
29S 36W 33ADB 01		3011.	466	91				226.9	227.0	226.5	231.9	247.3
29S 37W 03CDB 01	QU,TO	3051.	421	71	133.0	218.1	222.8	220.0	230.3	230.8	239.7	247.5
29S 37W 08CBA 01	QU,TO	3065.	430	46	114.5	215.1	218.1	220.8	230.2	230.6	247.2	254.9
29S 37W 29BBA 01	QU,TO	3094.	504	74	148.0	255.2	257.1		267.0	266.2	272.3	278.8
29S 38W 20CDC 01	QU,TO,KJ	3139.	489	59	80.8	146.5	150.4	153.6	160.4	168.1	180.4	192.1
29S 38W 35CCD 01	QU,TO	3124.	469	74	115.1	170.2	172.1	173.4	175.7	177.6	180.8	183.4
30S 35W 02DBC 01	QU,TO	3020.	525	225	240.5	313.5	315.3					
30S 35W 19BCD 01	QU,TO	3004.	474	134	153.3	198.8	202.1	200.9	198.8	193.1	204.8	203.7
30S 36W 01BBB 01	QU,TO	2973.	463	98	130.4	200.0	200.9	205.0	220.0	207.8	207.6	221.2
30S 36W 04ABB 01	QU,TO,KJ	3033.	493	113		151.1	153.4	156.8		162.1	166.5	157.3
30S 36W 32BBC 01	QU,TO	3064.	384	113	122.5	161.9	166.3	170.8	160.4	162.9	168.3	176.5
30S 37W 02BAA 02	QU,TO	3102.	507	122	221.7	291.4	292.0	296.5	299.5	300.6	306.3	310.7
30S 37W 03DBA 01	QU,TO,KJ	3108.	458	120		268.5	276.9	269.1	264.3		273.6	
30S 37W 20CBC 01	QU	3125.	385	114	164.6	200.2	208.2	210.7	212.6		221.2	223.9
30S 38W 13CCC 01	QU,TO,KJ	3142.	467	102	146.7	204.3	199.7	205.6	206.0	211.6	217.5	
30S 38W 15DBC 01	QU	3144.	360	89	118.7	170.0	173.3	175.7	178.5	187.6	195.3	195.0
30S 38W 30ACA 01	QU,TO	3152.	377	69	82.1	154.0	160.1	162.5	167.2	173.4	178.6	187.0

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TABLE 2. DERIVED HYDROLOGIC DATA, GRANT COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1940-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1940-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1940 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1940-89
27S 35W 17ADD 01	QU,TO	253.4	-78	-67.7	-1.3	-1.6	-2.9	287	209	-27
27S 35W 25BDC 01		238.2			-5.2					
27S 36W 18DCB 01	QU,TO	200.2	-96	-83.7	6.2	-2.0	-3.6	291	195	-33
27S 36W 21DCC 01	QU,TO	278.0	-79		4.4	-1.6				
27S 36W 25CC 01	QU,TO									
27S 37W 04ABB 01	QU,TO	185.9	-116	-99.5	-4.9	-2.4	-4.3	246	130	-47
27S 37W 11ABA 01	QU,TO	192.9	-86	-61.5	10.8	-1.8	-2.7	261	175	-33
27S 37W 16AAD 01		225.4	-171		-3.1	-3.5		270	99	-63
27S 37W 21BDD 01										
27S 38W 12ADC 01	QU,TO	203.3	-169	-137.8	-7.1	-3.4	-6.0	246	77	-69
27S 38W 15BBB 01	KJ	185.6		-52.7	-12.5		-2.3			
27S 38W 22CBB 01	QU,TO	172.0	-123	-95.2		-2.5	-4.1	291	168	-42
27S 38W 23CBB 01	QU,TO	166.4	-116	-68.2		-2.4	-3.0	285	169	-41
27S 38W 32BCC 01	QU,TO									
28S 35W 03DBB 01		292.0								
28S 35W 05BCC 01	QU,TO	329.4	-92	-76.2	-2.4	-1.9	-3.3	220	128	-42
28S 35W 15CBB 01	QU,TO	295.3	-82	-44.6	8.4	-1.7	-1.9	296	214	-28
28S 35W 36ABC 01	QU,TO	322.3	-100	-85.9	-4.5	-2.0	-3.7	350	250	-29
28S 36W 02CDD 02	QU,TO,KJ	284.4		-42.8	-.3		-1.9			
28S 36W 18ABC 01		239.9	-145		-2.2	-3.0		250	105	-58
28S 36W 21CDD 01	QU,TO	287.4	-129	-93.6	-.4	-2.6	-4.1	272	143	-47
28S 37W 02BBB 04		258.0			-4.0					
28S 37W 10BCD 02	QU,TO	207.1	-158	-106.4	-1.8	-3.2	-4.6	301	143	-52
28S 38W 12DDD 01	QU,TO									
28S 38W 17AAA 01	QU,TO	227.2	-186	-109.1	-17.2	-3.8	-4.7	381	195	-49
28S 38W 33BDB 01		212.7			6.8					
29S 35W 07CBD 01	QU,TO	289.2	-121		-9.7	-2.5		273	152	-44
29S 35W 24BAA 01	TO	342.6	-104		-7.3	-2.1		323	219	-32
29S 35W 28ACC 01	QU,TO	263.6	-117	-78.2	-3.1	-2.4	-3.4	353	236	-33
29S 36W 19BCB 01	QU,TO	218.9	-175	-100.9	-10.8	-3.6	-4.4	361	186	-48
29S 36W 33ADB 01		247.3	-156		-15.4	-3.2		375	219	-42
29S 37W 03CDB 01	QU,TO	247.5	-177	-114.5	-7.8	-3.6	-5.0	350	174	-50
29S 37W 08CBA 01	QU,TO	254.9	-209	-140.4	-7.7	-4.3	-6.1	384	175	-54
29S 37W 29BBA 01	QU,TO	278.8	-205	-130.8	-6.5	-4.2	-5.7	430	225	-48
29S 38W 20CDC 01	QU,TO,KJ	192.1	-133	-111.3	-11.7	-2.7	-4.8	430	297	-31
29S 38W 35CCD 01	QU,TO	183.4	-109	-68.3	-2.6	-2.2	-3.0	395	286	-28
30S 35W 02DBC 01	QU,TO									
30S 35W 19BCD 01	QU,TO	203.7	-70	-50.4	1.1	-1.4	-2.2	340	270	-21
30S 36W 01BBB 01	QU,TO	221.2	-123	-90.8	-13.6	-2.5	-3.9	365	242	-34
30S 36W 04ABB 01	QU,TO,KJ	157.3	-44		9.2	-.9		380	336	-12
30S 36W 32BBC 01	QU,TO	176.5	-64	-54.0	-8.2	-1.3	-2.3	271	208	-23
30S 37W 02BAA 02	QU,TO	310.7	-189	-89.0	-4.4	-3.9	-3.9	385	196	-49
30S 37W 03DBA 01	QU,TO,KJ									
30S 37W 20CBC 01	QU	223.9	-110	-59.3	-2.7	-2.2	-2.6	271	161	-41
30S 38W 13CCC 01	QU,TO,KJ									
30S 38W 15DBC 01	QU	195.0	-106	-76.3	.3	-2.2	-3.3	271	165	-39
30S 38W 30ACA 01	QU,TO	187.0	-118	-104.9	-8.4	-2.4	-4.6	308	190	-38

Gray County

TABLE 1. WATER LEVELS BY YEAR, GRAY COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1940 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
24S 27W 08CCC 01	QU,TO	2697.	138	66	59.1	72.2	73.2	75.0	74.0	75.2	73.9	80.3
24S 27W 14ABB 01	QU,TO	2654.	92	74	66.2	63.9	64.1	64.9	68.1	65.4	64.2	64.9
24S 27W 29BCC 01		2702.	152	72				84.8	84.6	86.4	85.0	86.8
24S 28W 28BBA 01		2750.	240	93				108.1	108.3	109.7	110.0	112.0
24S 28W 31DD 01	QU,TO	2754.	264	91	87.9	126.0	121.4	123.9	124.8	123.2	122.7	
24S 28W 36ACA 01	TO	2720.	135	85	83.3	97.4	97.1	97.0	97.3	98.3	97.9	98.3
24S 29W 16DCA 01	QU,TO	2787.	222	98	96.2	110.8	112.2	112.9		115.0	114.4	
24S 29W 18CCB 01	QU,TO	2814.	220	106	109.8	121.9	123.3	125.0	130.5	126.4	126.6	131.7
24S 30W 15CCC 01	QU,TO	2846.	248	114	117.0	133.0	135.3	136.6	136.7	139.2	145.7	144.3
24S 30W 33ADD 01	TO	2857.	282	130				156.2	149.9	149.9	151.7	156.6
25S 27W 33ABB 01	QU,TO	2728.	249	134	131.8	138.7	138.7	138.6	138.7	139.1	140.9	143.5
25S 29W 07BCB 01	QU,TO	2830.	281	131	129.0	146.9	143.1	144.3	143.8	145.6	145.5	148.1
25S 29W 14ABB 01	QU,TO	2776.		107	107.1	130.4	131.1		132.4	133.2	131.8	136.1
25S 29W 27CCB 01		2678.	168	8				16.2	10.1	9.9	9.2	12.0
25S 30W 20BCB 01	QU,TO	2734.	184	9	9.8	16.7	16.7	16.9	10.9	10.9	9.4	11.5
26S 27W 13BBC 01	QU,TO	2567.	165	9	7.9	11.1	4.3	10.6	12.6	8.6	4.6	8.9
26S 27W 27CDD 01	QU,TO	2612.	222	33		46.9	47.0	49.2	50.4	53.7	54.2	57.6
26S 28W 06DDB 01		2647.	147	9				14.5	12.0	11.9	11.6	13.2
26S 29W 15BCA 01		2732.	232	62				86.8	89.3	91.5	91.7	93.2
26S 29W 35CCC 01	QU,TO	2742.	242	72	71.6	94.6	96.1	98.7	101.6	103.4	106.8	110.0
26S 30W 01ABC 01		2740.							67.7	69.1	67.3	70.2
26S 30W 24DDD 01	QU,TO	2754.	253	54		81.3	82.6	85.2	90.6	103.3	103.7	105.6
27S 27W 01BAA 01		2631.						82.5	85.1	86.2	87.3	89.1
27S 27W 07ADC 01	QU,TO	2686.	186	82	74.0	104.3	94.6	95.9	94.1	99.5	101.4	
27S 27W 10CDB 01	QU,TO	2712.	235	131	123.4	141.0	141.0	142.8	144.3	145.7	147.3	150.3
27S 27W 25CCD 01	QU,TO	2732.	228	167	163.8	179.2	178.6	180.0	181.0	183.1	183.7	188.7
27S 28W 05AAA 01	QU,TO	2707.	228	66		88.1	88.8	91.6	94.0	98.0	98.5	106.7
27S 28W 30CCA 01	QU,TO	2738.	218	78		101.1		106.1	107.1		110.9	113.0
27S 29W 27CAA 01		2760.	235	83				102.4	105.7	107.1	110.6	113.3
27S 30W 08BBB 01	QU,TO	2790.	265	68	66.6	102.0		109.0	110.5	115.7	114.8	
27S 30W 23BBA 01	QU,TO	2772.	247	68	63.9	102.3	103.7	105.4	108.8	112.2	113.6	116.7
27S 30W 34CCC 01	QU,TO	2807.	404	102	101.0	141.4		144.9	147.4	150.5	152.2	154.7
28S 27W 03BBB 01	QU,TO	2755.	260	166		178.9		185.5	190.7	194.0	186.8	186.2
28S 28W 07CDD 01		2775.	250	117				178.0	182.8	187.5	189.1	194.0
28S 28W 20ADD 02	QU,TO	2795.	220	145	146.2	149.8	148.0	148.5	147.8	149.1	150.1	148.3
28S 29W 16ACC 01	QU,TO	2799.	299	121	125.0	157.9	158.6	159.6	161.0	162.0	162.9	164.0
28S 30W 10DDD 01	QU,TO	2814.	469	115	120.9	161.8	162.5	164.7	167.8	170.4	171.8	178.5
28S 30W 17BBA 01	TO	2817.	497	110	110.4	163.7	157.4	159.9	163.1	165.5	167.5	171.2
28S 30W 24BAB 01	QU,TO	2804.	429	114	119.5	160.2	160.6	161.7	164.0	167.1	168.9	180.7
29S 27W 30BCC 01	QU,TO	2655.	280	87	103.0	128.7	130.4	131.5	133.1	135.7	139.1	
29S 28W 28CDC 01	TO	2688.	278	88	91.2	118.7		120.2		124.6	126.7	129.7
29S 29W 10ABB 01		2745.				118.1			121.7	123.6	124.6	127.4
29S 29W 27BCB 01	QU,TO	2739.	494	98	101.0	132.2	132.9	136.6	139.7	139.9	141.9	143.8
29S 30W 22BBC 01	QU,TO	2816.	446	144	144.6		182.0	180.5	180.1	182.4	192.1	200.7
29S 30W 35ACD 01	QU,TO	2805.	445	146	147.8	193.2	193.8	195.3	204.1	203.9	203.6	206.8

TABLE 2. DERIVED HYDROLOGIC DATA, GRAY COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1940-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1940-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1940 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1940-89
24S 27W 08CCC 01	QU,TO	80.3	-14	-21.2	-6.4	-.3	-.9	72	58	-19
24S 27W 14ABB 01	QU,TO	64.9	9	1.3	-.7	.2	.1	18	27	50
24S 27W 29BCC 01		86.8	-15		-1.8	-.3		80	65	-19
24S 28W 28BBA 01		112.0	-19		-2.0	-.4		147	128	-13
24S 28W 31DD 01	QU,TO									
24S 28W 36ACA 01	TO	98.3	-13	-15.0	-.4	-.3	-.7	50	37	-26
24S 29W 16DCA 01	QU,TO									
24S 29W 18CCB 01	QU,TO	131.7	-26	-21.9	-5.1	-.5	-1.0	114	88	-23
24S 30W 15CCC 01	QU,TO	144.3	-30	-27.3	1.4	-.6	-1.2	134	104	-22
24S 30W 33ADD 01	TO	156.6	-27		-4.9	-.6		152	125	-18
25S 27W 33ABB 01	QU,TO	143.5	-10	-11.7	-2.6	-.2	-.5	115	106	-8
25S 29W 07BCB 01	QU,TO	148.1	-17	-19.1	-2.6	-.3	-.8	150	133	-11
25S 29W 14ABB 01	QU,TO	136.1	-29	-29.0	-4.3	-.6	-1.3			
25S 29W 27CCB 01		12.0	-4		-2.8	-.1		160	156	-3
25S 30W 20BCB 01	QU,TO	11.5	-3	-1.7	-2.1	-.1	-.1	175	173	-1
26S 27W 13BBC 01	QU,TO	8.9	0	-1.0	-4.3			156	156	0
26S 27W 27CDD 01	QU,TO	57.6	-25		-3.4	-.5		189	164	-13
26S 28W 06DDB 01		13.2	-4		-1.6	-.1		138	134	-3
26S 29W 15BCA 01		93.2	-31		-1.5	-.6		170	139	-18
26S 29W 35CCC 01	QU,TO	110.0	-38	-38.4	-3.2	-.8	-1.7	170	132	-22
26S 30W 01ABC 01		70.2			-2.9					
26S 30W 24DDD 01	QU,TO	105.6	-52		-1.9	-1.1		199	147	-26
27S 27W 01BAA 01		89.1			-1.8					
27S 27W 07ADC 01	QU,TO									
27S 27W 10CDB 01	QU,TO	150.3	-19	-26.9	-3.0	-.4	-1.2	104	85	-18
27S 27W 25CCD 01	QU,TO	188.7	-22	-24.9	-5.0	-.4	-1.1	61	39	-36
27S 28W 05AAA 01	QU,TO	106.7	-41		-8.2	-.8		162	121	-25
27S 28W 30CCA 01	QU,TO	113.0	-35		-2.1	-.7		140	105	-25
27S 29W 27CAA 01		113.3	-30		-2.7	-.6		152	122	-20
27S 30W 08BBB 01	QU,TO									
27S 30W 23BBA 01	QU,TO	116.7	-49	-52.8	-3.1	-1.0	-2.3	179	130	-27
27S 30W 34CCC 01	QU,TO	154.7	-53	-53.7	-2.5	-1.1	-2.3	302	249	-18
28S 27W 03BBB 01	QU,TO	186.2	-20		.6	-.4		94	74	-21
28S 28W 07CDD 01		194.0	-77		-4.9	-1.6		133	56	-58
28S 28W 20ADD 02	QU,TO	148.3	-3	-2.1	1.8	-.1	-.1	75	72	-4
28S 29W 16ACC 01	QU,TO	164.0	-43	-39.0	-1.1	-.9	-1.7	178	135	-24
28S 30W 10DDD 01	QU,TO	178.5	-64	-57.6	-6.7	-1.3	-2.5	354	291	-18
28S 30W 17BBA 01	TO	171.2	-61	-60.8	-3.7	-1.2	-2.6	387	326	-16
28S 30W 24BAB 01	QU,TO	180.7	-67	-61.2	-11.8	-1.4	-2.7	315	248	-21
29S 27W 30BCC 01	QU,TO									
29S 28W 28CDC 01	TO	129.7	-42	-38.5	-3.0	-.9	-1.7	190	148	-22
29S 29W 10ABB 01		127.4			-2.8					
29S 29W 27BCB 01	QU,TO	143.8	-46	-42.8	-1.9	-.9	-1.9	396	350	-12
29S 30W 22BBC 01	QU,TO	200.7	-57	-56.1	-8.6	-1.2	-2.4	302	245	-19
29S 30W 35ACD 01	QU,TO	206.8	-61	-59.0	-3.2	-1.2	-2.6	299	238	-20

Greeley County

TABLE 1. WATER LEVELS BY YEAR, GREELEY COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
16S 39W 02BDC 01	TO	3520.	220	81		134.6	136.0	137.7	137.5	139.7	141.1	143.2
16S 39W 22DCB 01	TO	3529.	163	95	88.8	128.9	129.8	132.5	136.0	131.2	131.8	131.8
16S 40W 15ACC 01	TO	3650.	192	114	119.9	149.5		162.0	151.5	151.7	152.7	
16S 40W 17CBC 01	TO	3688.							158.9	160.3	159.6	
16S 40W 26ADA 01	TO	3602.	157	93		114.4	117.8		117.0	118.0	119.0	121.5
16S 41W 20BAD 01	TO	3739.	234	129	131.3	167.2	168.1	169.7	169.6	170.5	171.9	
16S 41W 33AAB 01	TO	3746.	202	156		173.6	176.3		174.8		174.7	175.3
16S 42W 22BCB 01	TO	3828.	237	183	198.5	198.9	197.3	199.5	209.7	200.3	200.8	200.7
16S 42W 25AAA 01		3763.										174.0
17S 39W 02BAA 01	TO	3511.	161	102		114.9	116.5	117.1	117.6	117.6	117.8	117.3
17S 39W 22ABB 01	TO	3527.	195	118	123.3	132.2	130.8	133.5	136.5	131.7	131.8	132.6
17S 39W 34CCB 01	TO	3505.	135	95		94.6	99.0	96.4	98.8	96.1	96.6	95.9
17S 40W 15CCB 01	TO	3607.	209	123	127.0	138.1	138.7	138.6	138.3	138.8	138.9	138.0
17S 40W 17BBA 01	TO	3663.	217	165		185.5	185.4	184.7	179.4		185.5	184.9
17S 40W 31BBA 01	TO	3663.	218	151	168.1	164.8	167.7	164.2	165.7	163.4	164.1	164.7
17S 42W 27CBB 01	TO	3768.	61	31		36.3	38.1	37.2	36.6	37.0	36.6	38.8
18S 39W 07BBD 01	TO	3564.	145	109		116.3	116.2	118.6	116.2	116.3	114.6	114.8
18S 39W 19CDA 01	TO	3510.	100	70		72.4	73.4	73.6	74.0	74.2	74.2	75.6
18S 39W 23CCB 01	TO	3485.	185	113	122.2	132.3	133.3	133.2	133.1	133.4		133.2
18S 39W 24AAC 01	TO	3467.	183	105		136.9	140.7	142.3	135.3	135.1	134.8	134.4

TABLE 2. DERIVED HYDROLOGIC DATA, GREELEY COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
16S 39W 02BDC 01	TO	143.2	-62		-2.1	-1.6		139	77	-45
16S 39W 22DCB 01	TO	131.8	-37	-43.0	.0	-.9	-1.9	68	31	-54
16S 40W 15ACC 01	TO									
16S 40W 17CBC 01	TO									
16S 40W 26ADA 01	TO	121.5	-29		-2.5	-.7		64	36	-44
16S 41W 20BAD 01	TO									
16S 41W 33AAB 01	TO	175.3	-19		-.6	-.5		46	27	-41
16S 42W 22BCB 01	TO	200.7	-18	-2.2	.1	-.5	-.1	54	36	-33
16S 42W 25AAA 01		174.0								
17S 39W 02BAA 01	TO	117.3	-15		.5	-.4		59	44	-25
17S 39W 22ABB 01	TO	132.6	-15	-9.3	-.8	-.4	-.4	77	62	-19
17S 39W 34CCB 01	TO	95.9	-1		.7			40	39	-3
17S 40W 15CCB 01	TO	138.0	-15	-11.0	.9	-.4	-.5	86	71	-17
17S 40W 17BBA 01	TO	184.9	-20		.6	-.5		52	32	-38
17S 40W 31BBA 01	TO	164.7	-14	3.4	-.6	-.4	.1	67	53	-21
17S 42W 27CBB 01	TO	38.8	-8		-2.2	-.2		30	22	-27
18S 39W 07BBD 01	TO	114.8	-6		-.2	-.2		36	30	-17
18S 39W 19CDA 01	TO	75.6	-6		-1.4	-.2		30	24	-20
18S 39W 23CCB 01	TO	133.2	-20	-11.0		-.5	-.5	72	52	-28
18S 39W 24AAC 01	TO	134.4	-29		.4	-.7		78	49	-37

TABLE 1. WATER LEVELS BY YEAR, HAMILTON COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1940 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
21S 39W 07CBA 01	TO	3497.	215	196	194.0	185.7		185.1	185.3	183.0		188.5
22S 39W 03BBB 01	TO	3453.	199		191.2	183.2	183.3	182.8	183.4	183.2	182.0	188.7
22S 39W 08DDD 01	TO	3468.	214		178.5	176.5		174.7	176.0	182.1		
23S 39W 15ADD 01	QU,TO	3325.	144		130.1	129.5	129.4	129.1	129.2	129.5	128.2	129.6
23S 40W 29DDB 01	KU	3397.			240.3	297.8	301.0	304.6	308.0	309.4	315.5	321.3
23S 42W 19CBB 01	QA,QU	3339.	67	20	24.1	24.7	25.4	26.4	25.7	25.4	24.5	32.9
23S 42W 26DCA 01	QA	3309.	70	29	23.7	28.4	27.5	26.4	25.9	26.2	28.0	26.3
23S 42W 27DDB 01	QA	3311.	70	23	20.0	23.7		23.1	22.9	21.9	23.0	23.1
23S 42W 34CBB 01	QA	3307.	58	13	9.6	11.2	10.7	10.2	10.5	10.4	10.5	
23S 43W 21ABA 01	QA	3364.	29	15	15.0	13.9	13.5	12.2	12.5	13.0	12.8	12.9
23S 43W 23BCB 01	QA	3356.	68	21	20.5	21.9	21.5	21.4	20.8	21.1	20.8	27.2
23S 43W 25CBD 02	QA	3335.	47	8	8.8	9.0	8.3	8.5	8.3	8.0	8.0	8.4
23S 43W 26BCC 01	QA	3343.	22	7	7.1	8.3	7.6	9.3	7.9	9.2	7.5	7.8
24S 39W 19CBC 01	QA	3175.	65	6	6.7	9.8	8.9	9.0	8.4	8.7	8.8	9.2
24S 39W 22CCB 01	QA	3152.	42	8	11.8		10.6	10.5	11.7	12.7	11.0	10.8
24S 39W 35BAC 01	QA	3143.	43	9	5.4	9.8	8.8	8.6	8.5	8.7	8.7	8.9
24S 39W 35CBA 01	QU	3146.	97	11	11.4	16.4	15.5	15.3	15.1	15.4	15.3	15.6
24S 40W 07CBB 01	QA	3233.	58	14	13.9	16.4	15.2	15.0	13.4	14.9	15.1	15.2
24S 40W 17BBB 01	QA	3221.	71	13		15.6	14.8	14.6	13.4	14.0	13.8	15.0
24S 40W 23AAB 01	QA	3204.	104	26	24.4	27.3	27.0	26.5	23.6	25.6	25.4	28.8
24S 40W 31BBB 01	QU	3287.			63.6	65.1	64.9	65.1	66.7	64.4	65.7	65.1
24S 41W 01DAD 01	QA,QU	3254.	45		14.7	25.8	26.1	25.8	25.4	25.0	24.9	23.4
24S 42W 04AAD 01	QA	3304.	44	7	6.5	14.3	13.5	12.7	10.1	9.7	4.1	7.6
24S 42W 28DDD 01	KJ	3455.			160.0	163.3	164.4	164.5		165.3	166.0	166.0
24S 43W 14CBB 01	KJ	3452.		114	110.8	118.2	117.8	117.5	119.6	120.2	117.6	115.4
25S 39W 02CAD 01	QU,TO	3156.	46	24	27.9	34.5	33.2	32.7		34.7	33.6	34.1
25S 39W 23BDD 01	QU,TO	3286.	133		78.7	91.3	91.4	91.1	90.8			90.8
25S 40W 01CA 01	QU	3218.	58	46	45.8	51.0	50.8	48.2				51.3
25S 40W 26BBB 01	KJ	3412.		213	215.0	221.8	221.5	221.6	221.6	224.7	224.0	229.6
25S 43W 03ABB 01	KJ	3575.			190.5	261.7	266.2	261.6	248.3	266.0	275.9	263.2
25S 43W 21AAB 01	KJ	3522.			129.4	143.1	139.1	142.3	140.0	137.1	134.8	
25S 43W 25CCD 01	QU,TO	3490.	225	101	121.4	147.6	147.4		148.6	150.4	150.4	151.2
26S 41W 12DCC 01	KJ	3379.			186.5	224.1	226.3	229.6				
26S 41W 20BCD 01	QU,TO	3317.	242	17	20.7	33.0	33.2	33.1	32.4	34.7	39.3	37.8
26S 41W 32DDB 01		3354.										146.2
26S 41W 36CCC 01	QU,TO	3270.	231	35	29.0	52.4	54.3	56.4	56.6	59.2	62.2	63.1
26S 42W 10BB 02	QU,TO	3405.	245	52	77.2	108.4	108.2	110.1	112.2	115.0	116.7	120.7
26S 42W 17CBB 01	QU,TO,KJ	3458.			108.1		167.0	169.4	170.8		172.3	176.6
26S 42W 22CDB 01	QU,TO	3412.	212	77	93.1	153.5	162.2	159.0	164.5	163.7	168.2	170.3
26S 42W 22DCC 01		3414.										175.3
26S 43W 10DBB 01		3516.	241	118				232.1	233.1		238.0	240.6
26S 43W 25DCC 01	QU,TO,KJ	3508.	258	128		209.8	211.4	213.4	222.0	218.7	220.9	225.0

TABLE 2. DERIVED HYDROLOGIC DATA, HAMILTON COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1940-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1940-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1940 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1940-89
21S 39W 07CBA 01	TO	188.5	8	5.5		.2	.2	19	27	42
22S 39W 03BBB 01	TO	188.7		2.5	-6.7		.1		10	
22S 39W 08DDD 01	TO									
23S 39W 15ADD 01	QU,TO	129.6		.5	-1.4				14	
23S 40W 29DDB 01	KU	321.3		-81.0	-5.8		-3.5			
23S 42W 19CBB 01	QA,QU	32.9	-13	-8.8	-8.4	-.3	-.4	47	34	-28
23S 42W 26DCA 01	QA	26.3	3	-2.6	1.7	.1	-.1	41	44	7
23S 42W 27DDB 01	QA	23.1	0	-3.1	-.1		-.1	47	47	0
23S 42W 34CBB 01	QA									
23S 43W 21ABA 01	QA	12.9	2	2.1	-.1		.1	14	16	14
23S 43W 23BCB 01	QA	27.2	-6	-6.7	-6.4	-.1	-.3	47	41	-13
23S 43W 25CBD 02	QA	8.4	0	.4	-.4			39	39	0
23S 43W 26BCC 01	QA	7.8	-1	-.7	-.3			15	14	-7
24S 39W 19CBC 01	QA	9.2	-3	-2.5	-.4	-.1	-.1	59	56	-5
24S 39W 22CCB 01	QA	10.8	-3	1.0	.2	-.1		34	31	-9
24S 39W 35BAC 01	QA	8.9	0	-3.5	-.2		-.2	34	34	0
24S 39W 35CBA 01	QU	15.6	-5	-4.2	-.3	-.1	-.2	86	81	-6
24S 40W 07CBB 01	QA	15.2	-1	-1.3	-.1		-.1	44	43	-2
24S 40W 17BBB 01	QA	15.0	-2		-1.2			58	56	-3
24S 40W 23AAB 01	QA	28.8	-3	-4.4	-3.4	-.1	-.2	78	75	-4
24S 40W 31BBB 01	QU	65.1		-1.5	.6		-.1			
24S 41W 01DAD 01	QA,QU	23.4		-8.7	1.5		-.4		22	
24S 42W 04AAD 01	QA	7.6	-1	-1.1	-3.5			37	36	-3
24S 42W 28DDD 01	KJ	166.0		-6.0	.0		-.3			
24S 43W 14CBB 01	KJ	115.4	-1	-4.6	2.2		-.2			
25S 39W 02CAD 01	QU,TO	34.1	-10	-6.2	-.5	-.2	-.3	22	12	-45
25S 39W 23BDD 01	QU,TO	90.8		-12.1			-.5		42	
25S 40W 01CA 01	QU	51.3	-5	-5.5		-.1	-.2	12	7	-42
25S 40W 26BBB 01	KJ	229.6	-17	-14.6	-5.6	-.3	-.6			
25S 43W 03ABB 01	KJ	263.2		-72.7	12.7		-3.2			
25S 43W 21AAB 01	KJ									
25S 43W 25CCD 01	QU,TO	151.2	-50	-29.8	-.8	-1.0	-1.3	124	74	-40
26S 41W 12DCC 01	KJ									
26S 41W 20BCD 01	QU,TO	37.8	-21	-17.1	1.5	-.4	-.7	225	204	-9
26S 41W 32DDB 01		146.2								
26S 41W 36CCC 01	QU,TO	63.1	-28	-34.1	-.9	-.6	-1.5	196	168	-14
26S 42W 10BB 02	QU,TO	120.7	-69	-43.5	-4.0	-1.4	-1.9	193	124	-36
26S 42W 17CBB 01	QU,TO,KJ	176.6		-68.5	-4.3		-3.0			
26S 42W 22CDB 01	QU,TO									
26S 42W 22DCC 01		175.3								
26S 43W 10DBB 01		240.6	-123		-2.6	-2.5		123	0	-100
26S 43W 25DCC 01	QU,TO,KJ	225.0	-97		-4.1	-2.0		130	33	-75

Harper County

TABLE 1. WATER LEVELS BY YEAR, HARPER COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
32S 06W 01DDD 01		1360.							24.0	24.6		

TABLE 2. DERIVED HYDROLOGIC DATA, HARPER COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
32S 06W 01DDD 01										

TABLE 1. WATER LEVELS BY YEAR, HARVEY COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1944 (Feet)	Depth to Water 1974 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
22S 02W 05CBD 01		1468.						48.3	47.7	47.3	46.3	46.6
22S 02W 29BBA 01												21.2
22S 03W 02DCD 01	QU	1450.					40.3	39.4	34.1	33.9	33.6	36.2
22S 03W 29BAD 01	QU	1430.						15.8	6.9	9.3	9.6	15.0
22S 03W 35AAA 01	QU	1420.						10.9	6.1	6.9	7.2	12.2
23S 01W 19AAC 01	QU	1420.						33.1	31.6	31.5	29.7	32.3
23S 01W 28AAD 01		1403.						22.2	19.5	20.2	19.5	21.9
23S 02W 22CCD 01	QU	1395.						16.3	12.8	14.2	14.0	17.1
23S 02W 34DCC 01	QU	1398.				13.6	13.5	14.8	13.3	12.5	11.7	16.3
23S 03W 06DDD 01	QU	1495.						73.2	65.9	67.5	67.9	72.2
23S 03W 14AAC 01	QU	1450.						37.3	32.8	32.9	33.3	37.5
23S 03W 32DCC 02	QU	1444.				9.2	9.6	9.7	8.2	8.5	8.2	10.6
24S 01W 05AAB 01		1394.							22.3	24.0	21.8	26.0
24S 01W 19BCC 01	QU	1383.						23.0	18.6	20.1	19.0	21.9
24S 01W 22BCC 01	QU	1390.						27.8	24.6	26.8	25.3	28.3
24S 02W 28DDD 01	QU,QU	1403.				35.5	35.3	36.6	34.5	27.9	28.3	36.6
24S 03W 14BBB 01	QU	1430.				15.1	15.2	15.3	15.3	15.3	15.3	15.5

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TABLE 2. DERIVED HYDROLOGIC DATA, HARVEY COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1944-89 (Feet)	Water-Level Change 1974-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1944-89 (Feet/year)	Average Annual Water-Level Change 1974-89 (Feet/year)	Saturated Thickness in 1944 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1944-89
22S 02W 05CBD 01		46.6			-.3					
22S 02W 29BBA 01		21.2								
22S 03W 02DCD 01	QU	36.2			-2.6					
22S 03W 29BAD 01	QU	15.0			-5.4					
22S 03W 35AAA 01	QU	12.2			-5.0					
23S 01W 19AAC 01	QU	32.3			-2.6					
23S 01W 28AAD 01		21.9			-2.4					
23S 02W 22CCD 01	QU	17.1			-3.1					
23S 02W 34DCC 01	QU	16.3			-4.6					
23S 03W 06DDD 01	QU	72.2			-4.3					
23S 03W 14AAC 01	QU	37.5			-4.2					
23S 03W 32DCC 02	QU	10.6			-2.7					
24S 01W 05AAB 01		26.0			-4.2					
24S 01W 19BCC 01	QU	21.9			-2.9					
24S 01W 22BCC 01	QU	28.3			-3.0					
24S 02W 28DDD 01	QU,QU	36.6			-4.4					
24S 03W 14BBB 01	QU	15.5			-.2					

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TABLE 1. WATER LEVELS BY YEAR, HASKELL COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1940 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
27S 31W 24CDC 01	QU,TO	2816.	366	94	97.8	140.0		152.9	147.7	150.3	152.3	156.0
27S 31W 31BCC 01	QU,TO	2895.	520	151	154.8	193.3	194.8	199.6		204.9	207.2	210.9
27S 32W 03CBB 01		2872.		92				138.1	139.9	142.5	145.8	151.8
27S 32W 06CBB 01	QU,TO	2905.	465	107		145.5	147.8	152.8	154.9	155.4	161.1	165.9
27S 32W 19CCD 01	QU,TO	2906.	456	118	130.0	171.2	173.7	177.7	181.0	183.7	190.0	198.7
27S 33W 29DAA 01	QU,TO	2995.	540	194	186.3	257.0	256.9	265.4	270.8	271.9	279.3	284.0
27S 34W 16DDD 01		3000.				179.5	181.2	184.3	192.8	190.9	194.9	200.9
27S 34W 28DAA 02		3042.					227.4	230.8	234.2	237.7	242.8	250.5
28S 31W 35CCB 01	QU,TO	2863.	443	156	171.9	205.6	207.6	210.6		215.4	219.2	223.2
28S 32W 18BBB 01	QU,TO	2951.	581	192	203.3		296.6	303.4	301.1	302.5	315.7	
28S 32W 24BCC 01	QU,TO	2910.	549	175	181.5	219.6	221.1	231.6	229.5	231.7	234.0	234.0
28S 33W 20DDD 01		2967.									340.2	319.2
28S 33W 29CD 01		2958.									343.9	
28S 34W 13BBB 01	QU,TO	3022.	547	247	260.8	351.9	356.6	360.2	366.9			
28S 34W 15DAB 01	QU,TO	3020.	570	243	263.0		351.3	358.5		370.7	377.3	366.7
29S 31W 09CB 01	QU,TO	2871.	466	166	169.4	204.8	205.4	216.7	220.0	223.6	225.9	228.9
29S 31W 34BCA 01	QU,TO	2858.	468	168	172.7	216.3	224.6	218.5	222.4	224.7	227.3	233.5
29S 32W 04AAA 01		2914.							247.3	260.3	263.5	263.0
29S 32W 19CCC 01	QU,TO	2923.	598	208	218.2	280.4	282.7	286.5	291.6	296.0	298.8	303.9
29S 32W 26CBB 02	QU,TO	2895.		191	204.1	255.5	255.2	255.3	257.5	261.1	264.1	267.7
29S 33W 01AAB 01	QU,TO	2946.	601	213	226.3	326.9	329.1	327.6	329.0	336.5	334.9	
29S 33W 28BCB 01	QU,TO	2963.	558	212		296.4	299.3	299.3		307.6	311.3	315.1
29S 33W 34DDD 01		2950.						304.6	310.0	314.9	318.3	322.2
29S 34W 11CCC 01		2969.							306.7	303.9	310.6	
30S 31W 24BBC 01		2831.							204.5	213.1	214.9	214.8
30S 31W 26ABB 01		2834.						227.3	229.2	232.9	234.8	238.2
30S 32W 11BBB 01	QU,TO	2885.	560	188	202.4	255.2	258.1	252.9	263.1	270.1	268.4	
30S 32W 31BAB 01	QU,TO	2906.	466	194	202.0	270.6	258.7	256.6	259.4	264.0	268.5	271.0
30S 33W 06DBD 01	QU,TO	2986.	596	233	241.4	303.1	301.2	298.1	301.7	305.9	310.1	
30S 33W 30CBD 01	QU,TO	2963.	513	215	219.7	253.8	253.9	257.5	265.7	270.7		
30S 34W 05BBB 01	QU,TO	3006.	531	223	232.7	315.9	320.1	308.3	302.2	301.1	308.8	
30S 34W 30ADD 02		2843.		63		93.8	92.6	96.2	105.5	109.0	111.6	114.3

TABLE 2. DERIVED HYDROLOGIC DATA, HASKELL COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1940-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1940-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1940 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1940-89
27S 31W 24CDC 01	QU,TO	156.0	-62	-58.2	-3.7	-1.3	-2.5	272	210	-23
27S 31W 31BCC 01	QU,TO	210.9	-60	-56.1	-3.7	-1.2	-2.4	369	309	-16
27S 32W 03CBB 01		151.8	-60		-6.0	-1.2				
27S 32W 06CBB 01	QU,TO	165.9	-59		-4.8	-1.2		358	299	-16
27S 32W 19CCD 01	QU,TO	198.7	-81	-68.7	-8.7	-1.7	-3.0	338	257	-24
27S 33W 29DAA 01	QU,TO	284.0	-90	-97.7	-4.7	-1.8	-4.2	346	256	-26
27S 34W 16DDD 01		200.9			-6.0					
27S 34W 28DAA 02		250.5			-7.7					
28S 31W 35CCB 01	QU,TO	223.2	-67	-51.3	-4.0	-1.4	-2.2	287	220	-23
28S 32W 18BBB 01	QU,TO									
28S 32W 24BCC 01	QU,TO	234.0	-59	-52.5	.0	-1.2	-2.3	374	315	-16
28S 33W 20DDD 01		319.2			21.0					
28S 33W 29CD 01										
28S 34W 13BBB 01	QU,TO									
28S 34W 15DAB 01	QU,TO	366.7	-124	-103.7	10.6	-2.5	-4.5	327	203	-38
29S 31W 09CB 01	QU,TO	228.9	-63	-59.5	-3.0	-1.3	-2.6	300	237	-21
29S 31W 34BCA 01	QU,TO	233.5	-66	-60.8	-6.2	-1.3	-2.6	300	235	-22
29S 32W 04AAA 01		263.0			.5					
29S 32W 19CCC 01	QU,TO	303.9	-96	-85.7	-5.1	-2.0	-3.7	390	294	-25
29S 32W 26CBB 02	QU,TO	267.7	-77	-63.6	-3.6	-1.6	-2.8			
29S 33W 01AAB 01	QU,TO									
29S 33W 28BCB 01	QU,TO	315.1	-103		-3.8	-2.1		346	243	-30
29S 33W 34DDD 01		322.2			-3.9					
29S 34W 11CCC 01										
30S 31W 24BBC 01		214.8			.1					
30S 31W 26ABB 01		238.2			-3.4					
30S 32W 11BBB 01	QU,TO									
30S 32W 31BAB 01	QU,TO	271.0	-77	-69.0	-2.5	-1.6	-3.0	272	195	-28
30S 33W 06DBD 01	QU,TO									
30S 33W 30CBD 01	QU,TO									
30S 34W 05BBB 01	QU,TO									
30S 34W 30ADD 02		114.3	-51		-2.7	-1.0				

