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Estimate of Water Quality in the Dakota Aquifer of Northwest Kansas Using Self Potential Readings of Downhole Geophysical Logs

by

Roger Boeken

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ESTIMATE OF WATER QUALITY IN THE DAKOTA AQUIFER OF NORTHWEST KANSAS USING SELF POTENTIAL READINGS OF DOWNHOLE GEOPHYSICAL LOGS

by

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M.S. in Environmental Health Science
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SPECIAL PROBLEM REPORT

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ABSTRACT

A countoured map of total dissolved solids was prepared using water resistivity values calculated from the self potential curve of geophysical logs for sands in the Dakota aquifer in northwest Kansas. Water resistivities were calculated using the self potential curve from wells that had actual water resistivity measurements or were near wells that had actual measurements. The calculated resistivities were plotted versus actual measured resistivities to develop an empirically derived Dakota Aquifer type curve. A polynomial equation was determined for the line of best fit for the empirically derived curve. Geophysical logs from 977 boreholes in 11 counties were used to estimate water resistivity for sand units in the Dakota aquifer of northwest Kansas. The polynomial equation was used to correct these values to yield better estimates of actual water resistivity. The corrected resistivity values were converted to specific conductivity and then to total dissolved solids using a previously established empirical relationship between specific conductivity and total dissolved solids for the Dakota Aquifer.

ACKNOWLEDGMENTS

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CHAPTER 1
INTRODUCTION

Dakota Aquifer in Kansas

The Dakota Aquifer as outcrop and in the subsurface covers roughly the western half of Kansas (Figure 1). The Dakota aquifer is composed of interbedded sandstones and shales that were deposited in river valleys, deltas, and nearshore marine environments (McFarlane et al., 1991). It is the second most geographically extensive aquifer system in Kansas after the High Plains aquifer (Ogallala and associated alluvial aquifers) (Mcfarlane et al., 1990). Presently the Dakota aquifer is used widely for irrigation, public water supplies and industry in southwest, south central and north central Kansas where the aquifer is relatively shallow (McFarlane et al., 1990). The Dakota aquifer in Kansas consists of the Dakota Formation, Kiowa Formation, and the Cheyenne Sandstone (Figure 2)(McFarlane et al., 1990). This project is primarily concerned with the Dakota Formation as it generally contains sands with better water quality than the Kiowa Formation and Cheyenne Sandstone.

Scope of Study

This project was coordinated with the Kansas Geological Survey Dakota aquifer program. The Dakota aquifer program is an eight year study which began in 1989 (figure 3). The program goals are to provide a better understanding of the Dakota aquifer's geologic framework, hydrogeology, and hydrogeochemistry. This information can be used to help state water planning and regulatory agencies

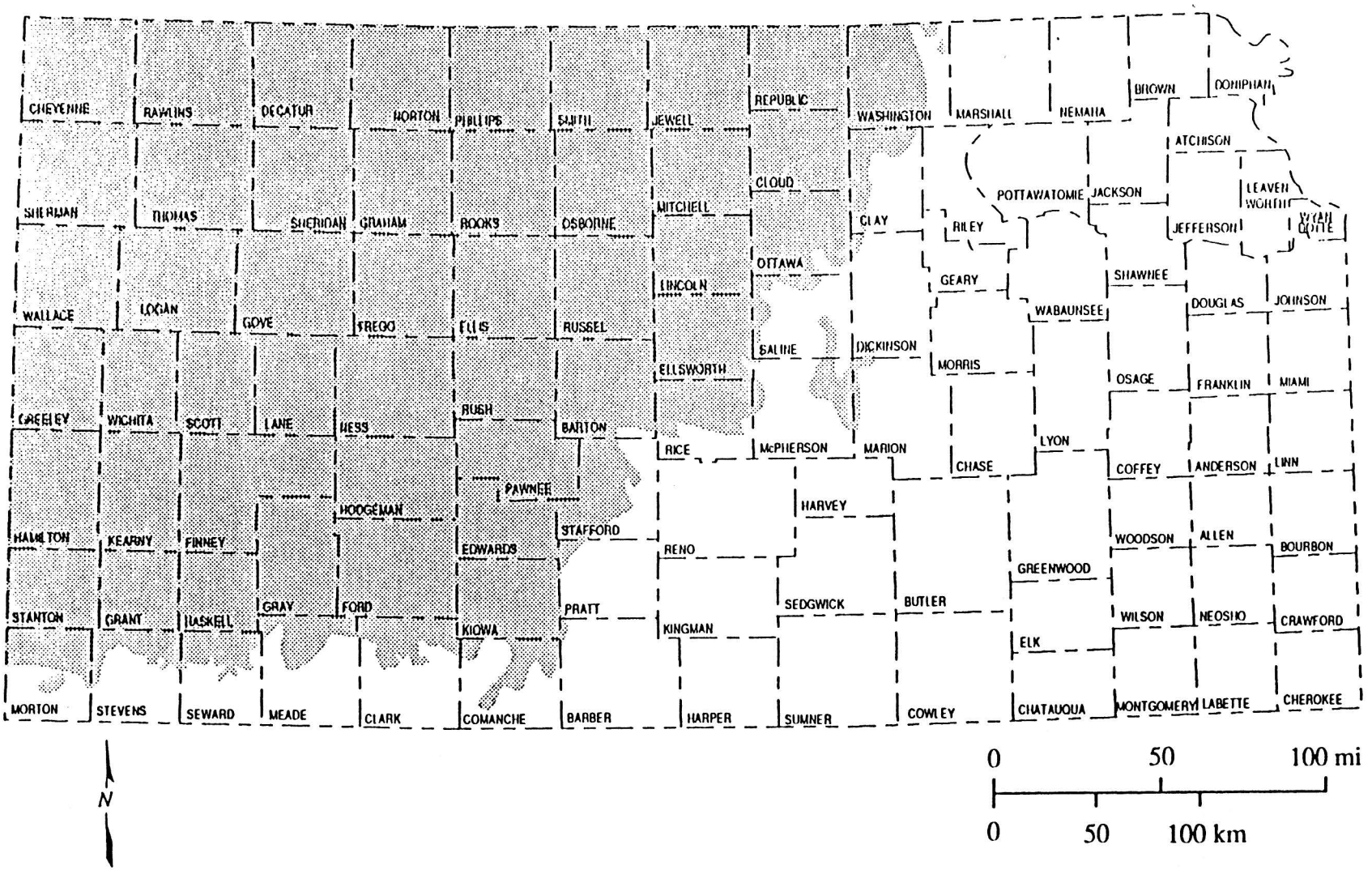


Figure 1. Extent of the Dakota aquifer in Kansas.

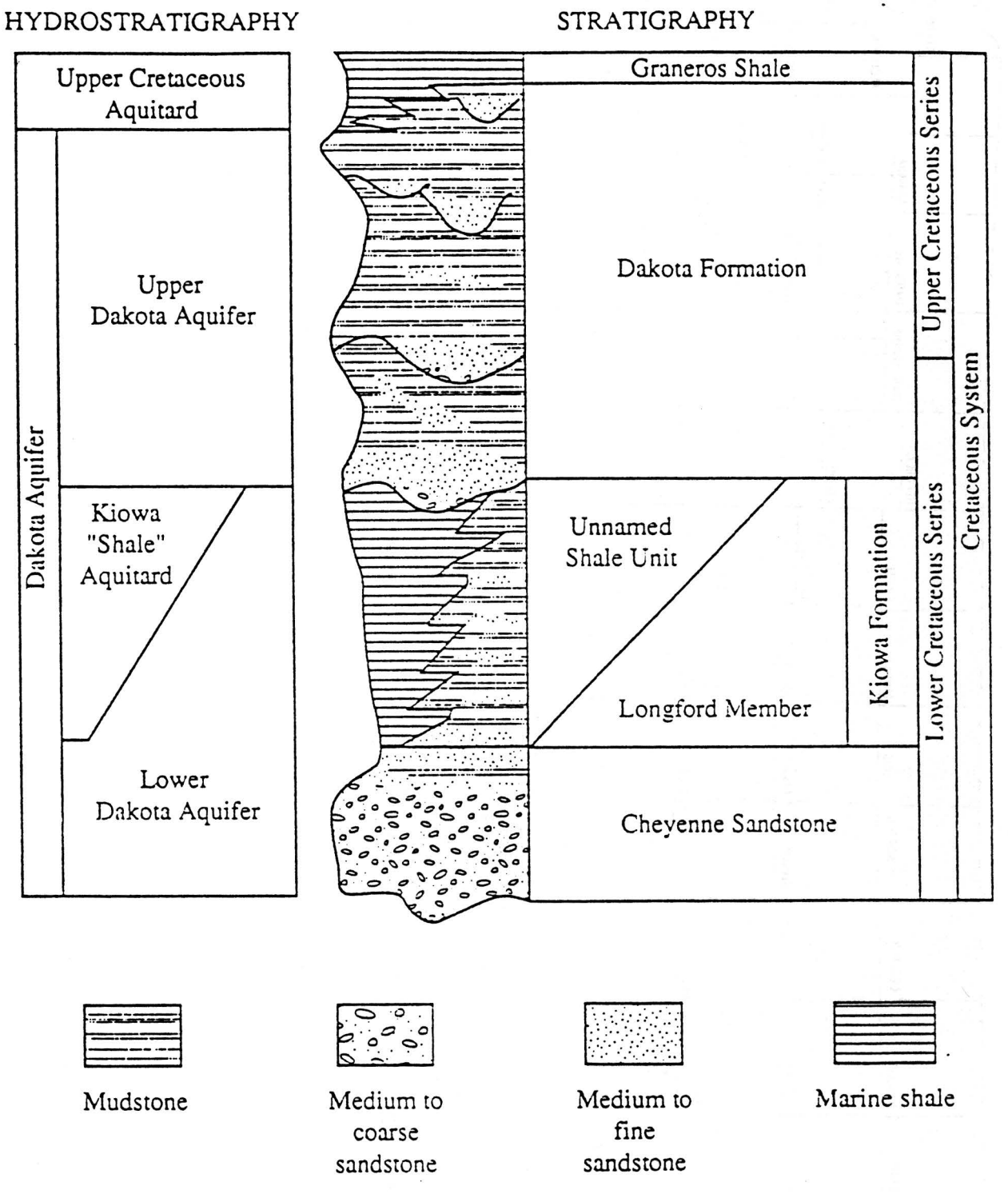


Figure 2. Stratigraphic and hydrostratigraphic classification of units that compose the Dakota aquifer in Kansas.

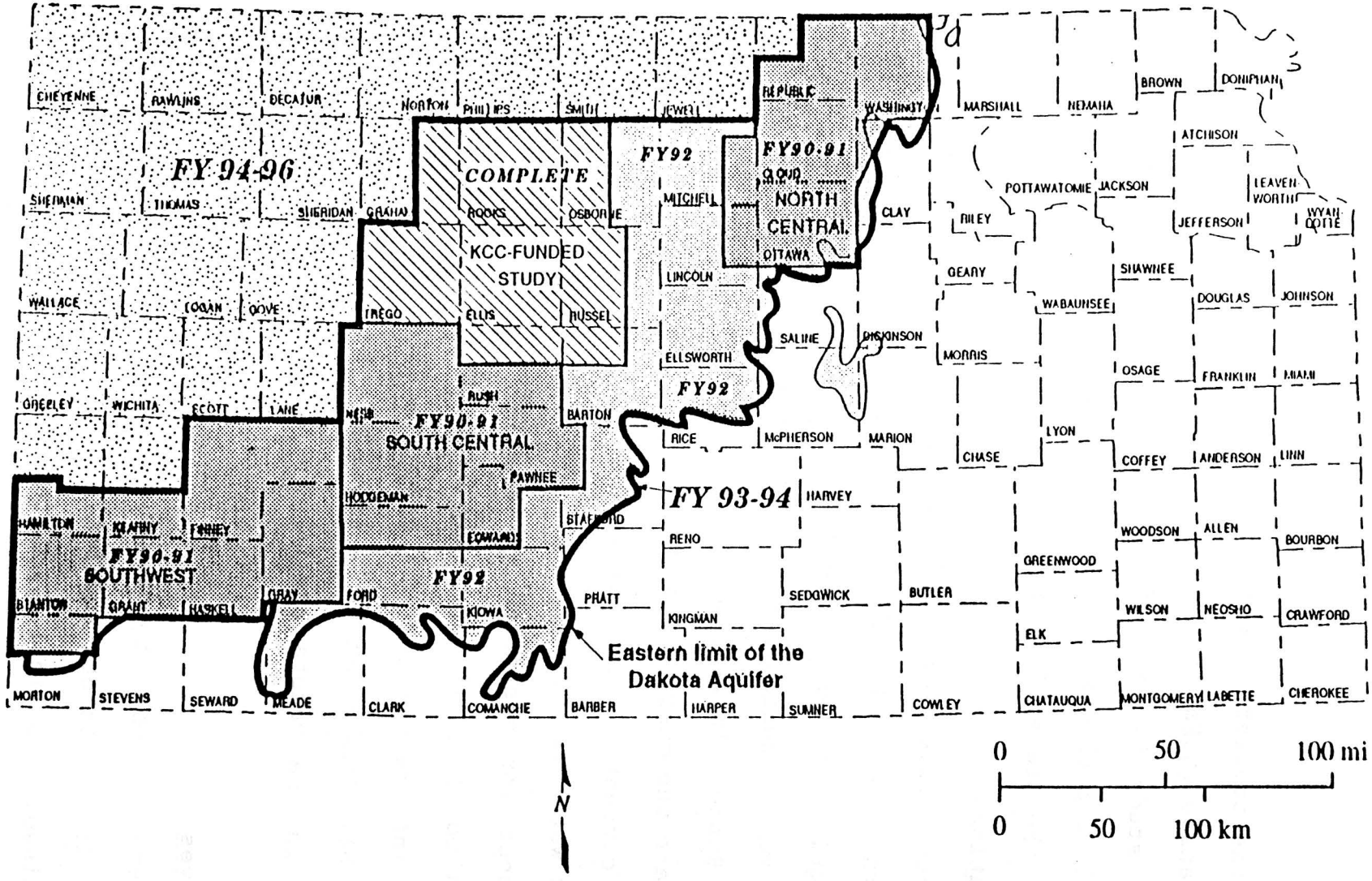


Figure 3. Subareas of investigation in the Dakota aquifer program.

evaluate the aquifer as a future source of water for central and western Kansas (McFarlane et al., 1989).

This study is part of years 6,7,and 8 of the project and covers all or portions of eleven counties located in the northwest corner of the state (figure 4).

Justification

In the near future, localized depletion of the High Plains aquifer in western areas of Kansas and depletion of water supplies in the stream aquifer system in the central part of the state may cause critical water shortages (McFarlane et al., 1990). The cities of Hays and Russell in west central Kansas have already drilled wells to evaluate the quality and quantity of Dakota waters. The city of Hays is currently using its Dakota well field for municipal and domestic water supplies.

Except for scattered wells located along the eastern and southern portions of the study area there is no existing water quality information for the Dakota aquifer in northwest Kansas (figure 5). This study will provide a better estimate of water quality in the Dakota aquifer in the northwestern part of the State.

Objectives

There were four main objectives of the study: 1) to estimate water quality in the Dakota aquifer of northwest Kansas by estimating total dissolved solids; 2) to combine this data with existing maps to produce updated and more accurate water quality maps; 3) to determine where the Dakota aquifer contains fresh water (<1,000

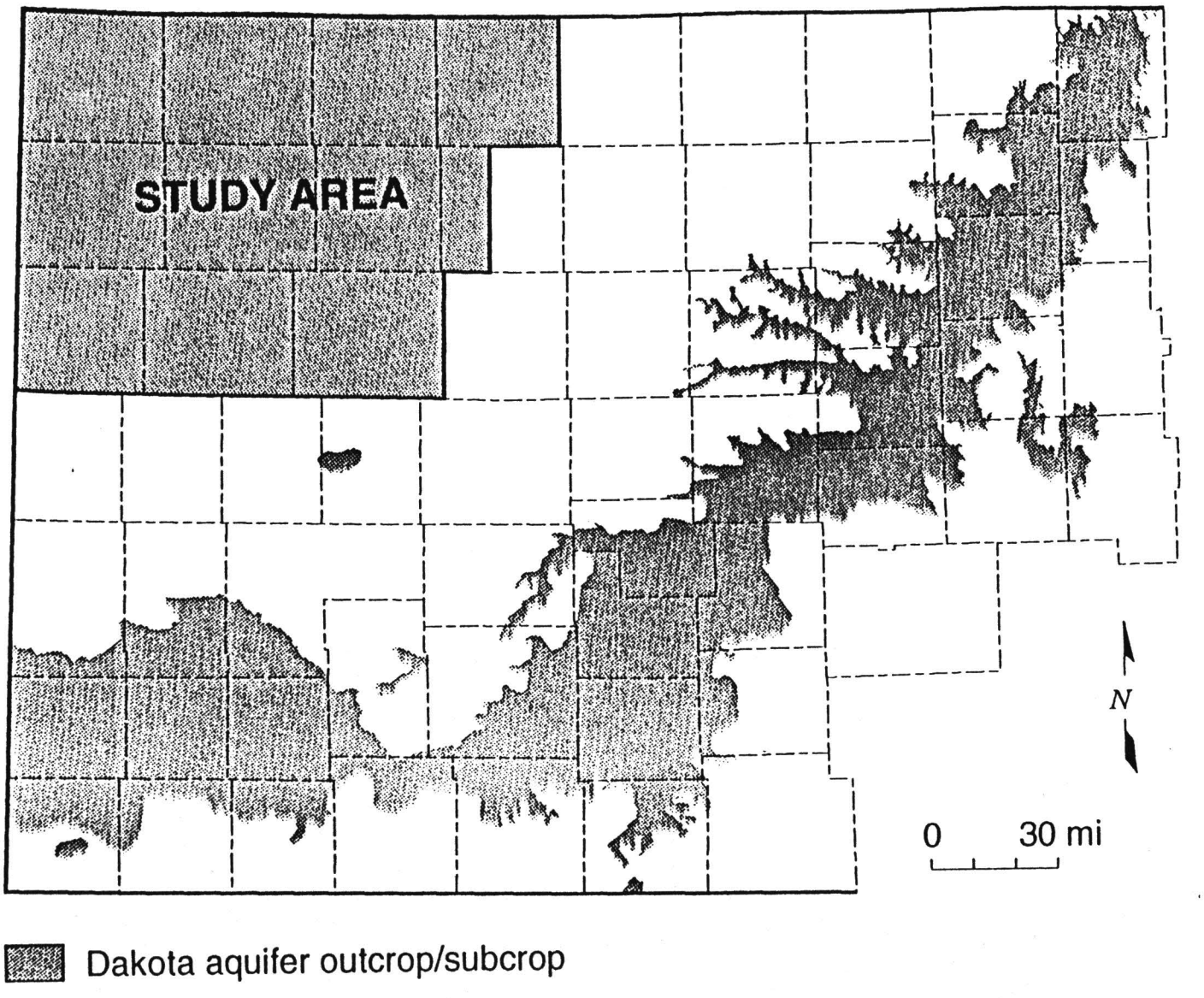


Figure 4. Study Area

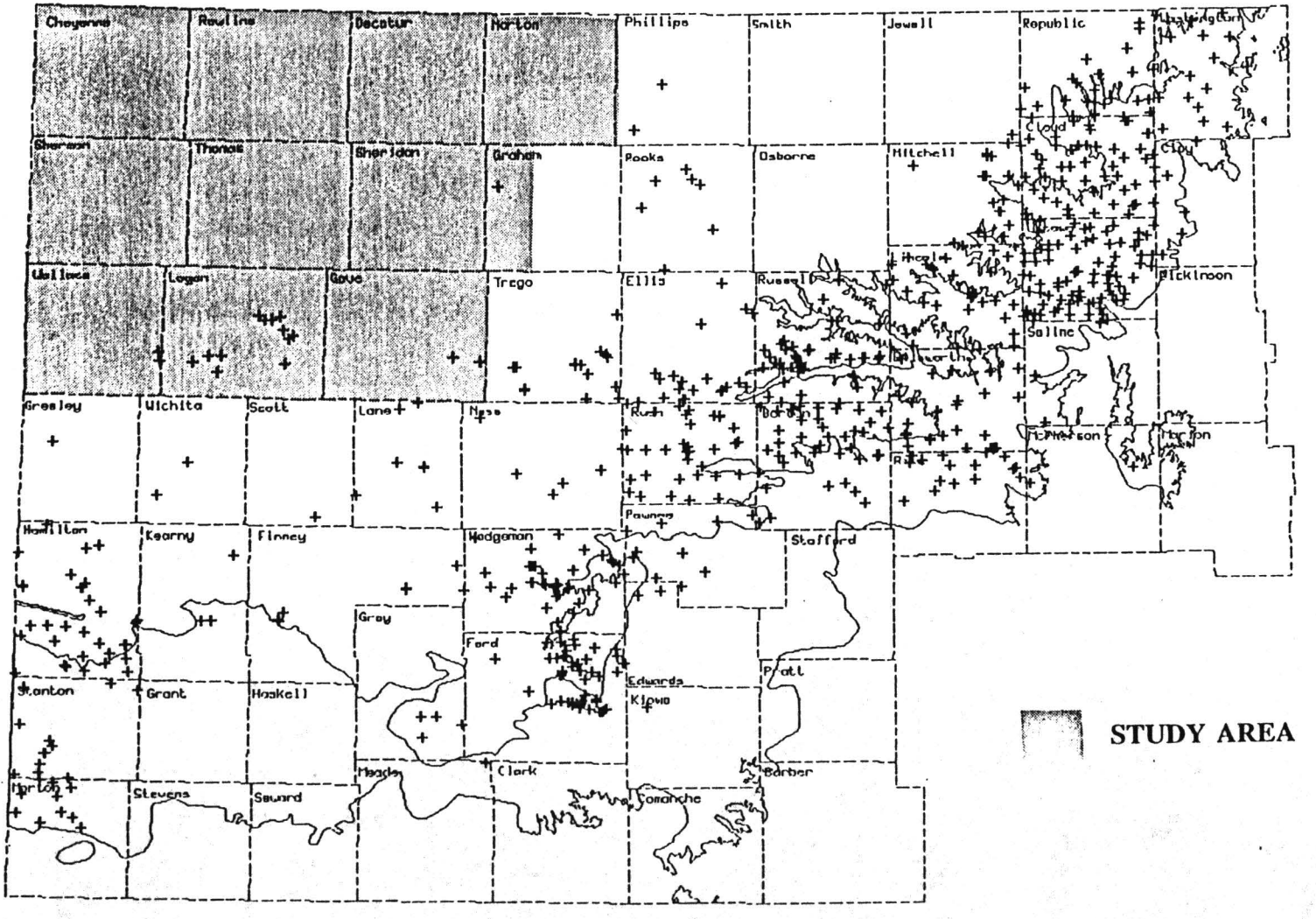


Figure 5. Existing Dakota Water Quality Database

contains fresh water (<1,000 mg/l TDS) and areas where the Dakota waters must be protected per requirements of the Kansas Corporation Commission (<10,000 mg/l TDS); and 4) to provide data to the Dakota aquifer program which can be combined with geological studies and other studies to determine the best potential areas for further investigation with regard to water quality and quantity.

Approach to Study

The methodology used to determine the estimated total dissolved solids of Dakota aquifer waters was as follows:

1) Plot measured Dakota water resistivities versus calculated equivalent water resistivities obtained from the SP curve on geophysical logs from the same or nearby well(s).

2) Determine the empirical relationship between measured resistivities and equivalent water resistivities.

3) Estimate equivalent water resistivities using the SP curve on available geophysical logs in northwestern Kansas.

4) Correct equivalent water resistivities using the polynomial equation obtained from the empirical relationship.

5) Calculate estimated total dissolved solids using an established empirical relationship between specific conductivity and total dissolved solids for the Dakota aquifer.

CHAPTER 2

THEORETICAL CONSIDERATIONS

The SP Curve

The SP curve is a recording versus depth of the potential difference between a moveable electrode in the borehole and a fixed surface electrode measured in millivolts (Figure 6). This battery is created by salinity (resistivity) contrasts between formation waters and the mud used in drilling operations. The Drilling process juxtaposes two solutions, the mud filtrate and formation water, with different ion concentrations. The difference in ion concentrations causes ions to diffuse from the more concentrated solution to the more dilute solution. This ion flow has an associated potential measured in millivolts.

The deflection of the SP recording corresponds to the potential differences created in the mud by the SP currents and make it possible to characterize formations (Franks, 1986). The main uses of the SP are to delineate porous and permeable beds and to determine formation water resistivity.

Origin of the SP

The cumulative potential is generated by electromotive forces (emf) generally of electrochemical and electrokinetic origins. The electrochemical components are the membrane potential and the liquid-junction potential.