TABLE 1. WATER LEVELS BY YEAR, HODGEMAN COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1940 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
21S 22W 12BCB 01	QA	2156.			35.5	51.1	50.6	51.3	51.1	51.2	50.4	52.9
22S 22W 13CCC 01	QA	2152.			24.0	28.3	31.1	34.0	34.1	33.6	30.6	34.3
22S 23W 31ADD 01		2340.						146.5	140.9	138.6	133.2	
22S 24W 14BBC 01	KD	2460.					280.9	273.3		267.6	261.8	278.9
22S 24W 15BDA 01	KD	2463.					282.3	271.6	265.3	266.4	261.2	276.2
22S 24W 16ADB 02	KD	2465.						269.7	262.2	269.5	259.7	276.1
22S 24W 24DDD 01	KD	2360.				183.4	180.2	171.9		160.8	158.3	169.4
22S 24W 25DDC 01	KD	2332.				156.5	154.4		138.7	138.4	134.4	159.3
22S 24W 26DDA 01	KD	2365.				157.0	150.1	158.7		152.8	151.1	156.5
22S 24W 35DAC 01	KD	2312.				140.5	135.8	138.0	127.7	118.3	114.2	135.6
23S 22W 07DAA 01	KD	2239.				78.9	77.4	79.1	78.2	76.7	75.1	79.9
23S 23W 04AAD 01	KD	2235.				36.7	40.0	33.7	32.4	31.6	30.8	
23S 23W 04DCA 01	KD	2236.				40.4	42.7	38.7	33.0	37.2	29.6	
23S 23W 12ABD 01	KD	2256.				84.0	79.4	82.4	88.3	86.2	86.1	90.7
23S 24W 11DAA 01	KD	2335.				152.1	155.0		138.2	136.1	133.5	137.4
23S 25W 22DBB 01	KD	2522.				264.8	267.3	265.5	259.1		258.0	
23S 26W 07CCC 01		2612.					323.3	323.2	325.3	327.7	321.4	324.5
23S 26W 20CCC 01		2594.						48.7	46.2	46.2	45.4	47.5
23S 26W 26AAD 01		2590.						70.7	67.7	69.2	68.8	70.5
23S 26W 31CDD 01	TO	2621.	122	71		70.6	69.6	70.4	67.5	68.6	70.0	71.1
24S 21W 20CBB 01	KD	2348.				77.3	77.7	77.8	79.2	77.6	77.4	77.7
24S 23W 03CCC 01	TO	2422.	90			56.3	57.7	57.0	57.3	58.7	58.2	61.2
24S 23W 06AAB 01	KD	2457.				264.0	215.1	214.7	212.1	211.3	211.2	212.2
24S 24W 02CCC 01	TO	2478.	90			54.9		58.3	59.4	59.6	60.3	63.9
24S 24W 20CCC 01	TO	2511.	86			65.1	63.6	64.1	68.4	63.1	62.7	63.3
24S 25W 22BAB 01		2545.						85.0	84.1	80.2	79.9	82.7
24S 26W 35CBC 01	TO	2608.		63		61.6	61.9	61.5	61.1	60.5	59.5	59.8

TABLE 2. DERIVED HYDROLOGIC DATA, HODGEMAN COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1940-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1940-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1940 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1940-89
21S 22W 12BCB 01	QA	52.9		-17.4	-2.5		-.8			
22S 22W 13CCC 01	QA	34.3		-10.3	-3.7		-.4			
22S 23W 31ADD 01										
22S 24W 14BBC 01	KD	278.9			-17.1					
22S 24W 15BDA 01	KD	276.2			-15.0					
22S 24W 16ADB 02	KD	276.1			-16.4					
22S 24W 24DDD 01	KD	169.4			-11.1					
22S 24W 25DDC 01	KD	159.3			-24.9					
22S 24W 26DDA 01	KD	156.5			-5.4					
22S 24W 35DAC 01	KD	135.6			-21.4					
23S 22W 07DAA 01	KD	79.9			-4.8					
23S 23W 04AAD 01	KD									
23S 23W 04DCA 01	KD									
23S 23W 12ABD 01	KD	90.7			-4.6					
23S 24W 11DAA 01	KD	137.4			-3.9					
23S 25W 22DBB 01	KD									
23S 26W 07CCC 01		324.5			-3.1					
23S 26W 20CCC 01		47.5			-2.1					
23S 26W 26AAD 01		70.5			-1.7					
23S 26W 31CDD 01	TO	71.1	0		-1.1			51	51	0
24S 21W 20CBB 01	KD	77.7			-.3					
24S 23W 03CCC 01	TO	61.2			-3.0				29	
24S 23W 06AAB 01	KD	212.2			-1.0					
24S 24W 02CCC 01	TO	63.9			-3.6				26	
24S 24W 20CCC 01	TO	63.3			-.6				23	
24S 25W 22BAB 01		82.7			-2.8					
24S 26W 35CBC 01	TO	59.8	3		-.3	.1				

Jackson County

TABLE 1. WATER LEVELS BY YEAR, JACKSON COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1944 (Feet)	Depth to Water 1974 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
06S 15E 27BAB 01		1135.			76.2	84.4	85.4	86.1	87.4	88.3	87.4	89.2

TABLE 2. DERIVED HYDROLOGIC DATA, JACKSON COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1944-89 (Feet)	Water-Level Change 1974-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1944-89 (Feet/year)	Average Annual Water-Level Change 1974-89 (Feet/year)	Saturated Thickness in 1944 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1944-89
06S 15E 27BAB 01		89.2		-13.0	-1.8		-.9			

Jefferson County

TABLE 1. WATER LEVELS BY YEAR, JEFFERSON COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
11S 16E 25CBA 01		873.			26.1	24.9	24.4	24.5	23.9	23.8	25.0	27.5
11S 17E 27BBC 01		860.			17.7	16.9	18.3	17.4	17.4	16.9	18.2	20.6
11S 18E 08DAC 01		852.			15.1	8.5	12.7	10.9	9.3	10.9	14.2	16.2
11S 19E 29CCA 01		848.			19.7	21.1	21.5	19.3	19.8	18.8	21.9	25.4

TABLE 2. DERIVED HYDROLOGIC DATA, JEFFERSON COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
11S 16E 25CBA 01		27.5		-1.4	-2.5		-.1			
11S 17E 27BBC 01		20.6		-2.9	-2.4		-.1			
11S 18E 08DAC 01		16.2		-1.1	-2.0					
11S 19E 29CCA 01		25.4		-5.7	-3.5		-.2			

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TABLE 1. WATER LEVELS BY YEAR, JOHNSON COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
12S 22E 25BCC 01		780.			20.1	25.7	27.3	28.7	23.9	24.9	26.9	31.2
12S 22E 29BBD 01		791.				17.0	18.4	14.2	15.1	14.9	18.7	21.9

TABLE 2. DERIVED HYDROLOGIC DATA, JOHNSON COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
12S 22E 25BCC 01		31.2		-11.1	-4.3		-.5			
12S 22E 29BBD 01		21.9			-3.2					

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TABLE 1. WATER LEVELS BY YEAR, KEARNY COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1940 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
22S 35W 23CDD 01	TO	3025.	175	95	107.6	128.4	129.3	130.8	131.5	132.0	132.7	133.3
22S 36W 28DCC 01		3215.	210	167				177.7		172.8		172.9
22S 37W 34BBC 01		3230.							135.2	135.8	135.7	136.3
23S 35W 05ACC 01	TO	3096.	180	118	122.7			150.9			164.8	
23S 35W 12CCC 01	QU,TO	3009.	369	67	79.1	168.1	161.5	154.6	153.3	143.9	149.4	140.4
23S 35W 16BBC 01		3038.	263	52				136.8	139.7	142.4	135.1	137.7
23S 35W 25BBB 02	QU,TO	3005.	385	46	59.1	132.7	125.2	121.1	120.2	107.2	102.5	106.0
23S 36W 04CBB 01	TO	3183.	198	142	132.9	147.4	144.9	145.4		143.9	143.4	145.3
23S 36W 32BBB 01	TO	3234.	305	189	218.0	238.5	236.8	236.9	235.9	238.2	240.4	247.4
23S 36W 35BBB 01		3193.	293	169				214.0		213.5	212.3	214.0
23S 37W 04ABC 01	TO	3281.	233	183		190.2	190.7	200.3		190.7		194.1
23S 37W 19CCC 01	TO	3326.	294	223	232.9	255.7	247.4	246.7	244.4	249.4	256.4	
23S 37W 28CCB 01	TO	3303.	300	218	236.9	258.9	256.1	255.1		254.7	256.2	256.8
24S 35W 09CCC 01	QU,TO	2998.	358	30	31.0	64.6	48.0	42.4	42.6	36.0	35.3	36.2
24S 35W 13CCC 02	QA	2941.	346	12	8.2	23.7	19.2	18.2	16.5	16.1	14.7	15.4
24S 35W 24BCB 01	QA	2941.	341	11				29.3	27.1	26.4	25.4	26.5
24S 36W 23CBB 02	QU,TO	3014.	310	26	24.8	38.8	38.7	34.6	31.9	32.3	30.9	32.0
25S 35W 02BAA 01	QU,TO	2990.	400	52		95.8	96.2	99.3	100.7	101.6	102.6	104.8
25S 35W 04BDD 01		2990.	410	40				41.9		70.3	69.7	71.0
25S 35W 17AAA 01	QU,TO	2995.	405	37		88.9	88.7	90.7	94.6	98.5	98.0	101.2
25S 35W 26BAB 01	QU,TO	3005.	450	70		112.4	113.1	115.7		136.0	141.2	145.3
25S 36W 14B 01		3050.						99.9	99.9	91.5	95.8	97.0
25S 36W 28BBD 01	QU,TO	3050.	362	51		93.5	96.5	87.2	91.0		101.3	111.7
25S 36W 35CCA 01		3025.								101.6	104.1	107.4
25S 37W 15ABA 02	QA	3050.	30	5		9.6	9.2	8.8	9.0	8.5	9.0	9.4
25S 37W 25BAD 02	QU,TO,KJ	3056.	156	41	38.1	66.4	66.9		69.1		71.4	73.0
25S 38W 02BDA 01		3170.						96.7				96.8
25S 38W 08CAA 01	QU,TO,KJ	3140.	90	30	37.5	44.5	44.7	38.6	45.0	44.9	44.9	45.0
25S 38W 20ACC 01	QU,TO,KJ	3175.	75	65	63.2	70.6	70.7	70.8	71.0	71.2	71.3	71.5
25S 38W 26ACC 01	QU,TO	3145.	145	63	65.4	81.3	81.6	77.6	77.5	75.6	76.1	76.1
26S 35W 06ACC 01	QU	3008.	418	58	60.7	95.9			93.4			105.0
26S 35W 29BBD 01		3045.		113		167.6	169.8	172.4		179.9	185.8	188.8
26S 36W 22CCA 01		3090.	440	125		163.3	165.9	168.9	172.6	177.3	180.4	184.6
26S 37W 06ACB 01	QU,TO	3092.	102		26.1	29.9	29.9	30.9	30.7	30.7	30.2	27.1

TABLE 2. DERIVED HYDROLOGIC DATA, KEARNY COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1940-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1940-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1940 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1940-89
22S 35W 23CDD 01	TO	133.3	-38	-25.7	-.6	-.8	-1.1	80	42	-48
22S 36W 28DCC 01		172.9	-6			-.1		43	37	-14
22S 37W 34BBC 01		136.3			-.6					
23S 35W 05ACC 01	TO									
23S 35W 12CCC 01	QU,TO	140.4	-73	-61.3	9.0	-1.5	-2.7	302	229	-24
23S 35W 16BBC 01		137.7	-86		-2.6	-1.8		211	125	-41
23S 35W 25BBB 02	QU,TO	106.0	-60	-46.9	-3.5	-1.2	-2.0	339	279	-18
23S 36W 04CBB 01	TO	145.3	-3	-12.4	-1.9	-.1	-.5	56	53	-5
23S 36W 32BBB 01	TO	247.4	-58	-29.4	-7.0	-1.2	-1.3	116	58	-50
23S 36W 35BBB 01		214.0	-45		-1.7	-.9		124	79	-36
23S 37W 04ABC 01	TO	194.1	-11			-.2		50	39	-22
23S 37W 19CCC 01	TO									
23S 37W 28CCB 01	TO	256.8	-39	-19.9	-.6	-.8	-.9	82	43	-48
24S 35W 09CCC 01	QU,TO	36.2	-6	-5.2	-.9	-.1	-.2	328	322	-2
24S 35W 13CCC 02	QA	15.4	-3	-7.2	-.7	-.1	-.3	334	331	-1
24S 35W 24BCB 01	QA	26.5	-16		-1.1	-.3		330	315	-5
24S 36W 23CBB 02	QU,TO	32.0	-6	-7.2	-1.1	-.1	-.3	284	278	-2
25S 35W 02BAA 01	QU,TO	104.8	-53		-2.2	-1.1		348	295	-15
25S 35W 04BDD 01		71.0	-31		-1.3	-.6		370	339	-8
25S 35W 17AAA 01	QU,TO	101.2	-64		-3.2	-1.3		368	304	-17
25S 35W 26BAB 01	QU,TO	145.3	-75		-4.1	-1.5		380	305	-20
25S 36W 14B 01		97.0			-1.2					
25S 36W 28BBD 01	QU,TO	111.7	-61		-10.4	-1.2		311	250	-20
25S 36W 35CCA 01		107.4			-3.3					
25S 37W 15ABA 02	QA	9.4	-4		-.4	-.1		25	21	-16
25S 37W 25BAD 02	QU,TO,KJ	73.0	-32	-34.9	-1.6	-.7	-1.5	115	83	-28
25S 38W 02BDA 01		96.8								
25S 38W 08CAA 01	QU,TO,KJ	45.0	-15	-7.5	-.1	-.3	-.3	60	45	-25
25S 38W 20ACC 01	QU,TO,KJ	71.5	-7	-8.3	-.2	-.1	-.4	10	4	-60
25S 38W 26ACC 01	QU,TO	76.1	-13	-10.7	.0	-.3	-.5	82	69	-16
26S 35W 06ACC 01	QU	105.0	-47	-44.3		-1.0	-1.9	360	313	-13
26S 35W 29BBD 01		188.8	-76		-3.0	-1.6				
26S 36W 22CCA 01		184.6	-60		-4.2	-1.2		315	255	-19
26S 37W 06ACB 01	QU,TO	27.1		-1.0	3.1				75	

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Kingman County

TABLE 1. WATER LEVELS BY YEAR, KINGMAN COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1944 (Feet)	Depth to Water 1974 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
27S 05W 24CDC 01	QU	1477.		14	12.6	15.4	15.7	15.6	11.1	12.4	12.3	16.3
27S 05W 33ABB 02	QU	1460.	60	25	4.0	7.5	8.0	3.9	3.7	5.1	5.3	9.3
27S 06W 12CCD 01	QU	1488.		7	6.6	10.8	8.9	8.6	7.1	7.1	9.3	11.5
27S 06W 16CCB 01		1462.	17	1	.9	3.3	2.5	2.4	2.6	2.6	1.4	3.9
27S 07W 03ADC 01	QU	1545.	25	20	8.2	11.1	8.9	8.4	5.6	6.9	7.8	11.0
27S 07W 23BCC 01	QU	1567.	14		7.3	8.4	8.0	7.0	6.1	6.6	6.3	7.9
27S 08W 14DDC 01	QU	1610.		2	.6							2.4
27S 08W 17DAB 01	QU	1665.	118	45	34.4	36.2	37.1	36.8	34.7	35.2	33.0	35.5
27S 08W 25DAD 01		1622.	67			20.9	21.9	20.0	18.4	19.0	15.1	19.6
27S 08W 35CBC 01	QU	1610.	54	32	20.4	21.8	22.3	21.7	20.3	22.7	20.5	21.9
27S 09W 15ABA 01	QU	1702.	153	50	49.8	48.3	48.1	47.7	45.8	45.6	44.8	45.7
27S 09W 29AAA 01		1700.		30		23.6	24.3	24.3	23.1	24.3	23.2	23.7
27S 10W 03DDD 01	QU	1743.	145	33	51.0	50.9	51.6	52.0	50.6	51.5	50.2	51.9
27S 10W 17DDD 01	QU	1755.	171	77	61.9	62.6	63.2	63.2	62.7	63.3	61.8	62.9
27S 10W 24DAD 01	QU	1692.	117	20	16.0	15.9	16.2	18.4	15.0	18.5	14.9	16.5
28S 07W 29CDD 01	QU	1601.	151	30	26.6	27.0	26.6	25.8	24.9	25.2	24.2	25.4
28S 07W 35CCD 01	QU	1585.		23	21.9	21.9	21.3	21.2	20.2	20.4	19.7	20.7
28S 08W 21BBB 01	QU	1562.	49	1	2.3	2.6	2.8	2.4	1.9	2.1	1.6	2.4
28S 08W 26ABC 01	QU	1652.		77	63.2	69.0	61.6	62.7	59.6	63.0	63.8	60.1
28S 09W 01BCC 01		1580.	55	15	7.5	7.7	7.9	7.6	6.7	7.2	6.9	8.1
28S 09W 21AAA 01	QU	1666.	118	34	28.1	28.9	29.3	28.7	27.1	27.9	26.8	27.8
28S 09W 29CCC 01	QU	1708.	107	30	32.7	33.8	33.6	33.0	31.3		27.4	32.2
28S 09W 34AAB 01	QU	1690.	75	41	42.8	44.2	44.5	43.9	41.7	41.6	40.8	41.7
28S 10W 16BCB 01	QU	1756.	154	51	50.2	50.8	51.2	53.8	48.8	49.0	48.5	49.7
29S 10W 19DDB 01		1765.								23.2	23.3	24.5
30S 10W 05BBD 01		1770.										43.7
30S 10W 28DAC 01		1730.										20.3

TABLE 2. DERIVED HYDROLOGIC DATA, KINGMAN COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1944-89 (Feet)	Water-Level Change 1974-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1944-89 (Feet/year)	Average Annual Water-Level Change 1974-89 (Feet/year)	Saturated Thickness in 1944 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1944-89
27S 05W 24CDC 01	QU	16.3	-2	-3.7	-4.0		-.2			
27S 05W 33ABB 02	QU	9.3	16	-5.3	-4.0	.4	-.4	35	51	46
27S 06W 12CCD 01	QU	11.5	-5	-4.9	-2.2	-.1	-.3			
27S 06W 16CCB 01		3.9	-3	-3.0	-2.5	-.1	-.2	16	13	-19
27S 07W 03ADC 01	QU	11.0	9	-2.8	-3.2	.2	-.2	5	14	180
27S 07W 23BCC 01	QU	7.9		-.6	-1.6				6	
27S 08W 14DDC 01	QU	2.4	0	-1.8			-.1			
27S 08W 17DAB 01	QU	35.5	10	-1.1	-2.5	.2	-.1	73	83	14
27S 08W 25DAD 01		19.6			-4.5				47	
27S 08W 35CBC 01	QU	21.9	10	-1.5	-1.4	.2	-.1	22	32	45
27S 09W 15ABA 01	QU	45.7	4	4.1	-.9	.1	.3	103	107	4
27S 09W 29AAA 01		23.7	6		-.5	.1				
27S 10W 03DDD 01	QU	51.9	-19	-.9	-1.7	-.4	-.1	112	93	-17
27S 10W 17DDD 01	QU	62.9	14	-1.0	-1.1	.3	-.1	94	108	15
27S 10W 24DAD 01	QU	16.5	4	-.5	-1.6	.1		97	101	4
28S 07W 29CDD 01	QU	25.4	5	1.2	-1.2	.1	.1	121	126	4
28S 07W 35CCD 01	QU	20.7	2	1.2	-1.0		.1			
28S 08W 21BBB 01	QU	2.4	-1	-.1	-.8			48	47	-2
28S 08W 26ABC 01	QU	60.1	17	3.1	3.7	.4	.2			
28S 09W 01BCC 01		8.1	7	-.6	-1.2	.2		40	47	18
28S 09W 21AAA 01	QU	27.8	6	.3	-1.0	.1		84	90	7
28S 09W 29CCC 01	QU	32.2	-2	.5	-4.8			77.	75	-3
28S 09W 34AAB 01	QU	41.7	-1	1.1	-.9		.1	34	33	-3
28S 10W 16BCB 01	QU	49.7	1	.5	-1.2			103	104	1
29S 10W 19DDB 01		24.5			-1.2					
30S 10W 05BBD 01		43.7								
30S 10W 28DAC 01		20.3								

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Kiowa County

TABLE 1. WATER LEVELS BY YEAR, KIOWA COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1944 (Feet)	Depth to Water 1974 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
27S 16W 10BAC 01	QU	2088.	248	28	12.1	25.7	25.4	26.0	25.4	28.0	25.9	29.4
27S 16W 19BBD 01	QU	2112.	182	37	20.3	31.8	32.2	32.6	32.1	32.7	31.0	33.6
27S 16W 28CDD 01	QU	2120.	168	65	56.7	64.9	66.0	66.5	65.6	67.7	65.8	68.1
27S 17W 21ADC 01	QU	2140.	175	39	24.4	34.4	33.8	34.4	34.1	34.7	33.2	35.3
27S 18W 13AAA 01	QU	2152.	219	24	15.6	24.1	23.8	24.3	23.3	24.1	22.0	26.2
27S 18W 18DDC 01	QU	2192.	187	26	15.7	18.1	17.6	19.4	18.9	20.0	20.0	23.3
27S 18W 22ADC 01	QU	2175.	210	29	14.1	23.7	23.9	23.9	23.1	23.8	22.5	24.3
27S 18W 36CCA 01												41.3
27S 19W 28CBD 01	QU	2262.	187	60	67.9	73.3	73.2	73.7	73.3	73.4	73.1	74.6
27S 20W 26ABD 01	QU	2274.	174	38	40.6	44.3	45.0	44.3	42.9	42.9	42.0	43.3
27S 20W 32ABD 01	QU	2308.	108	36	45.2	45.2	45.3	46.5	46.0	45.7	47.0	46.9
28S 16W 12BCA 01	QU	2111.	211	92	101.0	99.1	98.4	101.1	100.9	100.5	100.2	101.1
28S 16W 17AAC 01	QU	2165.	245	120	118.0	116.3	116.0	117.3	117.1	117.0	116.9	119.2
28S 16W 31DCA 01		2110.	192	75				70.3	71.5	70.7	69.2	69.6
28S 17W 01CAB 01	QU	2135.	180	65	55.6	59.6	59.7	60.1	59.8	60.0	59.9	60.8
28S 17W 05DDB 01	QU	2163.	163	65	62.0	58.1	58.0	60.5	60.3	60.1	59.0	59.6
28S 17W 15DDB 01	QU	2178.	191	105	96.0	96.0	96.4	97.0	96.7	96.6	96.4	97.2
28S 18W 09BAC 01	QU	2221.	182	66	61.7	64.0	64.7	64.9	64.5	64.3	64.4	65.3
28S 18W 19CCB 01	QU	2268.		103	88.0	88.1	88.6	89.0	88.6	88.7	90.2	89.0
28S 18W 26DCA 01	QU	2231.	181	119	119.0	120.0	120.5	121.3	119.9	120.3	119.8	
28S 19W 10AAC 01	TO					92.5	92.3	92.7	92.8	93.0	92.6	93.7
28S 19W 30CBC 01	QU	2335.	185	116	115.0	112.7	113.5	113.4	112.6	113.8	112.3	113.5
28S 19W 33CBD 01	QU	2325.	220	133	134.0	133.1	135.5	133.2	133.9	134.6	133.8	134.1
28S 20W 12BBD 01	QU	2288.	190	64	55.7	56.9	57.0	57.5	57.2	57.0	56.3	56.8
28S 20W 30ACA 01	QU	2319.	69	32	39.4	41.4	41.7	42.1	41.6	41.1	41.2	42.3
29S 16W 02ADB 01												50.1
29S 17W 04ABC 01	QU	2125.	122	60	50.0	52.1	51.9	51.9	51.6	51.9	51.3	51.6
29S 17W 12DAA 01												48.1
29S 18W 02ACC 01	TO	2251.	196			143.4	144.4	143.4	143.0	142.9	142.6	142.9
29S 18W 07BBD 01	QU	2311.	256	155	153.5	153.8	155.2	154.0	153.3	153.5	153.7	153.6
29S 19W 22BAA 01	QU	2340.	250	158	157.0	156.3	157.7	156.7	156.1	156.7	156.5	156.4
29S 20W 11CDD 01	QU	2398.		170	168.0	167.1	166.8	166.9	166.1	166.4	166.4	166.5

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TABLE 2. DERIVED HYDROLOGIC DATA, KIOWA COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1944-89 (Feet)	Water-Level Change 1974-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1944-89 (Feet/year)	Average Annual Water-Level Change 1974-89 (Feet/year)	Saturated Thickness in 1944 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1974-89
27S 16W 10BAC 01	QU	29.4	-1	-17.3	-3.5		-1.2	220	219	0
27S 16W 19BBD 01	QU	33.6	3	-13.3	-2.6	.1	-.9	145	148	2
27S 16W 28CDD 01	QU	68.1	-3	-11.4	-2.3	-.1	-.8	103	100	-3
27S 17W 21ADC 01	QU	35.3	4	-10.9	-2.1	.1	-.7	136	140	3
27S 18W 13AAA 01	QU	26.2	-2	-10.6	-4.2		-.7	195	193	-1
27S 18W 18DDC 01	QU	23.3	3	-7.6	-3.3	.1	-.5	161	164	2
27S 18W 22ADC 01	QU	24.3	5	-10.2	-1.8	.1	-.7	181	186	3
27S 18W 36CCA 01		41.3								
27S 19W 28CBD 01	QU	74.6	-15	-6.7	-1.5	-.3	-.4	127	112	-12
27S 20W 26ABD 01	QU	43.3	-5	-2.7	-1.3	-.1	-.2	136	131	-4
27S 20W 32ABD 01	QU	46.9	-11	-1.7	.1	-.2	-.1	72	61	-15
28S 16W 12BCA 01	QU	101.1	-9	-.1	-.9	-.2		119	110	-8
28S 16W 17AAC 01	QU	119.2	1	-1.2	-2.3		-.1	125	126	1
28S 16W 31DCA 01		69.6	5		-.4	.1		117	122	4
28S 17W 01CAB 01	QU	60.8	4	-5.2	-.9	.1	-.3	115	119	3
28S 17W 05DDB 01	QU	59.6	5	2.4	-.6	.1	.2	98	103	5
28S 17W 15DDB 01	QU	97.2	8	-1.2	-.8	.2	-.1	86	94	9
28S 18W 09BAC 01	QU	65.3	1	-3.6	-.9		-.2	116	117	1
28S 18W 19CCB 01	QU	89.0	14	-1.0	1.2	.3	-.1			
28S 18W 26DCA 01	QU									
28S 19W 10AAC 01	TO	93.7			-1.1					
28S 19W 30CBC 01	QU	113.5	3	1.5	-1.2	.1	.1	69	72	4
28S 19W 33CBD 01	QU	134.1	-1	-.1	-.3			87	86	-1
28S 20W 12BBD 01	QU	56.8	7	-1.1	-.5	.2	-.1	126	133	6
28S 20W 30ACA 01	QU	42.3	-10	-2.9	-1.1	-.2	-.2	37	27	-27
29S 16W 02ADB 01		50.1								
29S 17W 04ABC 01	QU	51.6	8	-1.6	-.3	.2	-.1	62	70	13
29S 17W 12DAA 01		48.1								
29S 18W 02ACC 01	TO	142.9			-.3				53	
29S 18W 07BBD 01	QU	153.6	1	-.1	.1			101	102	1
29S 19W 22BAA 01	QU	156.4	2	.6	.1			92	94	2
29S 20W 11CDD 01	QU	166.5	4	1.5	-.1	.1	.1			

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Labette County

TABLE 1. WATER LEVELS BY YEAR, LABETTE COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1944 (Feet)	Depth to Water 1974 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
31S 21E 15CCC 02		836.			7.3	8.4	7.6	.3	10.5	6.9	7.6	13.6

TABLE 2. DERIVED HYDROLOGIC DATA, LABETTE COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1944-89 (Feet)	Water-Level Change 1974-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1944-89 (Feet/year)	Average Annual Water-Level Change 1974-89 (Feet/year)	Saturated Thickness in 1944 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1944-89
31S 21E 15CCC 02		13.6		-6.3	-6.0		-.4			

TABLE 1. WATER LEVELS BY YEAR, LANE COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
16S 29W 26CCD 01	TO	2803.	140	90	89.2		104.7	105.0	105.2	106.5	106.0	107.6
16S 29W 33BAB 01	TO	2812.										109.9
16S 30W 24DCC 01	TO	2840.	155	109			121.5	121.4	120.5	121.9	121.5	122.4
16S 30W 29CDD 01	TO	2884.	174	121		128.3	128.6	128.5	127.9	128.4	128.2	128.9
16S 30W 34DAB 01	TO	2857.	172	116		131.7	127.5	125.2	123.0	125.9		
17S 27W 20CCC 01	TO	2717.	127	84		102.7	102.2	102.4			100.5	100.9
17S 27W 26CCC 01	TO	2678.	127	80		96.3	96.8	96.7	96.7	96.4	95.7	95.3
17S 28W 07BBB 01	TO	2785.	170	83		98.0	99.2	98.5	98.4	99.2	99.5	100.7
17S 28W 15BBC 01	TO	2760.	150	84		103.5	104.6	104.8	104.8	105.7	105.6	106.4
17S 28W 26ABB 01	TO	2735.	140	85	88.2	101.3	102.9	102.1	102.3	102.5	102.6	103.3
17S 28W 34CBB 01	TO	2747.	132	78		89.9	90.3	90.6	90.7	91.0	91.0	91.1
17S 29W 03BDC 01	TO	2816.	156	102		113.4	113.7	116.3	114.2	114.8	116.1	115.8
17S 29W 36BAA 01	TO	2784.	119	70		84.9	84.9	85.5	85.2	87.0	88.3	88.0
17S 30W 13CBB 01	TO	2846.	151	84	83.9	89.8	90.3	90.6	90.8	91.2	91.4	92.7
17S 30W 20BBB 01	TO	2889.	165	87		102.6	101.9	104.2	102.5			129.5
18S 27W 13CCC 01	TO	2674.	95	88	86.1	86.2	86.5	86.4	86.3	86.2	86.4	86.0
18S 28W 18ACC 01	TO	2764.	95	51				68.3	69.1		67.1	65.9
18S 29W 04DAD 01	TO	2801.	110	56		66.1	66.9	66.9	66.5	70.6	67.3	68.9
18S 30W 02AAA 01	TO	2849.	124	68		88.0	87.8	86.9	86.3	85.5	88.4	90.5
18S 30W 04BAB 01	TO	2872.	125	69			75.1	74.7	74.8	75.5	75.9	76.7
18S 30W 23AAA 01	TO	2848.	150	55		65.3	65.9	64.6	64.4	63.4	64.6	63.7

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TABLE 2. DERIVED HYDROLOGIC DATA, LANE COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
16S 29W 26CCD 01	TO	107.6	-18	-18.4	-1.6	-.5	-.8	50	32	-36
16S 29W 33BAB 01	TO	109.9								
16S 30W 24DCC 01	TO	122.4	-13		-.9	-.3		46	33	-28
16S 30W 29CDD 01	TO	128.9	-8		-.7	-.2		53	45	-15
16S 30W 34DAB 01	TO									
17S 27W 20CCC 01	TO	100.9	-17		-.4	-.4		43	26	-40
17S 27W 26CCC 01	TO	95.3	-15		.4	-.4		47	32	-32
17S 28W 07BBB 01	TO	100.7	-18		-1.2	-.5		87	69	-21
17S 28W 15BBC 01	TO	106.4	-22		-.8	-.6		66	44	-33
17S 28W 26ABB 01	TO	103.3	-18	-15.1	-.7	-.5	-.7	55	37	-33
17S 28W 34CBB 01	TO	91.1	-13		-.1	-.3		54	41	-24
17S 29W 03BDC 01	TO									
17S 29W 36BAA 01	TO	88.0	-18		.3	-.5		49	31	-37
17S 30W 13CBB 01	TO	92.7	-9	-8.8	-1.3	-.2	-.4	67	58	-13
17S 30W 20BBB 01	TO	129.5	-43			-1.1		78	36	-54
18S 27W 13CCC 01	TO	86.0	2	.1	.4	.1		7	9	29
18S 28W 18ACC 01	TO	65.9	-15		1.2	-.4		44	29	-34
18S 29W 04DAD 01	TO	68.9	-13		-1.6	-.3		54	41	-24
18S 30W 02AAA 01	TO	90.5	-23		-2.1	-.6		56	34	-39
18S 30W 04BAB 01	TO	76.7	-8		-.8	-.2		56	48	-14
18S 30W 23AAA 01	TO	63.7	-9		.9	-.2		95	86	-9

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Leavenworth County

TABLE 1. WATER LEVELS BY YEAR, LEAVENWORTH COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1944 (Feet)	Depth to Water 1974 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
12S 22E 21BCD 01		793.			21.7	24.1	26.4	25.1	26.9	25.8	28.5	30.8
12S 22E 22CAA 01		785.			13.7	16.8	21.1	20.8	18.6	19.2	22.6	25.1

TABLE 2. DERIVED HYDROLOGIC DATA, LEAVENWORTH COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1944-89 (Feet)	Water-Level Change 1974-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1944-89 (Feet/year)	Average Annual Water-Level Change 1974-89 (Feet/year)	Saturated Thickness in 1944 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1944-89
12S 22E 21BCD 01		30.8		-9.1	-2.3		-.6			
12S 22E 22CAA 01		25.1		-11.4	-2.5		-.8			

Logan County

TABLE 1. WATER LEVELS BY YEAR, LOGAN COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
11S 32W 04ACD 01	TO	3059.	208	96	102.0	110.5	112.8	110.8	111.7	113.6	112.6	110.7
11S 32W 19AAB 01	TO	3073.	183	92		102.3	102.3	103.0	103.7	103.3	103.3	104.5
11S 32W 31CCD 01		3054.						70.8	68.7	71.3	70.4	70.1
11S 32W 36ABA 01	TO	3009.						89.2	91.4	89.2	91.9	89.9
11S 33W 10BDD 01		3113.						116.0	116.6		117.0	117.2
11S 33W 14DCC 01	TO	3117.						130.5	131.3		132.3	132.2
11S 34W 13AAB 01	TO	3184.						143.3	143.8	143.9	143.7	144.2
11S 34W 16CDB 01	TO	3218.	170	122	118.4	119.7	120.1	121.8	121.1	120.2	120.2	120.5
11S 35W 01DCC 01	TO	3268.						154.1	153.5	152.4	153.1	153.5
11S 36W 06ADD 02	TO	3380.	220	142	137.0	164.5	164.6	165.8	167.6	168.9	165.2	166.5
11S 37W 01DCD 01		3369.									167.6	169.5
13S 36W 20CCB 01	QA	3023.	30			11.9	11.9					10.9
15S 37W 29AAA 01	TO	3420.	60			34.5	32.8	32.1	32.9	33.8	33.4	33.5

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TABLE 2. DERIVED HYDROLOGIC DATA, LOGAN COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
11S 32W 04ACD 01	TO	110.7	-15	-8.7	1.9	-.4	-.4	112	97	-13
11S 32W 19AAB 01	TO	104.5	-13		-1.2	-.3		91	79	-13
11S 32W 31CCD 01		70.1			.3					
11S 32W 36ABA 01	TO	89.9			2.0					
11S 33W 10BDD 01		117.2			-.2					
11S 33W 14DCC 01	TO	132.2			.1					
11S 34W 13AAB 01	TO	144.2			-.5					
11S 34W 16CDB 01	TO	120.5	2	-2.1	-.3	.1	-.1	48	50	4
11S 35W 01DCC 01	TO	153.5			-.4					
11S 36W 06ADD 02	TO	166.5	-25	-29.5	-1.3	-.6	-1.3	78	54	-31
11S 37W 01DCD 01		169.5			-1.9					
13S 36W 20CCB 01	QA	10.9							19	
15S 37W 29AAA 01	TO	33.5			-.1				27	

TABLE 1. WATER LEVELS BY YEAR, MCPHERSON COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1944 (Feet)	Depth to Water 1974 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
18S 03W 30CCC 01	QU	1515.					111.7	112.0	111.2	110.8	111.1	111.8
18S 04W 21CCC 01	QU	1412.					11.2	10.5	9.6	10.2	9.9	11.4
19S 01W 32DAC 01	QU	1590.					53.2	47.4	46.2	46.3	45.1	45.1
19S 03W 16BCB 01	QU	1511.					101.1	101.7	100.5	99.7	104.3	99.6
19S 03W 31BBA 01	QU	1494.						81.1	81.2	81.4	79.4	82.2
19S 04W 15AAC 01		1494.						85.8	85.8	85.9		85.7
20S 01W 22BBB 01	QU	1527.					9.5	11.0	7.3	6.9	5.6	9.5
20S 01W 29DDD 01	QU	1530.						4.7	6.2	7.3	5.6	8.1
20S 03W 22DAA 01	QU	1473.							37.5	37.6	37.5	38.6
20S 03W 30BBA 01	QU	1476.						53.4	53.5	52.6	53.7	54.6
20S 04W 15BDD 01	QU	1474.						52.7	52.5			53.8
20S 04W 27DAC 01	QU	1467.						43.0	40.7	41.5	41.5	43.7
21S 02W 12BBB 01	QU	1503.						11.4	10.3	10.6	10.1	11.8
21S 02W 28CBA 01	QU	1467.				37.9	37.9		37.3	35.5	35.3	35.2
21S 02W 36ACA 01	QU	1475.						11.2	8.7	9.4	11.1	12.7
21S 03W 06CBD 01	QU	1464.						44.8	44.2	43.6	43.1	44.8
21S 03W 22BBB 01	QU	1450.						34.6	34.0	33.9	29.8	33.0
21S 03W 33BBC 01	QU	1461.					55.8	47.7	45.2	43.8	42.6	45.7
21S 04W 26CDC 01	QU	1445.						33.8	31.3	30.2	29.2	34.3

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TABLE 2. DERIVED HYDROLOGIC DATA, MCPHERSON COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1944-89 (Feet)	Water-Level Change 1974-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1944-89 (Feet/year)	Average Annual Water-Level Change 1974-89 (Feet/year)	Saturated Thickness in 1944 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1944-89
18S 03W 30CCC 01	QU	111.8			-.7					
18S 04W 21CCC 01	QU	11.4			-1.5					
19S 01W 32DAC 01	QU	45.1			.0					
19S 03W 16BCB 01	QU	99.6			4.7					
19S 03W 31BBA 01	QU	82.2			-2.8					
19S 04W 15AAC 01		85.7								
20S 01W 22BBB 01	QU	9.5			-3.9					
20S 01W 29DDD 01	QU	8.1			-2.5					
20S 03W 22DAA 01	QU	38.6			-1.1					
20S 03W 30BBA 01	QU	54.6			-.9					
20S 04W 15BDD 01	QU	53.8								
20S 04W 27DAC 01	QU	43.7			-2.2					
21S 02W 12BBB 01	QU	11.8			-1.7					
21S 02W 28CBA 01	QU	35.2			.1					
21S 02W 36ACA 01	QU	12.7			-1.6					
21S 03W 06CBD 01	QU	44.8			-1.7					
21S 03W 22BBB 01	QU	33.0			-3.2					
21S 03W 33BBC 01	QU	45.7			-3.1					
21S 04W 26CDC 01	QU	34.3			-5.1					

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TABLE 1. WATER LEVELS BY YEAR, MEADE COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1940 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
30S 26W 04CBB 01	QU,TO	2525.	415	11	20.7	47.7	46.5	44.7	45.8	48.8	49.8	58.4
30S 26W 13ABB 01		2575.							64.0			
30S 26W 32DDD 01		2488.	388	16				19.3	17.9	18.7	17.3	19.7
30S 27W 20ABA 01		2564.						56.0	56.8	60.4	62.7	71.3
30S 27W 23ABB 01	QU,TO	2531.	321	12	16.5	44.0	42.7	41.4	42.0	44.4		
30S 27W 27BBB 01		2518.							25.5	22.1	24.7	37.3
30S 27W 32DDD 01		2475.	315	26	11.8	9.1	7.5	7.0	7.1	7.7	8.1	9.2
30S 28W 17ABB 01	QU,TO	2697.	517	102	109.6	136.1	136.7	139.0	141.3	144.7	146.7	164.5
30S 28W 33AAA 01		2646.	466	85				116.5	119.2	120.3	124.2	124.8
30S 29W 23CAD 01	QU,TO	2744.	544	134	141.3	176.3	179.3	181.9	178.0	180.0	181.2	184.3
30S 29W 28BBB 01	QU,TO	2758.	553	137	137.8	174.7	175.5	175.2	176.2	175.8	177.2	186.8
30S 30W 06CCC 01		2824.	449	152				185.8	199.5	201.3		207.4
30S 30W 28ABB 01	QU,TO	2803.	508	150	145.9	184.1	183.6	186.1	188.6	191.7		205.8
31S 26W 30BBB 01	QU,TO	2516.		98		102.5		102.5	102.1	102.0	103.6	105.3
31S 27W 20AAA 02	QU,TO	2466.	326	15		30.6	30.0	27.1	27.1	28.1	29.3	37.8
31S 28W 02CCC 01		2623.						123.5	124.4	121.2	122.3	129.1
31S 28W 10BCB 01	QU,TO	2643.	463	114	112.2	133.1	134.2	134.7	139.4	136.9	138.5	146.3
31S 28W 26ABB 01		2496.							30.5	27.0		37.4
31S 29W 02DBB 01		2720.	420	130				178.6	175.2	178.0		173.3
31S 29W 25AAA 02	QU,TO	2698.	438	145	156.5	178.9	177.7	177.5	178.3	181.2	182.8	
31S 29W 30AAA 01	QU,TO	2741.	461	136	130.2	161.3	162.5	160.5	169.0	166.7	166.2	173.9
31S 30W 16BBC 01	QU,TO	2770.	505	136	133.9	177.9	179.3	182.8	186.3	188.9	191.1	197.7
32S 28W 04ADD 01	QU,TO	2546.	366	63	66.1	71.2	72.7	71.6	73.9	71.4	74.4	74.0
32S 29W 05CC 01	QU,TO	2719.	464	139	137.3	163.1	164.0	163.2	168.2	167.7	168.6	169.7
32S 29W 27AAB 02	QU,TO	2688.	555	143		147.0	146.9	148.5	149.8	149.5	149.4	151.8
32S 30W 09CCC 01	QU,TO	2764.	504	155	156.7	191.8	191.1	192.4	192.9	194.3	197.0	202.2
32S 30W 28BBC 01	QU,TO	2759.	459	167	170.2	204.3	206.1	205.8	212.9	211.3	206.5	218.0
33S 28W 29BCB 01	TO	2371.	160	14	14.3	16.3	15.9	14.4	14.8	15.6	15.3	17.3
33S 29W 36AAB 01	QU,TO	2463.	283	81	81.3	86.8	86.5	86.0	87.1	87.2	90.9	94.5
33S 30W 21ACC 01		2725.						180.7	183.2		183.8	204.2
33S 30W 35CBB 01	QU,TO	2684.	544	161	157.8	175.1		171.1	179.2	180.3	167.4	
34S 28W 05BDA 01		2350.							25.8	24.7	25.2	26.4
34S 30W 22CBC 01	TO,TO	2675.	675	191		196.4	196.2	197.1	197.7	198.3	198.5	199.7
35S 30W 10CDA 01	QA,QU,TO	2393.	318	23	23.1	26.7	25.5	25.0	25.9	25.4	25.2	26.5

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TABLE 2. DERIVED HYDROLOGIC DATA, MEADE COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1940-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1940-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1940 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1940-89
30S 26W 04CBB 01	QU,TO	58.4	-47	-37.7	-8.6	-1.0	-1.6	404	357	-12
30S 26W 13ABB 01										
30S 26W 32DDD 01		19.7	-4		-2.4	-.1		372	368	-1
30S 27W 20ABA 01		71.3			-8.6					
30S 27W 23ABB 01	QU,TO									
30S 27W 27BBB 01		37.3			-12.6					
30S 27W 32DDD 01		9.2	17	2.6	-1.1	.3	.1	289	306	6
30S 28W 17ABB 01	QU,TO	164.5	-63	-54.9	-17.8	-1.3	-2.4	415	353	-15
30S 28W 33AAA 01		124.8	-40		-.6	-.8		381	341	-10
30S 29W 23CAD 01	QU,TO	184.3	-50	-43.0	-3.1	-1.0	-1.9	410	360	-12
30S 29W 28BBB 01	QU,TO	186.8	-50	-49.0	-9.6	-1.0	-2.1	416	366	-12
30S 30W 06CCC 01		207.4	-55			-1.1		297	242	-19
30S 30W 28ABB 01	QU,TO	205.8	-56	-59.9		-1.1	-2.6	358	302	-16
31S 26W 30BBB 01	QU,TO	105.3	-7		-1.7	-.1				
31S 27W 20AAA 02	QU,TO	37.8	-23		-8.5	-.5		311	288	-7
31S 28W 02CCC 01		129.1			-6.8					
31S 28W 10BCB 01	QU,TO	146.3	-32	-34.1	-7.8	-.7	-1.5	349	317	-9
31S 28W 26ABB 01		37.4								
31S 29W 02DBB 01		173.3	-43			-.9		290	247	-15
31S 29W 25AAA 02	QU,TO									
31S 29W 30AAA 01	QU,TO	173.9	-38	-43.7	-7.7	-.8	-1.9	325	287	-12
31S 30W 16BBC 01	QU,TO	197.7	-62	-63.8	-6.6	-1.3	-2.8	369	307	-17
32S 28W 04ADD 01	QU,TO	74.0	-11	-7.9	.4	-.2	-.3	303	292	-4
32S 29W 05CC 01	QU,TO	169.7	-31	-32.4	-1.1	-.6	-1.4	325	294	-10
32S 29W 27AAB 02	QU,TO	151.8	-9		-2.4	-.2		412	403	-2
32S 30W 09CCC 01	QU,TO	202.2	-47	-45.5	-5.2	-1.0	-2.0	349	302	-13
32S 30W 28BBC 01	QU,TO	218.0	-51	-47.8	-11.5	-1.0	-2.1	292	241	-17
33S 28W 29BCB 01	TO	17.3	-3	-3.0	-2.0	-.1	-.1	146	143	-2
33S 29W 36AAB 01	QU,TO	94.5	-14	-13.2	-3.6	-.3	-.6	202	189	-6
33S 30W 21ACC 01		204.2			-20.4					
33S 30W 35CBB 01	QU,TO									
34S 28W 05BDA 01		26.4			-1.2					
34S 30W 22CBC 01	TO,TO	199.7	-9		-1.2	-.2		484	475	-2
35S 30W 10CDA 01	QA,QU,TO	26.5	-4	-3.4	-1.3	-.1	-.1	295	292	-1

TABLE 1. WATER LEVELS BY YEAR, MORTON COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1940 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
31S 39W 18CCC 01	QU,TO	3246.	226	116	135.6	197.7	191.3			204.8	203.7	214.4
31S 39W 33BCC 01	QU,TO,KJ	3253.	278	123	160.0	222.7	222.4	220.6	231.0	224.9	233.2	242.6
31S 40W 01DA 01	QU,TO	3236.	276	111	133.1	181.3	180.7	187.1	189.8	191.4	191.2	
31S 40W 29ABB 01	QU,TO	3331.	233	141	166.1	182.4	182.2		183.6	184.6	183.2	184.7
31S 41W 07CDD 01	KJ	3441.				135.8	135.5	135.3	135.6	135.9		135.9
31S 41W 31CBB 01	KJ	3441.			73.0	94.2	93.5	91.3	99.2	100.9	94.9	96.1
31S 42W 29AAB 01	QU,TO,KJ	3510.		74	93.1	100.7	102.7	102.0	101.1	100.3	101.0	99.1
31S 43W 03CB 01	QU,TO,KJ	3609.		61	65.7	64.8	65.2	64.0		64.3	64.5	65.4
31S 43W 14DDC 01	KU	3576.			67.7	69.0	69.3	68.2	69.8	70.8	70.2	71.6
32S 40W 07BDC 01		3302.		52				106.8			109.3	110.5
32S 40W 21ADB 01	QU,TO	3342.						183.8	191.0	193.7	193.6	199.9
32S 41W 15CDC 01	QU,TO,KJ	3360.			18.0	19.8	21.1	21.2	20.0	21.6	22.0	21.7
32S 41W 35DCC 01		3420.							173.8	168.1	180.3	181.0
32S 42W 14CCC 01	QU,TO,KJ	3500.			90.6	124.7	128.6	122.0	127.0	127.8	124.1	129.7
32S 42W 21BCC 01	QU,TO,KJ	3526.	186	64	113.6	151.8	158.7	152.6			155.1	168.3
32S 42W 26CDD 01	QU,TO,KJ	3485.	175	75	102.0	147.8		153.4		151.0	119.2	121.4
32S 43W 08CBD 01		3615.		45				89.3	95.1	94.5	93.3	97.7
32S 43W 17DCC 01	TO	3626.	146	60	60.0	71.6	75.1	71.6		74.1	73.0	74.9
32S 43W 28BBC 01		3526.						62.0	63.2		64.5	
33S 39W 04DBB 01	TO	3237.	357	87				97.1	97.5	97.8	97.8	101.7
33S 39W 16ABB 01	QU,TO	3234.	344	82	70.0	76.7	78.7	75.0	76.3	77.2	77.5	86.7
33S 40W 27CCC 01	QU,TO	3308.	323	98	80.0	81.7	91.7	84.2	82.7	81.3	81.5	82.2
33S 41W 03AAD 01	QU,TO,KJ	3425.	445	113	117.2	145.0	147.3	139.6	144.5	140.9	146.6	148.0
33S 41W 33DDD 01	QU	3377.	157	68	69.4	67.2	68.6	68.1	70.4	69.1	68.6	68.0
33S 42W 05DCC 01		3235.						66.9			70.1	
33S 42W 21BCB 01	QU,TO	3527.	167	87	85.0	99.2	102.9	88.2	89.2	89.2	88.6	89.5
33S 43W 08BDA 01	QU,TO,KJ	3643.	183	86	95.0		107.8		105.4	105.3	107.3	109.1
33S 43W 09DBA 01		3612.							87.5		88.9	90.4
34S 39W 06CCA 01		3310.	355	140				121.3	121.0	123.0	120.7	121.8
34S 40W 16ABB 01		3363.	388	163				144.8	145.1	144.9	144.7	145.9
34S 41W 26DCD 01		3360.	290	120				157.0	158.2	159.2	160.3	162.0
34S 41W 28CBA 01		3299.						118.6	119.7	120.1	121.1	121.2
34S 42W 05BDC 01	QU,KJ	3449.	69	31	38.4	39.1	40.9	39.3	39.6			39.7
34S 42W 22CDB 01	QU,TO	3492.	112	92					79.4	79.2		79.4
34S 43W 07BDD 01	KJ	3655.		125	147.2		150.3	150.8	149.3	149.5	149.7	149.9
35S 39W 06CDD 01		3330.	510	175				210.1	211.5	212.8	212.2	229.3
35S 40W 03BBB 02		3369.								178.5	178.7	179.9
35S 41W 16CCD 01		3385.		80				217.2		215.6	216.5	225.9
35S 42W 02DBB 01		3554.						168.2	169.0	169.5	170.1	
35S 43W 04AAC 01		3554.	179	76				79.7	81.1	83.0	78.4	
35S 43W 13BDB 01	QU,TO	3615.	305	151		185.8	190.2	183.1	184.2	190.3	186.5	192.2

TABLE 2. DERIVED HYDROLOGIC DATA, MORTON COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1940-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1940-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1940 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1940-89
31S 39W 18CCC 01	QU,TO	214.4	-98	-78.8	-10.7	-2.0	-3.4	110	12	-89
31S 39W 33BCC 01	QU,TO,KJ	242.6	-120	-82.6	-9.4	-2.4	-3.6	155	35	-77
31S 40W 01DA 01	QU,TO									
31S 40W 29ABB 01	QU,TO	184.7	-44	-18.6	-1.5	-.9	-.8	92	48	-48
31S 41W 07CDD 01	KJ	135.9								
31S 41W 31CBB 01	KJ	96.1		-23.1	-1.2		-1.0			
31S 42W 29AAB 01	QU,TO,KJ	99.1	-25	-6.0	1.9	-.5	-.3			
31S 43W 03CB 01	QU,TO,KJ	65.4	-4	.3	-.9	-.1				
31S 43W 14DDC 01	KU	71.6		-3.9	-1.4		-.2			
32S 40W 07BDC 01		110.5	-59		-1.2	-1.2				
32S 40W 21ADB 01	QU,TO	199.9	-68	-43.9	-6.3	-1.4	-1.9	105	37	-65
32S 41W 15CDC 01	QU,TO,KJ	21.7		-3.7	.3		-.2			
32S 41W 35DCC 01		181.0			-.7					
32S 42W 14CCC 01	QU,TO,KJ	129.7		-39.1	-5.6		-1.7			
32S 42W 21BCC 01	QU,TO,KJ	168.3	-104	-54.7	-13.2	-2.1	-2.4	122	18	-85
32S 42W 26CDD 01	QU,TO,KJ	121.4	-46	-19.4	-2.2	-.9	-.8	100	54	-46
32S 43W 08CBD 01		97.7	-53		-4.4	-1.1				
32S 43W 17DCC 01	TO	74.9	-15	-14.9	-1.9	-.3	-.6	86	71	-17
32S 43W 28BBC 01										
33S 39W 04DBB 01	TO	101.7	-15		-3.9	-.3		270	255	-6
33S 39W 16ABB 01	QU,TO	86.7	-5	-16.7	-9.2	-.1	-.7	262	257	-2
33S 40W 27CCC 01	QU,TO	82.2	16	-2.2	-.7	.3	-.1	225	241	7
33S 41W 03AAD 01	QU,TO,KJ	148.0	-35	-30.8	-1.4	-.7	-1.3	332	297	-11
33S 41W 33DDD 01	QU	68.0	0	1.4	.6		.1	89	89	0
33S 42W 05DCC 01										
33S 42W 21BCB 01	QU,TO	89.5	-3	-4.5	-.9	-.1	-.2	80	78	-3
33S 43W 08BDA 01	QU,TO,KJ	109.1	-23	-14.1	-1.8	-.5	-.6	97	74	-24
33S 43W 09DBA 01		90.4			-1.5					
34S 39W 06CCA 01		121.8	18		-1.1	.4		215	233	8
34S 40W 16ABB 01		145.9	17		-1.2	.3		225	242	8
34S 41W 26DCD 01		162.0	-42		-1.7	-.9		170	128	-25
34S 41W 28CBA 01		121.2			-.1					
34S 42W 05BDC 01	QU,KJ	39.7	-9	-1.3		-.2	-.1	38	29	-24
34S 42W 22CDB 01	QU,TO	79.4	13			.3		20	33	65
34S 43W 07BDD 01	KJ	149.9	-25	-2.7	-.2	-.5	-.1			
35S 39W 06CDD 01		229.3	-54		-17.1	-1.1		335	281	-16
35S 40W 03BBB 02		179.9			-1.2					
35S 41W 16CCD 01		225.9	-146		-9.4	-3.0				
35S 42W 02DBB 01										
35S 43W 04AAC 01										
35S 43W 13BDB 01	QU,TO	192.2	-41		-5.7	-.8		154	113	-27

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Ness County

TABLE 1. WATER LEVELS BY YEAR, NESS COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
16S 24W 15ABB 01	TO					29.7	29.8	30.1	29.8	29.9	29.4	29.7
18S 21W 25AAB 01	QA	2085.				28.7	30.0	29.9	29.5	29.2	26.9	28.7
18S 21W 31CAA 01	QU	2122.				31.6	32.3	32.4	32.2	31.6	30.5	30.1
18S 24W 36ADB 01	QA	2235.				34.3	34.3	34.4	33.9	32.7	31.5	32.2
18S 25W 33BBC 01	QA	2402.				28.4	29.2	29.5	29.5	29.9	27.2	27.5
18S 26W 06BAB 02	QA,TO	2570.				7.2	7.2	7.3		7.5	7.0	7.9
19S 23W 01CCB 01		2214.				87.9	88.5	89.9	87.5	88.1	86.9	87.8
19S 23W 08CBB 01		2220.				21.8	21.8	21.9	22.5	22.2	18.6	20.5
20S 22W 20CCC 01		2189.				43.9	44.0	46.3	57.5	57.7	56.0	46.8
20S 22W 35BCC 01	QA	2168.				42.6	43.6	44.5	44.8	45.1	43.6	45.4
20S 23W 32CDA 01		2233.					36.6	37.0	37.2	36.2	36.8	35.9
20S 26W 07BDC 01	QA	2538.				24.3	24.6	23.1	23.3	21.9	19.7	24.4

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TABLE 2. DERIVED HYDROLOGIC DATA, NESS COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
16S 24W 15ABB 01	TO	29.7			-.3					
18S 21W 25AAB 01	QA	28.7			-1.8					
18S 21W 31CAA 01	QU	30.1			.4					
18S 24W 36ADB 01	QA	32.2			-.7					
18S 25W 33BBC 01	QA	27.5			-.3					
18S 26W 06BAB 02	QA,TO	7.9			-.9					
19S 23W 01CCB 01		87.8			-.9					
19S 23W 08CBB 01		20.5			-1.9					
20S 22W 20CCC 01		46.8			9.2					
20S 22W 35BCC 01	QA	45.4			-1.8					
20S 23W 32CDA 01		35.9			.9					
20S 26W 07BDC 01	QA	24.4			-4.7					

Norton County

TABLE 1. WATER LEVELS BY YEAR, NORTON COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
01S 21W 17AAA 01		2290.							85.3	84.9	83.6	83.6
01S 23W 15AAA 01		2340.							33.2	32.7	32.3	32.1
01S 24W 13BCB 01		2425.							116.3	116.1	115.7	115.3
01S 25W 25BBB 01		2405.							42.8	43.8	43.6	43.2
02S 21W 33CCC 01									94.2	94.2	93.7	93.5
02S 23W 22AAA 01		2378.							75.6	75.3	74.9	75.1
02S 25W 14AAA 01									142.4	141.8	141.9	141.5
04S 23W 03DDD 01									90.4	90.3	89.8	89.5
04S 23W 26CCC 01									46.1	46.1	45.8	45.7
04S 25W 13CCC 01									120.1	119.8	119.2	118.6

TABLE 2. DERIVED HYDROLOGIC DATA, NORTON COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
01S 21W 17AAA 01		83.6			.0					
01S 23W 15AAA 01		32.1			.2					
01S 24W 13BCB 01		115.3			.4					
01S 25W 25BBB 01		43.2			.4					
02S 21W 33CCC 01		93.5			.2					
02S 23W 22AAA 01		75.1			-.2					
02S 25W 14AAA 01		141.5			.4					
04S 23W 03DDD 01		89.5			.3					
04S 23W 26CCC 01		45.7			.1					
04S 25W 13CCC 01		118.6			.6					

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Osborne County

TABLE 1. WATER LEVELS BY YEAR, OSBORNE COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
06S 12W 23CDC 01		1505.			23.0	26.2	25.7	25.3	25.3	24.5	21.9	23.6
07S 15W 10CCC 01		1648.			17.2	17.5	17.4	17.6	17.6	17.4	16.5	

TABLE 2. DERIVED HYDROLOGIC DATA, OSBORNE COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
06S 12W 23CDC 01		23.6		-.5	-1.6					
07S 15W 10CCC 01										

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Pawnee County

TABLE 1. WATER LEVELS BY YEAR, PAWNEE COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1944 (Feet)	Depth to Water 1974 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
21S 15W 11CBB 01	QA	1932.		3	4.9	9.7	10.1	9.8	9.5	10.2	8.9	10.1
21S 15W 31BAD 01	QU	1972.		8	10.3	17.8	17.7	18.8	18.3	18.0	16.7	
21S 16W 14ADC 01		1970.		5				16.6	15.9	16.1	13.8	16.3
21S 18W 32DAA 01	QA	2056.		19	16.5	29.4	30.6	32.6	32.7	32.3	28.4	31.7
21S 19W 27CCC 01		2076.		23		42.2	38.9	43.8	44.1	44.6	42.9	45.6
21S 19W 30BCC 01		2087.		29	33.3	44.7	45.5	46.5	47.3	47.8	46.4	48.8
21S 20W 29BBB 01		2104.		24	34.8	44.8	45.1	47.2	46.0	46.3	47.3	47.4
22S 15W 03AAA 01	QU	1970.	207	18	15.5	26.3	27.1	28.3	28.9	29.4	28.7	29.9
22S 15W 03AAA 02	QU	1970.	207		18.7	28.3	29.2	30.4	30.5	30.8	30.1	31.9
22S 15W 09CCA 01	QU	1989.										34.1
22S 15W 13DCA 01	QU	1976.	171	29	17.5	34.6	35.9	37.7	37.8	37.7	37.2	
22S 15W 20CDC 01	QU	2004.	179	26	15.6	29.0	29.7	31.8	31.9	32.2	31.9	
22S 15W 33DDD 01		2003.	128	28				34.4	34.3	33.3	32.8	35.4
22S 16W 03CBC 02	QA	1996.		8	9.4	14.7	14.7	15.4	14.9	14.0	13.6	15.4
22S 16W 06BBA 01	QA	2010.		8	14.6	17.7	18.2	18.3	18.1	17.7	16.9	19.0
22S 16W 23AAA 01	QU	2011.	106	24	21.8	34.4	35.0	35.9	36.6	36.7	36.2	38.1
22S 16W 32CDD 01		2047.						31.4	31.7	30.5	29.4	32.5
22S 17W 05BBC 02		2036.		15		24.2	24.8	26.7	26.7	25.3	21.6	26.8
22S 17W 18AAD 01	QU	2047.		27		37.0	37.8	39.6	38.8	36.4		38.1
22S 17W 24CBC 01	QA	2034.		12	5.6	11.7	10.3			10.6	9.3	10.7
22S 17W 27BAB 01												7.7
22S 19W 07AAA 01		2102.				64.6	66.3	64.1	63.1	61.6	58.0	67.2
22S 19W 10BBA 01		2087.				54.5	54.6	56.1	55.6	55.7	52.9	58.1
23S 15W 12DDB 01		1974.	145						30.4	28.8	29.6	32.4
23S 15W 18DDB 01	QU	2035.	133	8	20.7	33.7		36.3	36.7	36.0	35.8	
23S 16W 16BAB 01	QU	2048.	123	13	8.1	19.6	19.2	20.5	20.6	19.0	18.5	
23S 15W 21DCC 01		2030.										34.1
23S 16W 11CDC 01	QU	2038.										25.9
23S 16W 35CCD 02						26.5	27.0	29.3	29.3	28.6	26.7	30.3
23S 17W 10CDB 01	QU	2091.	91	29	25.4	36.3	36.7		38.1	38.0	36.1	37.7
23S 17W 25ADC 01	QU	2076.	126	11	12.7	21.9	21.7		23.7	25.8		24.4
23S 17W 33CCA 01	QU	2109.	119	22	16.4	27.2	27.6	28.5	29.3	28.3	26.7	29.4
23S 18W 28DAD 01	QU	2102.	51	5	6.3	8.8	9.3	8.8	8.9	8.3	8.4	9.4
23S 18W 36DAC 01	QU	2116.	96	21	8.2	25.0	24.9	25.9	25.8	24.4	21.1	24.2

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TABLE 2. DERIVED HYDROLOGIC DATA, PAWNEE COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1944-89 (Feet)	Water-Level Change 1974-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1944-89 (Feet/year)	Average Annual Water-Level Change 1974-89 (Feet/year)	Saturated Thickness in 1944 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1944-89
21S 15W 11CBB 01	QA	10.1	-7	-5.2	-1.2	-.2	-.3			
21S 15W 31BAD 01	QU									
21S 16W 14ADC 01		16.3	-11		-2.5	-.2				
21S 18W 32DAA 01	QA	31.7	-13	-15.2	-3.3	-.3	-1.0			
21S 19W 27CCC 01		45.6	-23		-2.7	-.5				
21S 19W 30BCC 01		48.8	-20	-15.5	-2.4	-.4	-1.0			
21S 20W 29BBB 01		47.4	-23	-12.6	-.1	-.5	-.8			
22S 15W 03AAA 01	QU	29.9	-12	-14.4	-1.2	-.3	-1.0	189	177	-6
22S 15W 03AAA 02	QU	31.9		-13.2	-1.8		-.9		175	
22S 15W 09CCA 01	QU	34.1								
22S 15W 13DCA 01	QU									
22S 15W 20CDC 01	QU									
22S 15W 33DDD 01		35.4	-7		-2.6	-.2		100	93	-7
22S 16W 03CBC 02	QA	15.4	-7	-6.0	-1.8	-.2	-.4			
22S 16W 06BBA 01	QA	19.0	-11	-4.4	-2.1	-.2	-.3			
22S 16W 23AAA 01	QU	38.1	-14	-16.3	-1.9	-.3	-1.1	82	68	-17
22S 16W 32CDD 01		32.5			-3.1					
22S 17W 05BBC 02		26.8	-12		-5.2	-.3				
22S 17W 18AAD 01	QU	38.1	-11		-4.6	-.2				
22S 17W 24CBC 01	QA	10.7	1	-5.1	-1.4		-.3			
22S 17W 27BAB 01		7.7								
22S 19W 07AAA 01		67.2			-9.2					
22S 19W 10BBA 01		58.1			-5.2					
23S 15W 12DDB 01		32.4			-2.8				113	
23S 15W 18DDB 01	QU									
23S 16W 16BAB 01	QU									
23S 15W 21DCC 01		34.1								
23S 16W 11CDC 01	QU	25.9								
23S 16W 35CCD 02		30.3			-3.6					
23S 17W 10CDB 01	QU	37.7	-9	-12.3	-1.6	-.2	-.8	62	53	-15
23S 17W 25ADC 01	QU	24.4	-13	-11.7		-.3	-.8	115	102	-11
23S 17W 33CCA 01	QU	29.4	-7	-13.0	-2.7	-.2	-.9	97	90	-7
23S 18W 28DAD 01	QU	9.4	-4	-3.1	-1.0	-.1	-.2	46	42	-9
23S 18W 36DAC 01	QU	24.2	-3	-16.0	-3.1	-.1	-1.1	75	72	-4

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TABLE 1. WATER LEVELS BY YEAR, POTTAWATOMIE COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
09S 11E 31DCC 01		962.			15.3	15.3	14.7	15.1	15.1	14.5	15.7	17.6
09S 11E 32ADC 01		968.				23.5	21.6	21.8	20.2	19.1	21.9	25.1
09S 11E 35DDD 01		956.			17.9	19.0	17.4	16.8	14.8	14.1	14.9	20.4
10S 08E 14CBA 01		1009.			22.0	21.8	22.3	22.5	22.4			
10S 10E 10DBC 01		973.			20.6	18.5	19.8	18.9	19.3	18.7	20.6	22.4
10S 11E 03BCA 01		963.				18.3	20.0	19.2	18.2	18.1	20.9	25.9
10S 11E 04ACB 01		968.				26.5	26.2	25.4	26.3	24.1	27.2	31.4

TABLE 2. DERIVED HYDROLOGIC DATA, POTTAWATOMIE COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
09S 11E 31DCC 01		17.6		-2.3	-1.9		-.1			
09S 11E 32ADC 01		25.1			-3.2					
09S 11E 35DDD 01		20.4		-2.5	-5.4		-.1			
10S 08E 14CBA 01										
10S 10E 10DBC 01		22.4		-1.9	-1.9		-.1			
10S 11E 03BCA 01		25.9			-5.0					
10S 11E 04ACB 01		31.4			-4.2					

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TABLE 1. WATER LEVELS BY YEAR, PRATT COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1944 (Feet)	Depth to Water 1974 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
26S 11W 01DDB 01	QU	1801.	171	23	23.5	24.7	25.3	24.2	23.1	22.9	21.1	23.8
26S 11W 27AAC 01	QU	1808.	143	23	23.1	24.9	24.3	23.2	21.7	21.9	19.7	23.2
26S 11W 29BCB 01	QU	1830.	183	19	16.0	17.0	16.6	15.4	13.2	13.2	11.5	14.4
26S 12W 02DBD 01	QU	1868.	192	27	27.4	28.7	28.4	27.8	25.5	24.5	21.2	
26S 12W 17CCA 01	QU	1906.	196	37	34.1	37.1	36.6	35.0	32.0	31.3	28.3	31.6
26S 12W 34CDC 01	QU	1884.	207	46	43.2	46.5	45.2	43.2	41.0	41.7	39.5	42.3
26S 12W 34CDC 02	QU	1884.	207	46	41.0	44.8	43.9	41.9	40.0	40.7	34.2	41.5
26S 13W 16DAA 01	QU	1929.	174	20	15.6	25.9	25.1	24.9	21.3	20.6	17.3	21.5
26S 13W 19BBD 01	QU	1953.	193	18	14.4	26.5	26.9	27.3	24.0	23.7	19.1	23.0
26S 13W 34BCB 01	QU	1950.	230	44	46.7	52.5	53.0	52.8	49.9	49.2	46.3	48.2
26S 14W 17DCB 01	QU	2010.	213	10	16.5	28.2	27.8	30.4	27.1	26.7	22.0	27.3
26S 15W 01AAB 01										22.5	18.8	23.0
26S 15W 17BBC 01		2050.										21.7
26S 15W 18DAB 01	QU	2050.	250	11	4.8	17.1	17.3	18.5	17.7	17.6		
27S 11W 12CBC 01	QU	1783.	99	51	46.3	46.7	44.8	45.3	44.3	45.3	41.3	43.6
27S 11W 31DAA 01	QA	1726.	126	8	2.7	5.7	5.6		4.7	4.9	4.3	5.7
27S 12W 12DAA 01						56.6	55.8	55.1	54.2	54.2	50.5	53.4
27S 12W 33CBA 01	QU	1777.	152	3	1.2	3.0	3.1	2.8	2.4	2.4	2.4	3.4
27S 13W 13DDC 01	QU	1897.	145	72	57.0	65.1	58.5	58.5	57.1	56.9	55.4	57.0
27S 14W 03DAC 01	QU	1995.	220	35		45.1	45.8	46.4	43.8	44.0	39.8	43.5
27S 14W 12DDD 01	QU	1983.	252	53	57.7	63.6	63.3	63.7	62.3	61.6	60.0	60.5
27S 14W 21CAB 01	QU	1998.	203	39	34.2	43.1	43.9		43.4	43.0	41.0	43.4
27S 15W 02ABC 01	QU	2036.		26		31.9	32.0	33.9	30.5	30.4	29.7	32.0
27S 15W 05CDB 01		2070.									25.9	29.4
27S 15W 32CCA 01	QU	2068.	193	48	45.9	51.6	54.3	53.7	56.5	52.6	51.0	52.4
27S 15W 36ADD 01	QU	2050.	245	75	73.7	75.0	75.7	77.1	76.3	75.7	73.6	75.5
28S 11W 12ACC 01	QU	1755.	155	36	32.1	34.9	35.8	35.2	32.4	33.6	32.4	34.6
28S 11W 20CAC 01		1840.	215	70		69.9	70.3	70.4	67.7	67.7	65.9	67.5
28S 12W 21BAD 01	QU	1882.	207	83	81.8	83.1	82.5	82.7	81.7	81.3	85.1	80.7
28S 12W 34CCC 01		1902.										100.6
28S 13W 02DDC 01	QU	1827.	179	9	8.1	13.0	12.8	14.2	14.6	13.1	12.6	14.4
28S 13W 17AAA 01	QU	1938.	189	72	72.0	79.7	71.0	71.3	69.2	75.6	69.6	69.7
28S 13W 26DCB 01	QU	1916.	191	89	91.0	91.7	93.7	99.6	90.3	92.6	89.2	89.4
28S 14W 14CCC 01	QU	1984.	194	80	76.9	78.3	78.2	78.3	77.0	77.1	75.6	77.3
28S 15W 23CCD 01	QU	2071.	271	109	108.0	114.6	107.3	107.7	107.2	108.5	107.7	108.8
29S 11W 06AAA 01		1828.	173	50				45.6	42.2	42.2	40.3	42.0
29S 11W 09ADD 01	QU	1830.	170	55	48.9	54.6	54.4	54.1	50.7	51.5	49.7	52.6
29S 11W 29AAD 01	QU	1849.	199	63	57.4	62.3	62.0	61.7	57.9	58.7	57.6	59.2
29S 12W 20CCD 01	QU	1907.	232	95	98.4	116.9	109.4	99.9	97.5	97.1	96.0	98.0
29S 13W 12ABB 01		1906.	196	76				71.1	70.4	69.9	68.9	69.3
29S 13W 31CAA 01	QU	1893.	154	31	30.6	32.0	32.0	31.9	30.8	30.2	29.5	30.4
29S 14W 12ABB 01		1988.	233	108				100.8	99.6	99.0	98.6	98.5
29S 14W 17DBD 01		2012.	222	102		98.3	98.0	98.5	97.5	97.0	96.5	96.6
29S 15W 02CCA 01	QU	2035.	215	78	85.2	90.6	92.4	93.5	93.4	93.3		93.1
29S 15W 18ADA 01	QU	2050.	175	78	86.0	94.4	91.9	98.2	91.8	90.9	89.7	84.9
29S 15W 25AAB 02			117						33.8	33.4	32.7	33.6

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TABLE 2. DERIVED HYDROLOGIC DATA, PRATT COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1944-89 (Feet)	Water-Level Change 1974-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1944-89 (Feet/year)	Average Annual Water-Level Change 1974-89 (Feet/year)	Saturated Thickness in 1944 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1944-89
26S 11W 01DDB 01	QU	23.8	-1	-.3	-2.7			148	147	-1
26S 11W 27AAC 01	QU	23.2	0	-.1	-3.5			120	120	0
26S 11W 29BCB 01	QU	14.4	5	1.6	-2.9	.1	.1	164	169	3
26S 12W 02DBD 01	QU									
26S 12W 17CCA 01	QU	31.6	5	2.5	-3.3	.1	.2	159	164	3
26S 12W 34CDC 01	QU	42.3	4	.9	-2.8	.1	.1	161	165	2
26S 12W 34CDC 02	QU	41.5	5	-.5	-7.3	.1		161	166	3
26S 13W 16DAA 01	QU	21.5	-2	-5.9	-4.2		-.4	154	153	-1
26S 13W 19BBD 01	QU	23.0	-5	-8.6	-3.9	-.1	-.6	175	170	-3
26S 13W 34BCB 01	QU	48.2	-4	-1.5	-1.9	-.1	-.1	186	182	-2
26S 14W 17DCB 01	QU	27.3	-17	-10.8	-5.3	-.4	-.7	203	186	-8
26S 15W 01AAB 01		23.0			-4.2					
26S 15W 17BBC 01		21.7								
26S 15W 18DAB 01	QU									
27S 11W 12CBC 01	QU	43.6	7	2.7	-2.3	.2	.2	48	55	15
27S 11W 31DAA 01	QA	5.7	2	-3.0	-1.4		-.2	118	120	2
27S 12W 12DAA 01		53.4			-2.9					
27S 12W 33CBA 01	QU	3.4	0	-2.2	-1.0		-.1	149	149	0
27S 13W 13DDC 01	QU	57.0	15	.0	-1.6	.3		73	88	21
27S 14W 03DAC 01	QU	43.5	-9		-3.7	-.2		185	177	-4
27S 14W 12DDD 01	QU	60.5	-8	-2.8	-.5	-.2	-.2	199	192	-4
27S 14W 21CAB 01	QU	43.4	-4	-9.2	-2.4	-.1	-.6	164	160	-2
27S 15W 02ABC 01	QU	32.0	-6		-2.3	-.1				
27S 15W 05CDB 01		29.4			-3.5					
27S 15W 32CCA 01	QU	52.4	-4	-6.5	-1.4	-.1	-.4	145	141	-3
27S 15W 36ADD 01	QU	75.5	-1	-1.8	-1.9		-.1	170	170	0
28S 11W 12ACC 01	QU	34.6	1	-2.5	-2.2		-.2	119	120	1
28S 11W 20CAC 01		67.5	3		-1.6	.1		145	148	2
28S 12W 21BAD 01	QU	80.7	2	1.1	4.4		.1	124	126	2
28S 12W 34CCC 01		100.6								
28S 13W 02DDC 01	QU	14.4	-5	-6.3	-1.8	-.1	-.4	170	165	-3
28S 13W 17AAA 01	QU	69.7	2	2.3	-.1		.2	117	119	2
28S 13W 26DCB 01	QU	89.4	0	1.6	-.2		.1	102	102	0
28S 14W 14CCC 01	QU	77.3	3	-.4	-1.7	.1		114	117	3
28S 15W 23CCD 01	QU	108.8	0	-.8	-1.1		-.1	162	162	0
29S 11W 06AAA 01		42.0	8		-1.7	.2		123	131	7
29S 11W 09ADD 01	QU	52.6	2	-3.7	-2.9		-.2	115	117	2
29S 11W 29AAD 01	QU	59.2	4	-1.8	-1.6	.1	-.1	136	140	3
29S 12W 20CCD 01	QU	98.0	-3	.4	-2.0	-.1		137	134	-2
29S 13W 12ABB 01		69.3	7		-.4	.2		120	127	6
29S 13W 31CAA 01	QU	30.4	1	.2	-.9			123	124	1
29S 14W 12ABB 01		98.5	10		.1	.2		125	135	8
29S 14W 17DBD 01		96.6	5		-.1	.1		120	125	4
29S 15W 02CCA 01	QU	93.1	-15	-7.9		-.3	-.5	137	122	-11
29S 15W 18ADA 01	QU	84.9	-7	1.1	4.8	-.2	.1	97	90	-7
29S 15W 25AAB 02		33.6			-.9				83	

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Rawlins County

TABLE 1. WATER LEVELS BY YEAR, RAWLINS COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
01S 33W 29CCC 01	TO	2992.	144	115	115.6	113.8	113.5	113.5	113.3	112.8	112.8	115.1
02S 31W 03CAD 01	QA	2665.	42	15	14.7	15.9	16.5	16.8	16.4	17.7	17.7	18.6
02S 32W 20DCD 01	QA	2735.	32	5	8.3	11.0	11.6	10.7	10.6	12.2	12.1	12.8
02S 33W 26DCC 01	QA	2798.	46	13	19.8	22.3	22.8	23.0	22.3	23.4	23.6	24.2
02S 35W 13ABB 01	TO	3178.	208	174	170.3			169.4	168.9	168.6		168.5
02S 35W 34CAA 01	QA,TO	3064.	112	29	29.6	30.7	30.8		30.8		30.1	31.1
02S 36W 13DDD 01	TO	3286.	260	186	190.1	189.1	190.3	189.4	188.9	187.8	188.3	
02S 36W 15CDD 01	TO	3334.	290	204	203.8	203.0	202.6	198.6	202.3			
02S 36W 36BAA 01	TO	3263.	280	160	169.8	174.6	174.5	174.6	174.6	174.6	174.6	174.4
03S 31W 07CBD 01	TO	2960.	200	142	146.3	146.1	146.6	145.8	145.1		144.5	
03S 31W 23BBB 01	TO	2849.	119	73	73.1	73.7	73.2	73.3	73.4			
03S 33W 03DCC 01	QA	2823.	62	22	20.6	25.0	26.1	25.7	25.0	26.6	25.8	26.9
03S 33W 08CDC 01	QA	2855.	52	20	16.1	19.1	20.9	20.2	19.1	21.5	21.7	22.5
03S 34W 03ABB 01	QA	2882.	40	12	13.8	12.2	13.8	14.4	13.8	14.8	14.2	16.6
03S 34W 26BAC 01	QA	2900.	40	7	8.4	8.9	11.1	10.2	15.0		10.6	14.3
03S 35W 24CBB 01	QA	3001.	50	21	24.7	25.5	26.5	26.8	27.1	27.4	26.9	27.5
03S 36W 14CBB 01	TO	3332.	309	188	191.2	200.8	200.2	200.8	200.3	201.1	201.9	212.9
03S 36W 17CCC 01	TO	3375.	300	196	195.3	208.0	207.1	206.8	209.2	210.2	211.3	219.2
03S 36W 21DBC 01	TO	3345.									199.3	198.8
04S 31W 16ABD 01	QA	2761.	50	7	7.9	9.5	10.9	7.1	10.7	11.5	10.7	11.2
04S 31W 25DDD 01	QA	2755.	32	15	14.6		17.6	16.3	16.6	16.1		
04S 33W 10ABC 01		3086.						146.7	143.5	143.9	143.3	144.1
04S 33W 18DDA 01	TO	3068.	153	88	87.6	87.0	86.5	86.2	86.5	85.8	85.5	87.4
04S 33W 28DCA 01	TO	3125.	237	152	151.2	151.0	150.6	150.2	151.3	149.3	149.0	
04S 34W 33CBC 01	TO	3160.	210	115	117.2	118.8	116.7	118.9	118.4	120.8	118.8	126.8
04S 35W 06DCD 01	TO	3252.	260	157	157.8			163.3	161.9			164.2
04S 35W 13DAD 01	QA	3002.	51	13	15.0	15.8	15.8	16.1	16.1	15.2	15.7	
04S 35W 29DDD 01	TO	3219.	224	150	150.1	150.6	150.9	150.6	149.8	149.7	148.4	149.6
04S 36W 23CBB 01	TO	3351.						216.1	215.2	215.9	215.2	215.5
04S 36W 23DCA 01		3339.						212.7	211.9	212.6	212.6	212.1
05S 31W 10DDA 01	TO	2820.	70	30	40.1	42.1	42.7	42.9	42.6	41.5	41.7	44.0
05S 31W 20CCA 01	TO	2865.	68	22	29.7	35.5	35.6	36.2	33.0	33.2	31.5	
05S 32W 14CDD 01	TO	3020.	180	130	130.8	131.4	130.3	131.2	133.6	130.2	130.0	129.8
05S 33W 29BDA 01	TO	3042.	115	12	17.0	17.1	17.5	17.2	17.9	19.0	18.9	19.3
05S 34W 01BBB 01	TO	3137.	237	116	114.3	115.8	113.5	115.5	114.6	114.1	113.8	113.8
05S 34W 28ADC 01	TO	3207.	247	127	134.1	134.6	134.9	133.8	133.5	132.8	132.9	142.9
05S 35W 10CDD 01	TO	3267.	277	167	165.8	167.0	167.5	167.3	166.9	167.1	167.0	
05S 35W 30CBC 01		3336.						170.5	171.2	170.2	170.3	171.2
05S 36W 21BCD 01	QA,TO	3220.	155	17	15.5		13.7		18.0	19.0		19.3