Figure 7 shows a permeable sand invaded by mud filtrate and sandwiched between two thick shale beds. The membrane potential occurs at the contact between the drilling fluids in the pores of

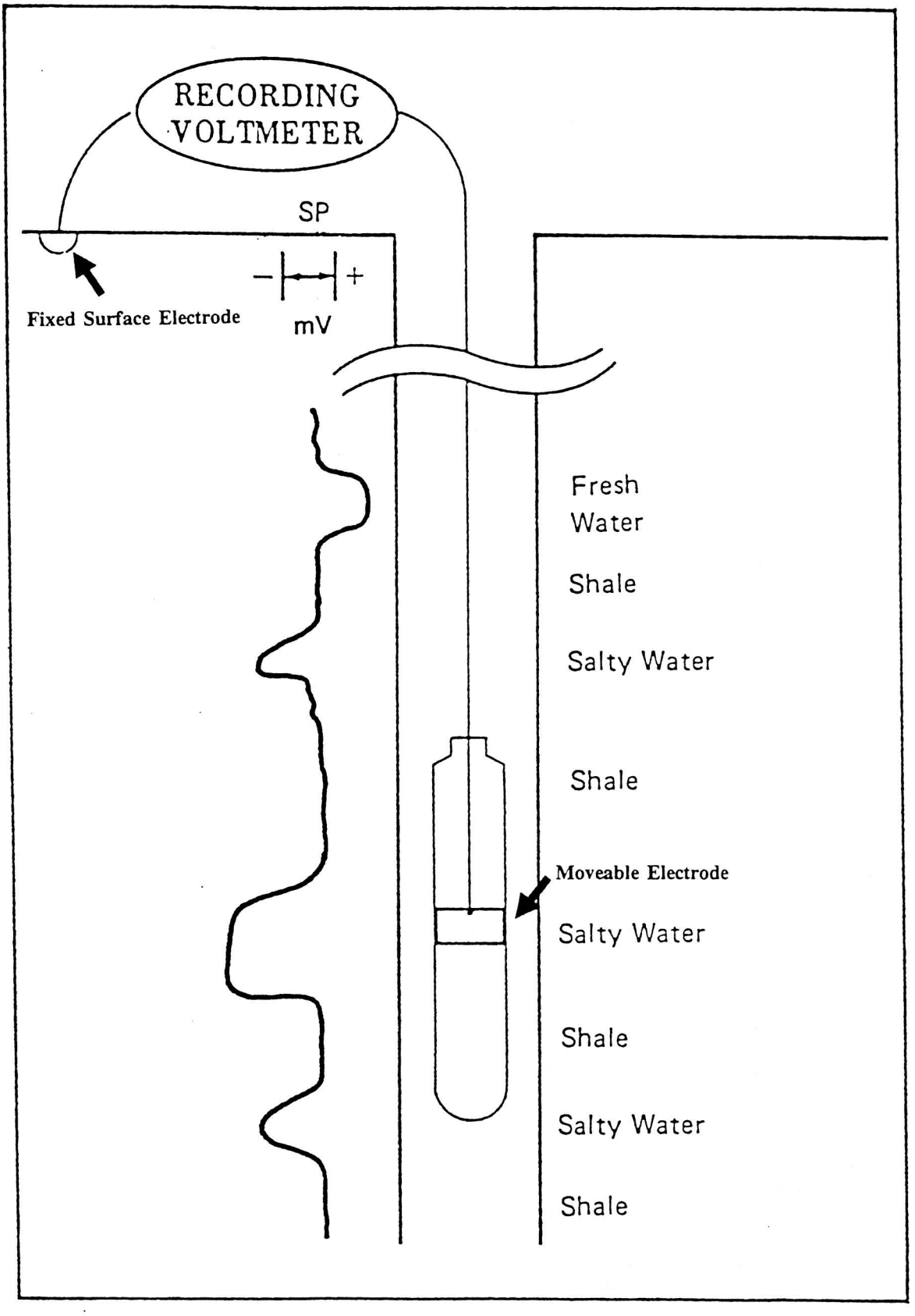
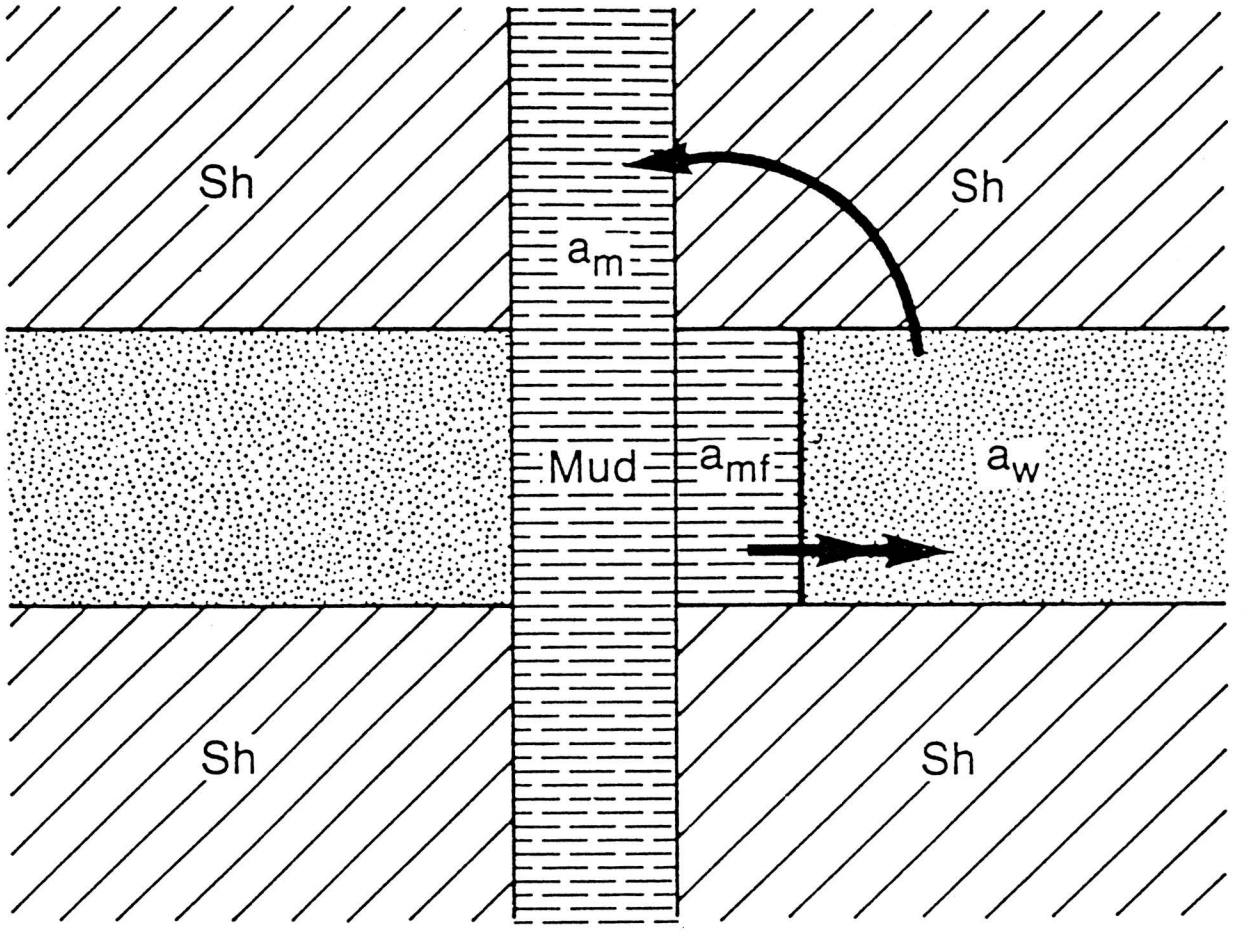


Figure 6. General Illustration of SP Log

(After Dresser Atlas Publications)



→ Membrane Pot.

→→ Liq. Junct. Pot.

a_w = activity of formation water

a_{mf} = activity of mud filtrate

a_m = activity of mud

Assuming Formation Water More Saline Than Mud Filtrate

Figure 7. Membrane and Liquid Junction Potentials

(After Schlumberger Publications)

a permeable bed and the adjacent shales. Because of the layered clay structure and the charges on the layers, shales are ion selective and permeable to the Na^+ cations but impervious to the Cl^- anions. Only the Na^+ cations are able to move through the shale from the more concentrated to the less concentrated NaCl solution (Schlumberger, 1987).

The liquid-junction potential occurs at the edge of the invaded zone, where the mud filtrate and formation water are in direct contact. Na^+ and Cl^- are free to diffuse from the more concentrated solution to the less concentrated. Chloride ions are more mobile and the net result of this ion diffusion is flow of Cl^- ions from the more concentrated solution to the less concentrated solution. This is equivalent to a conventional current flow in the opposite direction (Schlumberger, 1987). The arrows in Figure 7 show the direction of the current flow assuming the formation water is more saline than the mud filtrate.

Figure 8 is a general illustration of currents associated with the membrane and liquid junction potentials. The resultant deflection of the SP curve is also shown. This drawing assumes the formation water is more saline than the mud filtrate.

The electrokinetic potential is usually small, and regarded as negligible (Schlumberger, 1987).

Factors Affecting the SP Curve

1) Bed Thickness - beds under 10' thick may not reach the SSP because of shale influence and readings have to be corrected. These corrections are made utilizing charts supplied by

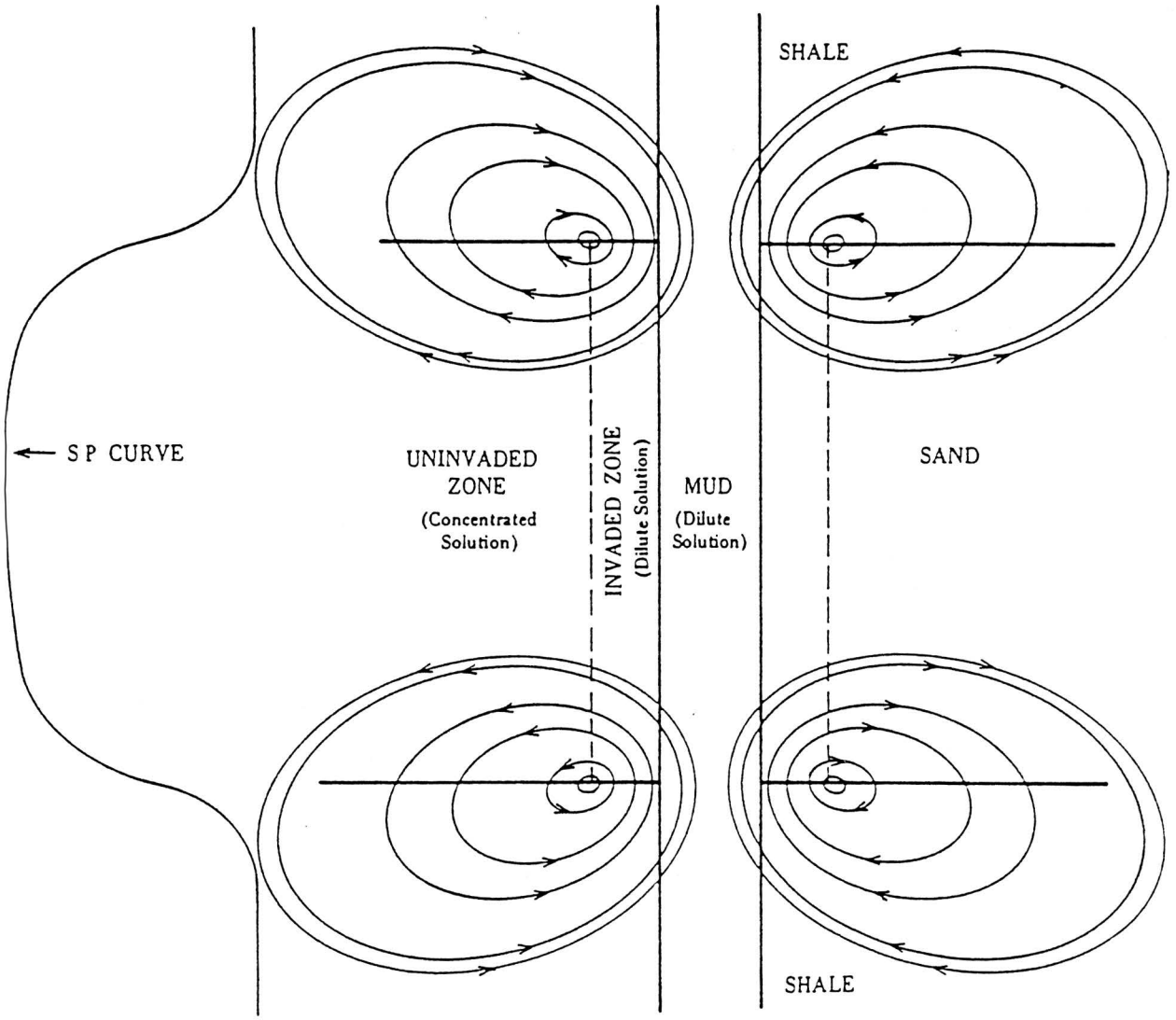


Figure 8. SP Current Distribution

(After Dresser Atlas Publications)

professional logging companies.

2) Bed resistivity - high resistivities reduce the SP reading.

3) Mud invasion profile - deep invasion reduces the SP reading.

4) Borehole diameter - large borehole diameters reduce the SP reading.

5) Shale Content - shale content reduces the SP reading.

6) *Rmf/Rw* ratio - greater the ratio = greater SP deflection.

Calculating formation water resistivity from SP readings works better in sand/shale sequences with thick clean sands as they typically have higher porosities and permeabilities, lower resistivities and limited invasion profiles.

Deflection of the SP Curve

Usually the SP recording includes a shale baseline which is more or less straight and has deflections to the left or right adjacent to permeable beds. The SP tends to reach an essentially constant deflection opposite clean, porous, and permeable beds and this is known as the sand line (Figure 9). Also shown in Figure 9 are three resistivity curves to the right of the SP curve. Different resistivity measurements are usually presented along with the SP recording. These measurements are a function of the formation water and/or drilling fluid and the porosity of the adjacent rock. The difference between the shale line and the sand line is the maximum potential which can exist and is known as the static SP or the SSP. The SSP is the total sum of all the electrochemical forces.

In sand/shale sequences with thick clean porous sands the magnitude and direction of the SP Curve is a function of the

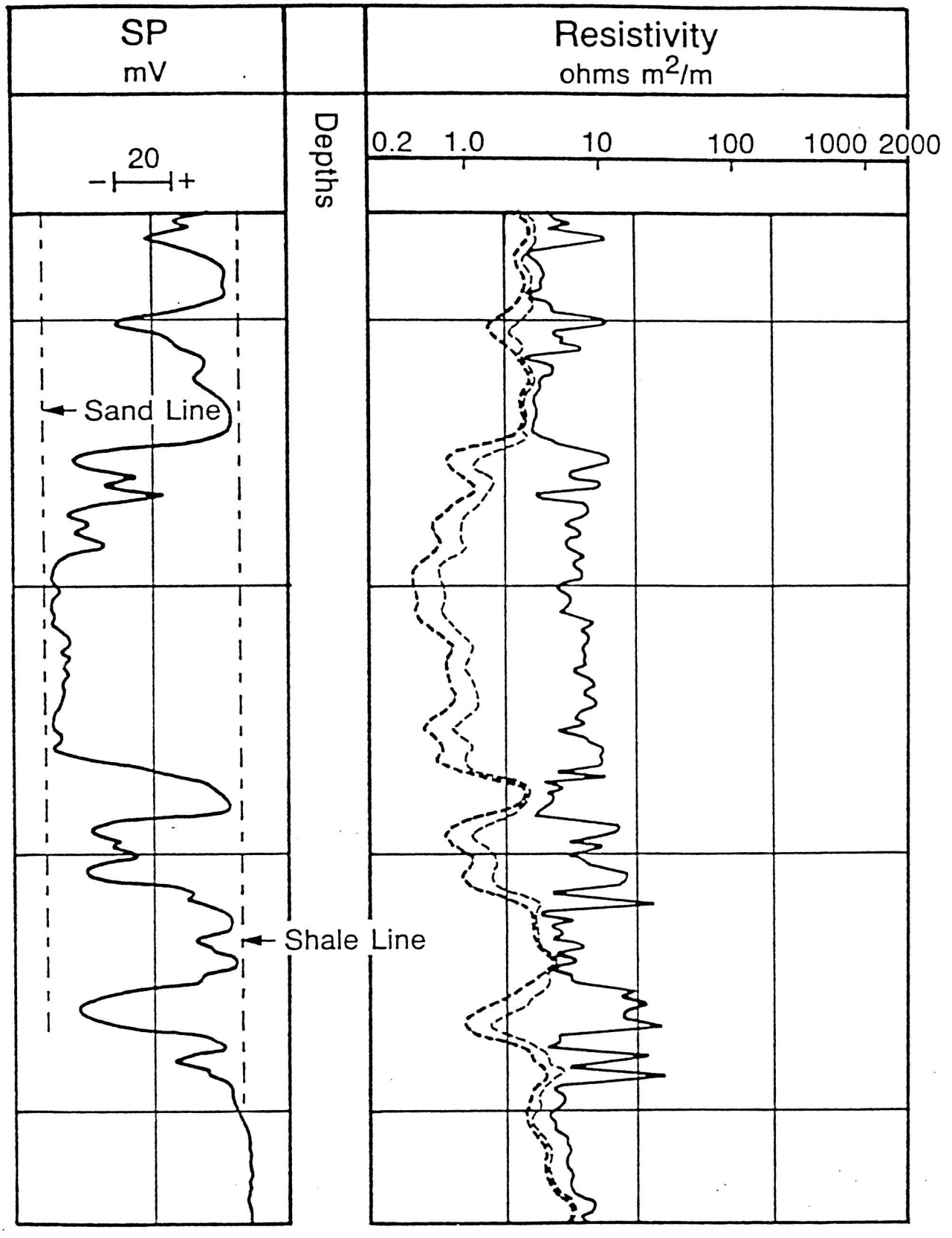


Figure 9. Example of Sand and Shale Lines in a Sand-Shale Sequence
(After Schlumberger Publications)

salinity contrast between the mud filtrate and formation water. Since salinity and resistivity are inversely related the SP is also a function of the resistivity contrast between the mud filtrate (*Rmf*) and the formation water (*Rw*) (Figure 10). The direction of the deflection follows these relationships:

Rmf > *Rw*: negative deflection, formation water more saline.

Rmf < *Rw*: positive deflection, filtrate water more saline.

Rmf = *Rw*: no deflection, equal salinities.

Figure 11 is a summary of the SP log.

Mathematical Relationships

Based on laboratory tests and theoretical considerations published in numerous documents the total electrochemical emf, E_c, corresponding to the membrane potential plus the liquid junction potential, is represented by:

$$E_c = - K \log a_w/a_{mf}$$

with a_w and a_{mf} being the activities at formation temperature of the formation water and mud filtrate respectively. K is a coefficient proportional to the absolute temperature. For NaCl solutions, K = 60 + (.133 x formation temp in °F) (Schlumberger, 1987). For NaCl solutions that are not extremely concentrated and do not contain other salts in appreciable amounts, formation water resistivities are inversely proportional to activities (Schlumberger, 1987); and since E_c = SSP the equation becomes:

$$SSP = - K \log Rmf/Rw$$

For very salty formation waters where *Rw* < .1 ohm-m at 75° (>60,000 mg/l TDS for the Dakota) and for fresher waters where Rw

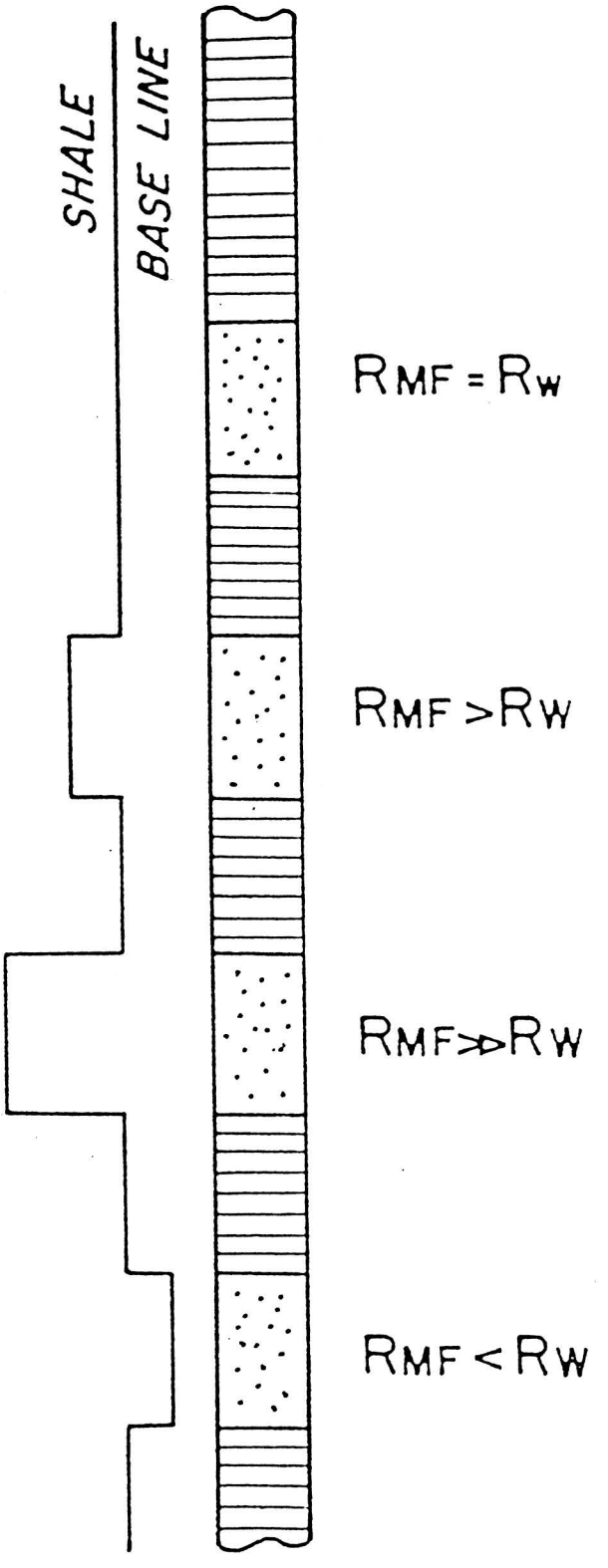


Figure 10. Examples of SP Deflection

(After Asquith)

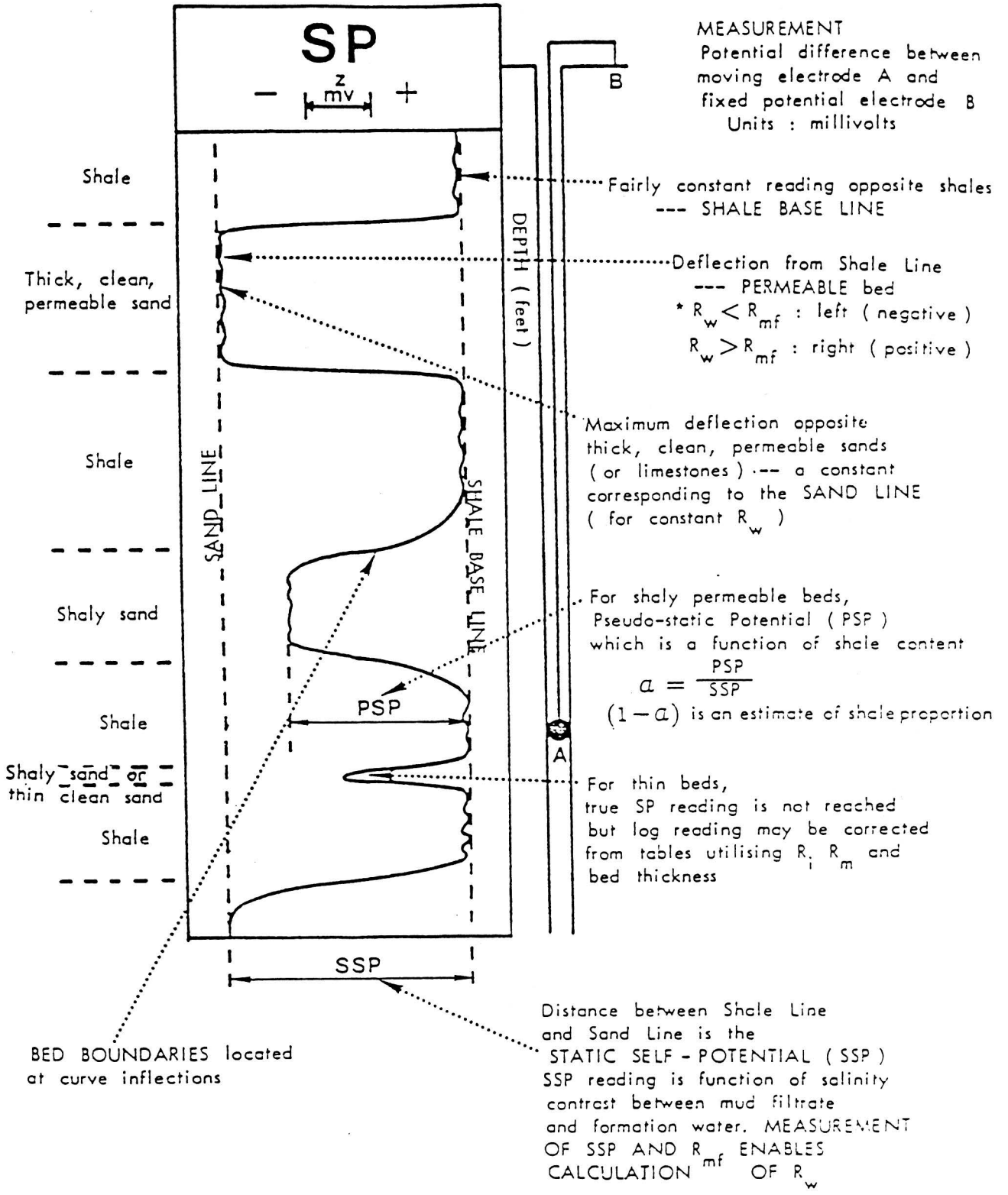


Figure 11. Summary of SP Curve (After Doveton)

> .3 ohm-m at 75° (<20,000 mg/l TDS for the Dakota) the inverse proportion does not hold exactly and values of *K* may differ from calculated values (Schlumberger, 1987). Highly saline waters are typically encountered when drilling for oil and gas and widely accepted corrections to *Rw* calculations have been extensively published. Corrections for fresh waters have not been the focus of as much research and there are no accepted correction formulas.