TABLE 2. DERIVED HYDROLOGIC DATA, RAWLINS COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
01S 33W 29CCC 01	TO	115.1	0	.5	-2.3			29	29	0
02S 31W 03CAD 01	QA	18.6	-4	-3.9	-.9	-.1	-.2	27	23	-15
02S 32W 20DCD 01	QA	12.8	-8	-4.5	-.7	-.2	-.2	27	19	-30
02S 33W 26DCC 01	QA	24.2	-11	-4.4	-.6	-.3	-.2	33	22	-33
02S 35W 13ABB 01	TO	168.5	6	1.8		.2	.1	34	40	18
02S 35W 34CAA 01	QA,TO	31.1	-2	-1.5	-1.0	-.1	-.1	83	81	-2
02S 36W 13DDD 01	TO									
02S 36W 15CDD 01	TO									
02S 36W 36BAA 01	TO	174.4	-14	-4.6	.2	-.4	-.2	120	106	-12
03S 31W 07CBD 01	TO									
03S 31W 23BBB 01	TO									
03S 33W 03DCC 01	QA	26.9	-5	-6.3	-1.1	-.1	-.3	40	35	-13
03S 33W 08CDC 01	QA	22.5	-3	-6.4	-.8	-.1	-.3	32	30	-6
03S 34W 03ABB 01	QA	16.6	-5	-2.8	-2.4	-.1	-.1	28	23	-18
03S 34W 26BAC 01	QA	14.3	-7	-5.9	-3.7	-.2	-.3	33	26	-21
03S 35W 24CBB 01	QA	27.5	-7	-2.8	-.6	-.2	-.1	29	23	-21
03S 36W 14CBB 01	TO	212.9	-25	-21.7	-11.0	-.6	-.9	121	96	-21
03S 36W 17CCC 01	TO	219.2	-23	-23.9	-7.9	-.6	-1.0	104	81	-22
03S 36W 21DBC 01	TO	198.8			.5					
04S 31W 16ABD 01	QA	11.2	-4	-3.3	-.5	-.1	-.1	43	39	-9
04S 31W 25DDD 01	QA									
04S 33W 10ABC 01		144.1			-.8					
04S 33W 18DDA 01	TO	87.4	1	.2	-1.9			65	66	2
04S 33W 28DCA 01	TO									
04S 34W 33CBC 01	TO	126.8	-12	-9.6	-8.0	-.3	-.4	95	83	-13
04S 35W 06DCD 01	TO	164.2	-7	-6.4		-.2	-.3	103	96	-7
04S 35W 13DAD 01	QA									
04S 35W 29DDD 01	TO	149.6	0	.5	-1.2	74	74	0		
04S 36W 23CBB 01	TO	215.5	-.3							
04S 36W 23DCA 01		212.1	.5							
05S 31W 10DDA 01	TO	44.0	-14	-3.9	-2.3	-.4	-.2	40	26	-35
05S 31W 20CCA 01	TO									
05S 32W 14CDD 01	TO	129.8	0	1.0	.2			50	50	0
05S 33W 29BDA 01	TO	19.3	-7	-2.3	-.4	-.2	-.1	103	96	-7
05S 34W 01BBB 01	TO	113.8	2	.5	.0	.1		121	123	2
05S 34W 28ADC 01	TO	142.9	-16	-8.8	-10.0	-.4	-.4	120	104	-13
05S 35W 10CDD 01	TO									
05S 35W 30CBC 01		171.2			-.9					
05S 36W 21BCD 01	QA,TO	19.3	-2	-3.8		-.1	-.2	138	136	-1

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TABLE 1. WATER LEVELS BY YEAR, RENO COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1944 (Feet)	Depth to Water 1974 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
22S 04W 12CDA 01	QU	1449.						40.2	32.8	32.7	31.3	37.6
22S 04W 32BBC 01	QU	1510.					11.1		12.7	14.0	15.3	18.7
22S 05W 17BCC 01								9.8	6.7	6.7	7.3	10.2
22S 05W 33DBD 01		1598.						18.9	18.0	18.4		
22S 06W 18BCB 01								9.6	7.6	9.1	8.7	10.5
22S 06W 28CCB 01						9.1	9.1	9.1	8.3	8.8	8.8	9.7
22S 07W 17DCB 01	QU	1596.			2.0	7.0		4.6	4.8	4.6	3.5	5.6
22S 08W 09DBB 01	QU	1670.		35		32.0	32.0	32.4	31.3	32.9	31.5	33.7
22S 08W 23DAD 01	QU	1651.			29.3	29.9	29.5	28.5	28.2	29.4	27.0	29.4
22S 08W 33CCD 01	QU	1658.			4.2		7.5	6.9	5.4			10.2
22S 09W 03BBD 01	QU	1712.		20	29.1	33.5	34.0	35.5	33.4	34.4	31.5	35.8
22S 09W 17BAB 01	QU	1732.		10	9.8	19.2	19.0	20.8	17.1	19.8	16.5	21.9
22S 09W 25BBA 01	QU	1705.			18.9			22.1	21.8	22.8	20.9	24.1
22S 10W 02DCC 01	QU	1736.		12	1.6	9.4	9.9	10.5	7.4	9.9	7.9	12.6
22S 10W 08BBB 01	QU	1764.		6	5.9	13.6	14.1	14.9	12.8	14.2	13.6	17.0
22S 10W 30DAA 01	QU	1775.		10	3.9	9.2	11.8	13.0	9.2	9.5	7.6	14.1
23S 04W 03BAB 02										2.5	4.4	8.4
23S 04W 16BBB 01	QU	1570.						22.2	18.9	19.1	20.7	23.7
23S 04W 30BAA 01	QU	1491.						8.6	7.2	6.7	7.4	9.5
23S 06W 15BAC 01								9.6	9.2	9.7	9.4	10.1
23S 06W 31DCB 01	QU	1577.		27	32.4	31.1	31.0	31.1	30.7	30.1	29.0	29.4
23S 07W 01ABA 01	QU	1567.		7	5.3	8.3	8.1	8.1	7.7	8.1	8.0	9.0
23S 07W 05ABA 01	QU	1623.		20	22.5	26.5	27.0	26.6	23.9	25.4	23.7	27.5
23S 07W 13DDD 01	QU	1604.		49	52.8	52.5	52.6	52.4	52.2	51.9	51.3	51.9
23S 08W 18AAD 01	QU	1675.		15	10.5	14.5	14.5	14.2	12.0	13.2	11.2	14.3
23S 09W 05CBD 01	QU	1740.		9	12.0	18.9	19.2	20.2	18.5	19.6	17.1	20.0
23S 09W 21DDB 01	QU	1732.		7	3.2	12.1	11.9	13.2	10.5	10.1	9.0	14.3
23S 09W 35CCC 01	QU	1718.	110	10	13.6	20.7	20.8	22.1	18.6	16.9	14.8	17.4
23S 10W 02BAB 01	QU	1751.		7	3.0	7.3	8.0	8.1	6.9	7.1	6.5	9.2
23S 10W 25CAC 01	QU	1752.		18	4.5	12.9	13.5	14.7	14.3	14.0	10.6	14.7
23S 10W 29DCA 01		1783.										18.7
24S 04W 05CDB 01	QU	1480.					7.5	7.4	7.3	7.0	7.9	10.0
24S 04W 14DAC 01	QU	1455.					9.5	9.2	7.4	7.2	7.9	10.0
24S 04W 25BBD 01	QU	1448.						5.7	4.2	4.4	4.5	6.4
24S 04W 31DAB 01		1485.					29.8	29.1	26.1	25.6	25.7	28.9
24S 05W 10CCA 01	QU	1509.					25.6		20.3	20.3	19.9	20.9
24S 06W 03AAB 01		1554.								27.2	26.5	27.2
24S 06W 23CBA 01								11.8	9.2	6.9	7.6	10.6
24S 07W 08ADA 02		1633.						44.4	43.3	42.2	41.0	41.0
24S 07W 28AAA 01	QU	1588.		13	14.1	12.3	11.9	11.9	10.4	9.0	9.2	10.8
24S 08W 04AB 01		1660.		13		17.7	16.9	15.2	12.7	10.0	9.0	13.0
24S 08W 18BAC 01	QU	1649.			2.5	6.1	6.1	5.9	4.9	2.6	3.7	6.7
24S 08W 34DAC 01	QU	1590.			6.4	6.3	6.2	6.3	5.9	5.1	4.9	6.3
24S 09W 19DDB 01	QU	1704.		17	21.9	23.3	23.8	24.0	23.3	22.6	20.3	22.6
24S 10W 06DBB 01	QU	1797.		17	17.9	22.7	23.5	24.5	24.4	24.6	19.9	23.3
24S 10W 17DDC 01	QU	1755.		9	11.8	16.9	17.4	17.6	17.6	17.2	14.3	17.4
24S 10W 31CBC 01		1750.						10.5	10.0	9.9	9.0	10.5

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Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1944 (Feet)	Depth to Water 1974 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
25S 04W 02ABB 01	QU	1449.						8.7	8.3	8.4	8.0	9.3
25S 07W 07BBD 01	QU	1602.			24.3	23.7	23.5	23.3	22.4	22.7	22.6	23.7
25S 07W 36CCC 01	QU	1570.			24.5	27.3	26.2	26.0	24.0	23.9	24.1	26.4
25S 08W 19ADB 01	QU	1607.			7.3	9.6	9.0	8.4	7.3	7.1	8.6	10.3
25S 09W 01DCD 01	QU	1658.		10	12.8	14.8	14.8	15.1	14.3	13.1	11.4	13.5
25S 09W 17BBC 01	QU	1710.		7	12.6	15.2	15.2	15.8	15.0	12.3	10.1	13.3
25S 09W 30DDA 01	QU	1693.		15	16.0	17.9	18.2	17.8	17.1	16.6	16.3	17.8
25S 10W 14BBB 01	QU	1748.	115	25	24.9	25.9	26.2	26.5	26.3	25.5	22.3	24.7
25S 10W 19ABD 01	QU	1790.		33	27.9	29.7	30.0	29.9	31.5	28.0	24.7	28.3
26S 06W 13BAB 01	QU	1475.			7.2	9.8	8.8	8.1	6.8	7.4	8.6	10.0
26S 06W 34BBC 01	QU	1545.			17.6	20.0	17.7	17.5	15.6	15.2	15.5	16.9
26S 07W 12DCC 01	QU	1582.			30.6	31.3	31.1	31.1	28.8	27.7	27.0	28.6
26S 07W 21DDC 01	QU	1620.			21.5	20.8	20.3	18.9	17.5	18.3	17.3	18.9
26S 08W 06DCC 01		1670.									6.5	9.3
26S 08W 30DCB 01	QU	1680.			32.5	34.0	31.7	30.9	29.9	31.0	29.9	31.7
26S 09W 10DDB 01	QU	1686.		26	19.8	19.9	22.1	19.9	19.7	20.0	21.4	21.3
26S 09W 18AAA 01	QU	1668.		17	8.3	7.5	7.6	6.7	6.5	7.1	6.6	8.6
26S 09W 31DCC 01		1735.						53.0	52.0	52.9	50.6	53.8
26S 09W 34DBD 01	QU	1685.		25	25.3	25.5	26.6	24.1	23.0	24.0	22.2	24.7
26S 10W 18CDC 01	QU	1797.		13	24.6	24.7	25.3	24.6	23.6	23.8	21.8	24.2
26S 10W 32BBD 01	QU	1760.		5	24.5	26.1	26.2	25.1	25.0	25.3	23.4	27.2

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TABLE 2. DERIVED HYDROLOGIC DATA, RENO COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1944-89 (Feet)	Water-Level Change 1974-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1944-89 (Feet/year)	Average Annual Water-Level Change 1974-89 (Feet/year)	Saturated Thickness in 1944 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1944-89
22S 04W 12CDA 01	QU	37.6			-6.3					
22S 04W 32BBC 01	QU	18.7			-3.4					
22S 05W 17BCC 01		10.2			-2.9					
22S 05W 33DBD 01										
22S 06W 18BCB 01		10.5			-1.8					
22S 06W 28CCB 01		9.7			-.9					
22S 07W 17DCB 01	QU	5.6		-3.6	-2.1		-.2			
22S 08W 09DBB 01	QU	33.7	1		-2.2					
22S 08W 23DAD 01	QU	29.4		-.1	-2.4					
22S 08W 33CCD 01	QU	10.2		-6.0			-.4			
22S 09W 03BBD 01	QU	35.8	-16	-6.7	-4.3	-.4	-.4			
22S 09W 17BAB 01	QU	21.9	-12	-12.1	-5.4	-.3	-.8			
22S 09W 25BBA 01	QU	24.1		-5.2	-3.2		-.3			
22S 10W 02DCC 01	QU	12.6	-1	-11.0	-4.7		-.7			
22S 10W 08BBB 01	QU	17.0	-11	-11.1	-3.4	-.2	-.7			
22S 10W 30DAA 01	QU	14.1	-4	-10.2	-6.5	-.1	-.7			
23S 04W 03BAB 02		8.4			-4.0					
23S 04W 16BBB 01	QU	23.7			-3.0					
23S 04W 30BAA 01	QU	9.5			-2.1					
23S 06W 15BAC 01		10.1			-.7					
23S 06W 31DCB 01	QU	29.4	-2	3.0	-.4		.2			
23S 07W 01ABA 01	QU	9.0	-2	-3.7	-1.0		-.2			
23S 07W 05ABA 01	QU	27.5	-8	-5.0	-3.8	-.2	-.3			
23S 07W 13DDD 01	QU	51.9	-3	.9	-.6	-.1	.1			
23S 08W 18AAD 01	QU	14.3	1	-3.8	-3.1		-.3			
23S 09W 05CBD 01	QU	20.0	-11	-8.0	-2.9	-.2	-.5			
23S 09W 21DDB 01	QU	14.3	-7	-11.1	-5.3	-.2	-.7			
23S 09W 35CCC 01	QU	17.4	-7	-3.8	-2.6	-.2	-.3	100	93	-7
23S 10W 02BAB 01	QU	9.2	-2	-6.2	-2.7		-.4			
23S 10W 25CAC 01	QU	14.7	3	-10.2	-4.1	.1	-.7			
23S 10W 29DCA 01		18.7								
24S 04W 05CDB 01	QU	10.0			-2.1					
24S 04W 14DAC 01	QU	10.0			-2.1					
24S 04W 25BBD 01	QU	6.4			-1.9					
24S 04W 31DAB 01		28.9			-3.2					
24S 05W 10CCA 01	QU	20.9			-1.0					
24S 06W 03AAB 01		27.2			-.7					
24S 06W 23CBA 01		10.6			-3.0					
24S 07W 08ADA 02		41.0			.0					
24S 07W 28AAA 01	QU	10.8	2	3.3	-1.6		.2			
24S 08W 04AB 01		13.0	0		-4.0					
24S 08W 18BAC 01	QU	6.7		-4.2	-3.0		-.3			
24S 08W 34DAC 01	QU	6.3		.1	-1.4					
24S 09W 19DDB 01	QU	22.6	-6	-.7	-2.3	-.1				
24S 10W 06DBB 01	QU	23.3	-6	-5.4	-3.4	-.1	-.4			
24S 10W 17DDC 01	QU	17.4	-8	-5.6	-3.1	-.2	-.4			
24S 10W 31CBC 01		10.5			-1.5					

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TABLE 2. DERIVED HYDROLOGIC DATA, RENO COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1944-89 (Feet)	Water-Level Change 1974-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1944-89 (Feet/year)	Averagex Annual Water-Level Change 1974-89 (Feet/year)	Saturated Thickness in 1944 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1944-89
25S 04W 02ABB 01	QU	9.3			-1.3					
25S 07W 07BBD 01	QU	23.7		.6	-1.1					
25S 07W 36CCC 01	QU	26.4		-1.9	-2.3		-.1			
25S 08W 19ADB 01	QU	10.3		-3.0	-1.7		-.2			
25S 09W 01DCD 01	QU	13.5	-4	-.7	-2.1	-.1				
25S 09W 17BBC 01	QU	13.3	-6	-.7	-3.2	-.1				
25S 09W 30DDA 01	QU	17.8	-3	-1.8	-1.5	-.1	-.1			
25S 10W 14BBB 01	QU	24.7	0	.2	-2.4			90	90	0
25S 10W 19ABD 01	QU	28.3	5	-.4	-3.6	.1				
26S 06W 13BAB 01	QU	10.0		-2.8	-1.4		-.2			
26S 06W 34BBC 01	QU	16.9		.7	-1.4					
26S 07W 12DCC 01	QU	28.6		2.0	-1.6		.1			
26S 07W 21DDC 01	QU	18.9		2.6	-1.6		.2			
26S 08W 06DCC 01		9.3			-2.8					
26S 08W 30DCB 01	QU	31.7		.8	-1.8		.1			
26S 09W 10DDB 01	QU	21.3	5	-1.5	.1	.1	-.1			
26S 09W 18AAA 01	QU	8.6	8	-.3	-2.0	.2				
26S 09W 31DCC 01		53.8			-3.2					
26S 09W 34DBD 01	QU	24.7	0	.6	-2.5					
26S 10W 18CDC 01	QU	24.2	-11	.4	-2.4	-.2				
26S 10W 32BBD 01	QU	27.2	-22	-2.7	-3.8	-.5	-.2			

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Republic County

TABLE 1. WATER LEVELS BY YEAR, REPUBLIC COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1944 (Feet)	Depth to Water 1974 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
01S 03W 09CBD 01		1635.				140.4	140.7	140.7	147.6	140.7	140.0	142.5
01S 04W 15AAA 01		1680.				176.9	175.4	178.7	177.1	176.1	175.3	178.0

TABLE 2. DERIVED HYDROLOGIC DATA, REPUBLIC COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1944-89 (Feet)	Water-Level Change 1974-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1944-89 (Feet/year)	Average Annual Water-Level Change 1974-89 (Feet/year)	Saturated Thickness in 1944 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1944-89
01S 03W 09CBD 01		142.5			-2.5					
01S 04W 15AAA 01		178.0			-2.7					

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TABLE 1. WATER LEVELS BY YEAR, RICE COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1944 (Feet)	Depth to Water 1974 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
20S 08W 22AAA 01		1644.		14		14.1	15.1	15.4	13.7	14.5	14.0	15.9
20S 09W 12DDA 01	QA	1664.		11	8.3	12.9	13.6	14.1	12.8	12.8	12.1	14.2
20S 09W 28ACD 01												20.3
20S 10W 27BBB 01		1786.		46				34.3	33.3	35.5	33.4	34.5
20S 10W 36ACD 01		1715.		10		13.0	13.8	14.2	13.0	14.2	13.9	14.5
21S 07W 04AAC 01		1615.		14		13.8	14.2	14.0	12.7	13.7	13.9	15.6
21S 07W 26CBD 01		1595.		10		9.7			11.0	13.0	12.3	14.5
21S 08W 09CBD 01		1647.		9		10.7	11.7	12.6	11.2	12.2	11.4	13.4
21S 08W 25ABB 01		1620.		7		4.7	5.8	5.9	4.3	5.6	5.1	7.0
21S 08W 32DBB 01		1641.		3				7.1	6.7	7.3		8.1
21S 09W 02DDA 01		1670.		9		12.4	13.2	14.3	12.7	13.3	12.9	14.8
21S 09W 15AAC 02		1669.							6.0	6.8	6.3	7.1
21S 10W 16CDC 01		1720.								6.7	6.1	7.2

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TABLE 2. DERIVED HYDROLOGIC DATA, RICE COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1944-89 (Feet)	Water-Level Change 1974-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1944-89 (Feet/year)	Average Annual Water-Level Change 1974-89 (Feet/year)	Saturated Thickness in 1944 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1944-89
20S 08W 22AAA 01		15.9	-2		-1.9					
20S 09W 12DDA 01	QA	14.2	-3	-5.9	-2.1	-.1	-.4			
20S 09W 28ACD 01		20.3								
20S 10W 27BBB 01		34.5	12		-1.1	.3				
20S 10W 36ACD 01		14.5	-5		-.6	-.1				
21S 07W 04AAC 01		15.6	-2		-1.7					
21S 07W 26CBD 01		14.5	-5		-2.2	-.1				
21S 08W 09CBD 01		13.4	-4		-2.0	-.1				
21S 08W 25ABB 01		7.0	0		-1.9					
21S 08W 32DBB 01		8.1	-5			-.1				
21S 09W 02DDA 01		14.8	-6		-1.9	-.1				
21S 09W 15AAC 02		7.1			-.8					
21S 10W 16CDC 01		7.2			-1.1					

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Riley County

TABLE 1. WATER LEVELS BY YEAR, RILEY COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
10S 09E 17BDD 01		996.			20.7	18.4	18.3	17.5	17.3	13.4	15.6	19.0

TABLE 2. DERIVED HYDROLOGIC DATA, RILEY COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
10S 09E 17BDD 01		19.0		1.7	-3.4		.1			

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Rooks County

TABLE 1. WATER LEVELS BY YEAR, ROOKS COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
07S 17W 24BBB 01		1713.			14.3	17.2	16.2	17.1	15.7	15.0	13.7	15.5
07S 19W 23CDB 01		1878.			18.7	15.3	17.1	15.4	14.8	15.3	15.1	17.2

TABLE 2. DERIVED HYDROLOGIC DATA, ROOKS COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
07S 17W 24BBB 01		15.5		-1.2	-1.8		-.1			
07S 19W 23CDB 01		17.2		1.6	-2.1		.1			

Rush County

TABLE 1. WATER LEVELS BY YEAR, RUSH COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
18S 16W 23DCC 01		1930.							25.7	27.2	19.2	23.9
18S 16W 23DCC 02		1930.							28.4	29.3	21.1	26.3
18S 17W 22AAD 01		1960.			25.8	37.3	36.9	37.1	37.1	34.2	35.2	
18S 17W 23BCC 01		1958.			25.1	34.7	36.1	36.8	37.1	37.2	33.9	35.2
18S 18W 27AAC 01		1993.			27.6	34.8	35.6	36.2	36.8	36.9	34.9	34.0
18S 19W 20ADD 01		2034.				34.8	35.9	35.9	30.8	32.6	30.3	31.6
18S 20W 19AAD 01		2077.			31.2	29.4	31.6	29.7	28.6	29.2	25.6	27.4

TABLE 2. DERIVED HYDROLOGIC DATA, RUSH COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
18S 16W 23DCC 01		23.9			-4.8					
18S 16W 23DCC 02		26.3			-5.2					
18S 17W 22AAD 01										
18S 17W 23BCC 01		35.2		-10.1	-1.3		-.4			
18S 18W 27AAC 01		34.0		-6.4	.9		-.3			
18S 19W 20ADD 01		31.6			-1.4					
18S 20W 19AAD 01		27.4		3.8	-1.8		.2			

Saline County

TABLE 1. WATER LEVELS BY YEAR, SALINE COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
13S 01W 23BCB 02		1172.				18.5	19.9	17.9	18.6	19.0	17.2	20.1
13S 02W 33DDC 01		1207.						21.8	22.5	23.6	22.1	24.6

TABLE 2. DERIVED HYDROLOGIC DATA, SALINE COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
13S 01W 23BCB 02		20.1			-2.9					
13S 02W 33DDC 01		24.6			-2.5					

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TABLE 1. WATER LEVELS BY YEAR, SCOTT COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1940 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
16S 31W 17DDD 01	TO	2931.	161	118		119.0	121.7	121.1	119.2	120.0	120.2	123.9
16S 31W 31BCB 01	TO	2958.	168	127	128.4	135.0	135.0	137.6	134.5	135.8	135.8	140.0
16S 32W 16BBA 01		2999.										158.3
16S 33W 19CBB 01	TO	3097.	192	124	140.7	157.2	160.2	159.3	159.9	161.5	163.2	159.5
16S 33W 33BAA 01	TO	3066.	194	130		148.9	152.3	150.7	150.4	151.8	152.1	153.2
16S 34W 09CCB 01	TO	3146.	181	118	133.5	156.7	157.0	157.4	157.8	158.6	158.8	159.5
16S 34W 29CBB 01	TO	3160.	181	119	134.1	166.2	166.3	166.7	166.7	167.5	167.9	169.0
17S 31W 04DCC 01	TO	2932.	170	117		135.1	125.6	129.3	125.7		128.9	134.2
17S 31W 19CDA 01	TO	2960.				122.0	124.2	125.4	121.5	123.7	127.6	128.8
17S 31W 35CCB 01	TO	2925.	147	86		101.0	98.3	97.6	97.5	99.9	98.1	105.8
17S 32W 16BBB 01	TO	2980.	231	88		152.2						
17S 32W 27BBB 01	TO	2990.	180	95	107.0	147.8	153.1	153.0	143.0	147.0	148.7	
17S 32W 31BCB 01	TO	2984.	245	68	88.6	146.8	136.2	137.2		138.7		
17S 33W 07BBB 01	TO	3093.	202	112	134.5	153.6		154.5	158.0	151.3	158.4	
17S 33W 14ACB 01	TO	3014.	214	93		138.7	139.5	140.6	140.7	140.0	143.4	148.1
17S 34W 06BCB 01	TO	3163.	194	108	118.5	144.6		146.8	146.1	147.9	149.7	153.6
17S 34W 16ACB 01	TO	3134.	194	107	112.1	126.3	127.4	127.1	128.2			
17S 34W 25DBB 01	TO	3092.	189	103	114.5	134.6	137.1	137.1	134.9	136.5	137.1	142.9
18S 31W 24BCB 01	TO	2913.	110	68		77.9	76.2	75.4	74.6	75.6	74.3	73.3
18S 31W 27ABA 01	TO	2930.	105	70		70.4	69.2		69.0	68.6	67.1	67.5
18S 32W 14BBB 01	TO	2980.	175	85	98.4	116.0	114.5	114.6	114.5	114.7	118.6	
18S 32W 17ABA 02	TO	2973.				116.2	114.9	113.6	113.5	114.1	117.1	118.8
18S 33W 03CCB 01	TO	3008.	182	71	83.1	117.0	118.0	118.8	118.2	118.9	122.5	121.5
18S 33W 05CCC 01	TO	3041.	119	75	84.7	99.9	99.1	99.7	99.6	106.7	102.3	101.4
18S 33W 11ABB 01	TO	2981.	199	55		114.9	113.6	117.1	115.4	114.8		
18S 33W 15DDD 01	TO	2958.	132			93.2	89.2	89.1	90.9	94.2		
18S 33W 26DAD 02		2952.	168	30	47.0	76.8	77.8	79.2	80.6	81.5	82.5	
18S 33W 34ADB 01	TO	2960.	122	26		79.0	77.3	76.0	78.7	82.5		
18S 34W 05CBB 01	TO	3148.	168	88		115.6	115.9	115.5	114.8	117.2	118.9	120.8
18S 34W 25BBD 01	TO	3092.	132	90	95.8	112.4	112.6	112.6	116.3	116.4	113.9	114.3
18S 34W 34BBC 01	TO	3130.	160	90	100.6	119.1	116.9		116.9	118.7	119.3	118.7
19S 32W 06CCB 01		2937.	199	21		67.5	68.0	70.3	68.4	72.2	72.9	75.5
19S 32W 32ACB 01	QU,TO	2984.	204	69		86.9	86.3	86.3	85.2	85.6	86.4	87.0
19S 33W 06DBB 01	TO,TO	3021.	117	59		64.6	66.5	68.1	62.7	62.9	68.5	61.4
19S 33W 12DDC 01	QA,TO	2939.	200	25	29.5	53.1	55.8	55.8	56.4	56.9		
19S 33W 15DBD 01	TO	2964.	132	56	70.9	109.0	108.6	108.8	109.9	110.0	110.2	109.3
19S 33W 29CBB 02		2994.	174	76	101.0	120.8	124.3	126.1	115.1	117.2	113.6	113.9
19S 34W 19DCCC01		3138.				125.0	125.9	126.1	126.1	126.2	126.4	127.4
20S 32W 16DAD 01	TO	2955.	155	57		126.2	123.2		123.9		127.5	125.4
20S 32W 30BCD 01	TO	2917.	187	25		92.5	91.1	92.8	97.4	101.6	105.8	106.7
20S 33W 02DBB 01		2955.	155	50	76.6	115.0		107.8	101.5	101.2		
20S 33W 09BBB 01	TO	2973.	128	60	84.5	98.1	98.9	99.5	100.1	100.7	101.1	101.6
20S 33W 17BAB 01	TO	2974.	132	62	84.8	117.4	117.5	117.1	116.9	118.2		
20S 33W 21ABD 01		2957.	147	48	50.9	124.1		135.0	123.2	126.0	126.0	
20S 33W 35DBA 01	QA,TO	2929.	147	40	53.2	93.7	94.5	96.9	96.8	100.0	103.9	105.8
20S 34W 15BAA 01	TO	3060.	138	97		102.6	102.9	103.4	102.7	102.6	102.9	
20S 34W 36CCD 01	TO	2962.	107	53		79.3	80.7	79.9	79.5	80.3	78.4	79.5

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TABLE 2. DERIVED HYDROLOGIC DATA, SCOTT COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1940-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1940-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1940 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1940-89
16S 31W 17DDD 01	TO	123.9	-6		-3.7	-.2		43	37	-14
16S 31W 31BCB 01	TO	140.0	-13	-11.6	-4.2	-.3	-.5	41	28	-32
16S 32W 16BBA 01		158.3								
16S 33W 19CBB 01	TO	159.5	-36	-18.8	3.7	-.9	-.8	68	33	-51
16S 33W 33BAA 01	TO	153.2	-23		-1.1	-.6		64	41	-36
16S 34W 09CCB 01	TO	159.5	-42	-26.0	-.7	-1.1	-1.1	63	22	-65
16S 34W 29CBB 01	TO	169.0	-50	-34.9	-1.1	-1.3	-1.5	62	12	-81
17S 31W 04DCC 01	TO	134.2	-17		-5.3	-.4		53	36	-32
17S 31W 19CDA 01	TO	128.8			-1.2					
17S 31W 35CCB 01	TO	105.8	-20		-7.7	-.5		61	41	-33
17S 32W 16BBB 01	TO									
17S 32W 27BBB 01	TO									
17S 32W 31BCB 01	TO									
17S 33W 07BBB 01	TO									
17S 33W 14ACB 01	TO	148.1	-55		-4.7	-1.4		121	66	-45
17S 34W 06BCB 01	TO	153.6	-46	-35.1	-3.9	-1.2	-1.5	86	40	-53
17S 34W 16ACB 01	TO									
17S 34W 25DBB 01	TO	142.9	-40	-28.4	-5.8	-1.0	-1.2	86	46	-47
18S 31W 24BCB 01	TO	73.3	-5		1.0	-.1		42	37	-12
18S 31W 27ABA 01	TO	67.5	3		-.4	.1		35	38	9
18S 32W 14BBB 01	TO									
18S 32W 17ABA 02	TO	118.8			-1.7					
18S 33W 03CCB 01	TO	121.5	-51	-38.4	1.0	-1.3	-1.7	111	61	-45
18S 33W 05CCC 01	TO	101.4	-26	-16.7	.9	-.7	-.7	44	18	-59
18S 33W 11ABB 01	TO									
18S 33W 15DDD 01	TO									
18S 33W 26DAD 02										
18S 33W 34ADB 01	TO									
18S 34W 05CBB 01	TO	120.8	-33		-1.9	-.8		80	47	-41
18S 34W 25BBD 01	TO	114.3	-24	-18.5	-.4	-.6	-.8	42	18	-57
18S 34W 34BBC 01	TO	118.7	-29	-18.1	.6	-.7	-.8	70	41	-41
19S 32W 06CCB 01		75.5	-55		-2.5	-1.4		178	124	-30
19S 32W 32ACB 01	QU,TO	87.0	-18		-.6	-.5		135	117	-13
19S 33W 06DBB 01	TO,TO	61.4	-2		7.1	-.1		58	56	-3
19S 33W 12DDC 01	QA,TO									
19S 33W 15DBD 01	TO	109.3	-53	-38.4	.9	-1.4	-1.7	76	23	-70
19S 33W 29CBB 02		113.9	-38	-12.9	-.3	-1.0	-.6	98	60	-39
19S 34W 19DCCC01		127.4			-1.0					
20S 32W 16DAD 01	TO	125.4	-68		2.1	-1.7		98	30	-69
20S 32W 30BCD 01	TO	106.7	-82		-.9	-2.1		162	80	-51
20S 33W 02DBB 01										
20S 33W 09BBB 01	TO	101.6	-42	-17.1	-.5	-1.1	-.7	68	26	-62
20S 33W 17BAB 01	TO									
20S 33W 21ABD 01										
20S 33W 35DBA 01	QA,TO	105.8	-66	-52.6	-1.9	-1.7	-2.3	107	41	-62
20S 34W 15BAA 01	TO									
20S 34W 36CCD 01	TO	79.5	-27		-1.1	-.7		54	28	-48

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Sedgwick County

TABLE 1. WATER LEVELS BY YEAR, SEDGWICK COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1944 (Feet)	Depth to Water 1974 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
25S 01W 07ABD 01	QU	1377.						30.8	27.6	27.2	26.2	29.0
25S 01W 28DBA 01	QU	1364.						15.1	12.9	13.7	13.0	15.5
25S 02W 16DDA 01	QU	1390.						6.7	4.4	4.9	5.0	7.3
25S 02W 23DBD 01	QU	1379.						10.3	8.7	9.1	9.0	11.1
25S 03W 03DDD 01	QA,QU	1423.				11.8	12.6	12.7	10.1	10.7	11.2	12.9
25S 03W 15CCC 01	QU	1428.						22.6	20.1	20.0	19.8	21.9
26S 01W 12BAD 01	QU	1341.						16.5	14.2	15.8	15.5	16.8
26S 01W 19ABA 01	QU	1351.				8.7		7.8	6.1	6.0	5.4	7.5
26S 01W 31CCD 01		1370.						40.1	38.8	38.0	37.0	38.6
26S 02W 08AAB 01	QU	1397.						32.8	30.9	29.6	28.7	31.0
26S 02W 29AAA 01	QU	1384.				27.5		27.2	25.8	24.8	23.5	24.6
26S 02W 13ACA 01	QU	1360.						11.1	8.7	8.5	7.9	
26S 03W 02AAC 01	QU	1409.						23.2	20.9	20.0	18.7	21.2

TABLE 2. DERIVED HYDROLOGIC DATA, SEDGWICK COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1944-89 (Feet)	Water-Level Change 1974-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1944-89 (Feet/year)	Average Annual Water-Level Change 1974-89 (Feet/year)	Saturated Thickness in 1944 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1944-89
25S 01W 07ABD 01	QU	29.0			-2.8					
25S 01W 28DBA 01	QU	15.5			-2.5					
25S 02W 16DDA 01	QU	7.3			-2.3					
25S 02W 23DBD 01	QU	11.1			-2.1					
25S 03W 03DDD 01	QA,QU	12.9			-1.7					
25S 03W 15CCC 01	QU	21.9			-2.1					
26S 01W 12BAD 01	QU	16.8			-1.3					
26S 01W 19ABA 01	QU	7.5			-2.1					
26S 01W 31CCD 01		38.6			-1.6					
26S 02W 08AAB 01	QU	31.0			-2.3					
26S 02W 29AAA 01	QU	24.6			-1.1					
26S 03W 02AAC 01	QU	21.2			-2.5					

TABLE 1. WATER LEVELS BY YEAR, SEWARD COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1940 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
31S 31W 08BCC 01	QU,TO	2829.	519	164	169.4	218.0	215.5	218.5	218.8	219.8	220.3	220.1
31S 31W 13BBC 01		2800.	515	152				158.4	159.0	160.8	159.9	
31S 31W 32DCC 01		2801.	456	153				162.2	162.4	163.2	164.2	164.6
31S 32W 03DAD 01	QU,TO	2845.	496	158	174.1	222.3	217.3	219.6	217.7	218.5	220.7	
31S 32W 31BBB 01		2864.	454	174				218.5	213.1	217.0	217.8	217.0
31S 33W 06CBD 01	QU,TO	2948.	498	210	211.2	242.4	242.5	243.7	245.0	247.5	249.5	250.5
31S 33W 20DBB 01	QU,TO	2897.	537	179	179.1	217.1	208.0	212.1	215.7	216.5	216.0	
31S 34W 18BBB 01	QU,TO	2951.	421	186	186.3	218.0	216.8	218.8	219.0	220.1		
32S 31W 02BBB 01		2787.	497	149				192.6	191.8	192.5	193.0	191.8
32S 31W 08BBB 01	QU,TO	2815.	455	175	165.5	214.6	202.9	204.4	203.3	204.5	205.7	204.8
32S 31W 26CAA 01	QU,TO	2783.	453	180	182.9	216.5	209.3	217.9	220.5	220.2		
32S 32W 14BBB 01	QU,TO	2830.	435	180	192.8	232.7	222.0	222.7	222.0	222.5	222.4	222.4
32S 32W 19BAB 01	QU,TO	2854.	475	189	194.7	227.2	214.8	217.1	217.1	217.5	217.1	217.2
32S 33W 04BAA 01		2869.		167			191.7	193.0	193.2	194.0		198.2
32S 33W 32DBD 01		2830.							151.7	150.8	149.9	
32S 34W 10DAA 01	QU,TO	2925.	470	205	203.5	222.8	223.1	220.9	220.6	220.5	221.6	223.5
32S 34W 17DCC 01		2953.	493	213	222.8	258.7	256.2	251.2	251.6	253.8	253.8	
32S 34W 32BBB 01	QU,TO	2921.	491	159	154.3	189.4	175.5	174.8	174.9	175.4	175.6	182.2
33S 31W 09AAB 01		2766.									204.3	202.0
33S 31W 28DDB 01		2720.	550	190				186.8	188.5	188.7	191.0	190.6
33S 32W 28CDD 02	QU,TO	2630.	399	60		58.4	58.7	58.7	58.7	58.8	58.9	59.2
33S 33W 12AAD 01	QU,TO	2626.	316	5	5.7	8.3	9.4	9.1	9.4	9.4	9.9	
33S 33W 20BCC 01		2866.		176		217.5	195.4	195.9	194.3	197.8	199.6	201.8
33S 33W 25DCC 01		2810.		197		213.0	198.3	198.6	198.3	203.0	202.4	
33S 34W 17DCC 01		2918.		123		114.0	112.2		114.4	118.9	120.6	124.5
34S 31W 30BBB 01		2731.	671	208		210.6	211.0	211.1	210.2		214.4	216.0
34S 32W 29BAA 01		2765.	525	175				175.7	168.8	171.7	169.6	170.8
34S 32W 35ADA 01	QU,TO	2734.		189		191.4	191.1	191.9	190.3		193.6	
34S 33W 04BCD 01		2855.		165		210.5	192.8	193.2		194.8	195.4	
34S 33W 07CCB 01		2901.	575	140	126.7	133.9	135.1	136.0	137.1	138.9	138.8	139.9
34S 34W 16DAA 01	QU,TO	2943.	673	114	94.5	137.9	131.0	125.7	125.6		125.7	
34S 34W 26BCA 01		2908.		98				106.8		109.9	110.7	
35S 31W 10AAC 01		2690.						194.0	193.5	194.0	194.9	196.5
35S 31W 18BBA 01	QU,TO	2707.	497	187	181.9	187.7	177.6	180.0	179.7	181.4	182.6	
35S 32W 06CBB 01		2780.	540	150				159.2	159.9	160.3	162.0	166.3
35S 33W 16BCA 01	QU,TO	2838.	658	126	103.7	123.2	121.3		128.9	129.7	129.5	132.0
35S 34W 03CBC 01		2920.	660	95		100.4	104.1	104.3	101.9	101.5	102.0	
35S 34W 10BBB 01	QU,TO	2912.	647	90	80.3	78.0	75.5	77.4	78.5	78.7	80.1	81.6

TABLE 2. DERIVED HYDROLOGIC DATA, SEWARD COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1940-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1940-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1940 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1940-89
31S 31W 08BCC 01	QU,TO	220.1	-56	-50.7	.2	-1.1	-2.2	355	299	-16
31S 31W 13BBC 01										
31S 31W 32DCC 01		164.6	-12		-.4	-.2		303	291	-4
31S 32W 03DAD 01	QU,TO									
31S 32W 31BBB 01		217.0	-43		.8	-.9		280	237	-15
31S 33W 06CBD 01	QU,TO	250.5	-41	-39.3	-1.0	-.8	-1.7	288	248	-14
31S 33W 20DBB 01	QU,TO									
31S 34W 18BBB 01	QU,TO									
32S 31W 02BBB 01		191.8	-43		1.2	-.9		348	305	-12
32S 31W 08BBB 01	QU,TO	204.8	-30	-39.3		-.6	-1.7	280	250	-11
32S 31W 26CAA 01	QU,TO									
32S 32W 14BBB 01	QU,TO	222.4	-42	-29.6	.0	-.9	-1.3	255	213	-16
32S 32W 19BAB 01	QU,TO	217.2	-28	-22.5	-.1	-.6	-1.0	286	258	-10
32S 33W 04BAA 01		198.2	-31			-.6				
32S 33W 32DBD 01										
32S 34W 10DAA 01	QU,TO	223.5	-19	-20.0	-1.9	-.4	-.9	265	247	-7
32S 34W 17DCC 01										
32S 34W 32BBB 01	QU,TO	182.2	-23	-27.9	-6.6	-.5	-1.2	332	309	-7
33S 31W 09AAB 01		202.0								
33S 31W 28DDB 01		190.6	-1		.4			360	359	0
33S 32W 28CDD 02	QU,TO	59.2	1		-.3			339	340	0
33S 33W 12AAD 01	QU,TO									
33S 33W 20BCC 01		201.8	-26		-2.2	-.5				
33S 33W 25DCC 01										
33S 34W 17DCC 01		124.5	-2		-3.9					
34S 31W 30BBB 01		216.0	-8		-1.6	-.2		463	455	-2
34S 32W 29BAA 01		170.8	4		-1.2	.1		350	354	1
34S 32W 35ADA 01	QU,TO									
34S 33W 04BCD 01										
34S 33W 07CCB 01		139.9	0	-13.2	-1.1		-.6	435	435	0
34S 34W 16DAA 01	QU,TO									
34S 34W 26BCA 01										
35S 31W 10AAC 01		196.5			-1.6					
35S 31W 18BBA 01	QU,TO									
35S 32W 06CBB 01		166.3	-16		-4.3	-.3		390	374	-4
35S 33W 16BCA 01	QU,TO	132.0	-6	-28.3	-2.5	-.1	-1.2	532	526	-1
35S 34W 03CBC 01										
35S 34W 10BBB 01	QU,TO	81.6	8	-1.3	-1.5	.2	-.1	557	565	1

TABLE 1. WATER LEVELS BY YEAR, SHERIDAN COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
06S 26W 26CBB 01		2636.						166.7	166.4	167.6	167.1	167.6
06S 27W 05CBB 01		2684.						112.8	112.1	113.8	113.2	113.3
06S 27W 08DCA 01	QA,TO	2588.	108	21	14.6	19.8		20.8	21.1	22.2	22.6	23.9
06S 27W 19ADC 01		2620.									33.7	34.0
06S 27W 27BCC 01	TO	2716.	320	162	154.4		160.1	162.5	162.9		158.9	
06S 29W 10DBC 01	TO	2823.	205	116	118.6	131.4		130.9	129.6	131.2	133.6	
06S 29W 24ABB 01	TO	2781.	205	91	96.2	103.6	103.1	104.3	104.8	107.4	108.4	115.9
06S 29W 33CDA 01	TO	2828.	207	94	93.3	106.4		107.6	117.2	121.6	120.4	117.2
06S 30W 13BAA 01	TO	2875.	216	115		127.8	129.8	131.1	132.6	128.0	130.9	131.8
06S 30W 14CCD 01	TO	2884.	203	95	102.8	110.1	110.0	111.5	110.8	110.8	112.0	112.4
07S 26W 06AAB 01	TO	2634.	204	125	125.9			131.2	131.5	132.1	132.3	132.7
07S 26W 12BAC 01	TO	2559.	170	94	91.9	100.1	101.4	105.0	99.2	101.7	103.1	101.4
07S 26W 19BBC 01	TO	2625.	201	115		124.6	124.8	124.7	124.0	125.4	125.4	126.7
07S 26W 28CAB 01	TO	2634.	243	142	148.4	154.4		157.5	161.7	162.1	159.3	164.4
07S 27W 22DAC 01		2644.						113.9	118.9	122.3	115.7	119.8
07S 28W 08BDC 01	TO	2808.	282	140		163.7		165.4	166.1		167.7	169.2
07S 28W 21ABB 01	TO	2774.	235	129	131.0	160.2	158.8	160.2	173.3	177.5	177.3	170.8
07S 28W 36ABA 01	TO	2725.	233	123	127.5	149.0	141.6	149.3	151.0	147.1	146.0	144.3
07S 29W 05BBB 01		2841.						103.3	104.2	104.9	105.5	107.4
07S 29W 27CCC 01	TO	2869.	265	131		175.1	179.7	177.9	195.7		180.7	
07S 29W 30ABA 01	TO	2886.	255	113	121.8	154.1	158.3	155.5	160.7	160.4	168.7	161.0
07S 30W 08CBB 01		2919.						104.6	99.2	104.5	104.2	101.6
08S 26W 14DAA 01	QA	2398.	66	13	19.5	16.9	19.0	18.8	13.9	19.2	18.0	19.8
08S 27W 11DCD 01	QA	2504.	60	13	8.5	10.4	11.1	10.3	10.3	10.6	10.4	10.7
08S 27W 35CBB 01								127.7	128.1	128.8	127.6	127.7
08S 28W 09ABC 01	TO	2766.	233	119	117.7	139.4	139.2		143.3	144.2	140.8	142.6
08S 28W 11DAA 01		2692.						97.9	98.0	99.7	104.8	99.1
08S 29W 01DCB 01	TO	2823.	240	125	122.6	144.3	146.2		154.5	157.7	157.3	161.3
08S 30W 11CBC 01	TO	2941.	277	123	133.5	182.1	179.4	181.2	182.8	184.9	187.4	188.0
08S 30W 13DAA 01	TO	2891.	257	103	109.7	141.5	144.1	145.3	144.7	147.4	149.9	151.2
08S 30W 30ABC 01	TO	2962.	234	107	105.8	129.1		129.9	131.6	132.0	132.9	131.7
09S 26W 22BBB 01		2669.						140.3	141.5	142.6	137.7	138.6
09S 27W 12CCC 01	TO	2678.	198	104	106.5	111.0		109.2	113.0	115.3	108.8	107.3
09S 27W 19DDD 01	TO	2750.	205	124	123.6	128.8	133.2	130.3	131.8	133.2	129.4	129.2
09S 27W 27DAA 01		2705.						110.3	111.6	113.3	110.6	117.4
09S 28W 04BCC 01	TO,QA	2677.	98	18	25.7	27.2		27.0	27.1	27.5	27.6	27.8
09S 29W 03AAA 01		2819.						104.2	103.4	104.6	105.8	110.9
09S 29W 17BAB 01	TO	2854.	196	84	84.2	102.6	104.6	106.5	106.5	106.3	107.0	
09S 29W 26BAA 01	TO	2863.	210	123	132.0		141.9	138.5	141.8		145.7	139.3
09S 30W 03AAB 02	TO	2933.	217	118	119.2	141.7	143.5	145.9	144.7	148.3	149.3	150.6
09S 30W 35BBB 01	TO	2943.	215	120	129.3	146.4	147.5	146.3	147.0	148.5		151.0
10S 26W 08BAA 01		2590.							24.0		23.3	21.2
10S 26W 12AAD 01		2534.						27.9	27.8	29.1	29.6	28.3
10S 27W 20CBC 01	QA	2605.	50	12	13.9	18.4			18.2	21.0	19.7	19.9
10S 27W 22DBA 01	QA	2568.	65	10	18.5	19.1	23.1	20.0	20.7	20.6	20.7	23.2
10S 28W 05DDB 01	TO	2789.	173	99	95.2	106.2	108.3	108.5	106.7	108.0	111.0	113.0
10S 28W 29DAA 01	QA,TO	2691.	62	22	25.4	25.8	30.2	27.0	27.1	27.0	25.8	27.2

TABLE 1. WATER LEVELS BY YEAR, SHERIDAN COUNTY, con't.