Fresher waters have significant amounts of Ca^{+2} and Mg^{+2} cations and the SSP value is then represented mathematically as:

$$SSP = - K \log (a_{Na} + (a_{Ca} + a_{Mg})^{1/2})_w / (a_{Na} + (a_{Ca} + a_{Mg})^{1/2})_{mf}$$

where a_{Na}, a_{Ca}, and a_{Mg} are the ionic activities of Na, Ca, and Mg in the formation water and the mud filtrate (Schlumberger, 1987). The effect of Ca^{+2} and Mg^{+2} on the SP is to lower the deflection (Schlumberger, 1987). This effect makes the calculation of the formation water resistivity lower than the actual resistivity (water will appear to be more saline than it actually is). Since the inverse relationship between activities and resistivities is not exact in this instance equivalent resistivities *Rwe* and *Rmfe* are used and the equation becomes:

$$SSP = - K \log Rmfe/Rwe$$

Equivalent resistivities are calculated resistivities assuming the water is a NaCl solution. This is the important deviation point that must be accounted for in evaluating fresh water zones.

Calculating Equivalent Water Resistivity (Rwe)

From the above equation it can be seen that if the SSP, *K*, and *Rmfe* values are known, *Rwe* can be determined. The values needed can be obtained or calculated from information on the log heading and in the case of the SSP, directly from the log presentation. *Rmfe* values are determined using established empirical relationships (Schlumberger, 1987). The following steps are used to determine *Rwe*:

Retrieve from log:

1) Rmf and temperature measured
2) Formation depth
3) SSP reading from log track corrected for bed thickness if necessary

Procedure:

1) Calculate formation temperature
2) Correct *Rmf* to *Rmf* at 75°F
3) Correct *Rmf* at 75°F to Rmfe at 75°F
4) Calculate *K* value at formation temperature
5) Calculate *Rmfe/Rwe* ratio
6) Calculate *Rwe* at 75°F
7) Calculate Rwe at 77°F

The standard temperature of 75°F is used in the oil and gas industry for which log interpretation methods are primarily focused. The correction to 77°F is made to correspond with the standard temperature used in the water industry.

Calculating Actual Water Resistivity (Rw)

Volumes have been written on obtaining *Rw* from *Rwe* in saline waters as these are typically encountered while drilling for oil and gas. In fresh water zones it is critical to establish empirical relationships between *Rwe* and actual *Rw* values in order to make better estimations of water quality. The main objective of this paper is to determine this empirical relationship for the Dakota aquifer using a limited number of observations and to use this relationship to correct *Rwe* values to obtain better estimates of actual water resistivities.

CHAPTER 3

PREVIOUS STUDIES & RELATED RESEARCH

In 1956 Gondouin et al. studied the influence of other salts on SP logs to explain why abnormal readings were observed in fresh water and highly saline zones. They investigated the influence of HCO_3^-, SO_4^{-2}, Ca^{+2}, and Mg^{+2} on the magnitude of the SP deflection. It was determined that the effect of HCO_3^- and SO_4^{-2} on the activity of Na^+ was negligible when Na^+ was the predominant cation. Ca^{+2} and Mg^{+2} cations were found to have a relatively large influence on the SP.

An empirical relationship between *Rwe* calculated from SP logs and actual formation water resistivities (*Rw*) was established for a combination of fresh waters in Venezuela, Nebraska, Colorado, and California. Field studies confirmed that empirically corrected *Rw* values calculated from the SP were generally within 10% of actual *Rw* readings from produced waters. Gondouin et al. recommended that for low salinity waters local plots of *Rwe* versus *Rw* be used to gain greater accuracy in determining water quality from the SP.

Alger in 1966 used empirical methods to show that good results could be obtained in estimating total dissolved solids and chloride concentrations in fresh water using the SP. Alger developed an empirical relationship for *Rwe* values calculated from the SP and actual fresh water resistivities for four Texas gulf coast aquifers. Alger also stated that relative ion assemblages are reasonably predictable on a local basis and this allows empirical studies to determine estimated total dissolved solids and chloride concentrations from computed values of *Rw*.

McConnell in 1983 used the SP to compute the thickness and distribution of groundwater with total dissolved solids of less than 1000 mg/l (ppm) in the Garber Sandstone and Oscar Group in Carter County, Oklahoma. McConnel states that when Ca^{+2} and Mg^{+2} are present an empirical relationship between *Rwe* and *Rw* must be developed for that particular local water chemistry and used as a correction factor.

Schlumberger (1987) states that in fresh water formations salts other than NaCl may become important. In these cases, the *Rwe-Rw* relationship may be quite different from that for NaCl dominated waters and empirical *Rwe-Rw* charts should be developed. Figure 12 is a Schlumberger graph showing theoretical *Rwe-Rw* curves at 77°F for solutions of several different salts and the area where plots for average fresh waters would be.

A paper with no stated author or year of publication was supplied to the author by P.A. McFarlane. From references cited it is estimated the date of publication was in the early 1960's. The publication estimated the salinity of groundwater in the Cheyenne Formation of Northwestern Kansas. The author used both the resistivity ratio method and the SP method to calculate formation water resistivity. The only use the author made of the SP derived resistivities was to compare them with resistivities derived from long and short normal resistivity curves.

The author created an empirical correction curve for the Cheyenne by plotting measured resistivities of Dakota waters from 15 wells in Nebraska and Colorado versus resistivities calculated

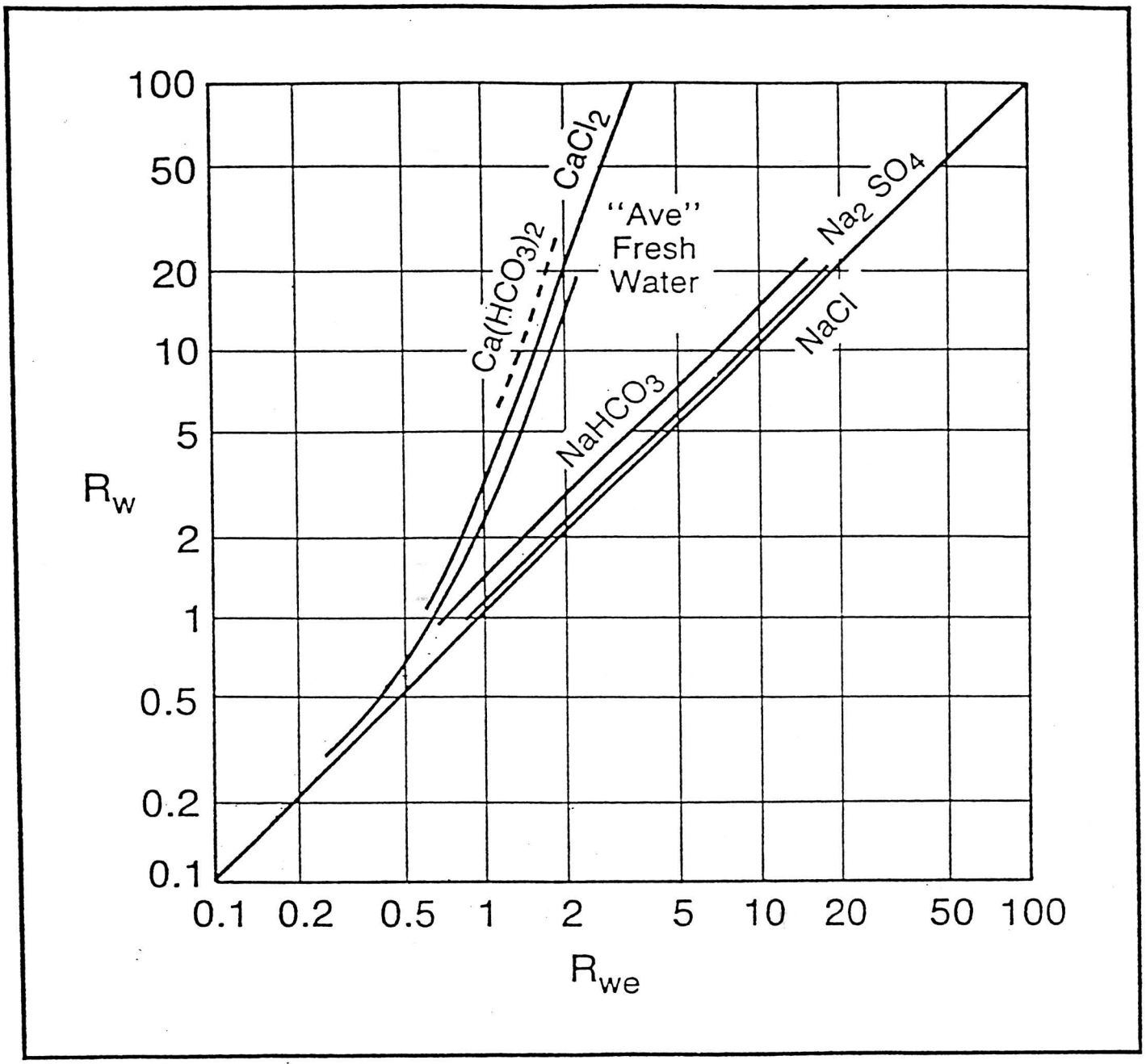


Figure 12. R_w vs. R_{we} for Solutions of Different Salts

from long and short normal curves using the ratio method. (For explantion of the ratio method using long and short normal curves see Franks, 1986). The Dakota was used instead of actual Cheyenne water as no analyses of Cheyenne waters were available. Maps showing estimated salinities in the Cheyenne formation in western Kansas were generated using only the resistivity derived resistivities converted to salinities using charts published by Schlumberger.

The significance of this paper is that it was an early attempt to determine water quality from logs in western Kansas using Dakota aquifer water analyses.

The best and most recent estimates of water quality in the Dakota aquifer in northwest Kansas are presented in maps prepared by Dr. Don Whittemore of the Kansas Geological Survey. Figure 13 is a total dissolved solids map prepared by Dr. Whittemore prior to this study. Water quality in most of the study area was estimated using maps prepared by the United States Geological Survey and limited available water analyses.

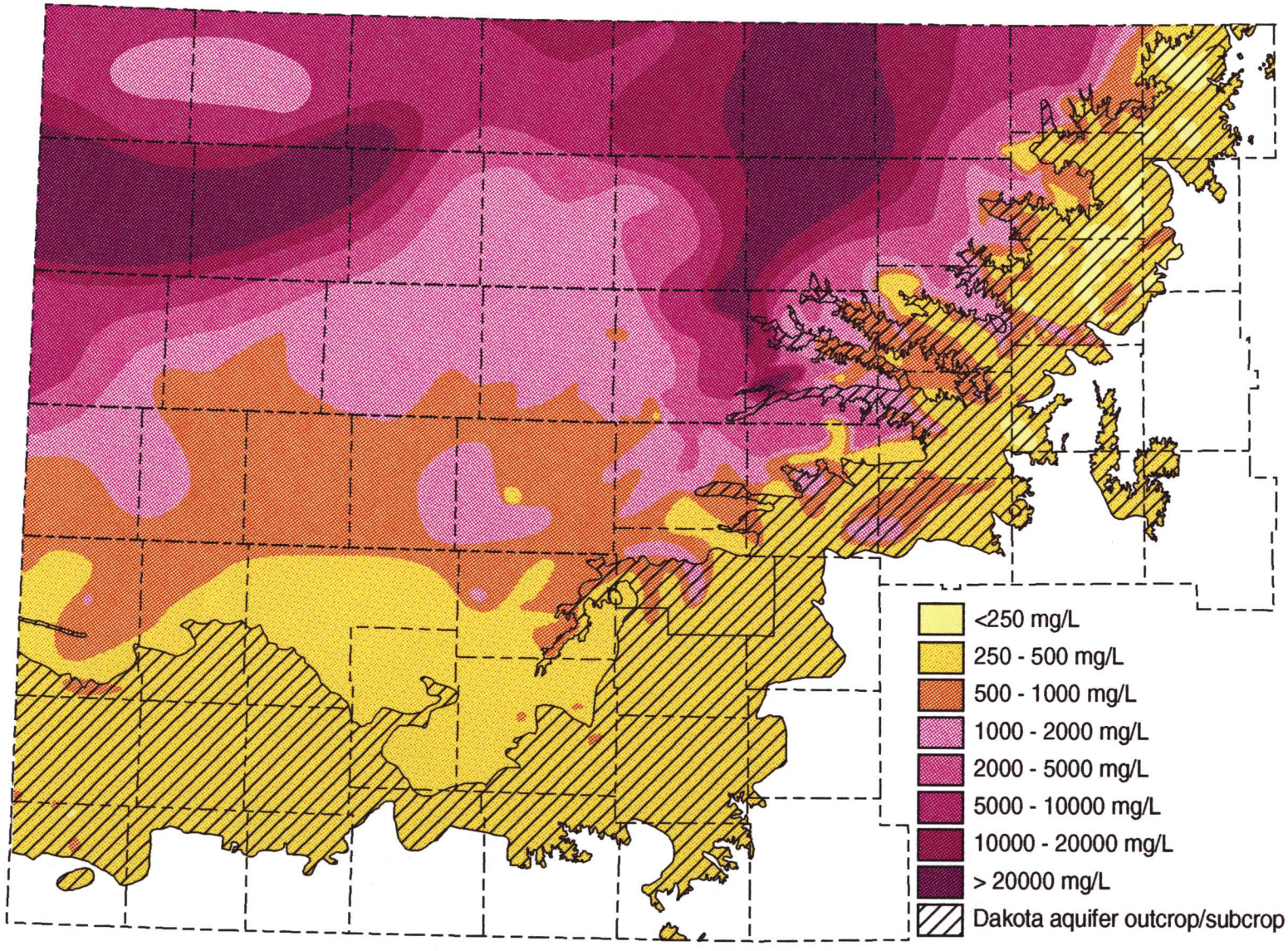


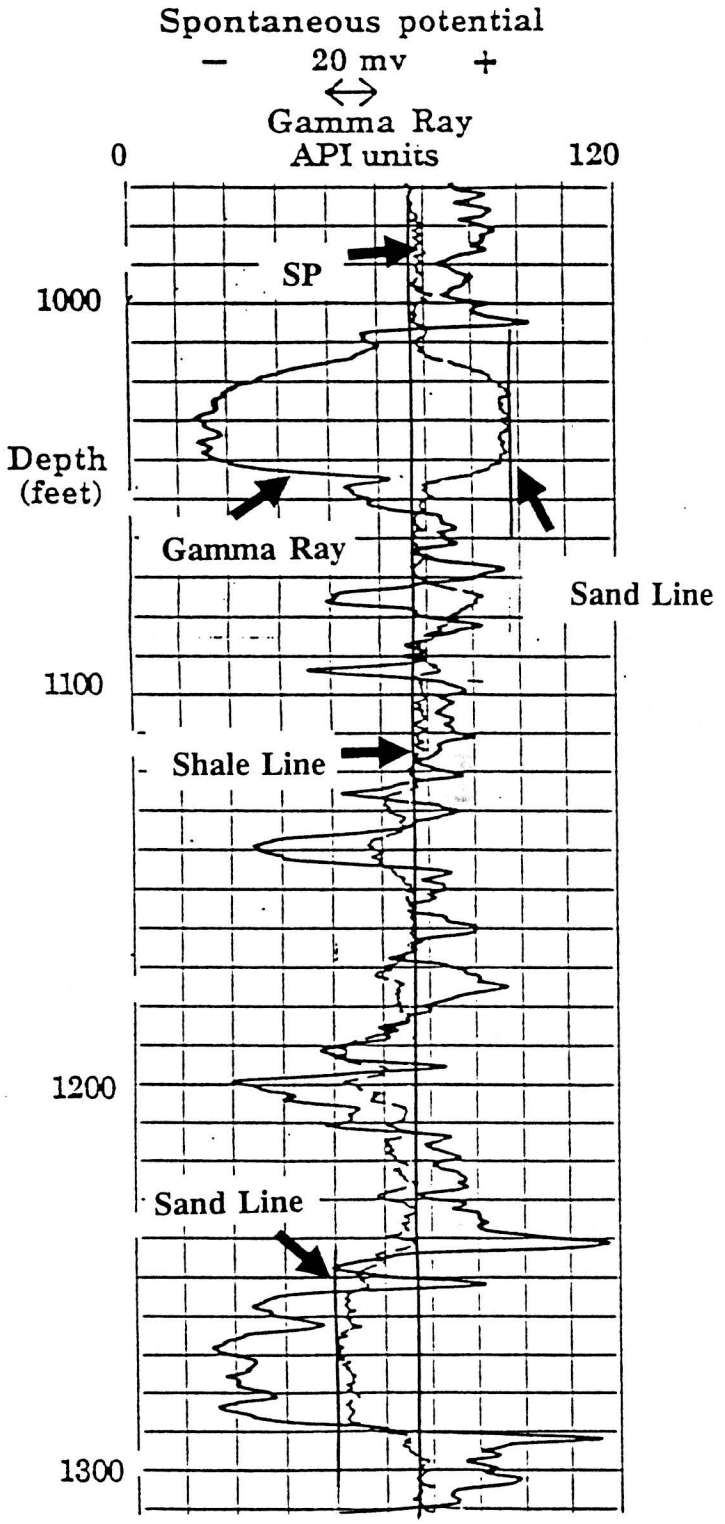
Figure 13. Kansas Geological Survey Dakota Aquifer Total Dissolved Solids Map.

CHAPTER FOUR

SAMPLE CALCULATIONS

Figure 14 is an example of a geophysical log across a portion of the Dakota aquifer. There are two thick clean sands on this log. The upper sand from 1015-1045 exhibits a positive SP deflection. The lower sand from 1255-1288 exhibits a negative SP deflection. Sample calculations will be made for both sands. Four data entries are obtained from the log itself. *Rmf*, *Rmf* temperature, formation depth and the SSP. The *Rmf* and *Rmf* temperature can be retrieved directly from the log heading. In this example, *Rmf* = 1.08 at 75°F. Notice that there are two *Rmf* values on this log. The one made at 75°F is probably the actual measured value and the one at 105°F has probably been calculated from the measured value. It is not common to have the *Rmf* value given at 75°F on the log heading and a conversion is usually necessary. Formation depths are retrieved from the log track. To obtain the SSP the shale and sand lines are drawn. The magnitude is measured using the scale at the top of the SP log track. In this example each chart division = 20 millivolts. The associated equations and computer program used to convert this data into *Rwe* are presented in Appendix A.

	Upper Sand	Lower Sand
Rmf (from log heading)	1.08 at 75°F	1.08 at 75°F
Formation Depth	1030'	1265'
SSP	40 mv	- 36 mv
Formation Temperature (Ave. Temp Gradient Method)	70°F	74°F
Rmf at 75° F (Arp's equation if necessary)	108	108
K at formation temperature	69.31	68.842
Rmfe at 75°(empirical studies)	.918	.918
Rmfe/Rwe	.2751	3.3577
Rwe at 77°	3.3803	.2734



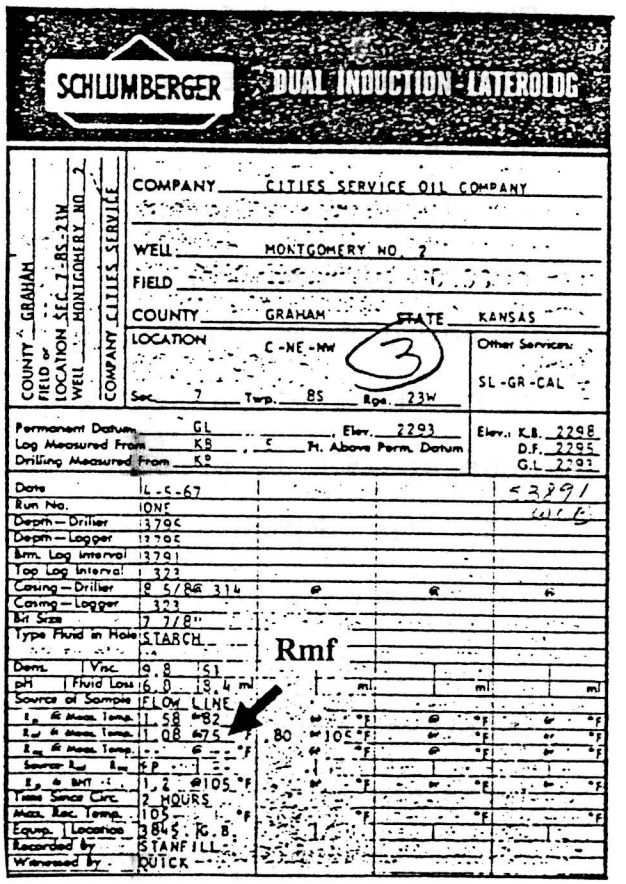


Figure 14. Sample Calulation Log

Rwe = *Rw* for waters that are not extremely saline or fresh. *Rwe* values for fresh waters have to be corrected by an empirically derived equation determined by plotting *Rwe* values versus actual resistivity values.

CHAPTER FIVE

RESULTS

Empirical Relationships

To determine the empirical relationship between *Rwe* and *Rw*, water quality data for 28 wells in 16 different areas were supplied by Dr. Don Whittemore of the Kansas Geological Survey (Figure 16). Fourteen wells had analyses for two sands for a total of 42 measured water quality data points. Thirty nine of the data points are from the Dakota, two from the Cheyenne and one from the Cedar Hills. Sixteen of the twenty eight wells had a geophysical log with a SP from the same borehole. For the remaining twelve wells the closest possible well(s) with an SP log was retrieved for calculating *Rwe*. Where the stratigraphy was not identical between the measured well and the nearby well a sand close to the same interval within the Dakota was selected. Of these 12 wells seven had the measured value plotted versus one nearby calculated *Rwe*. One well's measured resistivity was plotted versus four nearby *Rwe* values. Two well's resistivities were plotted versus two nearby *Rwe* values each. Two measured values from different sands from the same well were plotted versus five nearby *Rwe* values from two nearby wells. One well was plotted versus an average of four different sands from a nearby well. In all, fifty measured water quality data points were used to determine the empirical relationship. Appendix B shows the data in tabular form.