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
10S 29W 02DDD 01		2803.						90.7	93.4	82.2	80.1	82.2
10S 29W 20CAA 01								28.8	30.7	71.2	70.0	
10S 30W 08DDD 01	TO	2930.	186	96	93.0	102.7	100.8	100.0	97.9	98.9	100.4	102.3
10S 30W 12ADA 01	TO	2874.	187	89	87.7	96.3	99.8	101.5	106.9	100.3	102.6	

TABLE 2. DERIVED HYDROLOGIC DATA, SHERIDAN COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
06S 26W 26CBB 01		167.6			-.5					
06S 27W 05CBB 01		113.3			-.1					
06S 27W 08DCA 01	QA,TO	23.9	-3	-9.3	-1.3	-.1	-.4	87	84	-3
06S 27W 19ADC 01		34.0			-.3					
06S 27W 27BCC 01	TO									
06S 29W 10DBC 01	TO									
06S 29W 24ABB 01	TO	115.9	-25	-19.7	-7.5	-.6	-.9	114	89	-22
06S 29W 33CDA 01	TO	117.2	-23	-23.9	3.2	-.6	-1.0	113	90	-20
06S 30W 13BAA 01	TO	131.8	-17		-.9	-.4		101	84	-17
06S 30W 14CCD 01	TO	112.4	-17	-9.6	-.4	-.4	-.4	108	91	-16
07S 26W 06AAB 01	TO	132.7	-8	-6.8	-.4	-.2	-.3	79	71	-10
07S 26W 12BAC 01	TO	101.4	-7	-9.5	1.7	-.2	-.4	76	69	-9
07S 26W 19BBC 01	TO	126.7	-12		-1.3	-.3		86	74	-14
07S 26W 28CAB 01	TO	164.4	-22	-16.0	-5.1	-.6	-.7	101	79	-22
07S 27W 22DAC 01		119.8			-4.1					
07S 28W 08BDC 01	TO	169.2	-29		-1.5	-.7		142	113	-20
07S 28W 21ABB 01	TO	170.8	-42	-39.8	6.5	-1.1	-1.7	106	64	-40
07S 28W 36ABA 01	TO	144.3	-21	-16.8	1.7	-.5	-.7	110	89	-19
07S 29W 05BBB 01		107.4			-1.9					
07S 29W 27CCC 01	TO									
07S 29W 30ABA 01	TO	161.0	-48	-39.2	7.7	-1.2	-1.7	142	94	-34
07S 30W 08CBB 01		101.6			2.6					
08S 26W 14DAA 01	QA	19.8	-7	-.3	-1.8	-.2		53	46	-13
08S 27W 11DCD 01	QA	10.7	2	-2.2	-.3	.1	-.1	47	49	4
08S 27W 35CBB 01		127.7			-.1					
08S 28W 09ABC 01	TO	142.6	-24	-24.9	-1.8	-.6	-1.1	114	90	-21
08S 28W 11DAA 01		99.1			5.7					
08S 29W 01DCB 01	TO	161.3	-36	-38.7	-4.0	-.9	-1.7	115	79	-31
08S 30W 11CBC 01	TO	188.0	-65	-54.5	-.6	-1.7	-2.4	154	89	-42
08S 30W 13DAA 01	TO	151.2	-48	-41.5	-1.3	-1.2	-1.8	154	106	-31
08S 30W 30ABC 01	TO	131.7	-25	-25.9	1.2	-.6	-1.1	127	102	-20
09S 26W 22BBB 01		138.6			-.9					
09S 27W 12CCC 01	TO	107.3	-3	-.8	1.5	-.1		94	91	-3
09S 27W 19DDD 01	TO	129.2	-5	-5.6	.2	-.1	-.2	81	76	-6
09S 27W 27DAA 01		117.4			-6.8					
09S 28W 04BCC 01	TO,QA	27.8	-10	-2.1	-.2	-.3	-.1	80	70	-13
09S 29W 03AAA 01		110.9			-5.1					
09S 29W 17BAB 01	TO									
09S 29W 26BAA 01	TO	139.3	-16	-7.3	6.4	-.4	-.3	87	71	-18
09S 30W 03AAB 02	TO	150.6	-33	-31.4	-1.3	-.8	-1.4	99	66	-33
09S 30W 35BBB 01	TO	151.0	-31	-21.7		-.8	-.9	95	64	-33
10S 26W 08BAA 01		21.2			2.1					
10S 26W 12AAD 01		28.3			1.3					
10S 27W 20CBC 01	QA	19.9	-8	-6.0	-.2	-.2	-.3	38	30	-21
10S 27W 22DBA 01	QA	23.2	-13	-4.7	-2.5	-.3	-.2	55	42	-24
10S 28W 05DDB 01	TO	113.0	-14	-17.8	-2.0	-.4	-.8	74	60	-19
10S 28W 29DAA 01	QA,TO	27.2	-5	-1.8	-1.4	-.1	-.1	40	35	-13

TABLE 2. DERIVED HYDROLOGIC DATA, SHERIDAN COUNTY, con't.

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
10S 29W 02DDD 01		82.2			-2.1					
10S 29W 20CAA 01										
10S 30W 08DDD 01	TO	102.3	-6	-9.3	-1.9	-.2	-.4	90	84	-7
10S 30W 12ADA 01	TO									

TABLE 1. WATER LEVELS BY YEAR, SHERMAN COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
06S 37W 07BBA 01	QA	3304.	134	5	6.1			8.6	7.3	7.4	7.2	7.1
06S 37W 16CDD 01	TO	3460.	264	157	163.8		180.8	171.5	171.5	171.9	172.2	173.1
06S 37W 19ABB 01	TO	3476.	309	150	155.4	159.3	160.8	159.3	160.0	160.7	160.4	168.5
06S 38W 09ABD 01	TO	3510.	318	147	151.3		162.3	162.2		163.0	162.0	
06S 39W 09DDD 01	TO	3585.	330	145	142.7	148.3	148.6	148.0	149.2	149.5	149.8	150.3
06S 40W 10AAC 01	TO	3641.	341	151	151.2	161.4		161.1	161.5	162.9	162.1	161.6
06S 40W 13CBC 01		3624.						147.7	147.0	148.2	148.3	148.3
06S 40W 30DCC 01	TO	3718.	326	159	153.6	164.6	167.0	167.6	168.3	168.9	169.1	169.4
06S 41W 01ABB 01	TO	3675.	296	150	156.6	159.2		159.6	165.9	159.8	161.6	
06S 41W 19DBD 01	TO	3792.	325	162	169.5	181.7	182.3	182.6	183.8	185.4	185.7	
06S 41W 27DBD 01	TO	3741.	325	141	142.1	162.5	163.0	164.1	164.5	164.4	164.9	165.6
06S 42W 02AAA 01	TO	3777.	277	179	181.7	195.4	196.3	196.9	198.1	199.8	197.3	198.8
06S 42W 08CBB 01	TO	3841.	304	183	201.3	209.8	212.2		210.8	211.2	209.8	211.2
06S 42W 22DCC 01	TO	3837.	315	177	183.1	193.9	193.8	194.1	194.7	195.4	195.8	196.4
06S 42W 30ADA 01	TO	3871.	309	176	183.6	201.5	201.9	202.2	202.2	204.9	203.5	204.2
07S 37W 04BBC 01	TO	3455.	270	122		137.1	136.9	139.5	136.7	137.6	137.6	138.3
07S 37W 05CCB 01	TO	3472.	294	124	129.9	137.3	137.5	137.8	138.0	144.4	138.7	139.3
07S 38W 28DAA 01		3545.						145.4	147.4	147.8	148.3	149.2
07S 39W 01DCD 01		3563.						133.8	134.2	133.7	134.6	134.9
07S 39W 09BBB 01	TO	3589.	295	106	104.8	114.6	116.1	116.7	116.5	117.3	117.6	117.5
07S 39W 24BAA 01	TO	3587.	300	137	133.9	146.9				148.7	148.5	148.4
07S 40W 06ADB 01	TO	3722.	343	152	149.4	166.6	167.2	167.3	168.6	168.4	168.3	168.7
07S 40W 29BBA 01	TO	3708.	288	121	121.5			139.9	140.9	141.6	141.7	141.9
07S 40W 35BBB 01	TO	3650.	255	102	103.0	126.3	125.6	124.8	125.8	127.4	127.5	129.6
07S 40W 36BAB 01	TO	3643.	321	105	109.9	132.6	133.6	133.7	133.3	134.9	135.4	136.9
07S 41W 07BCB 01	TO	3840.	300	180	174.4		195.4		198.1	199.5	200.0	200.9
07S 41W 28DBB 01	TO	3774.	280	111	111.4	126.4	126.6	127.3	128.2	129.3	129.7	130.0
07S 42W 07DAA 01	TO	3903.	320	163	164.4	192.8			195.5	191.9	189.1	188.4
07S 42W 17CCC 01	TO	3864.	263	119	117.9	139.3	140.2		141.2	141.9	142.1	142.2
07S 42W 27AAB 01	TO	3862.	321	142	140.6	164.5	165.1	164.5	165.3	167.2	166.8	169.0
08S 37W 03ADB 01	TO	3476.	273	126	143.5	153.7		155.3	156.1	159.9	158.7	
08S 37W 21CCC 01	TO	3496.	230	120	121.1	139.1	138.7	140.4	140.1	141.0	141.1	141.3
08S 37W 32ABB 01	TO	3468.	216	83	80.0	95.9	95.7		94.9	96.1	96.0	96.3
08S 38W 17CDD 01	TO	3603.	293	143	142.0	161.0	162.2	161.2	161.2	160.8	162.2	162.1
08S 38W 24AAB 01	TO	3513.	260	110	111.0		117.9	119.8	120.7	124.3	125.9	127.1
08S 39W 15CCC 01	TO	3642.	272	127	135.0	163.6	163.5	163.9	163.5	163.8	164.7	165.3
08S 40W 12DBA 01	TO	3670.	290	120	133.0	166.0	166.0	165.6	166.1	165.8	166.1	167.5
08S 40W 17CDB 01	TO	3727.	277	102	108.0	132.5	132.7	135.1	133.1	133.9	134.1	137.0
08S 40W 20CCC 01	TO	3716.	277	80	80.0	113.7	113.6	114.3	111.9	112.9	112.7	110.8
08S 40W 25AAC 01	TO	3701.	290	133	158.0	182.6	182.1	182.3	181.5	182.1	182.9	182.2
08S 41W 17CBA 01	TO	3843.	300	129	129.0	145.7	147.4	153.6	146.3	148.8	149.7	147.1
08S 41W 25BBC 01	TO	3754.	264	94	96.0	117.2	116.1	118.6	119.3	120.5	120.8	121.9
08S 42W 15DDB 01	TO	3859.	274	98	99.0	125.8	124.0	125.5	125.9	126.8	126.5	127.9
08S 42W 31DCD 01	TO	3872.	207	50	58.0	79.0	79.1	79.9	80.6	81.2	81.7	82.2
09S 37W 07DDB 01		3496.						92.8	92.8	93.3	93.7	92.2
09S 38W 13BCC 01	TO	3510.						80.4	79.0	79.4	80.5	78.7
09S 39W 01DBA 01		3619.						163.4	156.7	139.7	140.1	140.8

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TABLE 1. WATER LEVELS BY YEAR, SHERMAN COUNTY, con't.

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
09S 39W 02BAB 01	TO	3646.	246	133		170.0	169.2	170.1	168.4	168.7	169.9	172.3
09S 39W 10CCB 01		3661.						144.4	144.4	146.6	139.3	148.8
09S 39W 19CCC 01	TO	3695.	245	105		131.4	134.5	135.8	134.0	134.5	135.4	136.0
09S 40W 13CDC 01	TO	3722.	260	123	125.0	157.7	158.6	159.5	158.7	159.8	159.4	160.6
09S 40W 29BBB 01	TO	3782.	246	122	119.0	156.6	158.0	159.4	158.8	156.0	159.7	161.2
09S 41W 05DCC 01	TO	3860.	265	128	136.0	166.7	167.1	177.0	167.7	168.9	168.8	172.9
09S 41W 14BBC 01		3835.		129		174.2	175.9	176.2	175.2	176.1	177.4	180.0
09S 41W 28AAA 01	TO	3854.	290	124	134.0			181.4	172.8	173.8	174.3	176.1
09S 41W 34BAB 01	TO	3841.	290	111	114.0	147.4	150.1	148.7	148.3	149.5	149.9	151.6
09S 42W 08AAA 01	TO	3943.	271	120	131.0	156.5	156.8	157.3	156.6	157.6	157.3	158.2
09S 42W 14AAA 01	TO	3901.	291	116	131.0	167.5			164.4	166.8	165.7	165.8
09S 42W 29CBB 01									139.6	138.5		140.5
09S 42W 35ABB 01	TO	3916.	268	102	103.0	142.5	143.0	143.0	141.9	143.9	143.9	142.5
10S 37W 23ABB 01	TO	3421.	289	171	174.0	196.4	191.7	189.6	193.7	200.4	199.2	
10S 40W 10ADC 01	QA,TO	3624.	68	12	16.0	16.5	17.8	17.9	18.1	18.4	16.5	17.6
10S 41W 15CAD 01	TO,QA	3762.	117	12	12.0	22.1		23.4	24.4	25.4		25.8
10S 42W 20ABB 01		3968.						117.2	113.5	113.5	113.9	115.8
10S 42W 21BBB 01	TO	3963.	223	73	86.0	108.3	109.1	109.0	109.6	110.8	111.8	112.7
10S 42W 24BAB 01	TO	3903.	204	73	84.0	98.2	100.2	98.2	100.9	102.0	102.8	

TABLE 2. DERIVED HYDROLOGIC DATA, SHERMAN COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
06S 37W 07BBA 01	QA	7.1	-2	-1.0	.1	-.1		129	127	-2
06S 37W 16CDD 01	TO	173.1	-16	-9.3	-.9	-.4	-.4	107	91	-15
06S 37W 19ABB 01	TO	168.5	-19	-13.1	-8.1	-.5	-.6	159	141	-11
06S 38W 09ABD 01	TO									
06S 39W 09DDD 01	TO	150.3	-5	-7.6	-.5	-.1	-.3	185	180	-3
06S 40W 10AAC 01	TO	161.6	-11	-10.4	.5	-.3	-.5	190	179	-6
06S 40W 13CBC 01		148.3			.0					
06S 40W 30DCC 01	TO	169.4	-10	-15.8	-.3	-.3	-.7	167	157	-6
06S 41W 01ABB 01	TO									
06S 41W 19DBD 01	TO									
06S 41W 27DBD 01	TO	165.6	-25	-23.5	-.7	-.6	-1.0	184	159	-14
06S 42W 02AAA 01	TO	198.8	-20	-17.1	-1.5	-.5	-.7	98	78	-20
06S 42W 08CBB 01	TO	211.2	-28	-9.9	-1.4	-.7	-.4	121	93	-23
06S 42W 22DCC 01	TO	196.4	-19	-13.3	-.6	-.5	-.6	138	119	-14
06S 42W 30ADA 01	TO	204.2	-28	-20.6	-.7	-.7	-.9	133	105	-21
07S 37W 04BBC 01	TO	138.3	-16		-.7	-.4		148	132	-11
07S 37W 05CCB 01	TO	139.3	-15	-9.4	-.6	-.4	-.4	170	155	-9
07S 38W 28DAA 01		149.2			-.9					
07S 39W 01DCD 01		134.9			-.3					
07S 39W 09BBB 01	TO	117.5	-12	-12.7	.1	-.3	-.6	189	178	-6
07S 39W 24BAA 01	TO	148.4	-11	-14.5	.1	-.3	-.6	163	152	-7
07S 40W 06ADB 01	TO	168.7	-17	-19.3	-.4	-.4	-.8	191	174	-9
07S 40W 29BBA 01	TO	141.9	-21	-20.4	-.2	-.5	-.9	167	146	-13
07S 40W 35BBB 01	TO	129.6	-28	-26.6	-2.1	-.7	-1.2	153	125	-18
07S 40W 36BAB 01	TO	136.9	-32	-27.0	-1.5	-.8	-1.2	216	184	-15
07S 41W 07BCB 01	TO	200.9	-21	-26.5	-.9	-.5	-1.2	120	99	-18
07S 41W 28DBB 01	TO	130.0	-19	-18.6	-.3	-.5	-.8	169	150	-11
07S 42W 07DAA 01	TO	188.4	-25	-24.0	.7	-.6	-1.0	157	132	-16
07S 42W 17CCC 01	TO	142.2	-23	-24.3	-.1	-.6	-1.1	144	121	-16
07S 42W 27AAB 01	TO	169.0	-27	-28.4	-2.2	-.7	-1.2	179	152	-15
08S 37W 03ADB 01	TO									
08S 37W 21CCC 01	TO	141.3	-21	-20.2	-.2	-.5	-.9	110	89	-19
08S 37W 32ABB 01	TO	96.3	-13	-16.3	-.3	-.3	-.7	133	120	-10
08S 38W 17CDD 01	TO	162.1	-19	-20.1	.1	-.5	-.9	150	131	-13
08S 38W 24AAB 01	TO	127.1	-17	-16.1	-1.2	-.4	-.7	150	133	-11
08S 39W 15CCC 01	TO	165.3	-38	-30.3	-.6	-1.0	-1.3	145	107	-26
08S 40W 12DBA 01	TO	167.5	-48	-34.5	-1.4	-1.2	-1.5	170	123	-28
08S 40W 17CDB 01	TO	137.0	-35	-29.0	-2.9	-.9	-1.3	175	140	-20
08S 40W 20CCC 01	TO	110.8	-31	-30.8	1.9	-.8	-1.3	197	166	-16
08S 40W 25AAC 01	TO	182.2	-49	-24.2	.7	-1.3	-1.1	157	108	-31
08S 41W 17CBA 01	TO	147.1	-18	-18.1	2.6	-.5	-.8	171	153	-11
08S 41W 25BBC 01	TO	121.9	-28	-25.9	-1.1	-.7	-1.1	170	142	-16
08S 42W 15DDB 01	TO	127.9	-30	-28.9	-1.4	-.8	-1.3	176	146	-17
08S 42W 31DCD 01	TO	82.2	-32	-24.2	-.5	-.8	-1.1	157	125	-20
09S 37W 07DDB 01		92.2			1.5					
09S 38W 13BCC 01	TO	78.7			1.8					
09S 39W 01DBA 01		140.8			-.7					

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
09S 39W 02BAB 01	TO	172.3	-39		-2.4	-1.0		113	74	-35
09S 39W 10CCB 01		148.8			-9.5					
09S 39W 19CCC 01	TO	136.0	-31		-.6	-.8		140	109	-22
09S 40W 13CDC 01	TO	160.6	-38	-35.6	-1.2	-1.0	-1.5	137	99	-28
09S 40W 29BBB 01	TO	161.2	-39	-42.2	-1.5	-1.0	-1.8	124	85	-31
09S 41W 05DCC 01	TO	172.9	-45	-36.9	-4.1	-1.2	-1.6	137	92	-33
09S 41W 14BBC 01		180.0	-51		-2.6	-1.3				
09S 41W 28AAA 01	TO	176.1	-52	-42.1	-1.8	-1.3	-1.8	166	114	-31
09S 41W 34BAB 01	TO	151.6	-41	-37.6	-1.7	-1.1	-1.6	179	138	-23
09S 42W 08AAA 01	TO	158.2	-38	-27.2	-.9	-1.0	-1.2	151	113	-25
09S 42W 14AAA 01	TO	165.8	-50	-34.8	-.1	-1.3	-1.5	175	125	-29
09S 42W 29CBB 01		140.5								
09S 42W 35ABB 01	TO	142.5	-41	-39.5	1.4	-1.1	-1.7	166	126	-24
10S 37W 23ABB 01	TO									
10S 40W 10ADC 01	QA,TO	17.6	-6	-1.6	-1.1	-.2	-.1	56	50	-11
10S 41W 15CAD 01	TO,QA	25.8	-14	-13.8		-.4	-.6	105	91	-13
10S 42W 20ABB 01		115.8			-1.9					
10S 42W 21BBB 01	TO	112.7	-40	-26.7	-.9	-1.0	-1.2	150	110	-27
10S 42W 24BAB 01	TO									

TABLE 1. WATER LEVELS BY YEAR, STAFFORD COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1944 (Feet)	Depth to Water 1974 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
21S 11W 07BBB 01		1808.	193	20			21.0	22.9		17.9	15.7	21.0
21S 12W 10CDD 01	QU	1845.	200	24	4.9	25.5	27.3	29.0	25.1		22.6	27.1
21S 13W 05CBD 01	QU	1893.									27.8	28.0
21S 13W 27DDD 02	QU	1877.	152	11	.6	10.2	10.8	11.1	9.0	10.6	7.8	10.8
21S 14W 22AAC 01	QU	1926.	196	16	4.8	20.1	21.0	22.7	22.3	22.9	21.1	23.3
21S 14W 32BAC 01	QU	1949.	219	22	16.2	27.6	28.5	29.9	30.1	30.7	30.1	
22S 11W 07BBB 01	QU	1785.	54	10	3.3	4.7	4.8	4.9	4.5	4.6	4.5	5.4
22S 12W 05BBD 01	QU	1870.	220	21	8.9	20.4	20.2	21.1	18.1	19.4	16.1	20.2
22S 12W 30BBD 01	QU	1872.	162	13	7.0	17.0	17.4	17.7	15.7	16.2	14.1	17.9
22S 12W 36BBB 02	QU	1827.	146		.7	4.4	5.0	4.6	3.0	3.8	3.2	5.7
22S 13W 05CBC 01	QU	1905.	165	6	3.1	17.0	17.7	18.9	17.1	17.9	15.9	18.9
22S 13W 12CAC 01	QU	1885.	180	20	8.6	21.0	21.1	22.2	19.5	20.4	17.4	21.5
22S 13W 29DAD 01	QU	1902.	204	17	5.2	17.3	17.8	19.2	17.6	17.6	14.9	19.0
22S 14W 14CCA 01	QU	1930.	200	12	.8	20.9	21.8	23.9	21.3	22.0	19.8	23.8
22S 14W 35DDB 01	QU	1930.	130	20	11.1	27.9	28.4	29.8	27.9	27.9	25.6	29.2
23S 11W 02BBB 01	QU	1789.	125		1.0	1.9	3.1	2.9	1.3	1.2	1.6	3.7
23S 11W 22BCC 01	QU	1802.	172	5	17.4	22.2	22.8	23.0	21.4	21.8	20.6	23.1
23S 11W 36CCA 01		1803.										19.7
23S 12W 07DBD 01	QU	1859.	174	1	.5	8.5	8.8	8.9	7.4	8.1	7.0	9.0
23S 12W 22BCC 01	QU	1853.	163	4	5.4	15.0	15.2	14.9	12.1	13.2	11.5	16.5
23S 12W 36BBC 01	QU	1849.	154	8	11.7	17.9	18.3	17.9	14.6	14.9	13.3	16.6
23S 13W 08CCB 01	QU	1895.	120	8	4.4	12.5	13.0	13.6	12.2	12.4	10.5	13.4
23S 13W 30CBB 01	QU	1906.	86	11	7.9	12.8	13.2	13.4	12.5	12.3	11.4	13.4
23S 13W 35CCA 01	QU	1897.	150	19	7.3	19.9	20.2	20.6	19.3	18.7	17.5	20.3
23S 14W 15ADD 01	QU	1927.	76	7	3.3	10.2	10.5	10.6	10.3	10.6	9.8	11.9
23S 14W 30BBB 01	QU	1988.	168	24	34.4	40.4		42.1	42.0	41.5	40.7	43.3
24S 11W 14CAB 01	QU	1813.	156	24	30.0	32.9	33.5	34.2	33.8	32.8	29.3	32.3
24S 11W 17DDB 01	QU	1833.	133	23	22.8	24.1	24.3	24.5	23.6	22.3	20.2	22.6
24S 12W 04CDB 01		1875.										22.2
24S 12W 17CAB 01	QU	1893.	144	22	16.8	28.5	28.4	27.8	24.6	24.7	22.8	27.5
24S 12W 34ABC 01	QU	1880.	150	29	20.0	23.9	23.7	23.6	22.0	19.3	17.2	21.0
24S 13W 16ACA 01	QU	1915.	137	18	8.6	21.6	21.6	21.9	20.6	20.2	19.0	21.8
24S 13W 20CDD 01		1932.								22.1	20.7	22.6
24S 13W 36DDD 01		1907.	155	21		23.2	22.7	22.1	19.2	18.8	15.9	20.6
24S 14W 17AAC 01	QU	1982.	132	27	21.7	30.6	30.5	33.2	30.8	30.9	30.1	32.9
24S 14W 31BBD 01	QU	1998.	158	23	7.8	21.8	20.5	21.2	20.1	20.4	17.6	21.2
24S 15W 10BAB 01	QU	2024.	114	24	14.6	27.8	27.8	28.9	29.0	29.4	28.3	30.7
24S 15W 32DBC 01	QU	2044.	184	21	9.9	25.2	25.0	26.7	27.0	26.6	23.5	26.9
25S 11W 02ACB 01	QU	1770.	90	10	10.3	11.8	11.8	11.7	11.4	11.0	10.4	11.6
25S 11W 23DDD 01	QU	1796.	156	13	12.9	16.7	17.0	16.8	15.6	14.9	12.1	15.9
25S 12W 11AAA 01		1846.	81	16			19.4	17.0	13.0	11.2	9.9	15.9
25S 12W 16DCA 01		1868.										13.8
25S 12W 24DDB 01	QU	1840.	145	17	10.2	13.8	13.7	13.6	12.3	11.7	10.3	13.1
25S 13W 16AAC 01		1940.	142	22		28.8	27.2	27.9	23.2	23.3	20.2	27.4
25S 13W 31DDA 01		1973.	221	38				21.1	18.9	18.9		22.4
25S 13W 36DCC 01		1902.	177	22				14.7		9.7	8.5	13.8
25S 14W 04AAD 01	QU	1969.	149	24	9.2	14.4	14.0	14.4	13.5	13.9	12.3	14.6

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TABLE 1. WATER LEVELS BY YEAR, STAFFORD COUNTY, con't.

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1944 (Feet)	Depth to Water 1974 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
25S 14W 21DDB 01		1980.								12.2	10.4	14.4
25S 14W 30CDB 01	QU	2004.	214	14	7.2	16.0	15.7	17.0	15.3	14.5	12.4	16.1
25S 15W 11BCB 01	QU	2020.	174	16	11.7	16.0	17.4	18.6	19.7	21.1	20.1	20.4
25S 15W 29BBD 01	QU	2034.	184	16	4.3	11.9	11.9	12.3	11.2	10.9	8.7	12.3

TABLE 2. DERIVED HYDROLOGIC DATA, STAFFORD COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1944-89 (Feet)	Water-Level Change 1974-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1944-89 (Feet/year)	Average Annual Water-Level Change 1974-89 (Feet/year)	Saturated Thickness in 1944 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1944-89
21S 11W 07BBB 01		21.0	-1		-5.3			173	172	-1
21S 12W 10CDD 01	QU	27.1	-3	-22.2	-4.5	-.1	-1.5	176	173	-2
21S 13W 05CBD 01	QU	28.0			-.2					
21S 13W 27DDD 02	QU	10.8	0	-10.2	-3.0		-.7	141	141	0
21S 14W 22AAC 01	QU	23.3	-7	-18.5	-2.2	-.2	-1.2	180	173	-4
21S 14W 32BAC 01	QU									
22S 11W 07BBB 01	QU	5.4	5	-2.1	-.9	.1	-.1	44	49	11
22S 12W 05BBD 01	QU	20.2	1	-11.3	-4.1		-.8	199	200	1
22S 12W 30BBD 01	QU	17.9	-5	-10.9	-3.8	-.1	-.7	149	144	-3
22S 12W 36BBB 02	QU	5.7		-5.0	-2.5		-.3	140		
22S 13W 05CBC 01	QU	18.9	-13	-15.8	-3.0	-.3	-1.1	159	146	-8
22S 13W 12CAC 01	QU	21.5	-2	-12.9	-4.1		-.9	160	159	-1
22S 13W 29DAD 01	QU	19.0	-2	-13.8	-4.1		-.9	187	185	-1
22S 14W 14CCA 01	QU	23.8	-12	-23.0	-4.0	-.3	-1.5	188	176	-6
22S 14W 35DDB 01	QU	29.2	-9	-18.1	-3.6	-.2	-1.2	110	101	-8
23S 11W 02BBB 01	QU	3.7		-2.7	-2.1		-.2		121	
23S 11W 22BCC 01	QU	23.1	-18	-5.7	-2.5	-.4	-.4	167	149	-11
23S 11W 36CCA 01		19.7								
23S 12W 07DBD 01	QU	9.0	-8	-8.5	-2.0	-.2	-.6	173	165	-5
23S 12W 22BCC 01	QU	16.5	-13	-11.1	-5.0	-.3	-.7	159	147	-8
23S 12W 36BBC 01	QU	16.6	-9	-4.9	-3.3	-.2	-.3	146	137	-6
23S 13W 08CCB 01	QU	13.4	-5	-9.0	-2.9	-.1	-.6	112	107	-4
23S 13W 30CBB 01	QU	13.4	-2	-5.5	-2.0		-.4	75	73	-3
23S 13W 35CCA 01	QU	20.3	-1	-13.0	-2.8		-.9	131	130	-1
23S 14W 15ADD 01	QU	11.9	-5	-8.6	-2.1	-.1	-.6	69	64	-7
23S 14W 30BBB 01	QU	43.3	-19	-8.9	-2.6	-.4	-.6	144	125	-13
24S 11W 14CAB 01	QU	32.3	-8	-2.3	-3.0	-.2	-.2	132	124	-6
24S 11W 17DDB 01	QU	22.6	0	.2	-2.4			110	110	0
24S 12W 04CDB 01		22.2								
24S 12W 17CAB 01	QU	27.5	-6	-10.7	-4.7	-.1	-.7	122	117	-4
24S 12W 34ABC 01	QU	21.0	8	-1.0	-3.8	.2	-.1	121	129	7
24S 13W 16ACA 01	QU	21.8	-4	-13.2	-2.8	-.1	-.9	119	115	-3
24S 13W 20CDD 01		22.6			-1.9					
24S 13W 36DDD 01		20.6	0		-4.7			134	134	0
24S 14W 17AAC 01	QU	32.9	-6	-11.2	-2.8	-.1	-.7	105	99	-6
24S 14W 31BBD 01	QU	21.2	2	-13.4	-3.6		-.9	135	137	1
24S 15W 10BAB 01	QU	30.7	-7	-16.1	-2.4	-.2	-1.1	90	83	-8
24S 15W 32DBC 01	QU	26.9	-6	-17.0	-3.4	-.1	-1.1	163	157	-4
25S 11W 02ACB 01	QU	11.6	-2	-1.3	-1.2		-.1	80	78	-3
25S 11W 23DDD 01	QU	15.9	-3	-3.0	-3.8	-.1	-.2	143	140	-2
25S 12W 11AAA 01		15.9	0		-6.0			65	65	0
25S 12W 16DCA 01		13.8								
25S 12W 24DDB 01	QU	13.1	4	-2.9	-2.8	.1	-.2	128	132	3
25S 13W 16AAC 01		27.4	-5		-7.2	-.1		120	115	-4
25S 13W 31DDA 01		22.4	16			.4		183	199	9
25S 13W 36DCC 01		13.8	8		-5.3	.2		155	163	5
25S 14W 04AAD 01	QU	14.6	9	-5.4	-2.3	.2	-.4	125	134	7

TABLE 2. DERIVED HYDROLOGIC DATA, STAFFORD COUNTY, con't.

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1944-89 (Feet)	Water-Level Change 1974-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1944-89 (Feet/year)	Average Annual Water-Level Change 1974-89 (Feet/year)	Saturated Thickness in 1944 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1944-89
25S 14W 21DDB 01		14.4			-4.0					
25S 14W 30CDB 01	QU	16.1	-2	-8.9	-3.7		-.6	200	198	-1
25S 15W 11BCB 01	QU	20.4	-4	-8.7	-.3	-.1	-.6	158	154	-3
25S 15W 29BBD 01	QU	12.3	4	-8.0	-3.6	.1	-.5	168	172	2

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TABLE 1. WATER LEVELS BY YEAR, STANTON COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1940 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
27S 39W 02BBB 01	QU,TO	3217.	97	88	88.1	85.5	85.8	85.6	85.5	87.5		
27S 39W 27BBA 01	QU,TO	3175.	395	68	102.2	189.3	181.9			181.0	176.4	227.6
27S 40W 07ABB 01		3273.	228	63				70.7		106.8	119.1	
27S 40W 16CCC 01		3259.							101.2	107.1	115.3	121.6
27S 40W 25CBC 01	QU,TO	3228.	328	73	85.8	174.1	178.0	156.3	165.0	169.2	166.0	191.3
27S 41W 31CCB 02	QU,TO	3402.	308	156	167.6	244.2	248.4	248.2	248.7	243.3		250.3
27S 41W 35CCC 01	QU,TO,KJ	3340.			135.0	165.3	167.8	168.8	169.3	172.5	174.8	179.7
27S 42W 11DBD 01	QU,TO	3409.	250	120	116.0		174.6					
27S 42W 17CCC 01		3496.							237.7	226.3	229.2	230.6
27S 42W 31CCC 01	QU,TO,KJ	3537.	292	167	193.2	240.6	235.7	239.6	238.1	240.5	241.4	245.0
27S 43W 02BBD 01		3544.	319	166				226.0	228.1	232.2		239.3
28S 39W 14BBC 01	QU,TO,KJ	3158.	408	53	97.1	139.5	141.5		144.9	146.0	146.6	150.4
28S 39W 16CCC 01		3171.	391	49				149.7	149.7	157.6	162.8	187.0
28S 39W 33ACC 01	QU,TO	3201.	428	82	120.1	183.8	179.7	178.0	181.0	186.3	185.2	186.0
28S 39W 36ABB 01	QU,TO	3145.	412	57	100.3	195.2	181.0	179.7		189.5	191.6	197.8
28S 40W 04CCC 01	QU,TO	3289.	354	110	115.6	197.5	194.6	194.6	194.1		214.2	231.7
28S 40W 12DDD 02	QU,TO	3225.	385	83	107.4	202.8	202.7	199.9	211.0	207.7	210.2	224.2
28S 40W 23ACC 01	QU,TO	3254.	404	103	120.2	173.1	172.2	179.2	181.5		183.8	194.9
28S 40W 32CCB 01	QU,TO	3320.	446	158	172.5	252.8	237.7	237.8	237.1			
28S 41W 02CCC 01		3343.	343	141				235.2	234.9	236.2	238.3	238.5
28S 41W 19CBB 01		3433.	333	183				224.4	224.0			
28S 41W 31BDD 01	QU,TO	3414.	280	155	146.0	172.3	173.5		172.3	169.0	173.2	
28S 41W 35CAB 01		3364.										
28S 42W 08CCC 01	QU,TO	3539.	300	199	233.9	260.7	261.5	256.7	260.9	259.0	259.9	271.9
28S 42W 20BCC 01		3553.							251.0	250.0	250.5	251.6
28S 42W 32BBB 01	KJ	3540.			215.9	232.0	236.6	233.0	229.9	228.6	233.7	246.6
29S 39W 17BCB 01	QU,TO	3239.	456	108	128.2			228.0	220.2	218.1	235.6	
29S 39W 21DBD 01	QU,TO	3183.	413	62	82.6	160.0	162.4	166.4	174.1	179.4	181.8	191.5
29S 39W 24DDA 01	QU,TO	3154.	449	62	80.0	147.1	150.7	154.6	157.0	149.9		178.4
29S 40W 28ABB 01		3282.	422	132				219.0	223.5	227.6	230.8	237.6
29S 41W 13ACC 01	QU,TO	3344.	400	176	192.6	254.5	257.0	258.5	262.2	267.1	266.5	275.1
29S 41W 31CBD 01	KJ	3477.			236.5	238.0	240.9	237.9	238.7	262.2		272.0
29S 42W 08CDC 01	KJ	3517.			186.9	196.5	197.9	193.6	195.9	192.7	189.3	194.6
29S 42W 24CCC 01	QU,TO,KJ	3484.			221.2	202.4	205.8	205.2	199.8	206.3	205.1	207.2
29S 43W 33CDB 01	KJ	3654.			119.8	117.8	116.8		117.2	115.8	117.0	115.0
30S 39W 18BBB 01	QU,TO,KJ	3238.			121.2		190.2		201.1	205.9	208.0	214.8
30S 39W 23BBB 01	QU,TO	3179.	404	72	89.5	170.1	163.9	173.0	167.7	167.7	167.6	162.1
30S 40W 12BBB 01		3274.	434	138				225.2	232.6	240.3	241.4	246.3
30S 40W 24CDC 01	QU,TO,KJ	3237.			115.3	178.6	158.6	161.7	166.0	167.1	168.8	174.5
30S 40W 33CCB 01	KJ	3309.			164.3	187.3	181.2	184.4	185.3	186.2	186.8	188.1
30S 41W 13CCC 02							198.4	198.3		201.7	208.0	212.4
30S 41W 23DDB 01		3365.	205	178				189.8	190.8	190.9	190.2	191.1
30S 42W 12ACC 01	KJ	3457.			188.0	192.2	193.9	195.5	192.3	192.0	193.4	198.9
30S 42W 16BDB 01	KJ	3524.			187.8	193.6	183.3	179.6	181.0	176.5	174.8	180.0
30S 43W 34BBB 01	QU,TO	3622.	103	42	66.3	81.6	81.7	81.0	74.7	74.4	73.7	78.2
30S 43W 36BB 01	QU,TO,KJ	3595.			71.6	75.3	74.7	76.1		79.4		81.4

TABLE 2. DERIVED HYDROLOGIC DATA, STANTON COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1940-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1940-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1940 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1940-89
27S 39W 02BBB 01	QU,TO									
27S 39W 27BBA 01	QU,TO	227.6	-160	-125.4	-51.2	-3.3	-5.5	327	167	-49
27S 40W 07ABB 01										
27S 40W 16CCC 01		121.6			-6.3					
27S 40W 25CBC 01	QU,TO	191.3	-118	-105.5	-25.3	-2.4	-4.6	255	137	-46
27S 41W 31CCB 02	QU,TO	250.3	-94	-82.7		-1.9	-3.6	152	58	-62
27S 41W 35CCC 01	QU,TO,KJ	179.7		-44.7	-4.9		-1.9			
27S 42W 11DBD 01	QU,TO									
27S 42W 17CCC 01		230.6			-1.4					
27S 42W 31CCC 01	QU,TO,KJ	245.0	-78	-51.8	-3.6	-1.6	-2.3	125	47	-62
27S 43W 02BBD 01		239.3	-73			-1.5		153	80	-48
28S 39W 14BBC 01	QU,TO,KJ	150.4	-97	-53.3	-3.8	-2.0	-2.3	355	258	-27
28S 39W 16CCC 01		187.0	-138			-2.8		342	204	-40
28S 39W 33ACC 01	QU,TO	186.0	-104	-65.9	-.8	-2.1	-2.9	346	242	-30
28S 39W 36ABB 01	QU,TO	197.8	-141	-97.5	-6.2	-2.9	-4.2	355	214	-40
28S 40W 04CCC 01	QU,TO	231.7	-122	-116.1	-17.5	-2.5	-5.0	244	122	-50
28S 40W 12DDD 02	QU,TO	224.2	-141	-116.8	-14.0	-2.9	-5.1	302	161	-47
28S 40W 23ACC 01	QU,TO	194.9	-92	-74.7	-11.1	-1.9	-3.2	301	209	-31
28S 40W 32CCB 01	QU,TO									
28S 41W 02CCC 01		238.5	-98		-.2	-2.0		202	105	-48
28S 41W 19CBB 01										
28S 41W 31BDD 01	QU,TO									
28S 41W 35CAB 01										
28S 42W 08CCC 01	QU,TO	271.9	-73	-38.0	-12.0	-1.5	-1.7	101	28	-72
28S 42W 20BCC 01		251.6			-1.1					
28S 42W 32BBB 01	KJ	246.6		-30.7	-12.9		-1.3			
29S 39W 17BCB 01	QU,TO									
29S 39W 21DBD 01	QU,TO	191.5	-130	-108.9	-9.7	-2.7	-4.7	351	222	-37
29S 39W 24DDA 01	QU,TO	178.4	-116	-98.4		-2.4	-4.3	387	271	-30
29S 40W 28ABB 01		237.6	-106		-6.8	-2.2		290	184	-37
29S 41W 13ACC 01	QU,TO	275.1	-99	-82.5	-8.6	-2.0	-3.6	224	125	-44
29S 41W 31CBD 01	KJ	272.0		-35.5			-1.5			
29S 42W 08CDC 01	KJ	194.6		-7.7	-5.3		-.3			
29S 42W 24CCC 01	QU,TO,KJ	207.2		14.0	-2.1		.6			
29S 43W 33CDB 01	KJ	115.0		4.8	2.0		.2			
30S 39W 18BBB 01	QU,TO,KJ	214.8		-93.6	-6.8		-4.1			
30S 39W 23BBB 01	QU,TO	162.1	-90	-72.6	5.5	-1.8	-3.2	332	242	-27
30S 40W 12BBB 01		246.3	-108		-4.9	-2.2		296	188	-36
30S 40W 24CDC 01	QU,TO,KJ	174.5		-59.2	-5.7		-2.6			
30S 40W 33CCB 01	KJ	188.1		-23.8	-1.3		-1.0			
30S 41W 13CCC 02		212.4			-4.4					
30S 41W 23DDB 01		191.1	-13		-.9	-.3		27	14	-48
30S 42W 12ACC 01	KJ	198.9		-10.9	-5.5		-.5			
30S 42W 16BDB 01	KJ	180.0		7.8	-5.2		.3			
30S 43W 34BBB 01	QU,TO	78.2	-36	-11.9	-4.5	-.7	-.5	61	25	-59
30S 43W 36BB 01	QU,TO,KJ	81.4		-9.8			-.4			

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TABLE 1. WATER LEVELS BY YEAR, STEVENS COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1940 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
31S 35W 15BAA 01	QU,TO	3009.	449	224	236.4	278.5	282.8	285.8	288.5	289.4	290.3	296.4
31S 35W 19CCC 01	QU,TO	3039.	490	174	187.3	222.7	223.5	224.6	226.0	227.0	225.3	
31S 35W 26DCC 01	QU,TO	2988.	447	213	230.2	277.3		281.4	285.6	286.1	287.5	
31S 36W 02CDD 01	QU,TO	3019.	365	139	155.8	174.1	182.7	182.1	184.0	180.6	182.7	178.2
31S 36W 27BCB 01	QU,TO	3071.	461	136	137.3	180.4	183.9	182.8			184.6	
31S 37W 09BCC 01	QU,TO	3103.	403	108	130.1	194.1	198.0		204.3			
31S 37W 22BCC 01	QU,TO	3096.	440	106	128.3	185.7		192.0	193.1	197.4	202.1	228.3
31S 37W 30DDB 01		3138.	498	123				201.0	216.9	219.8	218.9	226.2
31S 38W 17CDA 01	QU,TO	3170.	380	110	131.0	171.1	174.4				183.5	
31S 39W 23BBB 01	QU,TO	3199.	259	98	116.9			163.8		163.4		
32S 35W 08DDD 01	QU,TO	3012.	502	130		158.0	160.3	161.0	161.6	167.3	166.6	174.3
32S 36W 21AAC 01		3067.	467	125				187.5	183.7	189.1	191.0	194.7
32S 36W 27DDD 01		3041.		109		149.9	153.0	149.7	151.3		152.6	160.6
32S 37W 10DCC 01	QU,TO	3120.	540	127	136.4	162.4	166.4	166.5	167.3		167.6	178.7
32S 37W 26BAC 01		3118.		124		116.3	120.2	120.5	119.6	117.5	121.4	116.7
32S 38W 11ADA 01	QU,TO	3159.	529	118	114.1	126.7	128.3	129.9	131.4	132.9	134.6	134.1
32S 38W 23BDD 01	QU,TO	3175.	505	116	106.2	127.8	128.3	129.2	131.0	133.8	133.2	140.8
32S 39W 02BBB 01	QU,TO	3216.	296	96	132.9	208.6	208.5	206.5	189.9		200.5	232.2
32S 39W 14DDD 01		3202.						64.5	66.0	64.7	65.3	66.6
33S 35W 23CBB 01		2968.		104		124.6	129.4	124.7	125.0	133.0	132.5	
33S 36W 03ACA 01		3027.		90		121.7	122.4	121.2	121.8		120.8	
33S 36W 26DDD 01	QU,TO	3032.	422	121	118.7	148.4	150.1	144.3	146.7	151.9	151.2	157.5
33S 37W 17CCC 01	QU,TO	3124.	554	83	89.3	94.4	98.4	97.6	98.4	100.1	103.3	107.8
33S 37W 23CDB 01	QU,TO	3092.	562	87	83.8	96.5	95.3	95.9	96.0	96.6	96.1	96.8
33S 38W 06AAB 01	QU,TO	3203.	378	93	94.6	92.8	95.7	95.5	92.1	92.3	96.0	92.9
33S 38W 10ACC 01	QU,TO	3166.	466	101	107.7	134.8	142.2	142.0	138.6	140.9	140.6	149.1
33S 38W 20DAD 01							164.3	147.3	149.8	152.5	153.2	158.7
34S 35W 03DCC 01		2981.		108		136.7	136.7	134.6	137.2	139.5	140.5	148.5
34S 35W 07CBB 01		3014.				161.8	162.8	157.6	161.7	160.2	161.1	174.0
34S 35W 26ACC 01		2977.		112		118.6	128.0	121.0	123.6	128.5	128.7	131.3
34S 36W 10CAC 01		3065.		135		144.1	146.5	147.7	150.9	154.1	155.4	161.3
34S 36W 21DBD 01		3079.		144				156.8	158.2	161.2	161.9	169.4
34S 37W 08DAC 01	QU,TO	3162.	642	133	113.0	125.8	127.4	126.0	127.6	131.7	133.0	137.8
34S 37W 27ABC 01	QU,TO	3132.	532	125	105.8	116.9	115.7	116.2	120.2	122.8	124.3	124.9
34S 37W 29BBD 01		3170.	550	138				155.0	153.5	156.0	155.6	157.3
34S 37W 35AAD 01		3111.	666	129				123.6	122.2	124.5	122.9	124.5
34S 38W 02CAC 01	QU, TO	3197.	577	139	136.0	155.3	154.6					
34S 38W 34CAA 01		3194.						153.3	154.7	157.4		162.4
34S 39W 02CCA 01	QU,TO	3248.	533	118	108.3	99.9	102.5	100.5	99.9	100.1	99.8	100.0
34S 39W 15CAD 01	QU,TO	3280.	510	141	141.7	137.0	139.2	135.9	136.7	137.0	141.2	
35S 35W 15BCC 01		2978.	618	107				107.0	108.3	112.8	111.4	
35S 36W 01AAA 01	QU,TO	3022.	590	120		119.9	122.2	120.0	121.1	125.6	127.7	128.3
35S 36W 15AAD 01		3025.		93				103.9	104.8	107.1	105.4	108.3
35S 37W 16BCC 01		3138.							128.3	131.6	131.6	134.1
35S 39W 10CAD 01	QU,TO	3302.	502	183	188.0	199.2	202.3	191.0	191.8	195.5	198.3	196.2

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TABLE 2. DERIVED HYDROLOGIC DATA, STEVENS COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1940-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1940-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1940 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1940-89
31S 35W 15BAA 01	QU,TO	296.4	-72	-60.0	-6.1	-1.5	-2.6	225	153	-32
31S 35W 19CCC 01	QU,TO									
31S 35W 26DCC 01	QU,TO									
31S 36W 02CDD 01	QU,TO	178.2	-39	-22.4	4.5	-.8	-1.0	226	187	-17
31S 36W 27BCB 01	QU,TO									
31S 37W 09BCC 01	QU,TO									
31S 37W 22BCC 01	QU,TO	228.3	-122	-100.0	-26.2	-2.5	-4.3	334	212	-37
31S 37W 30DDB 01		226.2	-103		-7.3	-2.1		375	272	-27
31S 38W 17CDA 01	QU,TO									
31S 39W 23BBB 01	QU,TO									
32S 35W 08DDD 01	QU,TO	174.3	-44		-7.7	-.9		372	328	-12
32S 36W 21AAC 01		194.7	-70		-3.7	-1.4		342	272	-20
32S 36W 27DDD 01		160.6	-52		-8.0	-1.1				
32S 37W 10DCC 01	QU,TO	178.7	-52	-42.3	-11.1	-1.1	-1.8	413	361	-13
32S 37W 26BAC 01		116.7	7		4.7	.1				
32S 38W 11ADA 01	QU,TO	134.1	-16	-20.0	.5	-.3	-.9	411	395	-4
32S 38W 23BDD 01	QU,TO	140.8	-25	-34.6	-7.6	-.5	-1.5	389	364	-6
32S 39W 02BBB 01	QU,TO	232.2	-136	-99.3	-31.7	-2.8	-4.3	200	64	-68
32S 39W 14DDD 01		66.6			-1.3					
33S 35W 23CBB 01										
33S 36W 03ACA 01										
33S 36W 26DDD 01	QU,TO	157.5	-37	-38.8	-6.3	-.8	-1.7	301	265	-12
33S 37W 17CCC 01	QU,TO	107.8	-25	-18.5	-4.5	-.5	-.8	471	446	-5
33S 37W 23CDB 01	QU,TO	96.8	-10	-13.0	-.7	-.2	-.6	475	465	-2
33S 38W 06AAB 01	QU,TO	92.9	0	1.7	3.1		.1	285	285	0
33S 38W 10ACC 01	QU,TO	149.1	-48	-41.4	-8.5	-1.0	-1.8	365	317	-13
33S 38W 20DAD 01		158.7			-5.5					
34S 35W 03DCC 01		148.5	-41		-8.0	-.8				
34S 35W 07CBB 01		174.0			-12.9					
34S 35W 26ACC 01		131.3	-19		-2.6	-.4				
34S 36W 10CAC 01		161.3	-26		-5.9	-.5				
34S 36W 21DBD 01		169.4	-25		-7.5	-.5				
34S 37W 08DAC 01	QU,TO	137.8	-5	-24.8	-4.8	-.1	-1.1	509	504	-1
34S 37W 27ABC 01	QU,TO	124.9	0	-19.1	-.6		-.8	407	407	0
34S 37W 29BBD 01		157.3	-19		-1.7	-.4		412	393	-5
34S 37W 35AAD 01		124.5	5		-1.6	.1		537	542	1
34S 38W 02CAC 01	QU, TO									
34S 38W 34CAA 01		162.4								
34S 39W 02CCA 01	QU,TO	100.0	18	8.3	-.2	.4	.4	415	433	4
34S 39W 15CAD 01	QU,TO									
35S 35W 15BCC 01										
35S 36W 01AAA 01	QU,TO	128.3	-8		-.6	-.2		470	462	-2
35S 36W 15AAD 01		108.3	-15		-2.9	-.3				
35S 37W 16BCC 01		134.1			-2.5					
35S 39W 10CAD 01	QU,TO	196.2	-13	-8.2	2.1	-.3	-.4	319	306	-4

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Sumner County

TABLE 1. WATER LEVELS BY YEAR, SUMNER COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
30S 04W 34BAA 01		1460.				25.4		23.2	22.5	23.1		
31S 04W 01BBB 01		1442.							14.5			
31S 04W 01DAC 01		1441.							15.5	15.2		
31S 04W 02BBB 01		1435.							5.8	5.6		

TABLE 2. DERIVED HYDROLOGIC DATA, SUMNER COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
30S 04W 34BAA 01										
31S 04W 01BBB 01										
31S 04W 01DAC 01										
31S 04W 02BBB 01										

TABLE 1. WATER LEVELS BY YEAR, THOMAS COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
06S 31W 03ADB 01	TO	2957.	192	109	115.0	115.5	115.6	116.7	115.7	115.7	115.0	116.5
06S 31W 33CCD 01	QA,TO	2916.	131	18	10.0	30.2		30.4	30.3	31.1	31.9	33.2
06S 32W 12CBC 01	TO	3020.	210	115	114.0	117.6	120.8	119.2	119.2	119.7		117.2
06S 32W 29CDC 01	TO	3077.	204	113	111.0	122.2	124.1	125.1	123.7	122.4	123.2	125.6
06S 33W 07BBB 01	TO	3177.	234	137		137.5	139.3	141.2	137.8	138.9	138.4	139.8
06S 33W 23DDD 01	QA	2997.	81	9		11.0	12.0	11.5	11.4	12.8	12.1	13.8
06S 34W 01DDD 01	TO							143.4	141.6	143.1	142.7	143.6
06S 34W 11CDD 01	TO	3218.	253	158	156.0	162.5	163.0	168.7	161.7	161.3	160.1	161.4
06S 34W 17CBC 01	TO	3261.	258	151	151.0	157.9	158.4	158.1	158.7	159.1	159.0	159.0
06S 34W 22DCA 01		3207.						132.6	128.0	128.1		130.1
06S 34W 31CDB 01									130.6	131.7	136.5	133.3
06S 35W 02CDD 01	TO	3245.	250	117	127.0	129.7	129.8	129.9	129.7	129.8	129.9	130.3
06S 35W 26ACB 01	TO	3300.	255	151	150.0	154.6	154.2	154.6	154.8	155.2	156.7	157.4
06S 36W 06BCD 01	TO	3408.	323	174	178.0	189.1		188.6	190.5	188.9	189.2	189.6
06S 36W 11ACC 01	TO	3360.	280	168	161.0	165.7		166.1	167.1	166.8	167.2	168.5
06S 36W 30DCB 01	TO	3417.	307	152	147.0	154.5		155.4	155.4	155.5	156.1	156.7
06S 36W 34DDB 01	TO	3334.	246	99	94.0	101.6	102.7	102.0	102.6	103.2	103.0	103.6
07S 31W 01DCA 01	TO	2956.	246	108	101.0	113.6	114.5	121.1	123.5		125.1	
07S 32W 07ACA 01	TO	3056.	146	68	64.0	79.0	79.4	79.4	79.0	79.5	79.9	80.8
07S 32W 13AAA 01	TO	3037.	234	102	101.0	123.8		122.9	123.3	123.8	125.6	126.3
07S 32W 33BCB 01		3082.						114.6	115.3	116.1	116.4	118.5
07S 33W 07BDA 01	TO	3203.	254	141	149.0	153.2	155.0	154.4	154.4	155.6	155.3	155.5
07S 33W 35ADD 01	TO	3145.	252	131	131.0	148.3	150.6	151.0	150.6		152.6	
07S 34W 25AAA 01	TO	3167.	240	106	106.0	111.1	112.6	113.3	112.2	113.3	112.5	112.5
07S 34W 26DBD 01	TO	3177.	230	104	104.0			118.5	112.4	119.0	119.6	113.8
07S 35W 09CCC 01	TO	3315.	265	124		127.8	127.5	126.8	128.1	128.9	129.8	131.5
07S 36W 17CCC 01	TO	3417.	267	139	134.0	142.8	142.9	143.2	143.6	145.5	147.2	147.7
07S 36W 35CBB 01	TO	3341.	221	82	82.0	90.6		91.6	93.0	88.6	91.4	
08S 31W 03CDD 01	TO	3003.		110		131.3	133.4	135.0	135.2	137.7	139.0	141.0
08S 31W 20CDD 01	TO	3026.	220	98	101.0	115.2	118.3	120.2	118.0	120.1	121.7	123.8
08S 32W 07BAA 01	TO	3102.	272	98	99.0	118.2	120.4	121.2	121.1	123.1	123.4	136.2
08S 32W 12DBC 01	TO	3057.	217	110	108.0	113.9	116.6	116.3	117.0	118.4	119.5	121.6
08S 32W 27DAB 01	TO	3078.	228	112	110.0			122.3	124.1	128.1	123.8	126.0
08S 33W 34BBC 01	TO	3168.	197	130	130.0	147.2	148.7		151.7	155.4	155.9	157.8
08S 34W 01BAC 01	TO	3177.	270	113	116.0	124.4		125.9	124.4	126.5	126.7	127.6
08S 34W 06CBC 01	TO	3266.	227	130	135.0	139.4	135.5		137.9		137.9	153.6
08S 34W 23CBD 01	TO	3232.	235	162	155.0		176.3		178.5		180.4	182.4
08S 34W 29CCC 01		3283.						198.3	205.0	206.8	207.5	209.1
08S 35W 04CCC 01		3302.						94.8	94.8	94.8	94.8	95.0
08S 36W 15CBB 01		3365.						85.4	85.9	86.1	86.1	86.3
08S 36W 18ABA 02	TO	3428.		120		128.2			129.5	132.7	131.3	132.7
08S 36W 31BCD 01		3369.							45.2	45.2	45.0	
09S 31W 10BBB 01	TO	2999.	177	85	83.0	88.4	88.8	89.6	92.3	90.2	90.5	92.4
09S 31W 17CCC 01		3016.						91.0	88.6	89.9	89.9	91.0
09S 31W 36AAB 01	TO	3013.	209	130	131.0	139.1	141.8	143.1	142.4	143.4	143.7	
09S 32W 03AAA 01		3051.						99.2	97.5	99.4	99.9	101.1
09S 32W 27BCD 01	TO	3076.	207	97	98.0	119.1	119.7	118.7	121.4	121.6	123.3	124.3

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TABLE 1. WATER LEVELS BY YEAR, THOMAS COUNTY, con't.

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
09S 33W 35AAD 01	TO	3145.	250	125	129.0	154.2	156.3	156.9	157.4	158.6	158.8	159.8
09S 34W 11CCC 01		3180.						118.4	120.2	122.8	123.9	125.9
09S 34W 12ADA 01	TO	3199.	269	134		156.2	157.7	159.0	159.7	161.5	162.7	164.6
09S 34W 17ABA 01		3229.						153.4	154.2	155.5	155.9	157.2
09S 35W 32DAA 01	TO	3361.	235	182	188.0	186.4	188.2	186.8	186.8	193.4	195.7	201.6
10S 31W 26AAA 01	QA,TO	2891.	31	11	5.0	10.3	11.3	11.4	12.2	12.0	12.1	12.5
10S 31W 29AAB 01	TO	2997.	190	82	82.0	89.7	91.3	91.3	91.3	91.6	92.5	91.6
10S 32W 11BAA 01	TO	3072.	171	110	105.0	118.2	118.8	117.0	120.1	120.7	120.2	120.5
10S 32W 29DCB 01	TO	3064.	184	78	80.0	95.3	95.5	97.6	98.4	96.4	96.9	97.0
10S 33W 03DBC 01	TO	3145.	254	120	127.0	148.0	148.1		152.6	152.5		153.6
10S 33W 06BBC 01	TO	3191.	315	136					172.6	177.4		175.1
10S 33W 19CBD 01	TO	3161.	166	100	99.0	105.6	106.1	104.7	106.2	106.2	105.9	106.0
10S 34W 12BCD 01	TO	3220.	297	157	169.0	172.9	178.6	171.3	169.3	171.4		172.4
10S 34W 29BBC 01		3208.						88.9	91.6	88.8		89.2
10S 35W 09ABB 01		3290.						112.8	113.1	113.4	112.7	113.0
10S 36W 16CCC 01		3366.						128.8	128.7	130.2	130.5	131.4
10S 36W 36ACC 01	TO	3359.	199	164	169.0	172.0	172.4	175.8		171.7		

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TABLE 2. DERIVED HYDROLOGIC DATA, THOMAS COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
06S 31W 03ADB 01	TO	116.5	-8	-1.5	-1.5	-.2	-.1	83	76	-8
06S 31W 33CCD 01	QA,TO	33.2	-15	-23.2	-1.3	-.4	-1.0	113	98	-13
06S 32W 12CBC 01	TO	117.2	-2	-3.2		-.1	-.1	95	93	-2
06S 32W 29CDC 01	TO	125.6	-13	-14.6	-2.4	-.3	-.6	91	78	-14
06S 33W 07BBB 01	TO	139.8	-3		-1.4	-.1		97	94	-3
06S 33W 23DDD 01	QA	13.8	-5		-1.7	-.1		72	67	-7
06S 34W 01DDD 01	TO	143.6			-.9					
06S 34W 11CDD 01	TO	161.4	-3	-5.4	-1.3	-.1	-.2	95	92	-3
06S 34W 17CBC 01	TO	159.0	-8	-8.0	.0	-.2	-.3	107	99	-7
06S 34W 22DCA 01		130.1								
06S 34W 31CDB 01		133.3			3.2					
06S 35W 02CDD 01	TO	130.3	-13	-3.3	-.4	-.3	-.1	133	120	-10
06S 35W 26ACB 01	TO	157.4	-6	-7.4	-.7	-.2	-.3	104	98	-6
06S 36W 06BCD 01	TO	189.6	-16	-11.6	-.4	-.4	-.5	149	133	-11
06S 36W 11ACC 01	TO	168.5	-1	-7.5	-1.3		-.3	112	112	0
06S 36W 30DCB 01	TO	156.7	-5	-9.7	-.6	-.1	-.4	155	150	-3
06S 36W 34DDB 01	TO	103.6	-5	-9.6	-.6	-.1	-.4	147	142	-3
07S 31W 01DCA 01	TO									
07S 32W 07ACA 01	TO	80.8	-13	-16.8	-.9	-.3	-.7	78	65	-17
07S 32W 13AAA 01	TO	126.3	-24	-25.3	-.7	-.6	-1.1	132	108	-18
07S 32W 33BCB 01		118.5			-2.1					
07S 33W 07BDA 01	TO	155.5	-15	-6.5	-.2	-.4	-.3	113	99	-12
07S 33W 35ADD 01	TO									
07S 34W 25AAA 01	TO	112.5	-7	-6.5	.0	-.2	-.3	134	128	-4
07S 34W 26DBD 01	TO	113.8	-10	-9.8	5.8	-.3	-.4	126	116	-8
07S 35W 09CCC 01	TO	131.5	-8		-1.7	-.2		141	134	-5
07S 36W 17CCC 01	TO	147.7	-9	-13.7	-.5	-.2	-.6	128	119	-7
07S 36W 35CBB 01	TO									
08S 31W 03CDD 01	TO	141.0	-31		-2.0	-.8				
08S 31W 20CDD 01	TO	123.8	-26	-22.8	-2.1	-.7	-1.0	122	96	-21
08S 32W 07BAA 01	TO	136.2	-38	-37.2	-12.8	-1.0	-1.6	174	136	-22
08S 32W 12DBC 01	TO	121.6	-12	-13.6	-2.1	-.3	-.6	107	95	-11
08S 32W 27DAB 01	TO	126.0	-14	-16.0	-2.2	-.4	-.7	116	102	-12
08S 33W 34BBC 01	TO	157.8	-28	-27.8	-1.9	-.7	-1.2	67	39	-42
08S 34W 01BAC 01	TO	127.6	-15	-11.6	-.9	-.4	-.5	157	142	-10
08S 34W 06CBC 01	TO	153.6	-24	-18.6	-15.7	-.6	-.8	97	73	-25
08S 34W 23CBD 01	TO	182.4	-20	-27.4	-2.0	-.5	-1.2	73	53	-27
08S 34W 29CCC 01		209.1			-1.6					
08S 35W 04CCC 01		95.0			-.2					
08S 36W 15CBB 01		86.3			-.2					
08S 36W 18ABA 02	TO	132.7	-13		-1.4	-.3				
08S 36W 31BCD 01										
09S 31W 10BBB 01	TO	92.4	-7	-9.4	-1.9	-.2	-.4	92	85	-8
09S 31W 17CCC 01		91.0			-1.1					
09S 31W 36AAB 01	TO									
09S 32W 03AAA 01		101.1			-1.2					
09S 32W 27BCD 01	TO	124.3	-27	-26.3	-1.0	-.7	-1.1	110	83	-25

TABLE 2. DERIVED HYDROLOGIC DATA, THOMAS COUNTY, con't.

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
09S 33W 35AAD 01	TO	159.8	-35	-30.8	-1.0	-.9	-1.3	125	90	-28
09S 34W 11CCC 01		125.9			-2.0					
09S 34W 12ADA 01	TO	164.6	-31		-1.9	-.8		135	104	-23
09S 34W 17ABA 01		157.2			-1.3					
09S 35W 32DAA 01	TO	201.6	-20	-13.6	-5.9	-.5	-.6	53	33	-38
10S 31W 26AAA 01	QA,TO	12.5	-2	-7.5	-.4	-.1	-.3	20	19	-5
10S 31W 29AAB 01	TO	91.6	-10	-9.6	.9	-.3	-.4	108	98	-9
10S 32W 11BAA 01	TO	120.5	-11	-15.5	-.3	-.3	-.7	61	51	-16
10S 32W 29DCB 01	TO	97.0	-19	-17.0	-.1	-.5	-.7	106	87	-18
10S 33W 03DBC 01	TO	153.6	-34	-26.6		-.9	-1.2	134	100	-25
10S 33W 06BBC 01	TO	175.1	-39			-1.0		179	140	-22
10S 33W 19CBD 01	TO	106.0	-6	-7.0	-.1	-.2	-.3	66	60	-9
10S 34W 12BCD 01	TO	172.4	-15	-3.4		-.4	-.1	140	125	-11
10S 34W 29BBC 01		89.2								
10S 35W 09ABB 01		113.0			-.3					
10S 36W 16CCC 01		131.4			-.9					
10S 36W 36ACC 01	TO									

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Trego County

TABLE 1. WATER LEVELS BY YEAR, TREGO COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
12S 23W 20CCC 01		2373.				19.7	21.2	22.0	19.6	18.6	17.6	19.9

TABLE 2. DERIVED HYDROLOGIC DATA, TREGO COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
12S 23W 20CCC 01		19.9		-2.2						

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Wabaunsee County

TABLE 1. WATER LEVELS BY YEAR, WABAUNSEE COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
10S 10E 15DCC 01		971.			15.5	12.6	13.1	13.7	12.8	10.9	13.9	16.9
10S 12E 29ADD 01		944.				15.5	16.5	16.1	16.1	13.9	17.9	21.2

TABLE 2. DERIVED HYDROLOGIC DATA, WABAUNSEE COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
10S 10E 15DCC 01		16.9		-1.4	-3.0		-.1			
10S 12E 29ADD 01		21.2			-3.3					

TABLE 1. WATER LEVELS BY YEAR, WALLACE COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
11S 38W 35CCC 02	TO	3372.	189	81	76.0		136.3	127.6	124.9	126.2	127.8	125.2
11S 42W 08DDC 01	TO	3953.	98	98		107.5	108.3	109.7	109.9	110.3	109.0	107.4
11S 42W 10AAD 01	TO	3948.						130.1	128.6	130.0	130.7	130.8
13S 39W 33BBB 01	TO	3322.				25.4	25.9	25.8	26.3	26.0	25.8	26.7
13S 43W 36ABB 01	TO	3894.	270	149	149.0	177.4	180.7	180.0	182.2	183.0		186.0
14S 38W 21DCC 01	TO	3538.	94	82	80.1	81.8	82.1	82.1	82.2	82.5	82.3	82.7
14S 39W 28CAA 01	TO	3602.										157.4
14S 40W 23ADD 01	TO	3645.	220	118	124.5	155.2	156.6	156.1	157.1	156.0	157.4	157.7
14S 40W 29ABA 01	TO	3702.	230	137		169.8	172.2	171.8	174.7	174.0	175.3	178.0
14S 41W 18DCB 01	TO	3778.	387	106		149.6	155.2					173.5
14S 41W 22BBC 01	TO	3729.	218	84	86.1	121.0	124.1	125.8	124.9	128.2	130.1	133.1
14S 42W 10BAA 01	TO	3838.	403	133		178.5	181.3	182.1	177.2	186.1	187.3	189.6
14S 42W 14DBD 01	TO	3796.	400	101	117.4	149.8	151.6	151.5	152.1	154.1	159.7	
14S 42W 30BCA 01	TO	3880.	386	155	159.6			195.2	193.6	197.5	199.8	202.5
15S 38W 05CCB 01	TO	3531.	144	76		102.5	104.8	103.4	103.9	104.3		
15S 38W 14CCD 01	TO	3486.	150	70	81.1	102.1	104.5	103.2	105.5	107.2	104.6	105.2
15S 38W 21CCC 01		3510.										147.8
15S 38W 28DBB 01	TO	3502.	202	82	106.3	146.0	148.2	148.1	145.8	148.0	148.9	
15S 38W 36CBB 01	TO	3461.	153	76	80.8	121.9	121.9	121.4	121.4	122.9		124.9
15S 39W 02BCA 01	TO	3585.	195	109	125.0	156.7	152.5	152.6	152.8	151.2	153.3	153.1
15S 39W 06CBC 01	TO	3631.	223	106	118.8	146.3	146.3		146.1	153.3		157.8
15S 39W 08ACC 01	TO	3623.	222	113	129.9	158.5	159.8	160.3	162.6	160.8	163.0	163.7
15S 39W 26ACC 01	TO	3561.	239	90	111.5	151.0	154.2	152.1	159.5	153.8	157.3	157.7
15S 40W 03BAB 01	TO	3636.	254	86	85.0	120.4	119.8	122.8	124.3	124.3	126.2	128.6
15S 40W 09DCB 01	TO	3653.	261	85	90.8	128.5	128.7	129.2	130.3	131.8	133.3	135.4
15S 40W 26CAB 01	TO	3646.	245	100	102.0			130.0	134.1	137.3	137.7	141.3
15S 41W 02AAA 01	TO	3766.										212.3
15S 41W 05ACB 01	TO	3794.	235	136	147.2	189.4	190.5	190.0	204.7	207.9	193.1	201.0
15S 41W 10BAB 01	TO	3787.	264	157	163.7	200.0	200.7	202.2	212.1	204.1	206.9	
15S 41W 27CBC 01	TO	3750.	230	145		190.5	191.8	186.9	189.0	191.5	192.4	195.5
15S 41W 36DDB 02	TO	3695.	265	104	113.1	139.5		144.9	145.2	146.4	148.3	147.1
15S 42W 02BBB 01	TO	3854.	225	159	166.9	201.8	205.7	208.1	212.3	203.2	204.0	204.6
15S 42W 32BDA 01	TO	3901.	271	216	233.9	233.5	239.3	246.2		247.9	245.2	
15S 42W 36CDC 01	TO	3844.	270	194	214.1	242.7	243.3	241.7		245.3		248.9

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TABLE 2. DERIVED HYDROLOGIC DATA, WALLACE COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
11S 38W 35CCC 02	TO	125.2	-44	-49.2	2.6	-1.1	-2.1	108	64	-41
11S 42W 08DDC 01	TO	107.4	-9		1.6	-.2			-9	
11S 42W 10AAD 01	TO	130.8			-.1					
13S 39W 33BBB 01	TO	26.7			-.9					
13S 43W 36ABB 01	TO	186.0	-37	-37.0		-.9	-1.6	121	84	-31
14S 38W 21DCC 01	TO	82.7	-1	-2.6	-.4		-.1	12	11	-8
14S 39W 28CAA 01	TO	157.4								
14S 40W 23ADD 01	TO	157.7	-40	-33.2	-.3	-1.0	-1.4	102	62	-39
14S 40W 29ABA 01	TO	178.0	-41		-2.7	-1.1		93	52	-44
14S 41W 18DCB 01	TO	173.5	-68			-1.7		281	214	-24
14S 41W 22BBC 01	TO	133.1	-49	-47.0	-3.0	-1.3	-2.0	134	85	-37
14S 42W 10BAA 01	TO	189.6	-57		-2.3	-1.5		270	213	-21
14S 42W 14DBD 01	TO									
14S 42W 30BCA 01	TO	202.5	-48	-42.9	-2.7	-1.2	-1.9	231	184	-20
15S 38W 05CCB 01	TO									
15S 38W 14CCD 01	TO	105.2	-35	-24.1	-.6	-.9	-1.0	80	45	-44
15S 38W 21CCC 01		147.8								
15S 28W 38DBB 01	TO									
15S 38W 36CBB 01	TO	124.9	-49	-44.1		-1.3	-1.9	77	28	-64
15S 39W 02BCA 01	TO	153.1	-44	-28.1	.2	-1.1	-1.2	86	42	-51
15S 39W 06CBC 01	TO	157.8	-52	-39.0		-1.3	-1.7	117	65	-44
15S 39W 08ACC 01	TO	163.7	-51	-33.8	-.7	-1.3	-1.5	109	58	-47
15S 39W 26ACC 01	TO	157.7	-68	-46.2	-.4	-1.7	-2.0	149	81	-46
15S 40W 03BAB 01	TO	128.6	-43	-43.6	-2.4	-1.1	-1.9	168	125	-26
15S 40W 09DCB 01	TO	135.4	-50	-44.6	-2.1	-1.3	-1.9	176	126	-28
15S 40W 26CAB 01	TO	141.3	-41	-39.3	-3.6	-1.1	-1.7	145	104	-28
15S 41W 02AAA 01	TO	212.3								
15S 41W 05ACB 01	TO	201.0	-65	-53.8	-7.9	-1.7	-2.3	99	34	-66
15S 41W 10BAB 01	TO									
15S 41W 27CBC 01	TO	195.5	-51		-3.1	-1.3		85	35	-59
15S 41W 36DDB 02	TO	147.1	-43	-34.0	1.2	-1.1	-1.5	161	118	-27
15S 42W 02BBB 01	TO	204.6	-46	-37.7	-.6	-1.2	-1.6	66	20	-70
15S 42W 32BDA 01	TO									
15S 42W 36CDC 01	TO	248.9	-55	-34.8		-1.4	-1.5	76	21	-72

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Washington County

TABLE 1. WATER LEVELS BY YEAR, WASHINGTON COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
01S 05E 05ADA 01		1370.				41.0	41.4	39.6	36.9	33.1	34.6	37.6
04S 02E 14CCC 01		1485.				47.7	47.4	47.1	46.1	45.6	43.1	43.6
05S 01E 20ADA 01		1325.				43.8	44.2	44.1	42.9	38.9	37.6	
05S 01E 31DDD 01		1278.				16.2	16.8	17.1	16.9	14.7	16.1	18.2

TABLE 2. DERIVED HYDROLOGIC DATA, WASHINGTON COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
01S 05E 05ADA 01		37.6			-3.0					
04S 02E 14CCC 01		43.6			-.4					
05S 01E 20ADA 01										
05S 01E 31DDD 01		18.2			-2.1					

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TABLE 1. WATER LEVELS BY YEAR, WICHITA COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
16S 35W 06AAB 01	TO	3208.	118	71	81.5	82.6		83.0	82.8	83.2	84.7	83.4
16S 35W 13CCC 01	TO	3182.	170	118	126.6	157.6	157.7	157.7	157.7	158.8	159.2	160.0
16S 35W 20CCC 01	TO	3228.	189	103	124.6	157.2	155.8	156.0	155.2	160.3	162.4	
16S 36W 03DCC 01	TO	3267.	138	87		135.2		133.8	132.2	131.6		131.3
16S 36W 07BCB 01	TO	3319.	140	80	91.8	113.2	114.8	115.6	115.2	117.4	120.6	119.4
16S 36W 21CCC 01	TO	3295.	205	84	99.9	171.2	150.5	149.8	151.7	151.6		154.5
16S 36W 30CBC 01	TO	3319.	218	87	109.3	153.0		158.6	155.9	154.5	165.2	153.1
16S 36W 34CCC 02	TO	3275.							138.3	137.9	140.1	141.1
16S 36W 36CBC 01	TO	3246.	200	91	105.4	132.5	133.9	133.9	134.3	135.1		136.7
16S 37W 17BBB 01	TO	3399.	194	86	101.0	143.7	144.4	145.0	144.0	145.9	146.0	147.7
16S 37W 30BAB 01	TO	3404.						154.4	156.3	155.3	154.8	156.6
16S 38W 10ABB 01	TO	3458.	208	83	96.3	145.2	145.0	144.8	143.5	146.4	147.9	150.7
16S 38W 26BBB 01	TO	3424.	197	75	112.0	137.7	138.6	139.8	140.6	141.2	142.0	144.1
17S 35W 02BBB 01	TO	3189.	189	109		150.1	151.0	151.9	152.3	153.3	163.0	157.0
17S 35W 15CDC 01	TO	3194.	204	98	110.0	131.9	133.7	133.5	133.9	135.2		136.6
17S 35W 18ACB 01	TO	3226.	195	97	110.8	144.0	144.7	144.7	144.7	146.0	161.0	147.7
17S 35W 27CCC 01	TO	3195.	210	91	109.6	148.0	146.4	145.1	143.6	144.5	145.9	151.2
17S 35W 30CBB 01	TO	3235.	218	94	126.6	172.5	162.6		160.2	163.6	166.8	169.1
17S 36W 10CBB 01	QA,TO	3202.	97	29		56.5	57.8	59.6	60.0	61.0		62.9
17S 36W 23BCC 01	TO	3258.	228	100	125.3	158.2	162.5	156.3	155.3	156.8		160.6
17S 36W 33BCB 01	TO	3286.	208	98	113.3	143.5	143.5	145.0	145.0	145.9	147.0	146.7
17S 37W 08BAA 01	TO	3374.	196	84	101.2	141.2	134.8	132.3	133.4	134.1	135.5	137.1
17S 37W 13CDD 01	TO	3300.	175	70		104.2	106.2	107.7	107.7	110.8	115.1	117.3
17S 37W 28CCC 01	TO	3360.	190	85	98.4	151.7	133.9	138.1	137.0	138.2	144.4	142.0
17S 38W 21BBB 01	TO	3446.	165	100	100.3	127.7	127.6		126.4	129.5	127.7	
17S 38W 24ACC 01	TO	3394.	210	86	104.5	129.0	131.6	131.4	132.7	132.3		
17S 38W 28CCC 01	TO	3446.	190	105	113.6	143.9		144.9	144.8		146.2	146.5
18S 35W 08BBC 02	TO	3217.	186	82		144.6	143.0	133.6	134.7	137.0	135.8	136.2
18S 35W 14DCD 01	TO	3171.	137	80	91.1	117.5	115.2	119.3	114.0	115.8	116.2	
18S 35W 31DDD 01	TO	3210.							95.4			
18S 36W 15DAD 01	TO	3235.	165	60		87.0	88.4	88.8	87.6	88.3		
18S 37W 01BBB 01	TO	3315.	174	80	108.4	137.6	139.9	138.9	138.3	139.7	140.5	144.3
18S 37W 21BBB 01	TO	3360.	175	85	113.6	154.6	163.5	158.3		158.1	158.7	158.3
18S 37W 36ABB 01	TO	3301.	155	76	89.3	108.8	108.8	108.4	108.3	108.8	109.3	
18S 38W 02BCC 01	TO	3414.	199	95	115.7	159.4	160.9	152.3	153.0	151.4	154.7	154.5
18S 38W 08BBD 01	TO	3432.	182	82		131.9	130.2	128.6	129.2	132.4		129.9
18S 38W 12BCC 01	TO	3401.	202	91	117.4	161.5	164.7		161.9	160.0		
18S 38W 20ACC 02	TO	3440.	169	90	108.7	130.2	130.7	131.4	130.7	130.3	130.2	130.2
18S 38W 23BAB 01	QA,TO	3340.	108	23		39.8	53.5	25.8	40.2	25.7	42.3	43.4
18S 38W 31DBC 01	TO	3450.	148	109	108.7	123.8	125.4	125.5	121.2	121.0	120.4	120.0
18S 38W 36DDD 01	TO	3374.	129	78	82.4	83.1	83.1	83.7	83.8	84.1	84.3	87.3
19S 35W 01AAA 01	TO	3165.	134	83	100.2	115.3	115.0	116.0	115.4	115.5	115.5	
19S 35W 08BBB 01	TO	3217.	135	85		95.2	95.9	95.9	96.0	96.9	98.2	103.1
19S 36W 15BAA 01	TO	3236.	112	71		77.3	78.6	78.9	78.8	79.1	79.8	79.9
19S 37W 22AAB 01	TO	3330.	138	98		102.8	101.8	101.0	100.6	100.4	100.2	99.8
19S 37W 28ABB 01	TO	3357.										109.8
19S 38W 26CCB 01	TO	3408.	173	96		102.7	101.6	102.4		99.0	108.0	98.7

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TABLE 1. WATER LEVELS BY YEAR, WICHITA COUNTY, con't.