Figure 16 is the graphical representation of the empirical data. This graph was generated using log values rather than the

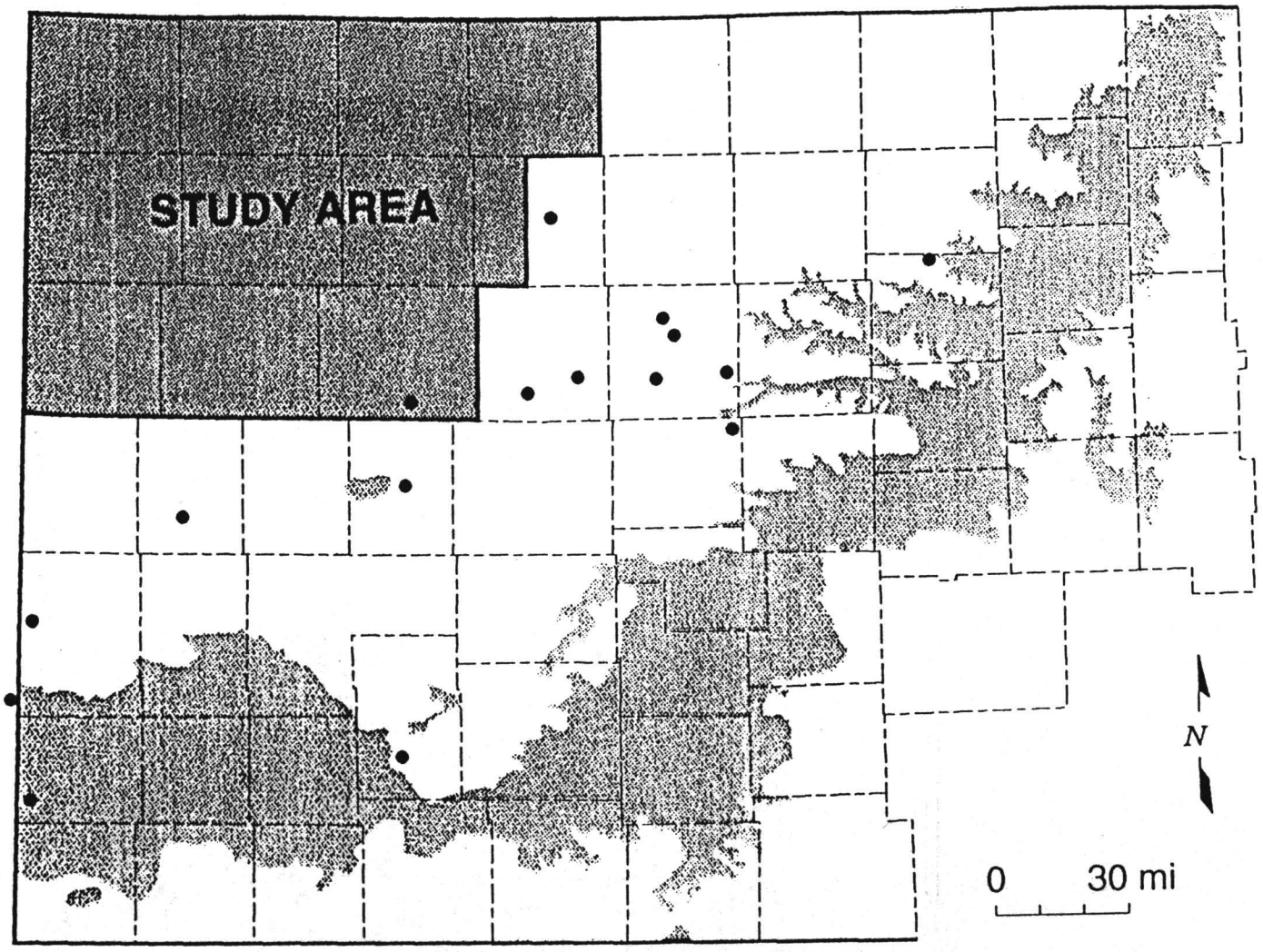


Figure 15. Map Showing Empirical Database Locations

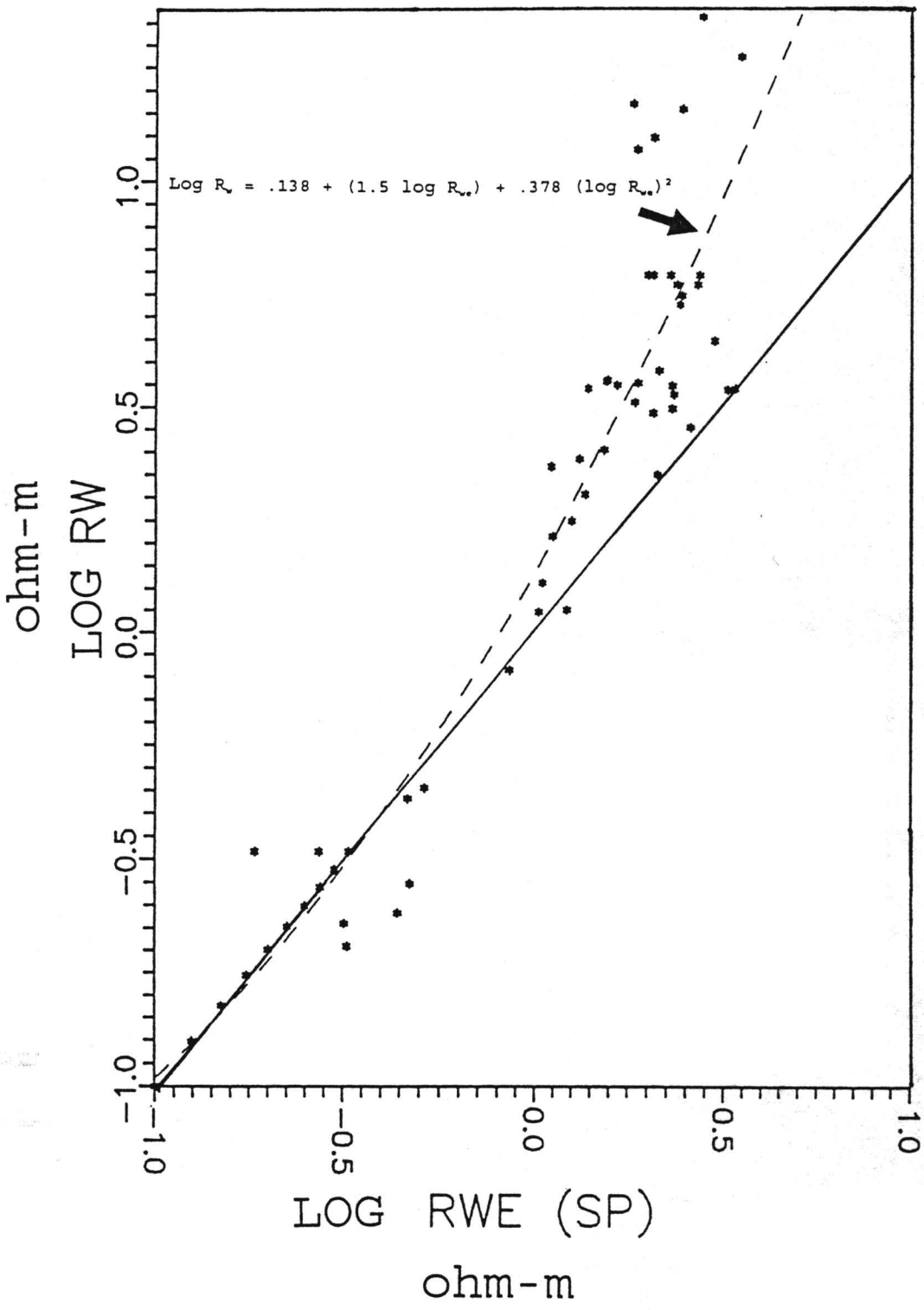


Figure 16. Empirical R_w vs. R_{we} Graph

actual resistivity values. This graph shows the line of best fit and the calculated polynomial equation for the line. Most of the data used to determine the empirical relationship were in the fresh water range. Nine extra data points were plotted in the salt water region of the chart (.1 - .3 ohm-m)(-.1 to -.5 ohm-m log values). This was done for two purposes: 1) to make the graph go through the intersection of the graph axes, as a linear relationship should exist in the higher salinity region of the graph; and 2) to include the influence of salt water zones in the calculation of the empirical relationship. The difference between using the additional nine points and not using them is shown in Table 1.

The empirical relationship between specific conductivity (resistivity) and total dissolved solids was supplied by Dr. Whittemore of the Kansas Geological Survey. This relationship was determined from a large database from actual Dakota aquifer waters. At 77°F:

TDS = .6 x Specific Conductivity (SC = 10000/*Rw*)

Applying the empirically derived equation to the log presented in the sample calculation on page 28 the results would be:

	Upper Sand	Lower Sand
Rmfe/Rwe	.2751	3.3577
Rwe at 77°	3.3803	.2734
Rw at 77°	10.0000	.2546

The comparison between TDS for *Rwe* and *Rw* is:

	UPPER SAND TDS mg/l	LOWER SAND TDS mg/l
Rwe	1774	21,945
Rw	550	23,172

Empirical Equation Using Extra Nine Data Points

$$\text{Log Rw} = .138 + 1.5 \log \text{Rwe} + .378 (\log \text{Rwe})^2$$

Empirical Equation Not Using Extra Nine Data Points

$$\text{Log Rw} = .142 + 1.51 \log \text{Rwe} + .311 (\log \text{Rwe})^2$$

Comparison of TDS Results at Different Salinities

	ASSUMED Rwe	EXTRA NINE EQUATION	ORIGINAL EQUATION
1)	5 ohm-m	255 mg/l	268 mg/l
2)	3 ohm-m	689 mg/l	700 mg/l
3)	1 ohm-m	4,366 mg/l	4,325 mg/l
4)	.5 ohm-m	11,413 mg/l	11,549 mg/l
5)	.3 ohm-m	20,949 mg/l	21,905 mg/l
6)	.2 ohm-m	31,880 mg/l	34,602 mg/l
7)	.15 ohm-m	41,637 mg/l	46,656 mg/l

Table 1. Comparison of Equations

Water Quality Database

Appendix C contains the tabular presentation of the retrieved and calculated data for all logs used to create the Dakota water quality database. Figure 17 is a map showing the location of these data points. A total of 977 logs were used to create the database. *Rw* values were calculated for one sand for 890 boreholes, two sand units at different depths for 69 boreholes, three sand units for 14 boreholes, and four sand units for 4 boreholes, for a total of 1086 calculated values. 1078 values are for Dakota Formation sands, 3 for sands in the Kiowa Formation and 5 for sands in the Cheyenne Sandstone. Only one data entry was made for each well to produce the final maps.

When more than one thick clean porous sand was seen on a log the sand which contained the freshest water by calculation was used for producing the maps. Values for other sands were calculated for comparison purposes only.

Final Maps

Figure 18 is the final contoured map of the estimated total dissolved solids in Dakota Formation waters in northwest Kansas. The map was combined with Dr. Whittemore's map to produce the final map and includes the neighboring counties on the southern and eastern edges of the study area.

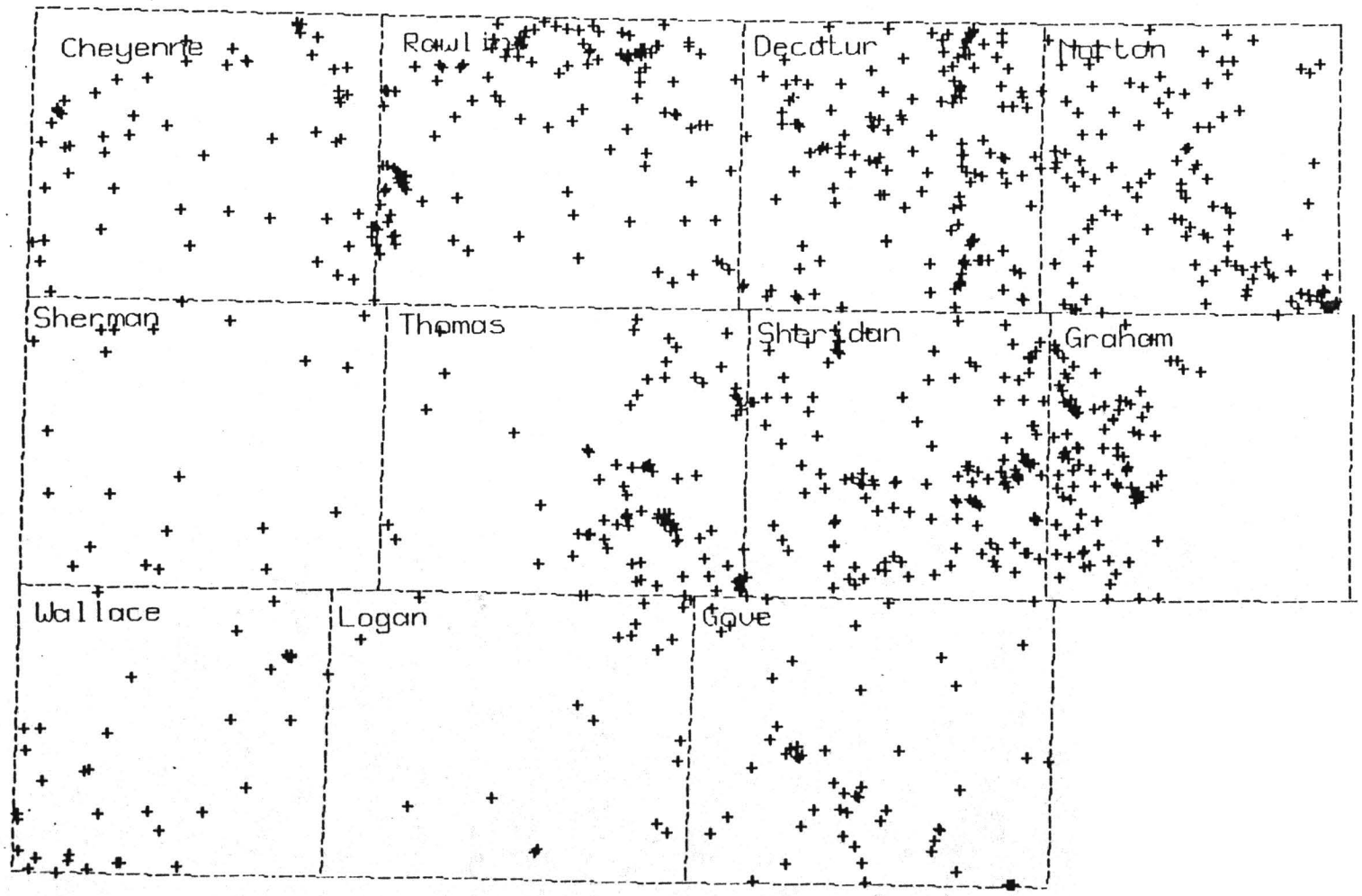


Figure 17. SP Derived Water Quality Database

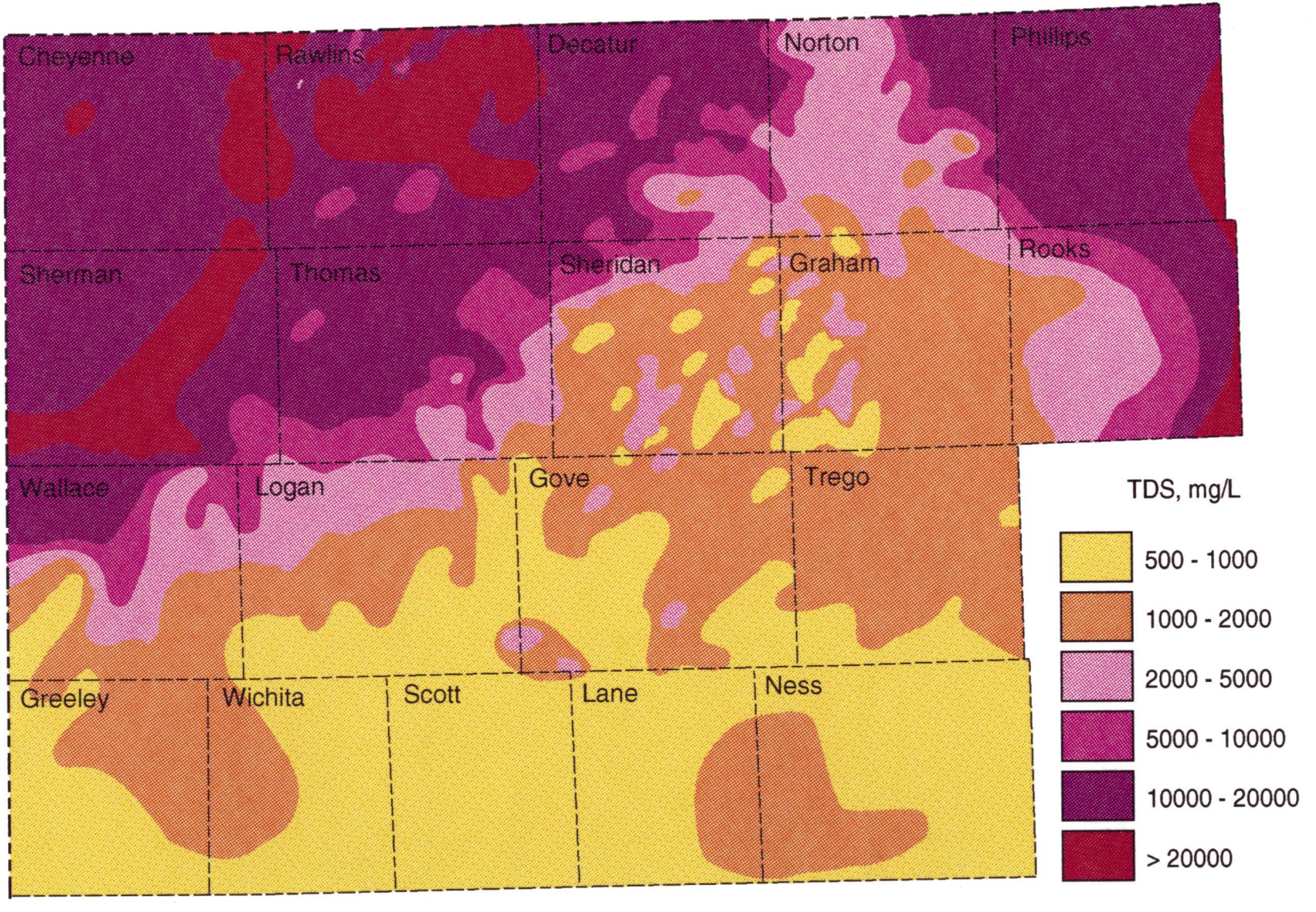


Figure 18. Dakota aquifer Total Dissolved Solids map

CHAPTER SIX

DISCUSSION OF RESULTS

The empirical relationship between *Rwe* and *Rw* calculated for the Dakota aquifer using Spontaneous Potential logs was patterned after methods previously published by Gondouin, Alger, and Schlumberger Logging Services. These studies determined that empirical relationships should be used to better estimate formation water resistivities in low salinity waters. The empirical relationship established for the Dakota aquifer confirmed that the fresher waters become the greater the difference between SP calculated formation water resistivities and measured resistivities.

The graphical presentation of the Dakota aquifer empirical data (Figure 17) fits into the area of "average" fresh waters as presented in the Schlumberger graph on page 24. Comparing the Schlumberger graph with the Dakota aquifer empirical graph, three observations can be made.

On the Dakota aquifer graph it is observed that for formation waters in the .4 to .7 log *Rw* range a number of data points fall beneath the line of best fit. These data points may represent data calculated from predominately $NaHCO_3$ or Na_2SO_4 waters. The Schlumberger graph shows that the theoretical $NaHCO_3$ and Na_2SO_4 lines lie just above the NaCl single salt solution line. This indicates that *Rwe* values for waters where the predominate salt is $NaHCO_3$ or Na_2SO_4 would plot closer to the single salt NaCl line and away from the line of best fit for all Dakota waters. The result of this observation is that for predominately $NaHCO_3$ and Na_2SO_4

waters the empirical equation would calculate optimistic values for TDS concentrations.

In the freshest area of the graph (1.0+ log *Rw* values) the data points fall above the line of best fit. This is probably the result of these waters being predominately $CaCl_2$, $MgCl_2$, $Ca(HCO_3)_2$, or $Mg(HCO_3)_2$ waters and would tend to plot towards the $CaCl_2$ line on the Schlumberger graph. The result of this observation is that for very fresh waters the empirical equation would yield pessimistic values.

In the highly saline portion of the graph (< -.5 log *Rw*) the few empirical data points available do not fit the theoretical single salt solution line. Of the eight data points used in the more saline portion of the graph three data points lie very close to the line while five are scattered. Of the five, the four that fall below the line are from the same well and some other factor associated with the mud or logging tools could be playing a part in this deviation. Without using the nine artificial data points the four data points below the line would have a large influence on the calculations of TDS for highly saline waters. This effect is illustrated in Table 1 on page 34. This scatter is not significant as waters in this range typically have TDS values >15,000 to 20,000 mg/l, and a 10-15% correction factor is not important as the water is of such poor quality.

The final result of this study was the TDS concentration map. Besides being colorful and interesting to look at, just what does this map mean? The map shows the typical TDS concentrations that

would probably be encountered in the Dakota Formation in the northwest portion of Kansas. If an individual or municipality wanted to drill for water in the Dakota Formation, the map could be use to estimate the water quality that might be encountered at the location of interest. The map provides an estimate of the freshest water that might be found in the Dakota Formation and should be used as a general reconnaissance tool.

The two critical areas of the TDS map are the area of fresh water (<1000 mg/l TDS) and the area where the Dakota aquifer must be protected (<10,000 mg/l). The <1000 mg/l area is predominately restricted to the southern portions of the study area in Logan, and Gove counties. There is a large area in Sheridan, Graham, and Gove counties where the general TDS range is between 1000-2000 mg/l. Within this area there are areas where the Dakota may contain waters with TDS in the 500-1000 mg/l as well as areas where TDS might be in the 2000-5000 mg/l range. The reason for this variance probably lies in the geology of the Dakota Formation. Throughout this area a thick porous basal channel sand is often encountered. Where this sand is present it usually calculates to have fresher water than the shallower thinner and less porous Dakota sands. The areas where fresher waters are projected are most likely areas where the basal channel sand was present and used in the calculations. The areas where the projected TDS values are higher are most likely areas where the basal channel sand was absent and shallower sands were used in the calculations. When looking for potential areas to drill for Dakota waters in this area it would be

important to combine this map along with a complete geological study. It is projected that a complete geological study would result in a map which would project where these paleochannels are most likely present.

The <10,000 mg/l line runs SW - NE through Wallace, Logan, Thomas, Sheridan, Decatur, and Norton counties. To the south and southeast of this line the potential exits for encountering Dakota waters which must be protected. There are some areas to the north of this line which may have waters that need to be protected but the calculations are near the 10,000 mg/l level and more data are needed to definitely say that the Dakota needs protection in these areas.

On the original map provided by Dr. Whittemore there was a large area in Cheyenne county that was shown to have <10,000 mg/l TDS. This study does not confirm this speculation and it is not recommended that the Dakota waters be protected this far west.

It is believed that the amount and quality of the data collected should greatly help with the prediction of water quality in the Dakota Formation in western Kansas. It is hoped that these data can be combined with other water quality and geological studies to help in better understanding the potential role the Dakota aquifer might play in augmenting the useable water resources of Kansas.

CHAPTER SEVEN

CONCLUSIONS

1) An empirical relationship between water resistivities calculated from the SP curve of geophysical logs and actual water resistivities was derived for the Dakota aquifer of western Kansas. The empirical relationship is expressed as a polynomial equation for the line of best fit derived from the grahpical presentation of the empirical data.

2) Contoured maps were generated and combined with existing maps to produce a final TDS map of the Dakota aquifer. This final map provides more detail than the original map and should improve the accuracy and confidence of projecting water quality of the Dakota aquifer in western Kansas.

3) Areas where Dakota waters most likely contain fresh water (<1000 mg/l) is restricted to the southern portions of Logan and Gove counties. There are potential areas where fresh waters may be found in portions of Sheridan and Graham counties in the study area.

4) Areas where Dakota waters must be protected (<10,000 mg/l) are found south of a line running SW - NE through Wallace, Logan, Thomas, Sheridan, Decatur, and Norton counties. The isolated areas northwest of this line where TDS levels are projected to be <10,000 mg/l are not supported by enough data to enforce the protection regulations at this time.

5) The final map and database were supplied to the Kansas Geological Survey in hopes that this study can be combined

with future water quality and geological studies. A current study using geophysical logs resistivity curves to estimate water quality in the Dakota aquifer is currently underway and will be combined or compared to data generated in this report.