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
19S 38W 31CBC 01	TO	3463.	205	140		139.5	139.1	139.7	139.0	139.2	139.2	139.1
20S 35W 15BBB 01	TO	3129.				68.0	68.2	68.0	68.1	68.2	67.9	68.1
20S 36W 14DAD 01	TO	3225.	108	94	94.2	98.4	96.8	96.8	98.2	99.3		
20S 37W 29DCC 01	TO	3359.	139	98		110.7	110.4	110.3	107.4	105.6	106.0	99.7
20S 38W 17CBD 01	TO	3442.	232	135			141.3	141.3	141.1	141.2	140.4	141.2
20S 38W 33BBA 01	TO	3424.	205	126	134.0	140.6	140.4	140.6	139.7	139.7	139.9	139.7

TABLE 2. DERIVED HYDROLOGIC DATA, WICHITA COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
16S 35W 06AAB 01	TO	83.4	-12	-1.9	1.3	-.3	-.1	47	35	-26
16S 35W 13CCC 01	TO	160.0	-42	-33.4	-.8	-1.1	-1.5	52	10	-81
16S 35W 20CCC 01	TO									
16S 36W 03DCC 01	TO	131.3	-44			-1.1		51	7	-86
16S 36W 07BCB 01	TO	119.4	-39	-27.6	1.2	-1.0	-1.2	60	21	-65
16S 36W 21CCC 01	TO	154.5	-71	-54.6		-1.8	-2.4	121	51	-58
16S 36W 30CBC 01	TO	153.1	-66	-43.8	12.1	-1.7	-1.9	131	65	-50
16S 36W 34CCC 02	TO	141.1			-1.0					
16S 36W 36CBC 01	TO	136.7	-46	-31.3		-1.2	-1.4	109	63	-42
16S 37W 17BBB 01	TO	147.7	-62	-46.7	-1.7	-1.6	-2.0	108	46	-57
16S 37W 30BAB 01	TO	156.6			-1.8					
16S 38W 10ABB 01	TO	150.7	-68	-54.4	-2.8	-1.7	-2.4	125	57	-54
16S 38W 26BBB 01	TO	144.1	-69	-32.1	-2.1	-1.8	-1.4	122	53	-57
17S 35W 02BBB 01	TO	157.0	-48		6.0	-1.2		80	32	-60
17S 35W 15CDC 01	TO	136.6	-39	-26.6		-1.0	-1.2	106	67	-37
17S 35W 18ACB 01	TO	147.7	-51	-36.9	13.3	-1.3	-1.6	98	47	-52
17S 35W 27CCC 01	TO	151.2	-60	-41.6	-5.3	-1.5	-1.8	119	59	-50
17S 35W 30CBB 01	TO	169.1	-75	-42.5	-2.3	-1.9	-1.8	124	49	-60
17S 36W 10CBB 01	QA,TO	62.9	-34			-.9		68	34	-50
17S 36W 23BCC 01	TO	160.6	-61	-35.3		-1.6	-1.5	128	67	-48
17S 36W 33BCB 01	TO	146.7	-49	-33.4	.3	-1.3	-1.5	110	61	-45
17S 37W 08BAA 01	TO	137.1	-53	-35.9	-1.6	-1.4	-1.6	112	59	-47
17S 37W 13CDD 01	TO	117.3	-47		-2.2	-1.2		105	58	-45
17S 37W 28CCC 01	TO	142.0	-57	-43.6	2.4	-1.5	-1.9	105	48	-54
17S 38W 21BBB 01	TO									
17S 38W 24ACC 01	TO									
17S 38W 28CCC 01	TO	146.5	-42	-32.9	-.3	-1.1	-1.4	85	44	-48
18S 35W 08BBC 02	TO	136.2	-54		-.4	-1.4		104	50	-52
18S 35W 14DCD 01	TO									
18S 35W 31DDD 01	TO									
18S 36W 15DAD 01	TO									
18S 37W 01BBB 01	TO	144.3	-64	-35.9	-3.8	-1.6	-1.6	94	30	-68
18S 37W 21BBB 01	TO	158.3	-73	-44.7	.4	-1.9	-1.9	90	17	-81
18S 37W 36ABB 01	TO									
18S 38W 02BCC 01	TO	154.5	-60	-38.8	.2	-1.5	-1.7	104	45	-57
18S 38W 08BBD 01	TO	129.9	-48			-1.2		100	52	-48
18S 38W 12BCC 01	TO									
18S 38W 20ACC 02	TO	130.2	-40	-21.5	.0	-1.0	-.9	79	39	-51
18S 38W 23BAB 01	QA,TO	43.4	-20		-1.1	-.5		85	65	-24
18S 38W 31DBC 01	TO	120.0	-11	-11.3	.4	-.3	-.5	39	28	-28
18S 38W 36DDD 01	TO	87.3	-9	-4.9	-3.0	-.2	-.2	51	42	-18
19S 35W 01AAA 01	TO									
19S 35W 08BBB 01	TO	103.1	-18		-4.9	-.5		50	32	-36
19S 36W 15BAA 01	TO	79.9	-9		-.1	-.2		41	32	-22
19S 37W 22AAB 01	TO	99.8	-2		.4	-.1		40	38	-5
19S 37W 28ABB 01	TO	109.8								
19S 38W 26CCB 01	TO	98.7	-3		9.3	-.1		77	74	-4

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TABLE 2. DERIVED HYDROLOGIC DATA, WICHITA COUNTY, con't.

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
19S 38W 31CBC 01	TO	139.1	1		.1			65	66	2
20S 35W 15BBB 01	TO	68.1			-.2					
20S 36W 14DAD 01	TO									
20S 37W 29DCC 01	TO	99.7	-2		6.3	-.1		41	39	-5
20S 38W 17CBD 01	TO	141.2	-6		-.8	-.2		97	91	-6
20S 38W 33BBA 01	TO	139.7	-14	-5.7	.2	-.4	-.2	79	65	-18

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Wyandotte County

TABLE 1. WATER LEVELS BY YEAR, WYANDOTTE COUNTY

Well Number	Geologic Unit	Land Surface Altitude (Feet)	Depth to Bedrock (Feet)	Depth to Water 1950 (Feet)	Depth to Water 1966 (Feet)	Depth to Water 1983 (Feet)	Depth to Water 1984 (Feet)	Depth to Water 1985 (Feet)	Depth to Water 1986 (Feet)	Depth to Water 1987 (Feet)	Depth to Water 1988 (Feet)	Depth to Water 1989 (Feet)
11S 24E 14BDA 01		754.				28.5	28.5	28.9	28.5	27.6	28.2	30.9

TABLE 2. DERIVED HYDROLOGIC DATA, WYANDOTTE COUNTY

Well Number	Geologic Unit	Depth to Water in 1989 (Feet)	Water-Level Change 1950-89 (Feet)	Water-Level Change 1966-89 (Feet)	Water-Level Change 1988-89 (Feet)	Average Annual Water-Level Change 1950-89 (Feet/year)	Average Annual Water-Level Change 1966-89 (Feet/year)	Saturated Thickness in 1950 (Feet)	Saturated Thickness in 1989 (Feet)	Percentage Change Saturated Thickness 1950-89
11S 24E 14BDA 01		30.9			-2.8					

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STATEMENT OF DAVID L. POPE
CHIEF ENGINEER-DIRECTOR
DIVISION OF WATER RESOURCES
KANSAS STATE BOARD OF AGRICULTURE
BEFORE THE
HOUSE COMMITTEE ON ENERGY AND NATURAL RESOURCES
ON DEPLETION OF THE OGALLALA AQUIFER

March 13, 1990

Mr. Chairman and members of the Committee, I appreciate the opportunity to appear today and provide information regarding the depletion of the Ogallala Aquifer in Kansas. Since it is my understanding that you will be receiving presentations from other parties regarding the results of various studies and the results of the cooperative water level measurement program sponsored by the U.S. Geological Survey, Kansas Geological Survey, State Board of Agriculture, and, in some areas, local units of government, I will not present any information related to those matters. However, it may be helpful for me to provide some background information regarding the role of the Chief Engineer as it pertains to the use of water from the Ogallala Aquifer through the administration of the Kansas Water Appropriation Act and my responsibilities as they relate to the programs of the groundwater management districts.

As we all know, the Ogallala Aquifer is an extremely important resource in the State of Kansas which provides water for domestic, municipal (i.e. public water supply), irrigation, stockwatering (i.e. feedlots), industrial, recreation uses and various other purposes. The Ogallala Aquifer is the principal source of water for a large portion of the state's irrigated acreage, much of which is located in western Kansas.

While some use of water from the Ogallala Aquifer began in the 1930's and 1940's, significant development began during the drought of the 1950's followed by a period of rapid growth in the 1960's and 1970's. This apparently occurred

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as a result of many interrelated factors such as the development of modern irrigation equipment and technology, the availability of agronomic inputs such as hybrid seeds, commercial fertilizers and pesticides, along with a source of relatively inexpensive energy as a result of the development of the Hugoton natural gas field. However, as the development of large scale irrigation escalated, it became apparent that the withdrawal of groundwater was exceeding the natural recharge to the aquifer system, resulting in a decline of the static water level. While it was recognized that very little water could be used from the Ogallala Aquifer without some degree of depletion, the rate of such depletion which should be allowed became an important policy question at the time.

In the late 1960's and early 1970's a consensus developed between state and local leaders that it would be desirable to provide for a considerable amount of local input into the regulation and management of groundwater, since it was apparent that some limitations would likely be needed to protect the resource from further overdevelopment and to provide input into some of the difficult decisions that would likely be needed in the future. This ultimately led to the enactment of the Groundwater Management District Act in 1972 and the subsequent organization of the five existing groundwater management districts in the mid-1970's. Three of these districts are located in the western portion of the state where the Ogallala Aquifer is the principal source of water available. See the attached map for the location of the districts.

As I mentioned earlier, the Division of Water Resources, Kansas State Board of Agriculture, administers the Kansas Water Appropriation Act that dedicates the use of water in Kansas to the people of the State of Kansas and prescribes a procedure whereby individuals or entities may acquire a right to the use of either surface water or groundwater for beneficial purposes. Since January 1, 1978, it has been unlawful to appropriate, or threaten to appropriate, water in Kansas, except for domestic use and other minor exceptions, without first applying for and receiving a permit to appropriate water or holding a vested right determined pursuant to the provisions of the act.

Since the focus of this hearing is on the depletion of the Ogallala Aquifer, I will not provide a lengthy description of the provisions of the act or how it is administered, but I would call your attention to the attached "Kansas Handbook of Water Rights" that our office published a few years ago to provide some basic information regarding water rights in Kansas.

I would note, however, that the criteria under which a determination is made as to whether or not to approve, modify or reject an application for permit varies significantly throughout the state depending upon the amount of water available, the extent of existing water rights, and any other related factors in any given area of the state. In the case of the Ogallala Aquifer, almost all of the aquifer is located within the boundaries of one of the three western Kansas groundwater management districts wherein policies and rules and regulations have been developed by the district and approved or adopted by the Chief Engineer relating to the appropriation of water and other matters involving to the conservation and management of groundwater.

I would also like to provide some general comments regarding the interrelationship between the responsibilities of the Division of Water Resources and the groundwater management districts. The Kansas Water Appropriation Act provides the "foundation", by setting forth a framework for establishing water rights and administering those rights during periods of shortage. The Groundwater Management District Act indicates that it is the policy of the State of Kansas to preserve basic water use doctrine and to establish the right of local water users to determine their destiny with respect to the use of groundwater insofar as it does not conflict with the basic laws and policies of the State of Kansas. The Groundwater Management District Act also provides a mechanism to manage aquifers, or portions thereof, on a systems basis recognizing the differences that occur in the State of Kansas between different aquifers.

The Chief Engineer, Division of Water Resources, has several roles under the Groundwater Management District Act. He or she has certain responsibilities during the organizational phase primarily associated with the determination of boundaries to ensure that a manageable area will result as it relates to one or more common aquifer systems. Once a groundwater management district is formed by favorable election of the eligible voters, the two most significant responsibilities of the Chief Engineer are as follows:

(1) Review and approval of the management program which is required to be developed by the district. The management program describes the characteristics of the district and the nature and methods of dealing with groundwater supply problems within the district. Upon examination of the proposed management program, if the Chief Engineer finds that it is compatible with the Kansas Water Appropriation Act and any other applicable state laws or policies, he or she shall approve it and notify the board of his or her action. After consideration at a public hearing, the board of directors may then adopt or propose to modify the management program.

(2) The board of directors may also recommend to the Chief Engineer rules and regulations necessary to implement and enforce the policies of the board. Once adopted, these rules and regulations become the Chief Engineer's rules and regulations for that specific area. It is by rules and regulations that most of the restrictions on the appropriation of water are created.

I would note that these policies have become increasingly more stringent over the last few years and have in many cases resulted in little or no additional water being appropriated due to the limited amount of water available, declining water levels and other concerns.

K.S.A. 82a-1036 through 82a-1040 gives the Chief Engineer another tool for dealing with localized water problems through the creation of intensive groundwater use control areas. The problems that can be dealt with include groundwater levels which are declining or have declined excessively, withdrawal of groundwater in excess of the rate of recharge, preventable waste of water, the unreasonable deterioration of the quality of water or other conditions that require regulation in the public interest. Outside the boundaries of a groundwater management district, the Chief Engineer may initiate such proceedings on his own initiative but inside a groundwater management district the Chief Engineer may initiate them only on recommendation of the Board or upon receipt of a petition filed by the eligible voters in the district. After holding a public hearing, taking evidence and determining findings of fact, the Chief Engineer decides whether or not to establish the control area and, if established, determines the boundaries and corrective control provisions necessary to deal with the problem. To date, seven intensive groundwater use control areas have been created in Kansas. One of them is located along the Arkansas River in western Kansas from the Colorado state line and extends through Ford County. It deals with the alluvium of the river and the hydraulically connected portion of the Ogallala.

As an Ex Officio Member on the Arkansas River Compact Commission, the Chief Engineer takes an active role in protecting Kansas' entitlement to the waters of the Arkansas River as set forth in the terms of the Arkansas River Compact.

Since 1980, the Division of Water Resources has been actively involved in an administrative investigation by the Compact Administration and with the Kansas v. Colorado law suit which was filed by Attorney General Stephan on December 16, 1985. Although this law suit is not directly related to the Ogallala, the outcome of this suit will have a direct bearing on the life of the Ogallala in that area. The reason for this is that water users depending directly upon the renewable surface waters of the Arkansas River use the nonrenewable waters of the Ogallala Aquifer when those surface flows are not available. Thus, the availability of the waters of the Arkansas River have a direct impact on the longevity of the Ogallala Aquifer in that region.

The Groundwater Management District Act has allowed the districts to assume a significant role related to the conservation and management of groundwater within their boundaries, subject to the review and oversight of the Chief Engineer. The statutory authority as to whether or not to issue permits to appropriate water is vested in the Chief Engineer but the primary criteria used during his or her review are the policies and rules and regulations for the district along with the specific recommendations on each application by the board of directors of the district. It is my understanding that representatives of the groundwater management districts will be appearing before the committee later to describe the programs and policies of their districts.

I would note that major changes in policies have occurred since the 1960's and 1970's. Most of the major irrigation development which has resulted in depletion to the Ogallala Aquifer occurred during that "development era". Since that time, the major emphasis has shifted to the conservation and management of groundwater. While depletion of the aquifer is still occurring, I believe it is apparent that the rate of depletion has decreased, at least to some degree, as a result of a number of factors. Among these are more awareness of the value of water, increased prices of energy, changes in cropping patterns, stronger regulation by state and local government, and physical changes within the aquifer system, which limit the amount of water that can be withdrawn from some portions of the aquifer. The primary physical limitation is the reduced rate of pumping possible from existing wells as a result of declining water levels and decreasing saturated thickness of the aquifer materials.

Our records indicate that just under four million acre-feet of groundwater was withdrawn in 1988 from approximately 17,000 large capacity wells authorized in the Ogallala Aquifer. This represents approximately 2/3 of the state's total water use.

Because major portions of the Ogallala Aquifer are now closed to new appropriations of water, it appears that the future demand for water will need to be met through reallocation or changes to water rights. Consequently, in the future I expect that our office will be more involved in the review and processing of changes to existing water rights than with applications for "new" permits. A market in water rights in Kansas is starting to evolve.

An existing water right limits the amount of water that is authorized to be diverted to a specific quantity and maximum rate of diversion along with a number of other terms, conditions and limitations. While the point of diversion, place of use or type of use authorized under an existing water right may be changed, the annual quantity of water or maximum rate of diversion can not ever be increased nor can the authorized source of supply be changed. An application for change can not be approved if it will result in impairment to other existing water rights.

I might also note that the Division of Water Resources has placed a considerable amount of emphasis on the matter of water use reporting in recent years. As you may recall, the holder of an existing water right or permit is required to file a complete and accurate report of water use to the Chief Engineer by March 1 for the preceding calendar years water use. The 1988 Legislature gave us additional enforcement capability through administrative fines, which have significantly improved the compliance with these requirements.

This information provides important data needed for the administration, perfection and enforcement of water rights, for planning and management decisions and for research projects.

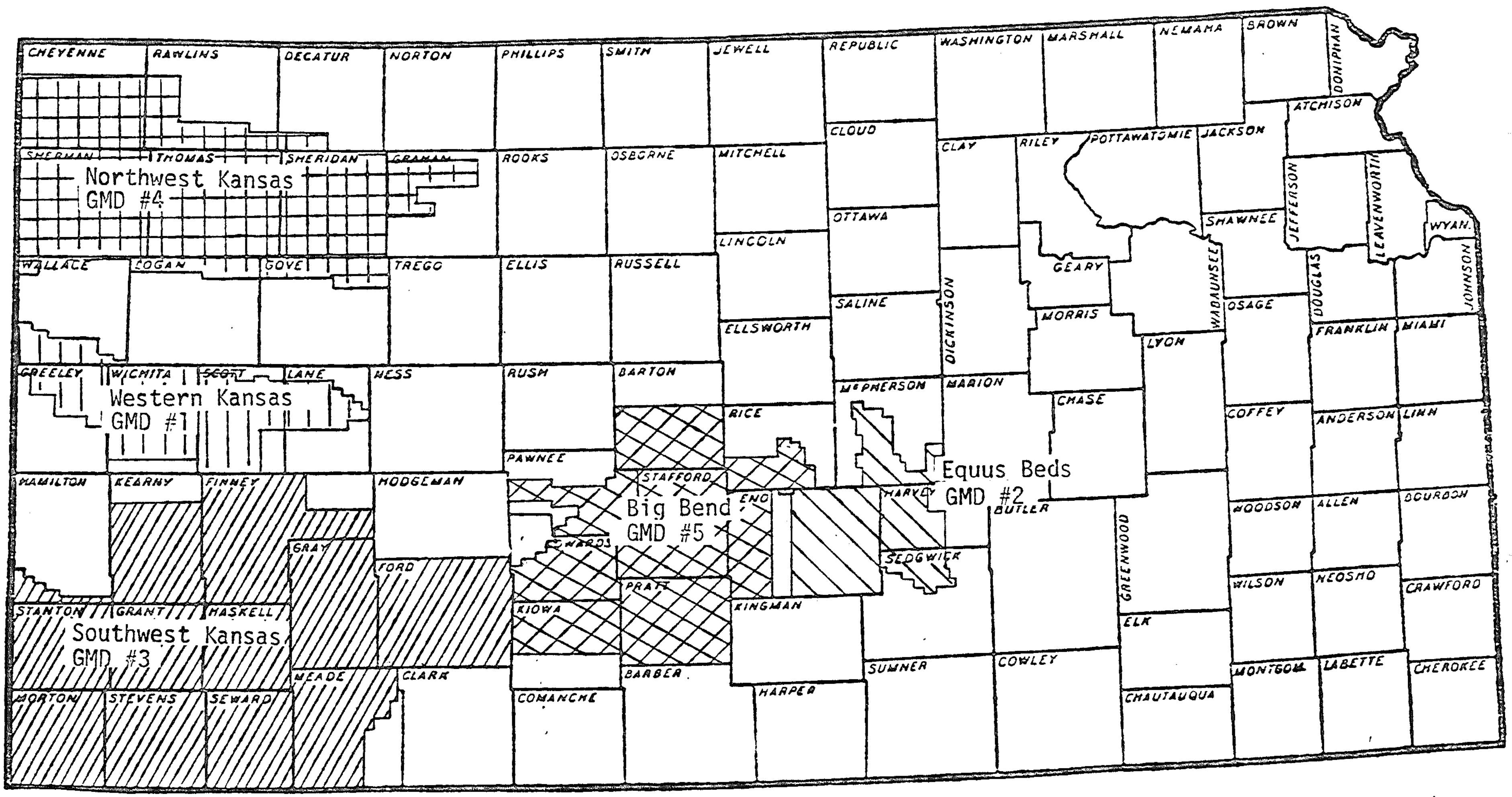
Last year, we received over 99% of the reports for the 1988 water use year. Since it was the first year under the amended law, we made several additional mailings and a significant effort to inform the water users regarding the requirements of the law. Our enforcement efforts included the assessment of fines on all individuals delinquent in the filing of reports and the filing of ten petitions in district court seeking payment of fines due and/or orders requiring the submission of delinquent water use reports. We are also placing as much emphasis as possible on improvements in the accuracy of data being submitted. This is being done by a review of the reports filed, verification of data, and requests for clarification from the holder of the water right as needed. Major improvements have occurred in the quality of data but we still have a lot of work to do in this area due to the large number of reports (approximately 30,000, statewide) and the limited staff to do it with.

Our computerized water rights and water use data base is now actively used by the Division headquarters and field office staff, groundwater management districts and other state agencies.

We have also embarked upon a program to require the use of better techniques to measure the water used in the State of Kansas. Several years ago, I adopted a policy requiring mandatory meters on all diversion works authorized by new permits to appropriate water and on most changes to existing water rights (e.g. replacement wells). Over a period of years, this will result in a large number of existing wells being metered. In a number of stream or aquifer systems where special management controls are in effect, we have required all water users to install meters. In some individual groundwater management districts, meters were made mandatory for new applicants or under various other circumstances by the districts at various times in the past.

Conservation and the need for more efficient use of water is receiving a considerable amount of attention by our office and other interested parties. All applicants for new appropriation and changes to existing water rights, in many cases, are required to develop and implement a water conservation plan consistent with state guidelines developed by the Kansas Water Office pursuant to new legislation passed in 1986.

In summary, issues related to the depletion of the Ogallala Aquifer are very complex. Considerable effort has been expended over the years to obtain better management and conservation of the resource. However, it is apparent that the depletion of the aquifer is continuing and that additional efforts may be required, particularly in some areas, to further address the problem. In this regard, my office has been working cooperatively with the groundwater management districts and others to deal with this extremely important long term issue.



SCALE-STATUTE MILES
0 10 20 30 40 50

Figure 1. Organized Groundwater Management Districts in Kansas

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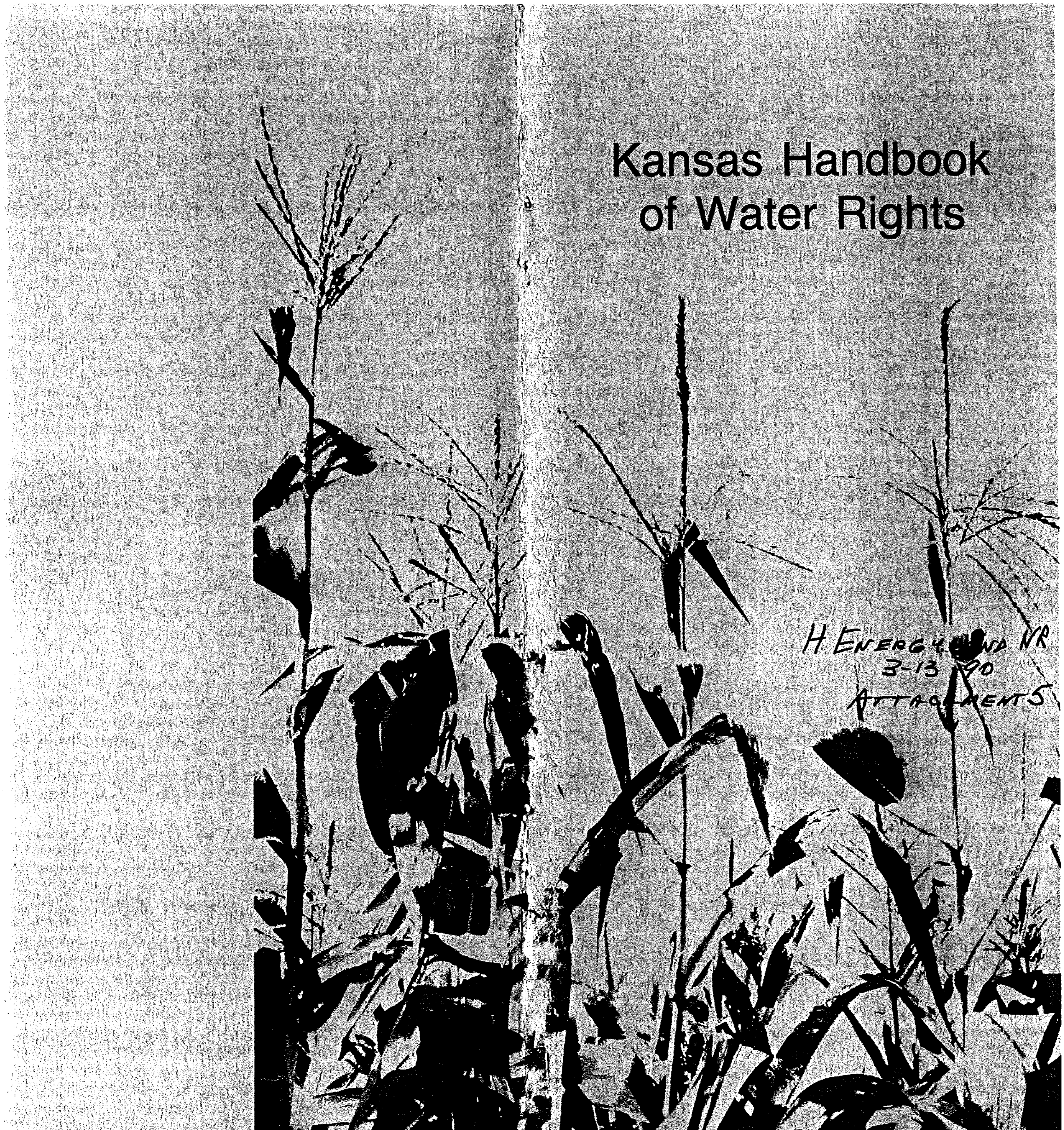
Kansas Handbook of Water Rights



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Division of Water Resources

The Kansas State Board of Agriculture's division of water resources was established in 1927 by the legislature. It administers some 23 Kansas laws including the Water Appropriation Act.

Other areas within the regulatory power of the division of water resources include dam construction, levee construction, channel changes in rivers and streams, and floodplain management.

The division has the responsibility to establish intensive groundwater use control areas to deal with special water problems in specific areas.

The Chief Engineer also represents Kansas on four interstate river compacts.

Division personnel also work closely with the state's five groundwater management districts to formulate and enforce policies to conserve, manage and control area groundwater supplies in south central and western Kansas where such districts have been organized.

■

Kansas State Board of Agriculture
Division of Water Resources
109 SW 9th St., Suite 202
Topeka, Kan. 66612-1283
(913) 296-3717

Why Do I Need a Water Right?

Water, like other natural resources enjoyed so bountifully by Kansans, is protected for the use and benefit of the citizens of this state.

The Kansas Water Appropriation Act protects both the people's right to use Kansas water and the state's supplies of ground and surface water for the future.

The law is administered by the Kansas State Board of Agriculture's division of water resources which issues permits to appropriate water, regulates usage, and keeps records of all water rights in the state.

The Kansas Water Appropriation Act protects both the people's right to use Kansas water and the state's supplies of ground and surface water for the future.

The Water Appropriation Act is specific. It makes it illegal for individuals in Kansas to use water without holding a vested right or applying for and receiving a permit to appropriate water from the division of water resources.

The exception is water used solely for domestic purposes—that is, water primarily used for the household, watering livestock on pasture, or watering up to two acres of lawn and gardens. No permit is needed for that class of water usage.

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The Water Appropriation Act affects all Kansans. If you are a farmer who uses irrigation to grow crops, it requires you to obtain a permit and to make yearly reports of the water you use. If you are a city-dweller who drinks, washes with or cavorts in city water, you likely are able to do so because your municipality has a water right or rights.

The right to use Kansas water is based on the principle of "first in time—first in right." In times of shortage, that means the earliest water right or permit holders have first right to use the water. The maintenance of water right and permit records allows Kansas water to be apportioned fairly.

. . . the Water Appropriation Act is Kansas law. Violating it can subject you to a maximum of six months in jail and a $500 fine.

Why is it so important to follow proper procedures to obtain a water right and report use of water? One reason is to protect the investment in your right to divert water for beneficial use on your farm for irrigation, a feedlot, recreational reservoir, or in your municipality, water supply district or industry. Another reason is to protect Kansas water resources for tomorrow and future generations. Finally, you should remember that the Water Appropriation Act is Kansas law. Violating that law can subject you to a maximum of six months in jail and a $500 fine.

Where to Find Help

You can contact the division of water resources at the Kansas State Board of Agriculture, 109 SW 9th, Suite 202, Topeka, Kansas 66612-1283, or call (913) 296-3717.

For your convenience, water resources field offices are located across the state. In eastern Kansas, write the Topeka Field Office, 1643 SW 41st St., Topeka, Kansas 66609, or call (913) 267-6200.

Serving the northwest is the Stockton Field Office, 425 Main St., PO Box 192, Stockton, Kansas 67669, telephone (913) 425-6152.

In the southwest is the Garden City Field Office, 214 Fulton Terrace, Garden City, Kansas 67846, telephone (316) 267-2901.

South central Kansas is covered by the Stafford Field Office, 105 N. Main St., Stafford, Kansas 67578, telephone (316) 234-5311.

You also can contact your local groundwater management district.

Special Cases

Abandonment of a Water Right

A water right is considered abandoned after three successive years of non-use without acceptable cause. Examples of acceptable cause for non-use include such reasons as water being unavailable from the source of supply; little or no need for irrigation of crops because of adequate rainfall; or temporary pollution of the water supply.

Changing a Water Right

If a water right holder wants to change such things as the place of use, the type of water use, or the point of diversion, he or she is required to file an application for change with the division of water resources, and to pay the appropriate filing fee. Some parts of Kansas have no water available for new permits. In those areas, acquisition of an existing water right and obtaining approval to change one of the features may be the only way to meet future water needs.

Temporary Permits

Temporary permits are available for water use which will last less than six months and consist of less than a million gallons of water used for non-domestic purposes. Temporary permits, which often are issued for such purposes as oil well drilling or small construction projects, must be accompanied by a filing fee.

Step by Step Guide To Obtaining a Water Right

1. File an Application

Contact the division of water resources for an application to appropriate water for beneficial use. Anyone who wishes to use water for any purpose other than domestic use or a pond smaller than 15-acre feet, must file an application accompanied by a filing fee which is determined by the amount of water to be appropriated. Obtain a form from the division of water resources, 109 SW 9th, Suite 202, Topeka, Kan., 66612-1283. Applications filed within a groundwater management district are reviewed by the district, and recommendations are made based on the policies and rules and regulations of that district.

2. Receive Permit

Division of water resources personnel will assist individuals until their applications are in proper form. If it is determined that water is available at the desired location, if its appropriation will not interfere with other area water rights, minimum desirable streamflow, or the public interest, and if it meets all other division requirements, the application may be approved.

3. Complete Diversion Works

After the permit is received from the division of water resources, its holder is free to complete the authorized diversion works by drilling and completing a well, pumpsite or building a dam within the time allowed. Check valves also are required for safety in chemigation use. The permit-holder then must notify the division of water resources of the completion of the diversion works and submit a $200 field inspection fee. A form for this purpose usually accompanies the permit. Installation of water meters must be completed before notice and proof is accepted. (Dams impounding more than 30-acre feet of water require an additional permit from the division's water structures section.)

4. Develop the Water Right

At this point the applicant has a specific period of time, usually four to five years, to "perfect"—or develop—the water right by actually using water as authorized by the permit. If more time is needed, an extension must be requested in writing before expiration of this period.

5. Field Inspection

After the water right has been perfected, the division of water resources does a field inspection to determine such things as rates of diversion of water, where and how the water has been used, as well as other numerous details of the actual operation in relation to the perfection or development of the water right. These tests will determine the maximum and normal rate of water diversion. Water use reports and other information also will be analyzed

to determine the quantity of water diverted and acres irrigated each year within the limits of the permit.

6. Comment on Draft Certificate

After completion of field testing, the water right holder will receive a draft certificate of appropriation from the division of water resources. He or she has 30 days to comment on the proposed certificate of appropriation.

7. Certificate Issued

When the water right holder receives the actual certificate, he or she must file it with the Register of Deeds in each county where authorized point or points of diversion are located.

8. Water Use Reported Yearly

After water use has begun as authorized by the permit to appropriate water, the permit holder is required to complete and return a yearly report of water use within 30 days of receipt. Report forms usually are mailed in January and cover the previous year's usage. Water use reports are mandatory for perfection of the water right and proof that it has not been abandoned. Even if water has not been used, the user should submit the report to explain the reason for non-use.

5-5

6

PRESENTATION
BY THE
KANSAS CORPORATION COMMISSION
ON THE DEPLETION OF THE
OGALLALA AQUIFER

PRESENTED TO THE HOUSE
ENERGY AND NATURAL RESOURCES COMMITTEE
REPRESENTATIVE DENNIS SPANIOL, CHAIRMAN
MARCH 13, 1990

WILLIAM R. BRYSON
KANSAS CORPORATION COMMISSION
4TH FLOOR DOCKING STATE OFFICE BLDG.
TOPEKA, KANSAS 66612
(913) 296-5113

H ENERGY AND NR
3-13-90

ATTACHMENT 6

INTRODUCTION

The issue of depletion of the High Plains aquifer has been a concern for over three decades when water users, water resource regulators and the Kansas legislature first realized that groundwater was a finite resource. When this reality soaked in, Kansans took steps to require more efficient water use and relate the withdrawal rate from the aquifer in terms of the physical properties of the aquifer to replenish the storage through recharge. Until the 1980's, the focus of this effort centered on issues of quantity and the correct approach to appropriation which would display concepts of safe yield, zero deletion or controlled depletion. The High Plains aquifer or as it used to be called, before being combined under one term the Ogallala, Meade (Pleistocene) and Equus Bed was in various stages of depletion and those using water for agricultural, municipal and industrial purposes joined the learning curve of concern somewhere during the twenty year period between 1960-1980. The public education process has finally caught up with the technical knowledge of what was and still is happening.

In the late 1970's or early 1980's, the concern over quality of the High Plains aquifer crescendoed and the water users, regulators, and the Legislature realized there was more than one way to deplete an aquifer.

(1) There was depletion by withdrawal creating less quantity.

(2) There was depletion by introducing contaminants which prevented water at certain locations from being used for irrigation or human consumption.

(3) The loss of water through unplugged conduits was created by downward drainage of fresh water into mineralized water bearing zones.

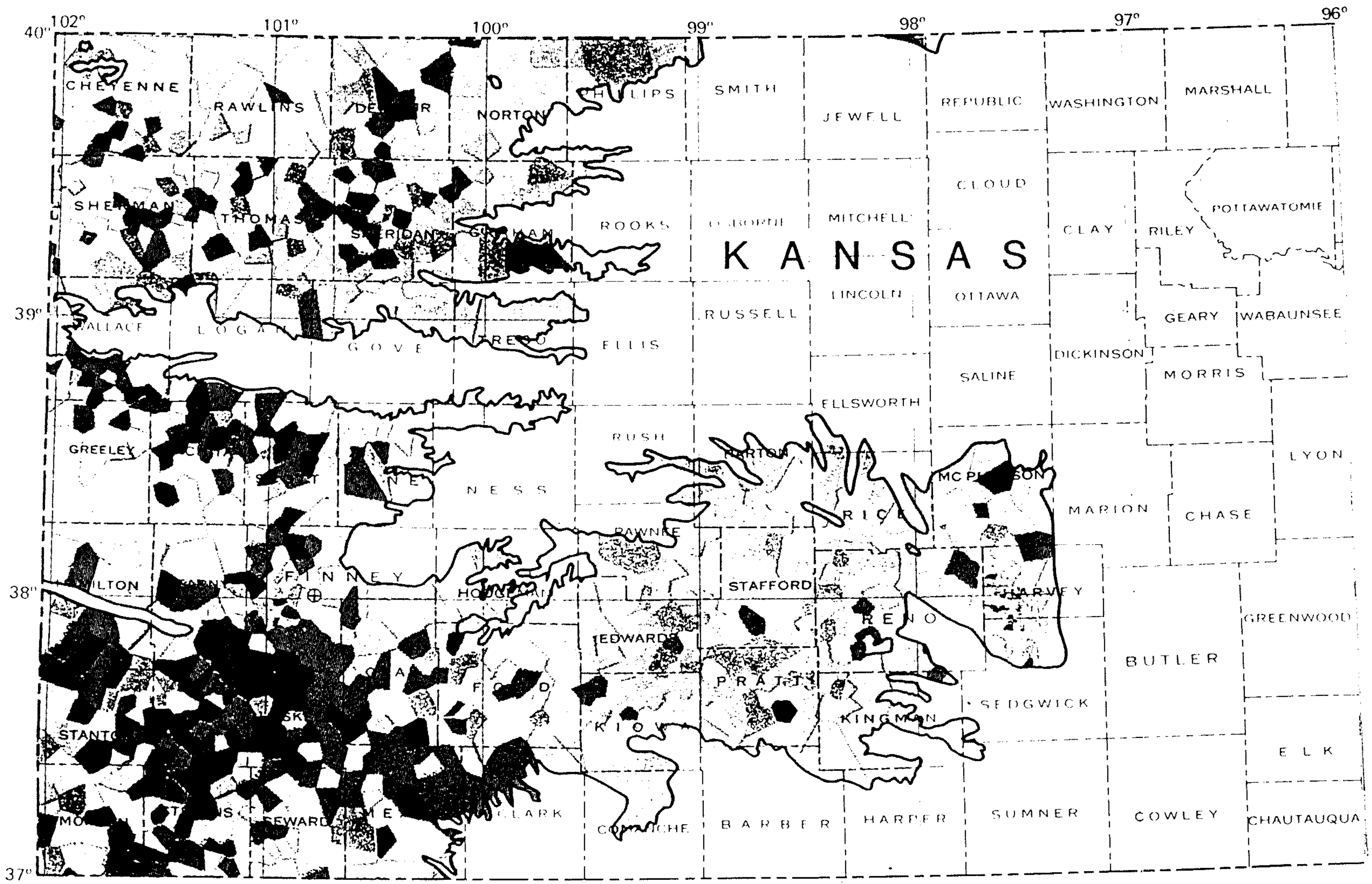
The Kansas Corporation Commission is dedicated to regulating the oil and gas exploration and producing industry with sufficient enforcement to prevent contamination of all water resources including the High Plains aquifer. In 1982, the Kansas Legislature, based on testimony by Howard O'Connor of the Kansas Geological Survey, mandated the Commission to establish practices which prevented the loss of fresh and usable water through downward drainage. Perhaps of significance of the Commission's effort is the fact that in 1982, 70% of the Conservation Division's budget was devoted to traditional oil and gas conservation activities and today 70% of the FY 1990 budget is devoted to water resource protection activities.