APPENDIX A

EQUATIONS AND COMPUTER PROGRAM

CALCULATIONS AND EQUATIONS

1) Calculating formation temperature:

Temperature Gradient Method: $TF = 55 + (E \times (A-55)/B)$

Where:
- TF = formation temp
- E = formation depth
- A = bottom hole temperature
- B = bottom hole temperature depth

Average Temperature Gradient Method: $TF = 55 + (E/100) \times 1.5)$

Where:
- TF = formation temp
- E = formation depth
- 1.5 = average temperature increase per 100' depth increase

For Both: 55 = average surface temperature

2) Resistivity Corrections for Temperature Changes:

Use Arp's Formula (Schlumberger 1987)

$F = C \times (Temp + 6.77)/(T + 6.77)$

Where
- F = resistivity at new temp
- C = resistivity at a temperature other than formation temperature
- Temp = temperature at which resistivity (C) was measured
- T = new temperature

3) Calculating K:

$K = 60 + (.133 + x\ TF)$

Where TF = Formation Temperature

4) Correcting Rmf to Rmfe:

Use empirical corrections for predominately NaCl muds (Schlumberger 1987).

a. Rmf at $75° \geq .1$ ohm-m: Rmfe = .85Rmf
b. Rmf at $75° < .1$ ohm-m: Rmfe = $(146 \times Z)-5/(337 \times Z)+77$
Where Z = Rmf at 75°

5) Calculating Rmfe/Rwe Ratio

SSP = - K log Rmfe/Rwe
Therefore:
log Rmfe/Rwe = SSP/-K
and
$Rmfe = 10^{(SSP/-K)}$

6) Calculating Rwe

Rmfe/Rwe = Rmfe/Rwe
Therefore:
Rwe = Rmfe/(Rmfe/Rwe)

7) Calculating Rw at 77°F

$$\log R_w = .138 + (1.5 \log R_{we}) + .378 (\log R_{we})^2$$

8) Where no Rmf value is given but a Rm value is given

Rule of Thumb Rmf = .75 x Rm (Frank 1986)

BASIC COMPUTER PROGRAM

Rw FROM SP
DAKOTA PROJECT

```
1  INPUT "BHT = ?";A
2  INPUT "BHT DEPTH = ?";B
3  INPUT "RMF = ?";C
4  INPUT "RMF TEMP = ?";D
5  INPUT "FORMATION DEPTH = ?";E
6  INPUT "SSP = ?";S
7  IF A = 0 GOTO 10
8  TF = 55 + (E*((A-55)/B))                    FORM TEMP (TEMP GRAD. METHOD
9  GOTO 11                                              USING BHT)
10 TF = 55 + ((E/100)*1.5)                     FORM TEMP (AVE. TEMP GRADIENT)
11 F = C * ((D+6.77)/81.77)                    F=RMF @ 75° (ARPS EQUATION)
12 K = 60 + (.133 * TF)                        K VALUE AT FORM TEMP
13 Z = 10^(S/-K)                               Z=Rmfe/Rwe
14 IF F < .1 GOTO 16
15 IF F > .1 GOTO 18
16 G = ((146*F)-5)/((337*F)+77)                Rmf to Rmfe (G=Rmfe)(SALT MUDS)
17 GOTO 19
18 G = .85 * F                                 Rmf to Rmfe(G=Rmfe)(FRESH MUDS)
19 H = G/Z                                     H=Rwe @ 75°
20 J = H * (81.77/83.77)                       Rwe @ 77° FROM 75°
21 L = 10^(.138+(1.5logJ)+(.378*(logJ)2))              Rw @ 77°
22 AA = L * (83.77/(TF+6.77))                  Rw @ FROM TEMP FROM 77°
23 SC = 10000/L                                SPECIFIC CONDUCTIVITY @ 77°
24 TDS = SC * .6                               TOTAL DISSOLVED SOLIDS
25 IF TDS < 1350 GOTO 27
26 IF TDS ≥ 1350 GOTO 29
27 CL = (.3815*TDS) - 163                      CHLORIDE CONCENTRATION
28 GOTO 30
29 CL = (.5441*TDS) - 381
30 USING "####.####"
31 PRINT "Rwe AT 77° = ";J
32 PRINT "Rw AT 77° =";L
33 PRINT "Rw AT Form Temp =";AA
34 USING "######"
35 PRINT "SC AT 77° =";SC
36 PRINT "TDS = ";TDS
37 PRINT "CL = ";CL
38 GOTO 1
39 END
```

Note: Steps 1-20 used to calculate *Rwe* for empirical database
Steps 21-39 used to correct *Rwe* to *Rw*, calculate TDS and chloride concentrations

APPENDIX B

EMPIRICAL DATABASE

SITE/WELL NAME	LOCATION	Rmf	Rmf Temp	Form Depth	SSP	SP CALC. RES. @ 77	MEAS. RES. @ 77	MEAS. TDS
CITY OF HAYS, ELLIS COUNTY								
% RESIG # 5-7	180' N of NW NW NE 7-14S-18W	3.75	70	375	-19	1.5360	2.5580	2270
NOTE : Rm temperature of 70 used as		3.75	70	485	-24	1.3030	2.4390	2380
Phannenstiel 5-12 was logged on same day		3.75	70	516	-26	1.2165	1.1310	5127
% PHANNENSTIEL 5-12	300' SE of SE NW NE 12-12S-19W	3.938	70	462	-11	1.3646	2.0408	2840
		3.938	70	477	-24	2.1164	2.2573	2570
		3.938	70	490	-30	1.1154	1.6501	3515
% A.J. PHANNENSTIEL 3-13-B	190' S &700' E of NW SW-14S-19W	2.81	70	500	-5	1.8494	3.2679	1885
% SUNLEY PROJECT #3	13-14S-19W	2.81	75	552	-12	1.5568	3.6363	1595
A.J. PHANNENSTIEL # 3-13C	NW SW 13-14S-19W	2.99	70	490	-10	1.6625	3.5714	1624
KRAUS 3-14	150' ENE of SW -14S-19W	3	80	500	-10	1.8855	3.6101	1607
% J. ROHR 2-18 A	18-14S-18W	6	70	460	-11	3.2244	3.4843	1665
% J. ROHR 2-18 B	60' S of SE SW 18-14S-18W	3.75	70	470	-7	2.3067	3.5587	1630
		3.75	70	492	-7	2.3070	3.1645	1833
J. ROHR 3-18	NW NW SE 18-14S-18W	3.825	70	440	-19	1.5686	3.6630	1583
PHANNENSTIEL 2-20 C	SW NE NW 20-14S-18W	4.05	66	370	-11	2.0640	3.0959	1873
		4.05	66	425	-10	2.1331	3.8464	1508
% STATE PROJECT 5-6	180' SSE of NW -14S-18W	4.05	70	420	-9	2.3276	3.4013	1700
		4.05	70	494	-6	2.5770	2.8751	2030
CITY OF RUSSELL								
T.H. 2-92 ELLIS COUNTY	330' N &60' W of SE COR-14S-16W	5.25	78	184	-43	1.0457	1.3020	4454
		5.25	78	220	-45	0.9785	1.1173	5191
% T.H. 1-92 RUSH COUNTY	2100N & 20'E of SW COR. of SE 3-16S-16W	4.2	78	237	-33	1.1776	2.3474	2471
HAYS NORTH								
BRAUN # 1	NE NE NE 30-12S-8W UPPER DAKOTA	4.71	46	650	-52	0.4406	0.2415	28730
	LOWER DAKOTA	4.71	46	772	-50	0.4734	0.2801	24360
	CHEYENNE SANDSTONE	4.71	46	835	-62	0.3183	0.2288	30410
	CEDAR HILL	4.71	46	1135	-62	0.3240	0.2036	34140
LINCOLN COUNTY								
KGS JONES #1	NE NE NE 2-10S-8W	5.54	71	88	-14	2.7115	14.6200	397
NOTE: used sand at 190' to estimate SP resistivity for sand at 140-155 due to shale		5.54	71	190	-48	0.8542	0.8264	7000

SITE/WELL NAME	LOCATION	Rmf	Rmf Temp	Form Depth	SSP	SP CALC. RES. @ 77	MEAS. RES. @ 77	MEAS. TDS
TREGO COUNTY #1	33-14S-22W			460			4.4840	1291
USED NEARBY WELL								
SWENCO WESTERN ALMA SEE #1 (2.5 MILES S	SE SE SE 8-15S-22W	0.44	95	625	56	2.9797		
LANE COUNTY	22-18S-28W			775 TO			5.6657	997
USED NEARBY WELL								
STAUFFER OIL FOOS #1 (4 MILES SE)	NE SW SW 36-18S-28W	1.2	56	890	35	2.4538		
WICHITA COUNTY	24-18S-37W			820 TO			5.9980	1046
USED TWO NEARBY WELLS								
HELMRICH & PAYNE DEAN #1-4 (7 MILES SW	NE 4-19S-37W	0.47	75	905	58	2.6923		
WESTBURY PET. FAIRCHILD 1-18 (9 MILES S	SW 18-19S-37W			965	32	2.3751		
ELLIS COUNTY	34-12S-18W			495			1.7825	3225
USED NEARBY WELL								
% RINE DRLG. CRISSMAN 31 (.75 MILE NE)	NW NE NE 34-12S-18W	3.375	56	535	-16	1.2542		
STANTON COUNTY	21-29S-43W			260			11.9040	510
USED TWO NEARBY WELLS								
ANDERSON STEWART UNIT #1 (1 MILE S)	NW NE 28-29S-43W	1.38	61	250	20	1.8714		
% SUNRAY PET. SANTA FE #1 (4 MILES SW)	NW 31-29S-42W	2.175	70	340	23	2.0678		
HAMILTON COUNTY	14-23S-43W			270 TO			15.0150	422
USED NEARBY WELL								
GERMANY INVESTMENTS (5 MILES W)	NE SE 18-23S-43W PROWERS CO. COLO.	0.32	108	400	47	1.8253		
PROWERS COUNTY, COLORADO	11-25S-42W			236 TO			19.1200	329
USED NEARBY WELL								
ALVIN HOPE STATE B # ? (2.5 MILES SW)	SE SE 16-25S-42W	1.9	92	540	18	3.4905		
		1.9	92	630	18	3.4875		

SITE/WELL NAME	LOCATION	Rmf	Rmf Temp	Form Depth	SSP	SP CALC. RES. @ 77	MEAS. RES. @ 77	MEAS. TDS
MARSH AREA , RUSSELL COUNTY								
HABERER #1	NE SE NE 14-12S-15W			185			0.4545	13350
USED NEARBY WELL	LOWER DAKOTA			290			0.4301	14460
% SOHIO PETROLEUM DECKERT #1 (7 MILES S	WL E/2 NW 30-12S-15W	2.175	75	300	-37	0.5147		
	LOWER DAKOTA	2.175	75	400	-40	0.4667		
GRAY COUNTY								
GRAY COUNTY FEED YARD #1	SE NE 26-27S-28W			464			23.5300	264
USED NEARBY WELL								
BRANDT PRODUCTION JANTZ #1 (9 MILES SW)	NE SE SE 10-28S-29W	0.52	84	596	52	2.7501		
NOTE: Mud used on Gray County well was O								
HILL CITY, GRAHAM COUNTY								
MAURICE L. BROWN MONTGOMERY #2	NW SE SW 2-8S-23W			785			3.5090	1737
USED TWO NEARBY WELLS	LOWER DAKOTA			1140			0.3289	20000
CITIES SERVICE MONTGONERY #2 (5 MILES SW	NE NW 7-8S-23W	1.08	75	1030	40	3.3803		
	LOWER DAKOTA	1.08	75	1200	-31	0.3277		
	LOWER DAKOTA	1.08	75	1265	-36	0.2734		
% HARRY GORE GRIFFITH #1 (.5 MILE NE)	NE NE SW 2-8S-23W	1.235	65	800	13	1.3886		
	LOWER DAKOTA	1.235	65	1140	-48	0.1837		
GOVE COUNTY	21-18S-28W			620			6.2890	938
USED FOUR NEARBY WELLS								
NATIONAL PET. RES. JASPER B-1 (9 MILES W	SW SW SE 29-15S-29W	0.71	69	765	48	2.7185		
VOYAGER PET. COBERELY 27-4 (1.5 MILES SE)	NW NW 27-15S-28W	0.451	90	635	45	2.0019		
K & E PETROLEUM HEFNER #1 (6 MILES NE)	NE NE SE 2-15S-28W	0.548	84	670	42	2.0646		
TEXAS ELDORADO CO. YOST #1-33 (3 MILES S	NE SW SE 33-15S-28W	0.563	68	650	50	2.2872		
TREGO COUNTY #2				365 TO			5.4054	1054
USED AVERAGE OF FOUR SANDS FROM A NEARBY								
@ DIAMOND SHAMROCK TOEDMAN # (4 MILES E)	SE SE SW 17-15S-23W	0.612	60	595	42	2.3785		
		0.612	60	640	50	2.2213		
		0.612	60	695	50	2.1353		
		0.612	60	745	58	2.8500		
	AVERAGE					2.4163		

APPENDIX C

SP WATER QUALITY DATABASE

COUNTY: CHEYENNE

% = Rmf estimated from Rm using Rmf = .75 Rm, @ = Thin Bed Corrected

OPERATOR/ WELL NAME	LOCATION	Rmf	Rmf Temp	Form Depth	SSP	Rwe @ 77	Rw @ 77	SC @ 77	Est. TDS
SHAKESPEARE BURKHALTER #1	NE SW 32-1S-37W	1.2	50	2135	-21	0.3517	0.3429	29162	17497
JOHN O FARMER MEARS #1	SW NE 33-1S-37W	0.68	121	2175	-28	0.3585	0.3506	28525	17115
JIM DILLIE O'BRIEN 1-D	SW SW SW 2-1S-38W	1.2	75	1940	-29	0.3897	0.3867	25859	15515
JAMES DILLIE O'BRIEN 2-D	E/2 SW SE 3-1S-38W	1.65	80	2040	-31	0.5345	0.5726	17464	10478
% WESTHEIMER ETAL GLASCO #1	SE SE 10-1S-38W	1.215	93	1965	-24	0.5662	0.6174	16197	9718
		1.21	93	2015	-32	0.4360	0.4430	22573	13544
GOLD. EAGLE CHRISTENSEN 10-2	SE NW NE 10-1S-38W	2.4	75	1950	-34	0.6632	0.7629	13107	7864
SHAKESPEARE E. HAM #1	NE SW NE 13-1S-38W	0.99	106	2090	-20	0.5948	0.6589	15177	9106
BADGERS DRLS. SCHRADER #1	NW NW 25-1S-38W	1.05	70	2175	-22	0.4033	0.4030	24814	14889
W.T. WAGGONER HARRISON #1	NE SW 22-1S-39W	0.7	88	2080	-20	0.3534	0.3448	29006	17404
% BEN BRACK JUDY #1	NW SE SE 26-1S-39W	0.825	138	2020	-55	0.2054	0.1930	51824	31094
DERN DRLG. GALVIN #1	SE NE 33-1S-39W	0.84	117	2070	-31	0.3884	0.3852	25958	15575
% BEN BRACK JUDY #2	NE NE NE 35-1S-39W	1.575	75	1970	-17	0.7544	0.9121	10963	6578
JOHN O FARMER CRABTREE #1	SE SE 14-1S-40W	0.78	93	2330	-20	0.4164	0.4188	23879	14327
% OHIO OIL ROSE #1	NE NE NE 35-1S-40W	0.975	80	2235	-12	0.5841	0.6432	15546	9328
MACK OIL WILKENS #1	S/2 SE SE 8-2S-37W	0.79	80	2170	-28	0.2828	0.2685	37241	22345
CENTURY OIL WILKENS 16-7	NE SW NE 16-2S-37W	1.96	72	2115	-34	0.5244	0.5587	17898	10739
TOTO GAS CO. EDIE #1	NE SE 17-2S-37W	0.534	82	2090	-23	0.2293	0.2154	46427	27856
PAUL PRAJATEL GLASCO 21-5	SW NW NW 21-2S-37W	1.278	78	2100	-40	0.3032	0.2898	34507	20704
JOHN O FARMER WAGNER #1	SW SW 5-2S-40W	1.03	73	2440	-16	0.5004	0.5262	19002	11401
TOTO GAS CO. ZWEYGARDT #1	SW SW 34-2S-40W	1.29	50	2180	-15	0.4589	0.4719	21191	12715
E.J. ATHENS RATH #1	NW NW 11-2S-41W	1.2	122	2315	-42	0.4087	0.4095	24420	14652
HILLON-SIMON OCHSNER 316	N/2 NW SW 16-2S-41W	1.35	67	2490	-24	0.4705	0.4868	20544	12327
MACK OIL RAILE #1	SE SE 25-2S-41W	0.44	106	2390	-35	0.1646	0.1566	63867	38320
CITIES SERVICE RAILE A-1	NW NW SW 24-2S-42W	1.64	64	2815	-22	0.5880	0.6489	15411	9247
CITIES SERVICE NORTHRUP A-1	NW NW SE 26-2S-42W	1.5	63	2575	-20	0.5624	0.6119	16342	9805
CITIES SERVICE NORTHRUP A-4	NW SW SE 26-2S-42W	1.34	65	2570	-25	0.4408	0.4490	22272	13363
CITIES SERVICES NORTHRUP A-3	NW SE SE 26-2S-42W	1.32	63	2590	-22	0.4646	0.4792	20870	12522
CITIES SERVICE NORTHRUP B-1	NW SE NW 26-2S-42W	1.4	123	2585	-66	0.2264	0.2127	47023	28214
CITIES SERVICE NORTHRUP B-2	NW NE SW 26-2S-42W	0.777	88	2755	-27	0.3181	0.3058	32702	19621
E.J. ATHENS ZWEYGARDT #1	SE SE 34-2S-42W	0.84	125	2585	-25	0.5075	0.5358	18664	11199

COUNTY: CHEYEENE

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CITIES SERVICE DORSCH A-1	SE SW SW 4-3S-37W	1.01	79	2200	-31	0.3248	0.3131	31943	19166
CITIES SERVICE DRAMER C-1	NE 8-3S-37W	0.84	68	2195	-30	0.2432	0.2288	43713	26228
JAMES DILLIE BURR 1-D	SE NW NE 1-3S-38W	1.1	92	2200	-25	0.4940	0.5176	19319	11592
% SERVICE DRLG. BEESON #1	NE NE NW 8-3S-38W	2.475	85	2265	-58	0.3591	0.3512	28473	17084
NORBLA OIL FONCANNON #1	SE SE 18-3S-39W	1.25	69	2235	-27	0.4042	0.4040	24754	14853
% FALCON ZWEYGARDT #1	SE SE SW 1-3S-41W	1.575	44	2300	-33	0.2820	0.2677	37356	22414
SHAKESPEARE R.WALTER #1	NE NE 9-3S-41W	0.92	62	2505	-12	0.4381	0.4456	22443	13466
NORBLA OIL KNORR #1	SW SW 15-3S-41W	0.66	124	2415	-13	0.5783	0.6348	15754	9452
SUN OIL RUEB #1	SE SE 9-3S-42W	0.56	118	2580	-20	0.3755	0.3701	27019	16211
R.G. LAWTON RUEB #2	NW NE 13-3S-42W	0.56	113	2550	-17	0.3963	0.3946	25342	15205
SUN OIL WALZ #1	N/2 SE NW 13-3S-42W	0.56	112	2525	-16	0.4056	0.4057	24650	14790
R.G. LAWTON LEIBRANDT #1	NW NE 36-3S-42W	0.54	122	2565	-21	0.3619	0.3545	28212	16927
ONEOK EXPL. SEYMOUR #1-14	E/2 W/2 W/2 14-4S-37W	1.7	79	2160	-50	0.2965	0.2828	35366	21220
		1.7	79	2375	-64	0.1914	0.1802	55494	33296
A.C. SMITH ETAL HAACK #1	SW NW 20-4S-37W	0.67	74	2135	-23	0.2620	0.2474	40423	24254
		0.67	74	2250	-33	0.1906	0.1795	55716	33429
CITIES SERVICE GIBSON C-1	NW NE NE 25-4S-37W	0.61	121	2175	-34	0.2652	0.2506	39905	23943
ABRAXAS PET. GIBSON #1	NW NE 25-4S-37W	1.3	70	2135	-38	0.2982	0.2846	35141	21084
TOTO GAS CO. REUBER #1	NW NE 36-4S-37W	1	70	2120	-35	0.2525	0.2380	42024	25214
H.F. BANGERT LILLICH #1	SW NE 20-4S-38W	1.11	68	2175	-22	0.4153	0.4174	23956	14374
% PHILLIPS PET. ST. FRANCIS #1	W/2 NW SE 15-4S-39W	0.9	87	2230	-22	0.4227	0.4265	23444	14066
TOTO GAS CO. RUEB #1	NE SE 14-4S-40W	1.12	74	2230	-19	0.4989	0.5242	19075	11445
R.G. LAWTON JOHNSON #1	NW SW 2-4S-41W	0.84	122	2370	-22	0.5433	0.5849	17096	10257
E.J. ATHENS DOUTHIT #1	SW SW 27-4S-41W	0.8	120	2360	-22	0.5093	0.5382	18581	11149
E.J. ATHENS SCHIRMER #1	NE SW 3-4S-42W	0.88	71	2555	-22	0.3450	0.3353	29822	17893
@ CITIES SERVICE FLEMING A-1	NE NW 3-5S-37W	1.08	63	1975	-26	0.3300	0.3187	31374	18824
@ THIN SANDS		1.08	63	2070	-41	0.2040	0.1917	52176	31306
@		1.08	63	2125	-52	0.1435	0.1386	72133	43280
		1.08	63	2145	-47	0.1686	0.1601	62472	37483
A.C. SMITH ETAL NELSON #1	SE SW 7-5S-37W	0.26	64	2005	33	0.5419	0.5829	17155	10293
C.W. HUGHES DEEDS #1	NE NW 21-5S-37W	0.48	87	2025	-13	0.3002	0.2867	34883	20930

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JACKSON ETAL EGGERS #1	NW NW SW 23-5S-37W	0.87	117	1985	-52	0.2037	0.1914	52253	31352
		0.87	117	2140	-40	0.3018	0.2883	34685	20811
ARVEL C. SMITH WATER #1	SE NE 1-5S-40W	0.973	90	2325	-18	0.5371	0.5762	17355	10413
% TEXAS CO. WALZ #1	SW NW NE 3-5S-42W	1.275	84	2205	-18	0.6588	0.7561	13225	7935
MEDALLION PET. WALZ 4-1	SE NW 4-5S-42W	0.966	77	2495	-15	0.5092	0.5381	18585	11151
AM. PETRO SCHLEPP #1	NE SW NW 15-5S-42W	1.51	48	2540	-21	0.4303	0.4358	22946	13767
MURFIN DRLG. SCHRITTER #1	SE NW 35-5S-42W	0.491	73	2645	-23	0.1916	0.1804	55429	33257

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MIDWEST OIL BLEES #1	SE SE 5-1S-26W	0.85	75	1100	-16	0.4151	0.4172	23969	14381
BARRON KIDD HUFF #1	SE SE 8-1S-26W	0.6	80	1020	-15	0.3210	0.3089	32369	19421
AINSWORTH & MURFIN BREMER #1	NW NW NW 18-1S-26W	0.85	75	1100	-16	0.4151	0.4172	23969	14381
VINCENT OIL #1 WHALE	SE NW 20-1S-26W	1	62	1040	-12	0.4686	0.4843	20646	12388
% STANOLIND O&G McCUNE #1	NW NW SE 28-1S-26W	1.8	40	1100	-20	0.4404	0.4484	22299	13380
CITIES SERVICE WARNER UNIT 110	SW SW SE 2-1S-27W	1.44	52	1135	-15	0.5227	0.5564	17972	10783
CITIES SERVICE WARNER # 1-12	SE SE SE 2-1S-27W	0.89	82	1100	-11	0.5568	0.6040	16556	9934
% CITIES SERVICE SATER #3	NE NE SE 2-1S-27W	0.9	82	1070	-12	0.5446	0.5867	17045	10227
GOWER OIL OSBURN #1	SE SE 6-1S-27W	1.45	56	1100	-26	0.3903	0.3874	25810	15486
PUBCO PET. ACKMAN-GREEN 1-8	NE SE 8-1S-27W	1.05	74	1065	-26	0.3634	0.3561	28081	16849
% CITIES SERVICE VAN VLEET #1	NW NE NW 9-1S-27W	0.75	83	1000	-17	0.3884	0.3852	25963	15578
% CITIES SERVICE WARNER E-5	SW SE SW 11-1S-27W	0.4875	97	1000	-3	0.4646	0.4792	20867	12520
% CITIES SERVICE WARNER E-1	NE NE SW 11-1S-27W	1.38	50	875	-13	0.5153	0.5463	18304	10982
CITIES SERVICE WARNER 1-14	S/2 NW NE 11-1S-27W	1.2	65	1165	-22	0.4222	0.4259	23479	14088
CITIES SERVICE WARNER #406	SW NE SW 11-1S-27W	1.28	76	1025	-22	0.5179	0.5498	18188	10913
GREAT BASINS PET. HUFF #1	SE SE NE 15-1S-27W	0.69	104	1045	-11	0.5384	0.5781	17299	10379
SAUVAGE DRLG. KILZER #1	SW SW SW 16-1S-27W	0.8	106	1040	-17	0.5207	0.5537	18060	10836
BARRON KIDD HITCHCOCK #1	SE SE NW 22-1S-27W	1.04	87	1055	-18	0.5447	0.5868	17040	10224
% SAUVAGE DRLG. McQUILLAN #1	NW NE 23-1S-27W	1.5	55	1030	-20	0.4840	0.5045	19821	11893
BARRON KIDD McQUILLAN #1	NW NW 23-1S-27W	1.04	80	1050	-18	0.5040	0.5310	18833	11300
% SAUVAGE & DUNN WOOLEY #1	NW NW SW 25-1S-27W	1.2	64	1060	-22	0.4154	0.4176	23947	14368
RITCHIE EXPL. METCALF FRAMS #1	SW SW 28-1S-27W	1.013	78	1050	-22	0.4200	0.4232	23632	14179
BURCH EXPL. CORCORAN #1	SE NE 28-1S-27W	1.15	52	900	-15	0.4160	0.4184	23903	14342
% JONES ETAL METCALF #1	SW SW SW 34-1S-27W	0.975	66	1030	-13	0.4676	0.4831	20700	12420
SAUVAGE DRLG. SMALLBERGER #1	NE NE SW 4-1S-28W	0.82	88	1240	-23	0.3692	0.3628	27564	16538
GREAT BASINS NELSON #1	NW NW SW 23-1S-28W	0.74	104	1330	-20	0.4307	0.4363	22919	13751
WOODMAN IANNITTE RIDGEWAY #1	SE SE SE 30-1S-28W	0.68	108	1420	-25	0.3486	0.3393	29471	17682
BEACON EXPL. BERNDT 1-4	SW NE 4-1S-29W	1.1	75	1300	-22	0.4422	0.4507	22187	13312
SAUVAGE DRLG. BRADY #1	SE SE SE 8-1S-29W	1	108	1325	-23	0.5463	0.5891	16976	10186
RAINS & WILL. WALDO #1	SW SW 23-1S-30W	1.2	65	1600	-24	0.3991	0.3979	25133	15080
EMPIRE DRLG. GRILL #1	NW SW 33-1S-30W	1.23	54	1485	-14	0.4794	0.4984	20063	12038

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% JONES ETAL. ALEXANDER #1	SE SE SE 1-2S-26W	0.975	62	965	-18	0.3739	0.3683	27155	16293
% JONES ETAL. ECKHART #1	SE SE SE 3-2S-26W	0.9	72	965	-17	0.4087	0.4094	24423	14654
% J.M. HUBER RAILSBACK #1	SE SE NE 5-2S-26W	0.9375	78	1075	-13	0.5241	0.5583	17913	10748
DUNNE GARDNER ECKHART #1	NW SW 11-2S-26W	0.794	68	1130	-10	0.4327	0.4388	22790	13674
% STRAIN & HALL ODLE #1	NW NW SE 14-2S-26W	1.0125	65	1030	-11	0.5118	0.5415	18466	11079
% EMPIRE DRLG. NEW #1	NW NW SW 15-2S-26W	0.975	84	1030	-19	0.4780	0.4965	20140	12084
% SYESH OIL STAPP #1	NW NW SW 16-2S-26W	0.975	75	1120	-12	0.5437	0.5855	17078	10247
HOUSTON OIL MACFEE #4	S/2 SW SE 3-2S-27W	1.32	65	1270	-27	0.3947	0.3927	25465	15279
DIAMOND SHAM. MCFEE #5	E/2 SW NE 3-2S-27W	0.904	89	1225	-24	0.3978	0.3964	25229	15137
HOUSTON HYDRO. MACFEE #1	N/2 NE SE 3-2S-27W	1.12	78	1315	-25	0.4230	0.4269	23427	14056
HOUSTON HYDRO. MACFEE #2	SE NW SE 3-2S-27W	1.543	75	1315	-23	0.6004	0.6671	14990	8994
MCGINNESS OIL GILLESPIE 1-10	SW NE SE 10-2S-27W	1.14	69	1320	-13	0.5713	0.6247	16008	9605
BELL. EXPL. WILSON 1-10	SW SE NW 10-2S-27W	1.7	62	1200	-24	0.5369	0.5760	17361	10417
ADECO ETAL. CHAMBERS 2-D	SE NE NE 16-2S-27W	1.38	65	1075	-20	0.5179	0.5498	18189	10913
% JONES ETAL. FORTIN #1	NE NE NE 17-2S-27W	1.23	74	1120	-24	0.4554	0.4674	21394	12836
CITIES SERVICE MILLER Z-1	SE NE SE 31-2S-27W	1.21	62	1370	-18	0.4672	0.4826	20720	12432
WALT SAUVAGE SMICK #1	NW NW 9-2S-28W	0.65	112	1345	-22	0.3799	0.3752	26652	15991
		0.65	112	1530	-27	0.3238	0.3119	32060	19236
ANATOLE OIL COOK 1-11	SE SE SE 11-2S-28W	0.57	66	1105	9	0.5670	0.6185	16167	9700
DIAMOND SHAM. KATHKA #1	NW SE SE 19-2S-28W	1.46	50	1295	-19	0.4498	0.4602	21728	13037
RAINS & WILL. RUZICKA #1	NE SE 22-2S-28W	1.33	67	1250	-17	0.5682	0.6203	16122	9673
% SAUVAGE & DUNN SAUVAGE #1	NW NW NW 26-2S-28W	1.2	50	1250	-16	0.4078	0.4083	24490	14694
HOUSTON HYDRO. FRICKEY #1	W/2 NW SW 29-2S-28W	2.45	79	1185	-17	1.2158	1.8536	5395	3237
HOUSTON HYDRO. FRICKEY #1	SW 29-2S-28W	1.65	57	1165	-21	0.5332	0.5708	17518	10511
SAUVAGE & DUNN THOMAS #1	NE NW NE 29-2S-28W	0.65	110	1265	-15	0.4697	0.4857	20587	12352
% W.B. CLEARY DIENES #1	NW NW NE 33-2S-28W	1.155	73	1170	-13	0.6083	0.6788	14731	8839
GRAYBOL OIL CASTLE #1	SE NE 3-2S-29W	1.4	91	1490	-37	0.4133	0.4150	24096	14458
WAGGONER ESTATE HELMKAMP #1	SW NE 6-2S-29W	0.65	99	1440	-22	0.3390	0.3286	30431	18259
BURCH EXPL. TORLUEMKE #12	NE SW 35-2S-29W	1.11	65	1370	-13	0.5272	0.5626	17774	10664
IREX CORP. TRAER 1-1	NE NE NW 1-2S-30W	2.33	58	1560	-32	0.5379	0.5774	17320	10392
M.J. LESBACK WEBER #1	SE SE NW 2-2S-30W	0.62	113	1390	-23	0.3539	0.3454	28955	17373

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RESOURCES INV. MINES 2-12	SW SW 12-2S-30W	1.06	86	1545	-32	0.3503	0.3413	29298	17579
BEREXCO INC. MINES #1	SW NE NE 14-2S-30W	0.957	70	1455	-20	0.3869	0.3834	26080	15648
HALLIBURTON JORDING #1	SW NW 23-2S-30W	0.85	88	1650	-15	0.5012	0.5272	18968	11381
RAINS & WILLIAMSON UNGER #2	SE SE 25-2S-30W	1.15	64	1520	-24	0.3765	0.3712	26939	16163
UNION TEXAS UNGER #1	NE SW 25-2S-30W	0.6	105	1550	-20	0.3538	0.3452	28967	17380
RAINS & WILLIAMSON UNGER #1	NW SE 25-2S-30W	0.87	81	1550	-29	0.3001	0.2866	34895	20937
KIMBARK EXPL. MILLAGE #1	NW SW 26-2S-30W	1.46	59	1690	-32	0.3436	0.3337	29965	17979
SPINES EXPL. MAY #1	W/2 SE 31-2S-30W	1.2	103	1800	-35	0.4289	0.4342	23032	13819
JOHM FARMER BRUNK #1	NW NW 6-3S-26W	0.87	80	1185	-18	0.4226	0.4263	23456	14074
% ANDERSON PRITCHARD WENIMAN #1	SE SE NE 7-3S-26W	1.65	84	1215	-27	0.6232	0.7012	14261	8557
MURFIN DRLG. SHIRLEY #2-9	W/2 SW SW 9-3S-26W	1.35	75	1140	-20	0.5779	0.6342	15768	9461
DIAMOND SHAM. STREVEY #1-12	NE SE SW 12-3S-26W	1.06	53	1125	-13	0.4181	0.4208	23764	14259
MURFIN DRLG. LIPPLEMAN #2-16	NW NE NW 16-3S-26W	0.443	82	1110	40	1.5007	2.5953	3853	2312
PAN AMERICAN VERNON #1	SW SW 19-3S-26W	0.65	86	1195	-12	0.4116	0.4130	24216	14529
% MUSGROVE PET. WOODWARD #1	NW NW SW 21-3S-26W	2.25	45	1250	-22	0.5721	0.6258	15981	9588
DIAM. SHAM. GALLENTINE #1-23	NE SW SW 23-3S-26W	1.28	55	1105	18	1.4563	2.4713	4046	2428
EMPIRE DRLG. BROOKS #1	NE NE NE 24-3S-26W	1.24	68	1150	17	1.6508	3.0371	3293	1976
COASTEL O&G HUBBARD 3-28	NW SE 28-3S-26W	1.54	76	2035	-39	0.3675	0.3609	27708	16625
% JONES ETAL SODERLUND #1	SE SE NE 3-3S-27W	0.9	94	1440	-14	0.5814	0.6392	15645	9387
HILLENBURG OIL PACKER #1	SE NW SW 11-3S-27W	1.25	58	1320	-10	0.5911	0.6534	15304	9183
FIRST ENERGY PACKER 16-11	SW NW SW 11-3S-27W	1.08	63	1295	-12	0.5149	0.5458	18322	10993
% MUSGROVE PER. BAILEY #1	SW SW SW 14-3S-27W	1.2	86	1230	-18	0.6236	0.7019	14247	8548
% H.E. ZOLLER MONAGHAN #1	NW NW SE 19-3S-27W	1.305	98	1350	-28	0.5524	0.5977	16732	10039
W.B. CLEARY ROBERTSON #1	SE SE NW 23-3S-27W	0.67	105	1235	-15	0.4632	0.4774	20947	12568
PAN CANADIAN KIMCAID #1	NE NE SW 24-3S-27W	0.545	83	1200	-11	0.3452	0.3355	29802	17881
% HARRY GORE FOLLIS #1	NE NE SE 26-3S-27W	1.2375	85	1205	-17	0.6573	0.7536	13269	7961
% HARRY GORE FRICKEY #1	NW NW SW 31-3S-27W	1.125	87	1430	-19	0.5738	0.6283	15917	9550
MURFIN DRLG. SPIER 1-21	NE SW NW 12-3S-28W	0.67	88	1440	-12	0.4346	0.4412	22664	13598
FALCON EXPL. RUZICKA #1	NW NE NE 17-3S-28W	0.95	68	1450	-10	0.5192	0.5516	18128	10877
EMPIRE DRLG. RUZICKA #1	NW SE 17-3S-28W	1.08	66	1400	13	1.2222	1.8688	5351	3211
HALLIBURTON ETAL UNGER #C-1	SE NE 18-3S-28W	0.55	80	1400	10	0.6725	0.7776	12860	7716

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BURCH EXPL. WITT B-1	SW NE 21-3S-28W	0.74	71	1500	13	0.8939	1.1636	8594	5156
CITIES SERVICE TILDEN #1	SE SE SE 32-3S-28W	0.79	82	1420	-12	0.4799	0.4991	20037	12022
HALLIBURTON OIL VAVROCH #16	S/2 SE SW 33-3S-28W	0.83	73	1440	-17	0.3846	0.3808	26263	15758
% ANDERSON PRITC. NITSCH #1	SE SE SE 3-3S-29W	1.2	85	1285	-25	0.4903	0.5127	19503	11702
% ASHLAND OIL PALLNOW #1	SE SW SW 4-3S-29W	0.645	93	1440	-11	0.4552	0.4671	21408	12845
% SAUVAGE & DUNN LARSON #1	NE NE SE 7-3S-29W	1.2375	65	1495	-21	0.4530	0.4643	21536	12921
% TRANS ERA SIMPSON #1	NE SE NE 8-3S-29W	0.93	73	1450	-17	0.4310	0.4368	22895	13737
ANDERSON PRITC. ZANDER #1	NW NE 9-3S-29W	0.68	102	1460	-8	0.5773	0.6334	15788	9473
HOUSTON HYDRO. UFFORD #1	NE SE 10-3S-29W	0.722	82	1440	-18	0.3603	0.3526	28359	17015
DIAMOND SHAM. B. LARUE #1	NW SE SW 12-3S-29W	0.78	91	1490	-18	0.4291	0.4344	23022	13813
% SAUVAGE & DUNN SAUVAGE #1	NE NE SE 23-3S-29W	1.35	83	1515	-36	0.3784	0.3735	26774	16064
TURNPIKE OIL 6-34 MILLER	SE NW 34-3S-29W	1.425	62	1650	-15	0.6097	0.6809	14686	8811
K&E DRLG. TONGISH #1	S/2 NE SW 24-3S-30W	0.47	110	1540	-10	0.4015	0.4008	24952	14971
% HARRY GORE NORRIS #1	NW NW NW 12-4S-26W	0.975	85	985	-9	0.6732	0.7787	12842	7705
FELMONT OIL LIEBER 33-1	SW NE SW 33-4S-26W	1.51	68	1170	11	1.6480	3.0286	3302	1981
DIAMOND SHAM. TILDEN #1	NW NE NE 3-4S-27W	0.769	68	1235	10	0.8115	1.0117	9884	5931
BURCH EXPL. KUMP #1	SE NW 10-4S-27W	1.1	65	1150	-6	0.6569	0.7530	13280	7968
NAPC J. PETRACEK #1	NW NW NW 11-4S-27W	0.4	73	1280	14	0.5136	0.5440	18384	11030
% R.W. SHIELDS COLEMAN #1	SW SE SE 15-4S-27W	0.6	78	1230	17	0.9045	1.1839	8447	5068
% HARRY GORE MAZANEK #1	NW NW SW 22-4S-27W	1.08	65	1220	12	1.1688	1.7432	5737	3442
% TEXAS CO. JENNINGS #3	NE NW SW 25-4S-27W	1.2	78	1005	12	1.5377	2.7008	3703	2222
% TEXAS CO. JENNINGS #1	NE NE SW 25-4S-27W	0.9	80	1060	17	1.3925	2.2988	4350	2610
% TEXAS CO. JENNINGS #4	NE SW SW 25-4S-27W	0.9	75	1095	18	1.3557	2.2021	4541	2725
% TEXAS CO. JENNINGS #6	SW NW SW 25-4S-27W	0.825	70	1015	22	1.3343	2.1469	4658	2795
% NYE & SNELL SKUBAL #1	NE NE NE 35-4S-27W	1.125	43	1115	12	0.8453	1.0728	9321	5593
GRYNBERG PET. VACURA 1-11	SE NW 11-4S-28W	1.07	78	1475	-20	0.4778	0.4964	20146	12088
% SINCLAIR PET. BREMER #1	NW SE 28-4S-28W	2.4	60	1605	-20	0.8463	1.0746	9306	5584
EMPIRE DRLG. MUIRHEAD #1	SW SE 28-4S-28W	0.58	113	1450	18	1.2720	1.9900	5025	3015
% JONES ETAL. WYMORE #1	SW SW SE 3-4S-29W	1.2	68	1525	-22	0.4431	0.4519	22129	13277
MACK OIL ALSTROM #1	SE NW 31-4S-29W	0.9	63	1655	-8	0.4909	0.5135	19475	11685
CITIES SERVICE SCREEN A-1	NW SE 3-4S-30W	1.36	66	1610	-12	0.6787	0.7874	12699	7620

COUNTY: DECATUR

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OPERATOR/ WELL NAME	LOCATION	Rmf	Rmf Temp	Form Depth	SSP	Rwe @ 77	Rw @ 77	SC @ 77	Est. TDS
DIAMOND SHAM. O-BOYLES 1-6	NW NE SE 6-5S-26W	1.07	76	1090	14	1.4291	2.3970	4172	2503
DIAMOND SHAM. NAUER 1-6	NE NW SW 6-5S-26W	0.898	70	1145	19	1.3116	2.0890	4787	2872
% JONES ETAL. SHIMEK #1	NE NE SW 10-5S-26W	1.2	60	1210	17	1.4253	2.3867	4190	2514
FELMONT OIL DIEDERICH 11-1	SW SW SW 11-5S-26W	1.24	66	1245	10	1.2734	1.9935	5016	3010
MURFIN DRLG. WOLF #1	NE NE SW 21-5S-26W	0.85	111	1734	15	1.6547	3.0491	3280	1968
DIAMOND SHAM. DWYER 1-26	NE SW 26-5S-26W	0.95	74	1140	15	1.2790	2.0072	4982	2989
DIAMOND SHAM. MUMM 1-26	SW SE NW 26-5S-26W	1.17	55	1110	22	1.5195	2.6487	3775	2265
W.B. CLEARY SHEARER #1	NE NE SE 1-5S-27W	0.61	100	1120	25	1.5121	2.6275	3806	2284
% CONT. OIL FEELY #3	SE NE SW 2-5S-27W	0.6	83	1210	18	0.9903	1.3541	7385	4431
% EMPIRE DRLG. GREEN #1	NW NW NW 8-5S-27W	1.2	87	1500	14	1.8059	3.5315	2832	1699
	NW NW NE 11-5S-27W	0.72	83	1200	23	1.4020	2.3240	4303	2582
% CONT. OIL DOEPERICK #1	NW NE NW 11-5S-27W	0.825	80	1160	16	1.2329	1.8947	5278	3167
RAINS & WILL. GELLISPIE #1	NW NW 14-5S-27W	0.72	76	1330	22	1.2473	1.9294	5183	3110
% R.W. SHIELDS M-FEELY #1	NW SW SW 14-5S-27W	1.05	60	1320	18	1.2866	2.0262	4935	2961
% R.W. SHIELDS M. FEELY #1	SE SE SE 15-5S-27W	0.765	62	1335	15	0.8745	1.1269	8874	5324
% HARRY GORE HAROLD #1	SW SW SW 20-5S-27W	1.8375	60	1450	-18	0.6899	0.8053	12418	7451
% HARRY GORE WELTER #1	NE NE SW 22-5S-27W	2.175	68	1335	-22	0.8001	0.9914	10087	6052
% R.W. SHIELDS DAMLEY #1	NW NW NW 23-5S-27W	1.35	45	1265	-8	0.5447	0.5869	17037	10222
% R.W. SHIELDS DANLEY #2	NW SW NW 23-5S-27W	0.825	94	1150	-14	0.5309	0.5676	17617	10570
% CONT. OIL GILLESPIE #2	SW SW NE 34-5S-27W	1.1625	83	1200	12	1.5740	2.8065	3563	2138
EMPIRE OIL MARCUSON #1	SW SW 4-5S-29W	0.87	110	1500	-20	0.5354	0.5740	17422	10453
CITIES SERVICE GRONEWEG A-1	SW NW SW 7-5S-29W	1.24	74	1670	-25	0.4499	0.4604	21718	13031
NELSON PET. EVERET SHULER #1	NE SW NE 29-5S-29W	1.8	60	1700	-24	0.5582	0.6059	16505	9903
CITIES SERVICE EMIGH A-1	SW NW SW 30-5S-29W	0.74	112	1565	-12	0.6024	0.6701	14922	8953
% E.K. CAREY WACHENDORFER #1	NE NE SW 35-5S-29W	0.975	75	1485	-15	0.4949	0.5188	19275	11565
DIAMOND SHAM. STOVER 1-19	SW NE 19-5S-30W	1.46	82	1750	-26	0.5646	0.6151	16258	9755
DIAMOND SHAM. McWILLIAMS #1	NE SW 19-5S-30W	0.638	82	1870	-23	0.2727	0.2582	38735	23241
CITIES SERVICE SCHMAHL A-1	SW SE SW 22-5S-30W	1.65	54	1705	-19	0.5481	0.5916	16904	10142
CITIES SERVICE SCHULER #1	SW SE NE 25-5S-30W	0.6	112	1755	-13	0.4738	0.4911	20361	12217
% BRG ADBLEMAN #1	NE NE SE 28-5S-30W	0.975	70	1645	-12	0.5135	0.5439	18387	11032

COUNTY: GOVE

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CITIES SERVICE FLORA C-1	E/2 NE NE 3-11S-26W	0.47	74	1130	50	2.0155	4.2619	2346	1408
% VIRGINIA OIL NEHER #1	NW NW SW 27-11S-26W	0.495	74	1075	70	4.1301	16.0460	623	374
CINCO EXPL. HARTMAN #1	SE NW 5-11S-28W	1.2	54	1375	20	1.4278	2.3937	4178	2507
CINCO EXPL. GILLESPIE A-1	SW 14-11S-29W	1.2	75	1365	25	2.2649	5.2268	1913	1148
JOHN FARMER DICKMAN #1	NE NW 5-11S-30W	2.31	84	1530	30	5.6783	30.5037	328	197
OLYMPIC PET. SIDLES #1	NW NE 18-11S-30W	0.48	76	1510	32	1.1494	1.6985	5887	3532
SUNBURST EXPL. MELLON #1	SE NE NE 8-11S-31W	1.04	70	1610	45	3.5205	11.7721	849	510
RITCHIE EXPL. RODIE #2	S/2 SW SE 15-11S-31W	1.35	76	1470	34	3.4557	11.3616	880	528
DRIELING LIMITED WIELAND #1	NW NE SE 21-11S-31W	1.2	89	1505	31	3.2181	9.9264	1007	604
JOHN FARMER WALDMAN #1	NE NE 6-12S-27W	0.62	58	1000	50	2.1453	4.7509	2105	1263
CINCO EXPL. JOHNSON #1	NE NW 21-12S-27W	1.22	63	1005	22	1.7936	3.4908	2865	1719
TIDEWATER OIL E.M. BLARE #1	NE SE 23-12S-29W	0.92	65	1090	58	4.5785	19.6831	508	305
HPB PROD. HEIER C #2-12	SW NW SW 2-12S-30W	1	67	1185	23	1.6006	2.8855	3466	2079
S&C DRLG. BEGAUGHER B-1	NW SW 16-12S-30W	0.99	80	1285	22	1.7996	3.5104	2849	1709
GUINN INVES. TURNER #2	SE 27-13S-26W	1.09	85	875	35	3.2603	10.1734	983	590
GUINN INVES. TURNER #1	SE 27-13S-26W	1	96	905	47	4.9908	23.4156	427	256
CITIES SERVICE STEWART #1	NE NE 36-13S-26W	0.563	45	765	68	2.8754	8.0460	1243	746
CINCO ENERGY MENDENHALL #1	SW NE NE 28-13S-28W	1.1	64	905	32	2.2937	5.3448	1871	1123
LOVE OIL PRIEFERT #1	NW NW NE 29-13S-29W	1.17	79	1060	30	2.7539	7.4315	1346	807
TXO OTTLEY #1	SE 9-13S-30W	1.28	69	1140	30	2.6555	6.9536	1438	863
MURFIN DRLG. DOWNWARD #1	NW NW NW 21-13S-30W	0.7	115	1300	45	3.8077	13.6916	730	438
O.A. SUTTON STECKEL #1	NW SE SE 23-13S-30W	0.99	115	1290	23	2.6098	6.7376	1484	891
FALCON EXPL. STECKEL #1	W/2 SW SW 23-13S-30W	0.667	78	1290	48	2.7894	7.6082	1314	789
TXO TEETER #1	SW 25-13S-30W	2.2	47	1125	37	4.0852	15.7048	637	382
R. GOODIN TRUST TEETER #2	SE SW SE 26-13S-30W	1.16	86	1120	27	2.6694	7.0201	1424	855
FALCON EXPL. WESLEY #2	NW NW NW 26-13S-30W	1.1	78	1095	28	2.3925	5.7613	1736	1041
FALCON EXPL. R & M #5	NE NW SE 27-13S-0W	1.17	73	1015	32	2.7406	7.3662	1358	815
RAYMOND OIL ROHR #1	E/2 NE NE 35-13S-30W	1.35	70	1075	34	3.2460	10.0893	991	595
GETTY OIL LONG #2	N/2 NW NW 15-14S-27W	0.32	64	710	70	2.3977	5.7836	1729	1037
STRATEGIC PET. BEESLEY #1-29	NW SE NE 29-14S-28W	0.9	80	750	7.5	1.0184	1.4123	7081	4248
APEX OPER. WEBB 32-12	NW 32-14S-28W	0.825	82	695	17	1.3137	2.0944	4775	2865