CHLORIDE CONTAMINATION AND THE HIGH PLAINS AQUIFER

During the latter part of 1989, the Conservation Division developed a Chloride Contamination Investigation Plan which was subsequently presented to the Kansas Water Authority in October 1989. That plan has been included with the written testimony provided to the House Energy and Natural Resources Committee and outlines those sites which are currently under investigation by Commission Staff or will be investigated during FY 1991 or where

A-9

HIGH PLAINS AQUIFER



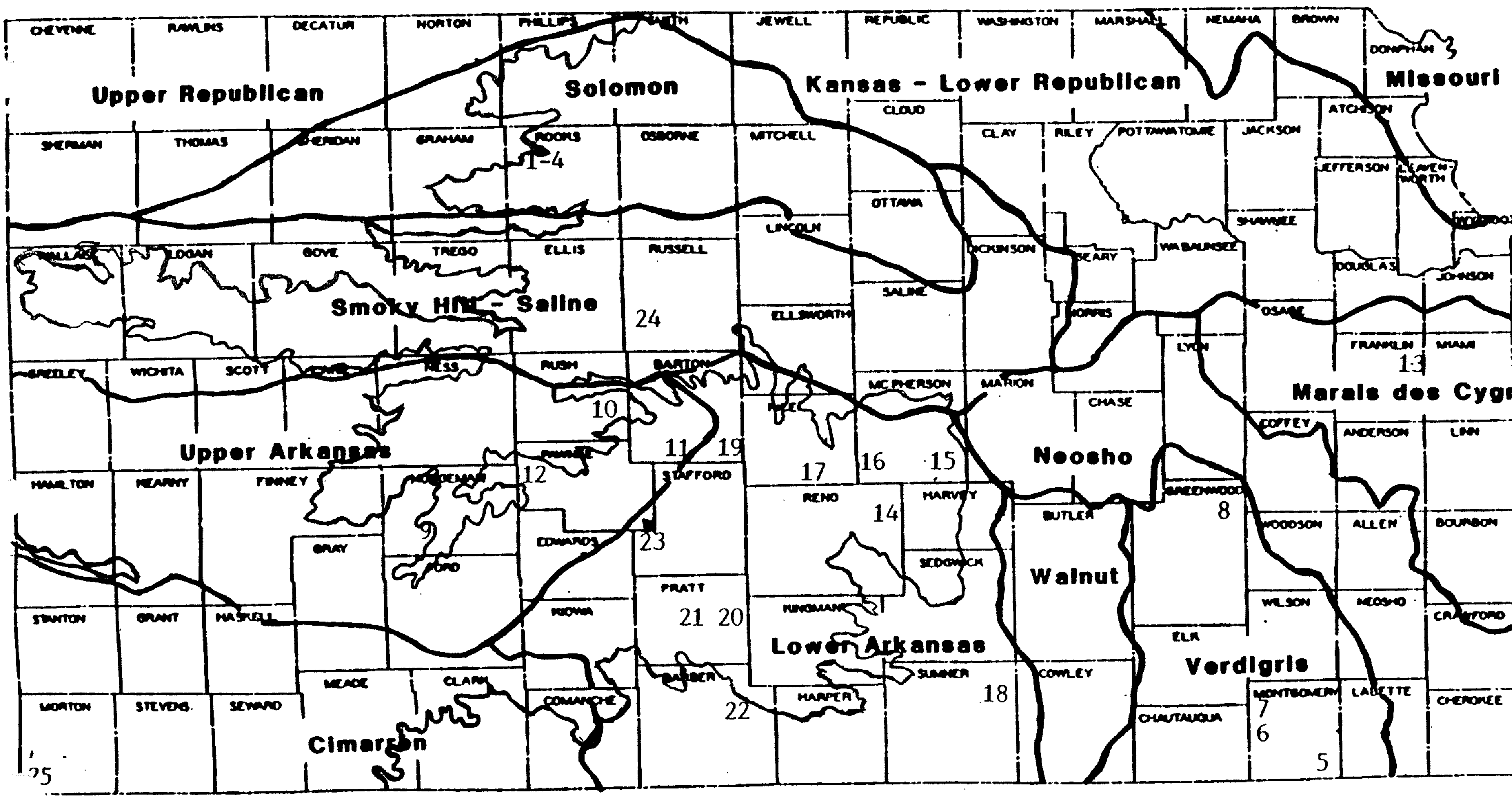
Taken from the U.S. GEOLOGICAL SURVEY Water-Resources Investigations Report 89-4073 (1989)

6-5

Location of

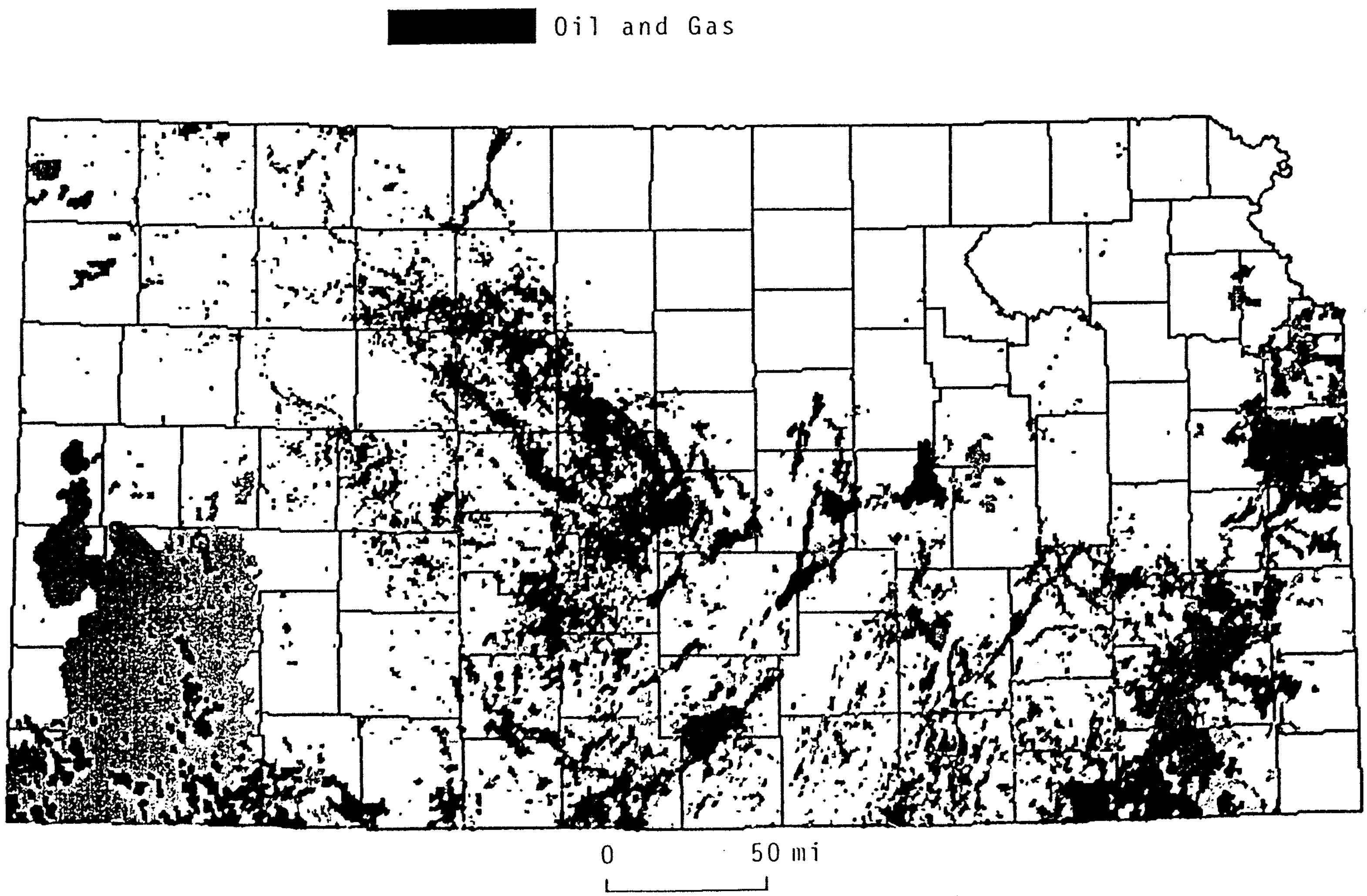
Chloride Contamination Sites

by Basin



Eastern Boundary
High Plains Aquifer

Oil and Gas Fields in Kansas



remediation is occurring. The appendix to that plan outlines specific sites within each river basin and the status first of investigation at the beginning of 1989. The Commission has provided a map as a part of this briefing paper which superimposes the area covered by the High Plains aquifer on the map in the site plan to indicate the number of contamination sites in the High Plains aquifer. Not included are those dozen sites where chloride quality is being monitored in lieu of active investigation.

The evaluation of the extent to which oil field related contaminants have contributed or can contribute to High Plains aquifer resource depletion can be best appreciated through a series of observations based on historical knowledge and more recent efforts to remediate the pollution by lowering the level of chloride contamination. It should be noted that a discussion of contamination of the Dakota aquifer or alluvial valleys in bedrock areas would create a different set of observations than portrayed below:

(1) The part of the High Plains aquifer originally referred to as Ogallala overlies oil and gas production which was primarily developed after the surface brine pond disposal legislation was introduced in 1957 and the Table I requirements for surface pipe protection and cementing were finalized in 1960. The number of oil field related pollution cases investigated in the area underlain by Ogallala have been few and far between but a real problem when occurring due to the depth of the aquifer and the lag between the failure of the well or facility and the

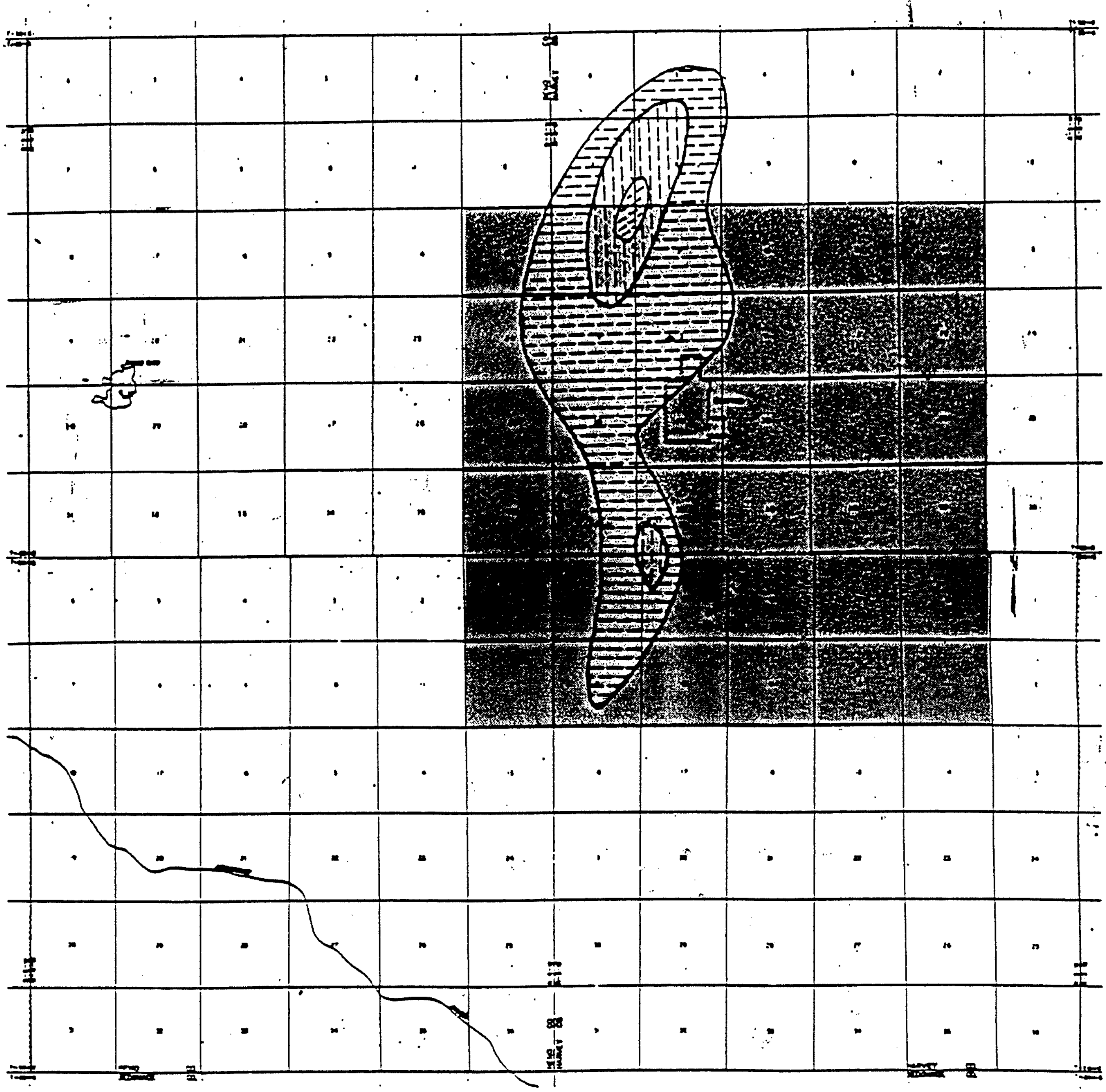
discovery of pollution. These occurrences are localized and did not result in widespread contamination. They usually cover less than one section of ground.

(2) Part of the reason for (1) above was that the 3900 wells in the Hugoton Gas Pool only produced small amounts of water through 1965 and the discovery of contamination has been extremely localized to the area around a former pit location. More recent development in Southwest Kansas was covered by stricter environmental standards and regulations.

(3) In the Ogallala portion of the High Plains aquifer pollution, when occurring, has generally been limited to one water bearing zone and dilutes rather rapidly to a level of 300-1500 ppm chloride at which point continued improvement occurs at an agonizingly decreasing rate. In other words, the "hot spot" diminishes rather rapidly but an areal body of groundwater remains which is too high to use for irrigation or to drink. Generally, such water can be used for stock watering.

(4) The eastern part of the High Plains aquifer formerly referred to as Meade or Pleistocene (Stafford, Pratt and Reno Counties) and the Equus Beds overlies much older oil production where brine was disposed of into surface ponds prior to adequate legislation prohibiting or severely curtailing the practice. A 1948 map of the pollution in the Burrton Field is included in with this testimony. Part of the Equus Beds in the Burrton area contains

1948 CHLORIDE DATA



From wells less than 50' deep

Proposed IGUCA

FROM 1948 KDHE FILES

mg/l

Greater than 1,000 Cl

Greater than 500 Cl

Greater than 250 Cl

KDHE 4/83

6-9

similar levels of chloride contamination today as it did in 1948. In some cases, the chloride levels are higher than they were in 1948 as discovered through the groundwater monitoring network developed by Equus Beds Groundwater Management District #2. The chloride levels found in these historical areas are in the 300-2000 ppm concentration range because the normal groundwater movement doesn't effectively move the heavier contaminants along the top of clay lenses where they reside. In these areas, the contaminants have spread from the points of introduction into the aquifer and migrated to merge with other areas.

(5) In areas such as the Equus Beds, residual salts are present in the old pond areas and in the zone of aeration above the water table. These are leached slowly out of the sediments into the groundwater. There is no magic formula to assess the rate of leaching or the year to year contribution to a particular area of contamination. Such contribution does retard quality improvement and does factor into the success of remediation in certain areas.

CHLORIDE CONTAMINATION RELATED TO WELLS

Chloride contamination related to the failure of injection or producing wells have been infrequent but have occurred. The Clawson site in Haskell County and the Richmeier in Graham County

Exc. pts from Corporation Commi sion

Table I

Surface Pipe Setting and Cementing

HARVEY Set a minimum of 200 feet in all areas. In all cases, set through all unconsolidated material plus 20 feet into the underlying formation. See Appendix A for special requirements.

HASKELL In all areas protect 20 feet into the Permian. The following options are open: (a) set 20 feet into the Permian or (b) set through all unconsolidated material plus 20 feet into the underlying formation and cement the production string from a point 20 feet below the top of the upper most Permian unit present to the surface. If (b) is used and the hole is dry, the hole shall be filled with cement from a point 20 feet below the top of the uppermost Permian unit present to the surface. In all cases, set through all unconsolidated material plus 20 feet into the underlying formation.

KIOWA Set a minimum of 200 feet in all areas and in all cases set 20 feet into the Kiowa shale. In all cases, set through all unconsolidated material plus 20 feet into the underlying formation.

LOGAN Protect through the Dakota formation plus 50 feet into the underlying formation. The following options are open: (a) set through the Dakota plus 50 feet into the underlying formation or (b) set through all unconsolidated material plus 50 feet into the underlying formation and cement the production string from a point 50 feet below the base of the Dakota to the surface. If (b) is used and the hole is dry, refer to K.A.R. 82-3-114.

MCPHERSON Set a minimum of 200 feet in all areas. Protect through the Dakota formation where penetrated plus 20 feet into the underlying formation. The following options are open: (a) set through the Dakota plus 20 feet into the underlying formation or (b) set through all unconsolidated material plus 20 feet into the underlying formation and cement the production string from a point 20 feet below the base of the Dakota to the surface. If (b) is used and the hole is dry, refer to K.A.R. 82-3-114. In all cases, set through all unconsolidated material plus 20 feet into the underlying formation. See Appendix A for special requirements.

are the most notable examples of injection well failure. The current Mechanical Integrity Testing program for injection wells began in 1982 and would have probably discovered these problems before the pollution to the aquifer became extensive. The other type of groundwater contamination occurrence has been associated with oil field related collapse sinkholes such as the Panning sink in Barton County (1960) and the recently developed Macksville sinkhole which occurred on July 21, 1988. Both cause contamination to groundwater because they displace salt water from the cavity in the salt and the conduit to the salt when the volume of the cavity is filled with overburden sediments. As is typical with other causes of oil field related contamination, the chloride concentrations diminish rather rapidly to the 1000-1500 ppm level.

Kansas has had a long, and for the number of wells drilled, a successful history of minimizing well related aquifer contamination. The level of protection afforded the Ogallala and the rest of the High Plains aquifer from substandard well completion practices was, even in the early days, much higher than for disposal facilities. Much of this stemmed from the realization that if the upper water formations weren't shut off, migration of the fluids downhole could flood out the production. The same concern developed over abandonment of holes in producing areas thus creating the evolution of the well plugging requirements. These are two examples where an industry practice oriented toward prevention of hydrocarbon waste actually prevented contamination. Excerpts from the Commission's Table I regarding the minimum surface casing setting depths have been provided the Committee to show the use of geologic based requirements used to protect the High Plains aquifer. In all cases, surface pipe must be set and cemented through all unconsolidated deposits. The entire High Plains aquifer is viewed by the Commission as unconsolidated and has been such since after World War II.

SUMMARY

(1) The instances of chloride or oil field related contamination in the Ogallala portion of the High Plains aquifer are very localized and not very prevalent based on current groundwater quality data.

(2) The remediation of past chloride contamination areas requires a different approach than can be used in remediating volatile organics or other organic compounds. With most of the chloride levels in the 500-1500 ppm range, the question arises as to what concentration point the withdrawal of contaminated water can be viewed as a waste of usable water. Public drinking water standards for chlorides are set at 250 mg/1 and the upper limit of fresh water under Chapter 55 is 1000 ppm total dissolved solids or roughly 500 ppm.

(3) The Conservation Division of the Commission has strict requirements for the completion and abandonment of wells and is dedicated to the protection of all water resources and views pollution as a depletion of that resource, either temporarily or permanently depending upon the

case. The Commission is currently looking at stricter requirements for reserve pits and emergency pits in Sensitive Groundwater Areas which includes parts of the Ogallala and High Plains aquifer.

CHLORIDE CONTAMINATION SITE
INVESTIGATION PLAN

KANSAS CORPORATION COMMISSION
CONSERVATION DIVISION

Presented to

Kansas Water Authority

October 25, 1989

H Energy and NR
3-13-90

Attachment 7

INTRODUCTION

Chloride contamination of groundwater has been a point of concern to those owning or renting property in Kansas oil or gas producing areas since the late 1930's when water wells in the Burrton Oil Field in Reno and Harvey Counties began to become salty. In the early days of oil production in Kansas, brine disposed of into surface ponds was thought to evaporate, particularly in central and western Kansas. Before very long, both industry and the State of Kansas realized that the disappearance of disposed of brines in surface ponds was due to percolation and not evaporation. Even as late as the early 1960's, when groundwater in several areas of Kansas had become polluted beyond the level safe for human consumption, many operators did not believe they were leaving an undesirable legacy for future generations to investigate and remediate. Most operators required education that dilution was not the cure for pollution.

In 1957, K.S.A. 65-171d was amended to require surface brine disposal pits to have permits from the Board of Health (now KDHE) prior to operation. Although approximately 4400 surface pond applications were filed with the Department between January 1, 1958 and 1968, the program was basically one of closing pits through denial, issuance of short term permits to allow completion of more acceptable disposal facilities or revoking permits as the water production increased to potentially polluting levels. Under K.S.A. 65-171d, closure of each pit had to be forced individually on the basis of potential pollution hazard and blanket, no pit laws such as occurred in some states did not occur in Kansas.

By the early 1970's, residents of Kansas finally accepted the concept that our groundwater resource is a finite quantity and the assurance of adequate supply rested upon proper management of reserves. Groundwater Management Districts (GMD) were statutorily created to provide a semi-autonomous local component to the state water appropriation regulatory program carried out by the Division of Water Resources (DWR). Both the DWR and GMD programs initially were concerned with developing policies and regulations directed toward the prevention of water waste, safe yield and developing spacing patterns for groundwater resources which would prevent mining of groundwater and further depletion. Until the late 1970's water quality, while tacitly a concern to most water users, was of secondary concern and was taken for granted except for those few individuals who happened to have experienced oil field pollution to their water supplies.

The emphasis on continued availability of groundwater and the accompanying concern over premature depletion of the Ogallala and other unconsolidated aquifers did finally allow a refocusing into the effects enclaves of groundwater contaminated by oil field salt water might have on long range groundwater management goals and the future acquistion of groundwater for public supplies in oil producing areas. Prior to 1980, the bureau of Oil Field and

Environmental Geology of KDHE and its predecessor, the Oil Field Section made investigation of oil field brine pollution occurrences and was generally successful in terminating the pollution source. Occasionally, an operator took responsibility for providing the owner of a contaminated water supply with a new source. The cleanup of past salt water contamination is basically an advent of the 1980's, consequently many of the listed contamination sites for which the Commission is currently investigation cleanup feasibility occurred 20-40 years ago from the era of pond disposal, frequent emergency pit usage and unreclaimed salt water spillage.

This introduction has been provided to demonstrate the temporal hiatus which exists between time of pollution discovery and the current development of salt water policy to attempt restoration of aquifer quality to levels usable for human consumption and other normal water uses. The evolution of chloride contamination in traditional oil producing areas is often complex due to more than one source contributing to the problem and was often exacerbated by releases from spills and equipment malfunction. Complete understanding of the rationale behind the Kansas Corporation Commission, Conservation Division, Salt Water Contamination Site Plan for FY 1991 and ensuing years probably makes the best sense when a historical perspective has been provided.

SITE CONTAMINATION PROGRAM FOR FY 1991

The Kansas Corporation Commission, through its Conservation Division, is committed to an oil field contamination remediation program which adheres to the following objectives:

(1) Investigate and determine feasibility of cleanup of past oil field pollution at active lease sites where past brine disposal or poor lease maintenance practices have raised the chloride concentration of groundwater to above acceptable concentrations for human consumption, irrigation or industry.

(2) Work cooperatively with the Department of Health and Environment Bureau of Environmental Remediation to investigate and conduct cleanup feasibility assessments or develop remediation plans for those cases where oil field brine contamination has traveled offsite from active leases or where contamination from more than one past source has coalesced into a real non-point source pollution problem.

(3) Use the Commission's legal resources to identify and require a former or present lease operator to assume responsibility for developing and implementing a Commission approved cleanup plan.

(4) Determine whether each documented oil field related salt water contamination site is more appropriately dispositioned for a remediation or monitoring program.

(5) Work with the Kansas Department of Health and Environment to develop definitive cleanup standards which are realistic, cost-effective, and yet acceptable to those engaged in water resource planning, water policy development and environmental protection.

(6) Develop, with assistance from other water and land resource agencies, a soil restoration policy for the State of Kansas which provides direction to landowners of salt contaminated soil areas as to whether state participation in reclamation or restoration can be expected. During the last two years, more landowners have viewed reclamation of oil field related salt scars as a State responsibility. There is neither policy or statutory direction addressing this issue.

KCC FY 1991 PROGRAM

Figure 1 shows the location of twenty-five salt water contamination sites which are actively being addressed by the KCC Conservation Division. The numbers correspond to the presentation in the Appendix which provides a narrative of current status for each project. Ten of the sites are not included on the Kansas Contamination Site List for 1988 but will show up on the next list.

Of these twenty-five sites, eight are being addressed by responsible parties and two others have assumed a partial operator responsibility through negotiation with the Commission. Five of the sites have no identified responsible party and are being investigated by the Commission or in cooperation with KDHE. Monitoring is being formally conducted at sites 3, 4, 17 and 21 as a result of field investigation. Not included in this report are another twenty sites where water sampling has been done to update the chloride quality information and detailed field investigation is lacking.

The Commission has developed an informal strategy to assist in site prioritization recognizing that both personnel resources and funding for site activities will always be limited. Prioritization is carried out as follows from highest to lowest for investigation and remediation plan development.

(1) New pollution cases forwarded to KCC through either complaint, agency referral or as a result of staff field investigation of active sources of salt water pollution (spills or illegal use of ponds for emergency or disposal). The most effective way to address salt water contamination is to contain and retrieve the pollutants before they have a chance to migrate or partially diffuse

through dilution. Within this category, KCC would use Fee Fund money only when necessary to address those areas of contamination which exhibit immediate endangerment of water supplies. Where responsible parties are identified funding for cleanup will come from the responsible party. Complaints involving old contamination sources may or may not be relegated to a lesser priority after the initial investigation.

(2) Areas of pollution, recent and past, for which a responsible party exists. The Commission uses formal orders to companies to develop and implement plans. Orders contain a scope of required work to be done and include time frames for submittal of plans and target dates for implementation.

(3) Selected older contamination sites which have been investigated using fee fund money or in cooperation with KDHE and the aquifer at that location does not supply groundwater to wells and where alternative sources of water have been installed.

Monitoring and water sample collection for chloride analysis are considered a part of the Commission's routine district responsibility and those sites strictly under monitoring are not on the priority schedule unless the chloride concentration of the contamination sites have to be prioritized on their own level of seriousness because the less toxic nature of chlorides relegates the site to a lower priority than inorganics when standard rating systems such as DRASTIC are used.

PUBLIC OUTREACH

The Commission views a high level of communication with state water agencies, river basin advisory committees, landowner involved legislators, and members of the Water Authority as essential. Chloride contamination is difficult, expensive and time consuming to remove from aquifers. An open dialogue on the successes and failures of various cleanup projects allows all parties a better understanding of the problems and gradually builds a level of technical credibility which is an essential quality for state regulatory program effectiveness. To achieve communication, Commission staff:

(1) Attends River Basin Advisory Committee meetings and is available to provide updates upon KCC supervised contamination sites within the basin.

(2) Provides quarterly updates to ongoing projects to the Kansas Water Office and at KDHE/KCC management meetings.

(3) Provides legislators updates of progress on sites in their district.

REMEDIATION OF ABANDONED WELL SITES

Part of the Conservation Division's remediation program involves the plugging of abandoned oil, gas or service wells. These wells are generally abandoned through operators abdication of responsibility or through inability to fulfill statutory plugging requirements as a result of bankruptcy. The philosophy of KCC statutory authority under Chapter 55 is that any abandoned well is a potential source of salt water or oil pollution if left unattended or open. Such wells, in certain cases, may act as conduits for downward drainage of fresh and usable water and, consequently, cause a loss of water resources into an unreclaimable environment. The KCC routinely prioritizes the district office request for access to Conservation Fee Fund money to plug abandoned wells. Wells generally receive high priority attention because they are:

(1) Actively flowing salt water and/or oil.

(2) Located in sensitive environmental or resource areas such as sole source aquifers, confined aquifers with interformational flow potential, wetlands or close proximity to public water supplies (surface or groundwater).

(3) Located in densely populated areas.

(4) Subject of many landowner complaints.

The Conservation Division does not generally include abandoned wells as listed contamination sites unless the pollution seems to be related to the existence of wells rather than some other facility such as a pond which was present during the active life of the lease. On any contamination site where well locations appear to be a factor in the pollution or where the retention of abandoned wells on the site might eventually negate an otherwise successful remediation effort, the final resolution of the well's status will be included in the contamination site cleanup plan.

PROBLEMS OF REMEDIATING ABANDONED WELLS

(1) There will probably never be enough money in the KCC Conservation Fee Fund to plug all the known abandoned oil, gas or service wells. Generally speaking, the number of well abandonments increases when the oil economy slumps as it did in 1986 after a period of high ride for speculators. Fortunately, the highest number of past well abandonments has occurred in Southeast Kansas where there are less groundwater resources and the flow potential of a given well creates "localized" rather than "areal" pollution.

(2) In FY 1989, approximately $400,000 was spent on the actual plugging of abandoned wells. A routine fee fund plugging costs from $3500 to $5000 per well. When the well has to receive remedial work prior to plugging or the well has collapsed or has to be drilled out to a depth where an effective plug can be set, the costs can increase substantially to the $10,000 to $50,000 range. For example, the well plugged by KCC in the Neosho River in early 1989 cost over $25,000, and the Witt Sinkhole well in Russell County cost a total of $200,000 after two remediation efforts.

(3) The KCC does have statutory authority to seek reimbursement for plugging abandoned wells from past operators of the well or lease and to require new owners of a lease to plug existing abandoned wells. In many cases, the amount of expenditure to pursue legal means for the reimbursement to the KCC Conservation Fee Fund exceeds the cost of the plugging. The question of bonding operators or wells to assure financial resources for plugging the well is futuristic and generally not applicable to the universe of abandoned wells which were drilled and abandoned prior to bonding program if it were invoked.

ASSESSMENT OF PROGRAM IN FY 1991

The Conservation Fee Fund will continue to be utilized to plug abandoned wells using the prioritization criteria described above. The Commission will continue efforts to have active operators of large tracts enter into negotiated agreements whereby a monthly quota of abandoned wells are plugged until all such wells on the tract are plugged. This approach allowed operators who were not responsible for the abandonment to generate income from production which, in turn, is used to address the abandonment of previous generations of wells. As long as those wells which exhibit potential or actual threats to water or environmental resources are remediated and plugged in the first phase, Conservation Fee Fund expenditures can be directed towards abandoned wells where no operator responsibility is lacking.

In FY 1991, KCC anticipates spending up to $500,000 on the plugging of abandoned wells. As previously mentioned, Fee Fund expenditures diverted to investigation of contamination site investigations not associated with wells, <u>per</u> <u>se</u> leaves the KCC with less resources to address abandoned well problems.

In FY 1991, KCC district staff will be trying to develop an inventory of abandoned wells in each county. This project will probably take more than one year to complete particularly in Southeast Kansas where some abandoned leases have as many as four generations of wells. KCC Wichita Staff is currently developing a more comprehensive program to track the temporarily abandoned

(TA) wells. Newly promulgated regulations, which are expected to be effective in early 1990, will require formal approval of TA wells before they are allowed to remain in a non-producing state for a year. Prior to approval, the operator has to conduct a fluid level measurement on the well to demonstrate the groundwater resources will be protected. District staff may require a temporarily abandoned well to be tested for mechanical integrity and/or be plugged if a potentially polluting condition exists.

Those contamination sites shown in the Appendix which involve the plugging of abandoned wells are:

(1) West Blake - Montgomery County
(2) Fowler Project - Montgomery County
(3) Rantoul Area - Franklin County
(4) Eastman Lease - Montgomery County

All of these areas except (4) were listed in KDHE 1988 contamination site listing. Sites (1) and (2) above involve other remediation or cleanup activities in addition to the wells.

APPENDIX

Chloride Contamination Site Update

Solomon River Basin

1. <u>West Stockton/Solomon River 7-18W Rooks County</u>
   Entire area of watershed that impacts Stockton water well field has been investigated. Samples from all wells were taken and results plotted on map. The results of the study indicate the presence of a large amount of high quality alluvial water with a minute amount of slightly salty water. The alluvial aquifer is not at risk based on study. Final report should be available early in 1990.

2. <u>Richardson-Brummer (Southwest Stockton) SE 24-7-18W Rooks Co.</u>
   An active pumping program is continuing on this site. The Richardson well tested 1225 mg/l chloride on May 18, 1989 and 690 mg/l on October 3, 1989. Chlorides have been as high as 3,100 mg/l. The Brummer well tested 500 mg/l chloride on May 18, and 490 mg/l on October 3. The Liberty-Lawbanco withdrawal well tested 1100 mg/l chloride on May 18 and 680 mg/l on October 3. The remediation wells pump about 8 gallons per minute continuously. District staff will test pump new monitoring well located between the Liberty-Lawbanco well and the Richardson Well.

3. <u>Elton Byfield SE 19-7-17W Rooks Co.</u>
   Active well monitoring program. Chlorides in well have decreased over the past two years. This well tested 450 mg/l chloride on March 28, 1989 and 360 mg/l on October 3, 1989, after having been as high as 800 mg/l in mid 1988.

4. <u>Rogers S/2 18, N/2 19-7-17W Rooks Co.</u>
   Past remediation project. Well tested 275 mg/l chloride on January 1, 1989 and 240 mg/l on October 3, 1989. Recent spill by operator of 500 barrels of salt water into shallow alluvial channel may affect this well. Cleanup instructions have been given to operator. Area is under very close monitoring.

Verdigris River Basin

5. <u>Eastman S/2 NE and N/2 SE 12-35-16E Montgomery Co.</u>
   Completed plugging of 11 abandoned oil wells that had the casing cut off below ground. Oil is still bubbling up in the Verdigris River near site. Current investigation has not determined whether oil is from wells or from other source in area. Further investigation will be made using aerial photos, geonic survey and visual reconnaissance of river using small boat. Lines from adjoining leases will also be checked. Investigation will continue in 1990.

6. West Blake S/2 SE 28-33-14E Montgomery Co.
Remediation plan has been submitted to Director of Technical Services for review. Lease had been non productive since 1984 when operator (Wayside Production Company) services shut down by KCC. New operator is now pumping lease and has agreed to plug unproductive wells. Remediation to consist of soil restoration and revegetation of heavily saltwater scarred, slopping area. Remediation activities should begin in late 1989 and extend into 1990.

7. Fowler 19-32-14E Montgomery Co.
Remediation plan for entire site is being finalized. Large salt water kill area from past surface pond usage. Forty abandoned wells on site. Vegetation is starting to grow through old basic sediment around ponds. Report will be ready for review and approval in late 1989, early 1990.

8. Tate Creek SW 6-22-12E Greenwood Co.
Old spill area. Recommended to KDHE by letter dated May 19, 1989 that site be removed from list.

Upper Arkansas River Basin

9. Schraeder 2, 3, 11-24-24W Hodgeman Co.
Site report submitted to the Director of Technical Services for review. Additional investigation to be done in late 1989 - early 1990 to determine potency and direction of plume movement. Source of chlorides not pinpointed but known since 1972.

10. Shaffer Area 22-18-16W Rush Co.
Current sampling by district shows chlorides in 550 - 1,080 mg/l range. No production in area; officially transfered to KDHE by letter dated July 6, 1989.

11. West Hiss 36-20-14W Barton Co.
Groundwater cleanup project has been underway by Phillips Petroleum Co. for a year or more. Monitoring and remediation wells have been drilled. Monitoring wells are checked monthly for chlorides and fluid levels and are reported to the state monthly. Active project into 1990. Chloride sources were line leaks and have concentrations at 800 - 2000 mg/l. The ultimate cleanup program will be to pump four recovery wells on a schedule controlled by the water quality being produced.

12. Enoch Thompson NW 17-21-20W Pawnee Co.

On September 11, 1989 the KCC along with GMD #5 sampled several of the monitoring wells on this site. Chlorides in these wells ranged from 50 mg/l to 23,000 mg/l (near the source). On September 20, the unplugged rathole was drilled out and filled with cement by the Benson Mineral Group. At least two more monitoring wells will be drilled to help determine the width of the plume. If high chlorides are found in either well, additional wells will be drilled to define the plume as it crosses Section 17. Groundwater cleanup program in force and is operated by lease operator, BMG. Since program has started in October 1988, the 2,362,110 gallons of groundwater have been removed with an average chloride concentration of 2,500 mg/l.

Marais des Cygnes River Basin

13. Rantoul RWD #6 22-17-21E Franklin Co.

Plugging program is underway which will eventually plug 72 wells using the Fee Fund. Phase 1 involves plugging the 29 wells having the most serious potential for pollution. This site is in the middle of the former Franklin County RWD #6 well field and chloride concentration of 500 - 800 mg/l could be found when wells were pumped.

Lower Arkansas River Basin

14. EB3 Burrton Area 25-23-4W Reno Co.

By agreement with the Burrton Task Force this project has been deferred until spring 1990. Crude oil on groundwater.

15. Norman Schroeder SE 1-20-1W McPherson Co.

Monitor wells were drilled in cooperation with KDHE using their drill rig. A quarterly groundwater monitoring program is now in place. Chloride concentration of Schroeder well 1590 mg/l. No remediation or cleanup plan currently being worked on and will depend upon results of monitoring.

16. Knackstedt NW 30-20-5W McPherson Co.

Regular hauling of drilling mud and cuttings has been halted due to pending civil action. To date 15,000 cubic yards of materials have been deposited in the sink area. Hauling took place through September 1989. No current contamination of groundwater known to be taking place. Activity is to arrest cavity growth.

17. Brothers Lease S/2 NE 12-21-7W Rice Co.
Continued quarterly monitoring. Chlorides showing a slight downward trend except near the pit area. Current chloride concentrations range from 2250 mg/l at source to 430 mg/l near property boundary.

18. Sumner County, Junction of Arkansas and Ninnescah Rivers SW 25-31-2E
Oil was found flowing on the water from an island at the junction of the rivers after high flow on the Ninnescah carved a new channel. At this time staff does not believe oil from active source but rather from an old pit that has leached into a gravel section below island. Excavation work, if possible, might verify source, help determine the concentration and determined need or feasibility of remediation. Will ask the Corp of Engineers to provide bank stabilization work to stop further erosion of the island. This abandoned lease contained several wells and pits which were sited on the promontory of the river junction.

19. Larry Panning Sink SE 2-20-11W Barton Co.
Request by Mr. Panning to re-check area for growth or unusual activity. Bottom of pond area will be contour mapped and water quality checked for stratification. These will be carried out during October 1989. A plan for future work and analysis will depend upon findings of current investigation.

20. Maxedon 25-27-11W Pratt Co.
The remediation activities outlined in the KCC order are in progress and is being done by Texaco, the lease operator. Remediation of three salt scar areas have been completed, and a large scar area is being worked on now. An old well was discovered on the east side of the area. It appeared the cement had slipped on the top plug, although the integrity of the cement was good. The conductor pipe was visibly leaking and cement was squeezed to surface to conclude remedial action. Soil contamination will continue to be removed from the area. Work on other areas will continue through spring of 1990.

21. Hullman 7-27-12W Pratt Co.
Settlement has been reached between landowner and operator. Additional monitoring wells will be drilled in old spill area. This will be on a bi-annual monitoring program. Chloride levels in shallow groundwater have lowered to point where groundwater remediation is deemed unnecessary.

22. Coleman 36-32-11W Barber Co.
Settlement has been reached between landowner and company. Landowner intends to use settlement resources to treat soil scar areas over the next three years. Will monitor progress of remediation and lend technical assistance. KCC has an abandoned well on Coleman property set for bi-annual monitoring.

23. Macksville Sinkhole Project 30-23-15W Pawnee Co.
Three recovery wells are in place and operational at this time. As of October 4, 1989, Recovery Well #1 has pumped 30,194,500 gallons with a chloride of 2,300 mg/l. Recovery Well #2 has pumped 13,404,300 gallons with chlorides of 3,500 mg/l. Recovery Well #3 has pumped 2,202,400 gallons with chlorides of 1,600 mg/l. The pumping rates are 115 GPM, 90 GPM, and 100 GPM respectively. In the near future a withdrawal system for the water in the sink will be designed and completed.

Smoky Hill River Basin

24. Russell Rural Water District #1 (Ruby Blake) 34-14-14W Russell Co.
KDHE and KCC project with KDHE as the lead agency. Extensive investigation has been conducted in this area. Brine lines have been checked, all completion and plugging records have been used to map area, 13 monitoring wells have been drilled, a magnetic survey conducted and 2 plugged wells have been dug out and cement inspected for slippage. There are a series of water bodies that carry from 600 to 1500 mg/l chloride through the area. Evidence exists to suggest that the abandoned well location north of RRWD #2 well was used as a disposal well. Past leasekeeping activities may have accounted for these chloride concentrations. Further investigation including the completion of 2 additional monitoring wells, which KDHE as the lead agency, has to approve before this project move forward. Active progress expected during 1990.

Cimarron River Basin

25. Stanton Smith 8-34-43W Morton Co.
Two two-inch monitor wells were drilled by Henkle Drilling on August 14 and 15, 1989. The first well was drilled west of the Smith "B" SWD, the suspected source. Chloride in the well has measured at 37 mg/l on August 14 and 61 mg/l on August 28. Monitor well #2 was drilled approx.

half way between the original house well and the first replacement well east of the Smith "B" SWD. Chloride was expected to be fairly high in this well prior to drilling. However, the bed rock turned out to be about 25 feet higher than the surrounding wells. The chloride level in this well was 25 mg/l on August 15 and 21 mg/l on August 28. The chloride level in the Finn's present house well was still low at 13 mg/l on August 28. Awaiting another meeting with Anadarko to discuss further drilling and possible clean-up plan. Additional wells should reveal more about the extent and concentration of the plume. Chloride concentration of water from the original Smith house well and a replacement well were 2455 and 1609 mg/l respectively in early 1989. Depth of wells are approximately 200 feet.

Location of

Chloride Contamination Sites

by Basin