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STRATEGIC PET. BEASLEY 1-12	NE SW SW 12-14S-29W	0.915	84	1025	22	1.7494	3.3467	2988	1793
MURFIN DRLG. COBERLY #1	NE NE SW 9-14S-29W	0.51	112	1050	52	3.4497	11.3238	883	530
% JONES ETAL. BEASLEY #1	SW SW SW 13-14S-29W	0.5625	75	1090	70	4.7467	21.1605	473	284
VOYAGER PET. COBERLY #14-15	NE SW SE 14-14S-29W	0.65	89	1105	48	3.0969	9.2362	1083	650
CITIES SERVICE SHAW #1	NW NW SE 15-14S-29W	0.345	96	985	85	6.0662	35.0010	286	171
ALLEN DRLG. FOOS #1-27	E/2 NE SE 27-14S-29W	1.1	68	985	45	3.7238	13.1135	763	458
% CITIES SERVICE LUNGREN #1	NW 27-14S-29W	0.585	84	995	57	3.5805	12.1590	822	493
% COBERLY ETAL. LUNGREN #1	SW NE 30-14S-29W	1.08	86	1020	35	3.2497	10.1113	989	593
% WESTGATE GREENLAND BENSON #1	NE NW 6-14S-30W	1.275	70	1300	42	3.9611	14.7849	676	406
VOYAGER PET. THEIS 35-4	SW NW NW 35-14S-31W	0.73	79	850	48	3.1516	9.5443	1048	629
SOURCE PET. BABCOCK #1	SE NW SE 33-15S-26W	0.682	74	955	40	2.1146	4.6326	2159	1295
SOURCE PET. BABCOCK E-1	NW SW 33-15S-26W	0.62	80	885	45	2.4463	5.9953	1668	1001
EMPIRE DRLG. BABCOCK #2	NE. SW 33-15S-26W	2.95	75	785	8	3.1981	9.8105	1019	612
ENERGY 3 MENDENHALL #1	SW NW NW 5-15S-27W	1.14	56	655	43	3.0733	9.1052	1098	659
ENERGY 3 MENDENHALL #3	NE SW NW 5-15S-27W	1.06	75	655	44	3.8497	13.9859	715	429
HILL CO.EXPL. COBERLY 1-7	NE SW NE 7-15S-27W	1.43	72	655	45	5.1736	25.1934	397	238
AMERICAN ENERGIES OWEN D-1	SW SE NW 18-15S-27W	0.45	65	555	52	1.8857	3.8010	2631	1579
BEREXCO SARALEE #1	SE SE NE 28-15S-27W	0.63	86	530	40	2.2809	5.2923	1890	1134
ANDERSON ENERGY CURTIS #1	SE NE SE 36-15S-29W	1.875	70	860	10	2.0389	4.3477	2300	1380
LEBSACK OIL HANNA #1	NW NW NE 10-15S-29W	0.68	73	645	45	2.4925	6.2005	1613	968
ABERCROMBIE MILLER B 5-14	N/2 NE NE 14-15S-29W	1.35	55	615	36	2.8357	7.8425	1275	765
AMERICAN ENERGIES FULLMER A-1	SW NW SE 24-15S-29W	1.275	61	630	21	1.7747	3.4289	2916	1750
NAT. PET. RES. ZIEGENBALG #1	NE NE NW 1-15S-30W	1.8	65	985	38	4.6349	20.1722	496	297
NAT. PET. RES. RIEMER #1	SE SE SE 22-15S-30W	0.85	84.5	795	38	2.8028	7.6757	1303	782
LANDMARK EXPL. HUCK 1-31	SE 31-15S-30W	1.125	66	850	19	1.5659	2.7827	3594	2156
McALESTER FUEL THEIS A-1	SE SW 4-15S-31W	0.472	68	895	40	1.3579	2.2079	4529	2718

COUNTY: GRAHAM

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RITHCIE EXPL. C.BAUGHMAN #1	NW SW SW 30-6S-23W	1.8	72	1035	13	2.2148	5.0244	1990	1194
RITCHIE EXLP. SUNDAY #1	NE SW SE 30-6S-23W	0.825	80	995	8	0.9475	1.2679	7887	4732
DYCO PET. WALTERS #1	E/2 SW 32-6S-23W	0.91	76	1115	21	1.5319	2.6842	3725	2235
% ANDERSON OIL DEITZ #1	SW SW SW 34-6S-23W	1.05	80	1105	15	1.5193	2.6482	3776	2266
% MUSGROVE PET. LOGUE #1	NW NW NE 8-6S-24W	1.125	85	1105	27	2.5619	6.5154	1535	921
% HARRY GORE BELL #1	SW SW NW 14-6S-24W	1.35	86	1200	20	2.4602	6.0569	1651	991
N-B COMPANY KLEIN #1	NW SE SE 19-6S-25W	1.425	65	1285	9	1.3960	2.3081	4333	2600
% TRANS-ERA PET. BRADLEY #1	SW NW NE 19-6S-25W	1.35	52	1210	12	1.1965	1.8079	5531	3319
% EMPIRE DRLG. JOHNSON #1	NW NW SE 19-6S-25W	1.425	54	1125	15	1.4437	2.4369	4104	2462
% HERNDON DRLG. JEFFREY #1	SE SE NW 29-6S-25W	1.305	77	1115	15	1.8228	3.5876	2787	1672
% PET. INC. CARVER #1	SE SE NW 33-6S-25W	0.975	84	1135	28	2.2683	5.2404	1908	1145
% DAN KORNFELD ZOHNER #1	SW SW SW 10-7S-24W	3.225	45	1060	7	2.1368	4.7178	2120	1272
% EMPIRE OIL ZOHNER #1	SW SW SW 10-7S-24W	1.275	78	1160	18	1.9888	4.1648	2401	1441
% PET INC. KOBLER #1	SW SW SW 17-7S-24W	1.425	70	1170	3	1.2258	1.8775	5326	3196
% K & E DRLG. HYDE #1	SE SE SE 19-7S-24W	1.305	60	1120	22	1.8317	3.6173	2765	1659
PET INC. MOORE D-1	NW NE 20-7S-24W	1.06	63	1260	24	1.6558	3.0524	3276	1966
% EMPIRE DRLG. GOODARD #1	NW SW NW 21-7S-24W	1.05	110	1125	8	1.6213	2.9474	3393	2036
% VEEDER ET.AL. GRISSWELL #1	SW NE SE 22-7S-24W	1.275	80	1240	15	1.8414	3.6500	2740	1644
BHP PET. SHOEMAKER #1	NW SE SW 27-7S-24W	1.35	65	1060	17	1.7277	3.2772	3051	1831
DUNNE OIL #1-30 GODDARD	S/2 SE SW 30-7S-24W	1.8	70	1085	4	1.6009	2.8863	3465	2079
DUNNE OIL #1 CUMMINGS	NE NW 31-7S-24W	0.48	100	1160	22	1.0764	1.5359	6511	3907
DUNNE OIL #2-31 CUMMINGS	E/2 NW 31-7S-24W	0.58	84	1145	31	1.4897	2.5644	3900	2340
% HARRY GORE CAREY #1	NW NW NE 2-7S-25W	0.69	88	1100	27	1.6229	2.9522	3387	2032
SCARTH OIL LINDENMAN #1	W/2 NW NE 5-7S-25W	2	63	1275	10	1.9687	4.0924	2444	1466
% TEXAS CO. LINDENMAN #1	NE NE SE 5-7S-25W	1.05	34	1080	35	1.3857	2.2809	4384	2631
% PEEL & HARDMAN SHUGHART #1	SW SW NW 8-7S-25W	1.65	62	1070	16	1.9570	4.0507	2469	1481
% MURFIN DRLG. BARNETT #1	SE SW SW 16-7S-25W	1.275	92	1070	55	7.9142	61.7598	162	97
ROBERT MYERS MYERS-BROWN #4	NW NE NW 17-7S-25W	2.625	74	1085	-10	1.5445	2.7205	3676	2205
% ROBERT SHIELDS GOODROW #1	W/2 NW NE 20-7S-25W	1.8	68	1200	30	3.6787	12.8085	781	468
% CITIES SERVICE BLAZIER #5	SW SW SE 21-7S-25W	1.125	80	1160	40	3.7181	13.0749	765	459
% CITIES SERVICE BLAZIER #2	SE-NW-SE 21-7S-25W	1.125	83	1145	40	3.8489	13.9800	715	429

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% CITIES SERVICE BLAZIER #1	NE SW SE 21-7S-25W	1.02	90	1200	42	4.0103	15.1457	660	396
% CITIES SERVICE VANCE #4	NE NW SW 21-7S-25W	1.125	71	1115	43	3.6868	12.8631	777	466
% CITIES SERVICE VANCE #3	SW NE SW 21-7S-25W	1.1475	80	1090	50	5.2965	26.4307	378	227
% C&G DRLG. LINDERMAN #1	SW SW SE 23-7S-25W	1.5	55	1150	30	2.5362	6.3976	1563	938
% HERNDON DRLG. KEITH #1	NW NW SE 24-7S-25W	1.275	68	1175	25	2.2103	5.0065	1997	1198
% CITIES SERVICE MAUPIN #1	NE NE NW 28-7S-25W	1.05	84	1175	38	3.3961	10.9909	910	546
% CITIES SERVICE McFADDEN B-2	SW NE NE 28-7S-25W	0.9	70	1115	47	3.3238	10.5516	948	569
% CITIES SERVICE McFADDEN B-3	NE 28-7S-25W	1.05	73	1125	40	3.1945	9.7900	1021	613
% CITIES SERVICE McFADDEN B-4	SE NE 28-7S-25W	0.9075	75	1140	35	2.3973	5.7821	1729	1038
% CITIES SERVICE McFADDEN B-1	SW NW NW 27-7S-25W	1.2	80	1105	40	3.9743	14.8811	672	403
KAISER FRANCIS WELTY #1	SE NW SE 2-8S-24W	0.65	104	1075	23	1.5660	2.7831	3593	2156
% HALL & JONES GOFF #1	NW NW SW 3-8S-24W	0.9	64	1075	20	1.2542	1.9462	5138	3083
% HALL ET.AL. PARKS #1	SE NE NW 4-8S-24W	0.9	64	955	16	1.1004	1.5886	6295	3777
% PRIME OIL GODDARD #1	SE SE SE 7-8S-24W	1.725	35	950	10	1.0197	1.4149	7068	4241
% PEEL HARDMAN STINEMETZ #1	SW SW SE 17-8S-24W	0.87	70	1030	40	2.5566	6.4910	1541	924
% EMPIRE DRLG. SMITH D-1	SE NE SE 18-8S-24W	0.945	61	1050	35	2.0752	4.4831	2231	1338
% NCRA RUTHERFORD #1	SW SW SW 21-8S-24W	2.1	45	920	20	2.1471	4.7578	2102	1261
MERIT ENERGY GATES 1-25	NW SE SW 25-8S-24W	0.95	62	1145	30	1.7885	3.4741	2878	1727
BURCH EXPL. KEITH #2	NW SE NE 29-8S-24W	1.8	65	1125	18	2.3786	5.7017	1754	1052
BURCH EXPL KEITH #2	SE SE NE 29-8S-24W	1.2	75	1120	28	2.5159	6.3058	1586	952
TEXACO HOLLEY UNIT 2-7	W/2 NW SW 30-8S-24W	1.2	63	1025	40	3.2054	9.8528	1015	609
% HERNDON DRLG. McKINLEY #1	NE NE SE 31-8S-24W	0.57	60	970	54	2.3258	5.4783	1825	1095
% HERNDON DRLG. McKINLEY #2	NE SE SE 31-8S-24W	0.48	70	990	52	2.1049	4.5956	2176	1306
THEODORE GORE ROSS #2	SE SE 35-8S-24W	0.33	105	1005	58	2.5696	6.5510	1526	916
ARNTEL CO. FOX ESTATE #1	NW NW NE 1-8S-25W	0.64	108	1135	16	1.2656	1.9742	5065	3039
% TRANS ERA HURLBUT #1	NE NE SE 5-8S-25W	0.975	92	1040	17	1.7177	3.2456	3081	1849
% TRANS ERA DAVIS #1	SW SW SE 6-8S-25W	1.425	85	1040	33	3.9666	14.8250	675	405
% CHAMPLIN McFADDEN #1	SE SE SE 9-8S-25W	1.125	73	1070	22	1.8884	3.8103	2624	1575
% EMPIRE DRLG. COVALT #1	NW NW NE 13-8S-25W	1.35	62	1165	40	3.5355	11.8681	843	506
% NCRA PEOPLES BANK #1	N/2 NW NW 15-8S-25W	0.9	77	1155	24	1.6920	3.1645	3160	1896
% CHAMPLIN PAXSON #1	NE NE NE 16-8S-25W	1.275	60	1200	21	1.7285	3.2799	3049	1829

COUNTY: GRAHAM

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OPERATOR/ WELL NAME	LOCATION	Rmf	Rmf Temp	Form Depth	SSP	Rwe @ 77	Rw @ 77	SC @ 77	Est. TDS
% TEXAS CO. MADDEN-DAVIS B-1	NE NW SE 17-8S-25W	0.72	86	970	32	1.9641	4.0760	2453	1472
% TEXAS CO. MADDEN-DAVIS B-1	SW SE NE 17-8S-25W	0.75	73	935	30	1.6477	3.0276	3303	1982
% TENNESSEE GAS SCHMEID B-2	N/2 N/2 NE 20-8S-25W	0.75	76	985	30	1.7072	3.2124	3113	1868
% C. U. BAY SCHMEID C-3	NW NW NW 21-8S-25W	1.0125	79	940	29	2.3131	5.4254	1843	1106
% C. U. BAY SCHMEID C-2	N/2 N/2 NW 21-8S-25W	0.75	85	945	36	2.3138	5.4282	1842	1105
CAMBRIA CORP. MOWRY #1	NW SW SW 22-8S-25W	0.9	75	1010	28	1.8925	3.8244	2615	1569
% JAY BERGMAN MINIUM #1	NW SE NW 26-8S-25W	1.5	70	1030	27	2.8631	7.9824	1253	752
CAMBRIA CORP. CULLEY #1	W/2 SW NE 28-8S-25W	1.6	44	1065	22	1.7095	3.2197	3106	1864
ROCK ISLAND STEPENSON #1	SW SW 29-8S-25W	0.787	68	1140	32	1.7214	3.2572	3070	1842
% MAMMOTH PROD. RICHMEIER #1	SE SW SE 35-8S-25W	1.1625	75	1130	42	3.8729	14.1499	707	424
VENTURE RES. KEITH #2	NE NE NW 2-9S-24W	0.474	80	1120	51	2.2582	5.1995	1923	1154
% HERNDON DRLG. HOLLEY #1	SW SW NW 3-9S-24W	0.825	76	1040	27	1.6973	3.1813	3143	1886
% EMPIRE DRLG. KEITH #1	SW SW SW 3-9S-24W	0.975	67	1195	20	1.4131	2.3538	4248	2549
% CHAMPLIN KEITH #4	SE NE SE 4-9S-24W	0.9	76	1115	25	1.7296	3.2835	3046	1827
% CHAMPLIN KEITH #3	SE SW SE 4-9S-24W	0.9	60	1000	25	1.3991	2.3164	4317	2590
% CHAPMLIN KEITH #7	SE SE NE 4-9S-24W	0.675	80	1115	23	1.2728	1.9919	5020	3012
% CHAMPLIN KEITH #6	NW NE SE 4-9S-24W	1.05	62	1230	15	1.2020	1.8209	5492	3295
% CHAMPLIN G. KEITH #1	NW NE NW 4-9S-24W	0.75	76	1070	27	1.5418	2.7128	3686	2212
% EMPIRE DRLG. WAITE #1	NW NW NW 5-9S-24W	0.93	50	1130	28	1.3533	2.1960	4554	2732
% HERNDON DRLG. KEITH #4	NE NW NE 9-9S-24W	0.9	74	1215	17	1.2930	2.0422	4897	2938
% HERNDON DRLG. KEITH #1	NE NE NE 9-9S-24W	0.75	78	1215	14	1.0242	1.4243	7021	4212
% HERNDON DRLG. KEITH #2	SW NE NE 9-9S-24W	0.8175	72	1190	21	1.3077	2.0793	4809	2886
% HERNDON DRLG. KEITH #5	NW SE SE 9-9S-24W	0.525	82	1195	30	1.2740	1.9950	5012	3007
% SUNRAY M. CLARK #1	NW NW NE 10-9S-24W	1.125	82	1155	32	2.9201	8.2786	1208	725
% NCRA KEITH #5	SE NE NW 10-9S-24W	0.825	84	1080	22	1.5755	2.8109	3558	2135
% NCRA KEITH #2	SE NW NW 10-9S-24W	0.69	72	1235	22	1.1398	1.6767	5964	3578
ENERGY THREE SPROUL #1	SW NW SW 36-9S-24W	0.831	54	1125	53	2.9618	8.4995	1177	706
DIAMOND SHAM. OPAL MINIUM #1	NW NW NE 4-9S-25W	0.78	84	1290	45	3.1641	9.6154	1040	624
CROWN AMERICAN JOHNSON #1	SW NW NW 5-9S-25W	1.28	70	1315	40	3.7210	13.0946	764	458
BEACON EXPL. FLY 1-8	SE NW NE 8-9S-25W	1.85	60	1355	24	2.7596	7.4600	1340	804
BEACON EXPL. McGRATH 1-9	SE NW 9-9S-25W	1.05	74	1240	40	3.2205	9.9406	1006	604

COUNTY: GRAHAM

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% KEATING DRLG. MINIUM #1	SE SE SW 15-9S-25W	0.9	68	1200	43	2.8259	7.7922	1283	770
% JULIAN ET.AL. WAGGONER C-1	SE NE SE 23-9S-25W	0.375	53	1225	60	1.6480	3.0284	3302	1981
ALLEN DRLG. ROME 1-27	SE SW NW 27-9S-25W	0.713	68	1235	60	3.9175	14.4689	691	415
% LEBEN DRLG. HUNSINGER #1	NW NW NW 29-9S-25W	0.36	90	1235	52	1.9660	4.0828	2449	1470
EMPIRE DRLG. BRUNGARDT #1	E/2 NE 32-9S-25W	0.188	80	1120	60	1.2066	1.8317	5460	3276
EMPIRE DRLG. RICHMEIR #1	SW 7-10S-24W	0.4	65	1155	88	5.3500	26.9809	371	222
STABB ENERGY A. HERMAN #1	NW SE SW 9-10S-24W	0.36	76	1205	45	1.3365	2.1524	4646	2788
DONALD SLAWSON HOBBS #2	NE NE NE 19-10S-24W	0.7	66	1075	60	3.7774	13.4809	742	445
% WICKS PET. HANNAH #1	E/2 NW 30-10S-24W	1.125	71	1080	50	4.6562	20.3583	491	295
ABERCROMBIE HOBBS #1	NW SW 31-10S-24W	0.975	65	1120	35	2.2621	5.2154	1917	1150
NORWOOD OIL RUDER #2	E/2 NW SW 36-10S-24W	1.3	71	1020	40	3.8714	14.1397	707	424
DCF EXPL. RUDER #1	NE SW 34-10S-24W	1.087	62	900	44	3.2856	10.3233	969	581
EMPIRE DRLG. RICHMEIER #1	NW NW 1-10S-25W	0.205	105	1125	47	1.1018	1.5915	6283	3770
% CHAMPLIN McGUIRE #1	NW NW NW 8-10S-25W	0.675	85	1150	32	1.8115	3.5501	2817	1690
EMPIRE DRLG. REIDEL #1	NW SE NW 9-10S-25W	0.29	108	1065	60	2.4695	6.0981	1640	984
EMPIRE DRLG. KNOLL B-4	NE NW NE 10-10S-25W	0.38	105	1040	42	1.7367	3.3059	3025	1815
HERNDON DRLG. PFEIFER B-1	SE NE NW 14-10S-25W	0.4	107	1225	70	4.6545	20.3433	492	295
HERNDON DRLG. PFIEFER A-5	NW SE NE 15-10S-25W	0.54	103	1190	68	5.6881	30.6132	327	196
% EMPIRE DRLG. KRUG B-1	SE SE NW 20-10S-25W	0.435	62	1120	65	2.6110	6.7434	1483	890
MURJO OIL KINDERKNECHT #1	SW NE SE 3-10S-25W	0.9	60	980	35	1.9517	4.0319	2480	1488

COUNTY: LOGAN

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OPERATOR/ WELL NAME	LOCATION	Rmf	Rmf Temp	Form Depth	SSP	Rwe @ 77	Rw @ 77	SC @ 77	Est. TDS
SOLAR PET. STEINLE #1	NE SW NE 1-11S-32W	1.43	62	1455	30	2.6688	7.0171	1425	855
GROSS PET. HEYEN #1	SE NW SW 5-11S-32W	0.575	71	1465	40	1.6839	3.1392	3186	1911
GRUENERWALD SWART #1	NW NW NW 12-11S-32W	0.81	113	1500	40	3.6483	12.6057	793	476
PETEX INC. ZERR #3	SW SE SW 18-11S-32W	0.473	75	1380	56	2.4718	6.1080	1637	982
% GRUENERWALD MUEHLENKAMP 1	SW SW NW 26-11S-32W	1.2	49	1670	36	2.1953	4.9467	2022	1213
TOTO GAS MARKIN #1	NW SE 33-11S-32W	1.3	76	1605	40	4.0308	15.2972	654	392
ABERCROMBIE EHRLICH #1	S/2 NE NE 25-11S-33W	0.675	62	1605	48	2.2580	5.1985	1924	1154
FIRST ENERGY BERTRAND 63-26	NE SW NE 26-11S-33W	0.258	67	1405	60	1.3853	2.2796	4387	2632
FIRST ENERGY KRONYALL 43-4	NE SE 4-11S-36W	0.136	57	1705	68	0.8055	1.0010	9990	5994
U.S. SIGNAL OIL 71 COLLINS #1	NW NW 34-11S-37W	0.15	69	1460	70	1.1447	1.6878	5925	3555
ABERCROMBIE OPAL HAYS #1	SW NE SE 31-12S-33W	0.41	72	1490	55	1.9860	4.1546	2407	1444
TOTO ENERGY EATON #1	SW NW 24-13S-32W	0.28	90	1400	90	5.2840	26.3036	380	228
FIRST ENERGY NUSS FARMS 44-35	SE SE NE 35-13S-32W	0.25	72	1110	105	6.4682	40.0552	250	150
PET INC. GANEY AU #1	S/2 SE NE NW 9-13S-33W	0.369	91	1640	63	2.8581	7.9570	1257	754
CONTINENTAL OIL CHRISTY #1	SW SW SW 34-14S-32W	0.2295	64	815	90	3.3299	10.5879	944	567
		0.2295	64	1170	60	1.1979	1.8112	5521	3313
HOLDEN ENERGY #23-1 DIRKS	SE NW SE 23-14S-35W	0.614	50	1160	50	1.8480	3.6724	2723	1634
CITIES SER. NEUNSCHWANDER A-1	SW NE SW 28-14S-36W	0.19	74	1275	80	2.1752	4.8676	2054	1233
FIRST ENERGY STRODE #14(40)-2	SW SW 2-15S-32W	0.195	81	1025	55	1.0781	1.5396	6495	3897
CITIES SERVICE PLUMMER A-1	NW NW NW 22-15S-34W	0.47	65	1205	75	4.0749	15.6274	640	384
CHOLLA RES. ROBINSON FARM 1-15	SW 15-15S-34W	0.3	72	935	70	2.4641	6.0740	1646	988

COUNTY: NORTON

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OPERATOR/ WELL NAME	LOCATION	Rmf	Rmf Temp	Form Depth	SSP	Rwe @ 77	Rw @ 77	SC @ 77	Est. TDS
KODIAK PET. GRAHAM # 23-13	SW SW SW 23-1S-21W	1	82	1085	-28	0.3561	0.3479	28747	17248
		1	82	1135	-32	0.3124	0.2996	33377	20026
KODIAK PET. MANGELLI # 1-27	SW SW SW 27-1S-21W	1.2	70	1130	-37	0.2747	0.2602	38431	23059
KODIAK PET. SCHNUERLE #28-15	SE SW NW 28-1S-21W	1.79	78	1045	-31	0.5505	0.5950	16807	10084
% EMPIRE DRLG. ATENS ESTATE 1	SW SE SE 6-1S-22W	0.9	85	915	-18	0.4602	0.4735	21118	12671
% JONES ETAL. GRAMZOW #1	NE NE SW 10-1S-22W	0.825	90	950	-15	0.4918	0.5148	19427	11656
C.N.&G. PROD. CUNDUAN #1-19	SW NE SW 19-1S-22W	1.63	60	1115	-10	0.7930	0.9790	10215	6129
SINCLAIR OIL RORABOUGH #1	NE SW 20-1S-22W	0.87	82	1020	-14	0.4923	0.5154	19402	11641
% C-G DRLG. KINDALL #1	NE NE NE 31-1S-22W	0.75	92	1195	-15	0.4579	0.4707	21247	12748
FREDERICK OIL BALLINGER #1	NE SW 14-1S-23W	0.9	60	890	13	0.9404	1.2538	7976	4785
RAYMOND OIL SAVER #1	SW NW 31-1S-23W	0.81	70	970	18	1.1480	1.6953	5898	3539
% GREAT LAKES MINSHALL #1	SE SE SE 35-1S-23W	1.47	85	1025	-12	0.9190	1.2120	8251	4950
SUNBURST EXPL. McKINLEY L-1	NW NW SW 1-1S-24W	0.213	80	915	52	1.0597	1.4997	6668	4001
SUNBURST EXPL. McKINLEY X-1	NE NE NE 14-1S-24W	0.46	69	1025	35	1.1303	1.6553	6041	3625
EMPIRE DRLG. BROWN #1	SE SW SW 34-1S-24W	1.3	58	1050	20	1.6588	3.0616	3266	1960
HELBERG OIL COZAD #1	NE SE 7-1S-25W	0.97	70	960	-7	0.5987	0.6646	15047	9028
BRITISH OIL ERVIN #1	NE NE 13-1S-25W	0.78	74	890	12	0.9536	1.2800	7813	4688
CHAMPLIN OIL RAILSBACK #1	NW NE 15-1S-25W	1.37	64	975	7	1.2416	1.9155	5220	3132
BRITISH-AM. OIL MEYER C-1	SE NE 24-1S-25W	0.58	100	960	18	1.1434	1.6850	5935	3561
BRITISH-AM. OIL YUNT #1	NW NW 25-1S-25W	0.91	70	925	20	1.3796	2.2647	4416	2649
CINCO EXPL TEMPLE #1	NE NW 28-1S-25W	1.49	61	1020	14	1.6309	2.9765	3360	2016
PUBCO. PET. DROMMER # 16-13	SW SW 16-2S-22W	0.7	64	1005	12	0.7488	0.9027	11078	6647
EMPIRE DRLG. BROOKS #1	SE SE NW 19-2S-22W	1.38	40	995	15	1.0780	1.5394	6496	3898
D & D DRLG. BROWN #1	SW SW SW 5-2S-23W	0.6	75	920	20	0.9689	1.3108	7629	4578
% EMPIRE DRLG. WALLACK #1	NW NW NE 9-2S-23W	1.05	75	950	12	1.2987	2.0564	4863	2918
% JONES ETAL. ANDERSON B-1	NW NW NW 18-2S-23W	1.05	60	1000	21	1.4292	2.3973	4171	2503
EMPIRE DRLG. McMILLEN #1	NE NE NE 19-2S-23W	0.82	67	985	20	1.1932	1.8001	5555	3333
SLAWSON GREEN # 1-25	NE NW SW 25-2S-23W	0.74	72	955	15	0.9741	1.3212	7569	4541
% JONES ETAL. CITY OF NORTON #1	NE NE SE 27-2S-23W	0.9	65	895	5	0.7742	0.9462	10569	6341
% JONES ETAL. CHASE #1	SE SE NW 2-2S-24W	0.8748	80	980	20	1.4974	2.5860	3867	2320
SINCLAIR OIL THIELE #1	NE NW NE 20-2S-24W	0.72	84	1030	18	1.2053	1.8286	5469	3281

COUNTY: NORTON

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% JONES ETAL. SIDMAN #1	SW SW NW 26-2S-24W	0.75	80	1000	18	1.2008	1.8180	5501	3300
McLISH ETAL. MILLER #1	SE NW 31-2S-24W	0.76	70	1040	22	1.2285	1.8841	5308	3185
% READING & BATES LeCOUNT #1	SE NW 1-2S-25W	1.5	64	985	-10	0.7726	0.9433	10601	6361
% JONES ETAL. HANSEN #1	SE SE SE 9-2S-25W	0.9	76	1095	-13	0.4914	0.5142	19450	11670
SAUVAGE DRLG. PRESTON #1	NW NW 23-2S-25W	0.85	61	1020	13	0.9000	1.1753	8508	5105
CITIES SERVICE YOUNG C-1	SW SW NE 35-2S-25W	0.45	106	1040	16	0.8756	1.1291	8857	5314
% CITIES SERVICE HAYS #1	SW SW NE 15-3S-21W	1.05	70	1060	-12	0.5494	0.5935	16850	10110
BRIKWELL OIL HENDERSON #1	SW NW SW 3-3S-23W	1.2	60	820	20	1.5855	2.8404	3521	2112
BARKER EXPL. HENDERSON #1	NW SE SE 4-3S-23W	0.58	85	800	23	1.1647	1.7338	5768	3461
% C-B DRLG. HORESKY #1	NE NE SE 15-3S-23W	1.2	56	975	15	1.2585	1.9567	5111	3066
% JONES ETAL. CAMBELL #1	NE NE NE 17-3S-23W	0.93	75	855	16	1.3159	2.0999	4762	2857
BARKER EXPL. MOODY #1	NE NW NE 22-3S-23W	0.742	81	960	18	1.2025	1.8220	5488	3293
% JONES ETAL. STEWART #1	NE NE NE 26-3S-23W	0.75	72	1060	15	0.9858	1.3450	7435	4461
% K&E DRLG. HORESKY #1	NE NE SW 28-3S-23W	1.125	48	1000	18	1.1369	1.6702	5987	3592
DIAMOND SHAM. SCHULTE 1-33	NE SE NW 33-3S-23W	0.678	84	1110	20	1.2110	1.8422	5428	3257
% TRANS ERA KING #1	SW SW SE 17-3S-24W	1.305	46	990	15	1.1503	1.7006	5880	3528
HUMMON CORP. ALVIN #1	NE NW SW 24-3S-24W	0.84	74	1170	14	1.0936	1.5735	6355	3813
% SAUVAGE & DUNN PORTER #1	SE SE NW 26-3S-24W	0.9	62	1050	20	1.2193	1.8620	5371	3222
% JONES ETAL. BROWN #1	SW SW SW 27-3S-24W	0.9	66	960	17	1.1697	1.7453	5730	3438
DIAMOND SHAM. LEICHLITER #1-8	NE NE NE 8-3S-25W	1.25	51	1105	0	0.7327	0.8756	11421	6852
DIAMOND SHAM. GALLENTINE #1-9	SE NE 9-3S-25W	0.714	60	1140	10	0.6735	0.7791	12835	7701
SINCLAIR OIL ROBBINS #1	SW NE NW 14-3S-25W	0.75	80	1030	19	1.2407	1.9134	5226	3136
LARIO OIL SCHOEN #1	SW NW 16-3S-25W	1.1	67	1055	-10	0.5910	0.6532	15309	9185
% ANDERSON ETAL. BROOKS #1	SE SE SE 17-3S-25W	0.825	92	1090	33	2.4677	6.0901	1642	985
% JONES ETAL. BRUNK #1	SW SW SW 22-3S-25W	1.125	80	950	-12	0.6645	0.7649	13073	7844
SCHERMERHORN OIL SHOEN #1	SW NE 23-3S-25W	0.62	105	1040	23	1.5084	2.6170	3821	2293
% TRANS ERA HUMPHREY #1	N/2 NE NE 25-3S-25W	1.05	76	945	15	1.4526	2.4613	4063	2438
% EMPIRE OIL GRAY #1	SW SE SE 27-3S-25W	1.05	80	970	17	1.6270	2.9645	3373	2024
NAPC ROY SIDES #1	NW SW 3-4S-21W	1.05	80	980	31	2.5907	6.6485	1504	902
% B&R DRLG. KORNFELD #1	SE SE SE 19-4S-21W	1.125	70	810	-10	0.6275	0.7078	14129	8477
MARTIN & KELLER SLEFFEL #1	NE NE 7-4S-22W	0.82	67	1040	28	1.5543	2.7490	3638	2183

COUNTY: NORTON

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CONT. OIL HEMPHILL #1	NE SW 8-4S-22W	0.84	54	1060	20	1.0054	1.3853	7219	4331
IREX CORP. TURNER #1	NE SW NW 20-4S-22W	1.27	80	980	20	2.1738	4.8622	2057	1234
COLORADO OIL FOSS #1	NE NW NW 32-4S-22W	0.75	71	920	38	2.0976	4.5680	2189	1313
% WALTERS DRLG. RIFE #1	SW SW SE 1-4S-23W	1.035	63	875	15	1.2082	1.8355	5448	3269
ALLEN DRLG. REICH #1	NE NE NE 4-4S-23W	1.3	60	1175	12	1.3096	2.0839	4799	2879
IREX CORP. HARTING #1	SW SW NE 16-4S-23W	1.4	82	1050	19	2.3684	5.6584	1767	1060
ANADARKO PROD. ARCHER A-1	NE 17-4S-23W	0.77	71	1080	21	1.2188	1.8607	5374	3225
% HARRY GORE BULLOCK #1	NE NE NW 22-4S-23W	1.38	50	965	7	1.0033	1.3808	7242	4345
W.E. CARL WARD # 1-23	SW SE 23-4S-23W	1.07	83	910	14	1.5537	2.7472	3640	2184
PET. INC. BROWNE #1	NW NW 25-4S-23W	1	78	1020	21	1.7274	3.2763	3052	1831
% SOHIO PET. SCHANDLER #1	NE NE NE 28-4S-23W	0.9	80	975	15	1.3047	2.0717	4827	2896
% GREAT LAKES HENRY #1	NE NE NE 3-4S-24W	0.675	80	965	15	0.9787	1.3304	7516	4510
% TEXAS CO. GLEASON #1	SE SE NE 7-4S-24W	0.975	95	1070	25	2.3064	5.3974	1853	1112
CONT. OIL WILTFONG #1	SW SW SW 9-4S-24W	0.8	67	1200	20	1.1593	1.7213	5809	3486
@ HUMMON VAN DIEST #1	SW NW 24-4S-24W	1.02	65	1015	23	1.5943	2.8666	3488	2093
DIAMOND SHAM. V. HAGER #1-13	SE SW NE 13-4S-25W	1.54	60	1205	12	1.5508	2.7388	3651	2191
DIAMOND SHAM. MINDRUP #1-24	NE SW NW 24-4S-25W	1.44	62	1170	6	1.2253	1.8763	5330	3198
DIAMOND SHAM. HAGER #2-27	SW SE NE 27-4S-25W	0.99	58	1170	22	1.3465	2.1783	4591	2754
% ANSCHUTZ DRLG. ZIERLEIN #1	NW NW SE 36-4S-25W	0.825	82	1025	13	1.1441	1.6866	5929	3557
BENNETT ETAL. ARCHER #1	NW NE SW 8-5S-21W	0.54	89	780	20	1.0241	1.4242	7022	4213
% NADEL & GUSSMAN KEMPER #1	NE NE NE 14-5S-21W	0.72	84	685	14	1.0603	1.5011	6662	3997
D&D OIL WILLIAMS #1	SE SW 21-5S-21W	0.53	102	915	18	1.0653	1.5117	6615	3969
% EMPIRE OIL DEMPER #1	SW SW SW 22-5S-21W	0.825	88	845	16	1.3531	2.1955	4555	2733
% CLIFF TRICE KEMPER #1	NE NE SW 23-5S-21W	0.975	71	820	18	1.4035	2.3281	4295	2577
OSAGE OIL KEMPER #4	S/2 NW SE 23-5S-21W	0.7	102	820	15	1.2749	1.9972	5007	3004
OSAGE OIL KEMPER #2	NE SW SE 23-5S-21W	0.96	105	850	12	1.7255	3.2705	3058	1835
% CITIES SERVICE FINNIGAN #3	SW NE SE 25-5S-21W	0.75	77	870	15	1.0513	1.4817	6749	4050
% PHILLIPS PET. KEMPER #3	SE NE SW 26-5S-21W	1.05	70	960	10	1.1407	1.6787	5957	3574
PHILLIPS PET. WILTROUT #3	NE NW SW 27-5S-21W	0.67	100	845	21	1.4628	2.4895	4017	2410
JOYCELYN & VARN WILTROUT #6	NE NE NE 27-5S-21W	0.44	101	940	25	1.1056	1.6000	6250	3750
% HALL AND STRAIN VOSS #1	NE NE SW 29-5S-21W	0.825	80	980	20	1.4121	2.3513	4253	2552

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% POWELL DRLG. VOSS #1	SW SW SW 31-5S-21W	0.96	58	990	28	1.5998	2.8831	3469	2081
RAYMOND OIL SHELLY #1	NW SW NW 33-5S-21W	0.531	72	970	18	0.7722	0.9426	10609	6365
@ VINCENT OIL STATES #1	N/2 S/2 NE 35-5S-21W	1.44	60	925	14	1.5549	2.7507	3635	2181
% CITIES SERVICE FOX #1	NE SW NE 35-5S-21W	0.885	68	920	20	1.3068	2.0770	4815	2889
% CITIES SERVICE KITKE #9	NE NE NE 35-5S-21W	0.975	52	940	24	1.2923	2.0405	4901	2941
CITIES SERVICE KITZKE #6	NE SW NW 36-5S-21W	0.5	105	850	19	1.0689	1.5196	6581	3948
% CITIES SERVICE KITZKE #5	NE SE NW 36-5S-21W	1.32	42	800	25	1.5061	2.6105	3831	2298
% CITIES SERVICE KITZKE #7	NE NE NW 36-5S-21W	0.645	90	850	23	1.3643	2.2246	4495	2697
% CITIES SERVICE KITZKE #8	SW NW NW 36-5S-21W	0.84	70	950	27	1.6066	2.9034	3444	2067
CITIES SERVICE VEEH #14	NE NW NE 36-5S-21W	0.58	100	915	17	1.1068	1.6027	6239	3744
% HANSEN ETAL. ALLEN #1	SE NE SE 2-5S-22W	0.825	55	785	27	1.2751	1.9977	5006	3004
SUNBURST EXPL. SPROUL D-1	N/2 N/2 SW 5-5S-22W	0.605	76	835	21	1.0242	1.4244	7021	4212
% CITIES SERVICE FREDDE #1	NE NE NE 8-5S-22W	0.6	78	775	28	1.3163	2.1008	4760	2856
HUMMON EXPL. VERNON #1	SW SW NE 9-5S-22W	1.05	68	800	27	1.9636	4.0743	2454	1473
% HARRY GORE VOSS #1	SE NE NE 10-5S-22W	0.975	75	760	13	1.2497	1.9352	5167	3100
CITIES SERVICE ARCHER #1	SE SW SW 12-5S-22W	0.46	105	800	30	1.4215	2.3766	4208	2525
ABERCROMBIE FITZHUGH #1	NW NE 13-5S-22W	1.3	70	750	15	1.6728	3.1049	3221	1932
IREX CORP. RIEMANN #1	NE SW NE 15-5S-22W	0.9	80	780	12	1.1835	1.7774	5626	3376
R.W. SHIELDS HUNTER #1	SW SW NW 22-5S-22W	0.63	106	845	13	1.1124	1.6151	6191	3715
% PEEL & HARDMAN LON #1	NE NE NE 28-5S-22W	1.2	88	875	23	2.4844	6.1642	1622	973
% HARRY GORE LEIDIG #1	SE SE SE 3-5S-23W	0.9	88	875	19	1.6307	2.9757	3361	2016
% EMPIRE DRLG. MAGILL #1	NE NE SE 12-5S-23W	1.05	70	930	20	1.5917	2.8588	3498	2099
% LEBEN DRLG. DELP #1	NW NW SE 14-5S-23W	0.8748	85	760	15	1.3454	2.1756	4596	2758
IREX CORP. RAHJES #1	SE SE SE 26-5S-23W	0.916	78	910	10	1.0993	1.5861	6305	3783
% BURCH ETAL. SCHANDLER #1	SW SE 31-5S-24W	0.7875	60	1050	22	1.1069	1.6029	6239	3743
% HARRY GORE SHEETZ #1	SE SE SE 5-5S-25W	1.05	84	1150	-8	0.7422	0.8915	11217	6730
DIAMOND SHAM. BREDFELT E-1	NE NW 12-5S-25W	1.53	75	1115	11	1.8273	3.6025	2776	1665
DIAMOND SHAMROCK STREIT #1	N/2 SE SE 15-5S-25W	1.15	62	1255	10	1.1160	1.6231	6161	3697
% MUSGROVE PET. HICKERT #1	SW SW NW 25-5S-25W	1.65	75	950	-9	1.0148	1.4047	7119	4272
% BELL OIL GILLEECE #1	SE SE SE 28-5S-25W	0.915	67	1100	17	1.2028	1.8228	5486	3292
K&E DRLG. NOONE #1	SE SW NE 34-5S-25W	0.63	100	1150	25	1.5605	2.7671	3614	2168

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TEX. CO. SPIESS #1	SW SW NW 35-5S-25W	0.72	106	1050	38	2.9062	8.2062	1219	731
K&E DRLG. SPEISS #1	NW NW SW 35-5S-25W	0.87	108	1070	21	2.0326	4.3247	2312	1387

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ABERCROMBIE DRLG. SATTLER #1	NW NE 18-1S-31W	0.73	65	1815	-26	0.2286	0.2147	46571	27943
COLUMBIAN FUEL SOLKO #1	NW SE 18-1S-31W	0.49	115	1750	-28	0.2436	0.2292	43637	26182
EDWIN FOSTER NEIMETH #1	SE NE 20-1S-31W	1.03	73	1720	-38	0.2420	0.2277	43923	26354
FRANK SCHULTZ GRANKE #1	SE SE SW 36-1S-31W	0.85	72	1530	-24	0.3098	0.2968	33691	20215
KIRKMAN ESTATE KOMPUS #1	SW NW 2-1S-32W	1.5	50	1870	-30	0.3268	0.3152	31725	19035
D&D DRLG. HORNIEK #1	NW SE 7-1S-32W	0.53	96	1725	-27	0.2296	0.2156	46374	27824
H.E. BANGERT ETAL. KASTENS #1	NE SW 15-1S-32W	0.545	89	1795	-40	0.1445	0.1395	71697	43018
EDWIN FOSTER WALSH #1	NW SE 15-1S-32W	1.14	67	1755	-30	0.3217	0.3097	32291	19375
SKELLY OIL WICKE #1	SW SW 16-1S-32W	0.56	115	1770	-38	0.2012	0.1891	52869	31721
SKELLY OIL WICKE #1	SE SE SE 17-1S-32W	0.51	114	1775	-27	0.2599	0.2453	40770	24462
EMPIRE DRLG. MUSTERMANN #1	SE SW 19-1S-32W	1.4	65	1850	-22	0.4995	0.5250	19046	11428
SKELLY OIL MEYER A-2	NW SE 19-1S-32W	0.99	55	1825	-30	0.2344	0.2203	45397	27238
SKELLY OIL WILHELM MEYER #1	SE SE NW 20-1S-32W	0.6	110	1735	-32	0.2510	0.2365	42291	25375
GETTY OIL WILHELM UNIT #21	NW SE NW 20-1S-32W	1.8	78	1740	-38	0.4498	0.4603	21725	13035
GETTY OIL WILHELM UNIT #22	S/2 NE SE 20-1S-32W	2.3	61	1955	-34	0.5268	0.5621	17792	10675
GETTY OIL WILHELM UNIT #23	NW SE NE 20-1S-32W	1.5	88	1785	-28	0.5808	0.6384	15664	9398
PHILPOTT OIL REUBER 1-0821	SE NE 21-1S-32W	2.025	61	1720	-40	0.3788	0.3739	26744	16046
BURCH EXPL. REUBER #1	SE SW 28-1S-32W	0.74	64	1800	-24	0.2437	0.2293	43604	26162
SAM HARRISON SIMMINGER #1	NW NE 30-1S-32W	1.12	59	1840	-32	0.2647	0.2501	39984	23990
ANADARKO PROD. KASTENS A-1	SE NE 32-1S-32W	0.53	75	1780	-22	0.2152	0.2020	49497	29698
HOUSTON HYDRO. HORINEK #1	NW NW SW 3-1S-33W	0.55	74	1935	-38	0.1318	0.1291	77488	46493
EMPIRE DRLG. PETERSON #1	SE SE SW 6-1S-33W	0.74	90	1985	-23	0.3456	0.3360	29759	17855
LEBEN DRLG. PETERSON #1	NW NE 8-1S-33W	0.76	116	1865	-39	0.2674	0.2528	39551	23731
DEKALB HORINEK #1	NW NE 10-1S-33W	1.13	65	1760	-31	0.3004	0.2868	34864	20918
EDWIN FOSTER ARENDY #1	SE NE 12-1S-33W	2.01	60	1735	-40	0.3706	0.3645	27437	16462
ANADARKO PROD. KOPRIVA A-1	SW NW 16-1S-33W	1.44	62	1905	-26	0.4330	0.4392	22768	13661
GOLDEN EAGLE REUNITZ 21-1	NW NE NE 21-1S-33W	1.05	85	1795	-37	0.2940	0.2801	35699	21419
DOUBLE R OIL VAP B # 2-1421	E/2 W/2 NE 21-1S-33W	1.2	73	1810	-33	0.3327	0.3217	31085	18651
JAY BOY OIL HOLTHUS #1	SW SE NE 24-1S-33W	2.422	75	1830	-35	0.6455	0.7354	13598	8159
SOURCE PET. RATHER A-1	NW NE SE 24-1S-33W	1.5	65	1865	-38	0.3187	0.3064	32633	19580
DOUBLE R OIL HUSS A #1-427	NW NW NE 27-1S-33W	1.612	73	1820	-28	0.5259	0.5607	17834	10700

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MURFIN DRLG. VAP #1	NW SE 28-1S-33W	0.8	115	1760	-37	0.2969	0.2831	35319	21191
TURNPIKE OIL #10-30 VAP	SW NW SE 30-1S-33W	2.625	70	1835	-38	0.5960	0.6607	15136	9082
MURFIN DRLG. CAHOJ NE. A #1-W	SW 1-1S-34W	0.85	72	1960	-30	0.2576	0.2430	41158	24695
MURFIN DRLG. CAHOJ NE. A #1-W	SW NW 2-1S-34W	0.9	55	2150	-23	0.2692	0.2547	39268	23561
SKELLY OIL CAHOJ #3	SE SW SE 8-1S-34W	0.76	110	1970	-32	0.3201	0.3080	32473	19484
GETTY OIL CAHOJ UNIT #911	NW 9-1S-34W	1.27	73	1910	-30	0.3892	0.3862	25896	15538
GETTY OIL CAHOJ UNIT #922	SE SW SW 9-1S-34W	2.03	54	2145	-34	0.4194	0.4224	23672	14203
SKELLY OIL KISLING #7	NW NW 10-1S-34W	1.02	80	2000	-26	0.3879	0.3846	26004	15602
GETTY OIL CAJOJ UNIT #906	N/2 N/2 NW 10-1S-34W	1.43	60	2150	-33	0.3353	0.3245	30816	18490
GETTY OIL CAHOJ #939	NW NW SW 16-1S-34W	1	102	2165	-35	0.3583	0.3503	28545	17127
		1	102	2270	-40	0.3062	0.2931	34123	20474
GETTY OIL CAHOJ UNIT #946	SE NE SW 17-1S-34W	1.7	79	2200	-66	0.1777	0.1680	59523	35714
GETTY OIL CAHOJ #938	NW NE SE 17-1S-34W	1	104	2165	-36	0.3533	0.3447	29010	17406
ABRAXAS LEO #1	SE SW 19-1S-34W	1.43	85	2155	-22	0.6564	0.7523	13293	7976
ABERCROMBIE #1 WEISHAPL	NW NE 19-1S-34W	2.1	75	1915	-25	0.7757	0.9487	10540	6324
		2.1	75	2150	-41	0.4662	0.4812	20780	12468
FAGIN EXPL. #1 MICEK B	SW SW SE 20-1S-34W	0.72	80	2165	-32	0.2266	0.2129	46981	28188
TEXAS PET. MICEK #1	SE SE NE 28-1S-34W	1.7	79	2080	-36	0.4638	0.4782	20911	12547
		1.7	79	2225	-42	0.3844	0.3805	26282	15769
EAGLE CREEK #1 D. RUMMEL	NE NW SE 36-1S-34W	2.175	70	1825	-28	0.6829	0.7942	12591	7555
JOHN O. FARMER #1 WILKINSON	NW NW SE 1-1S-35W	2.25	65	1845	-23	0.7771	0.9512	10513	6308
BURCH EXPL. #4 CHADDERDON	N/2 N/2 NW 13-1S-35W	1.388	65	1955	-28	0.4088	0.4095	24418	14651
		1.38	65	2200	-30	0.3835	0.3794	26355	15813
CITIES SERVICE SIS A #1	NW NW NW 24-1S-35W	2.72	65	2180	-28	0.8056	1.0012	9988	5993
RAYMOND OIL SABATKA #1	SW SW 28-1S-35W	2.4	75	2120	-36	0.6251	0.7042	14202	8521
		2.4	75	2380	-33	0.6938	0.8116	12321	7393
HUSKY OIL HUSKY 3-31 REEH	N/2 NW 31-1S-35W	0.84	65	2355	-21	0.3126	0.2998	33356	20013
RAYMOND OIL CAHOJ #1	NE NE 32-1S-35W	1.163	72	2150	-20	0.4886	0.5105	19588	11753
TWIN DRLG. VACHUTA #1	SW SW SE 13-1S-36W	0.49	122	2130	-22	0.3154	0.3029	33015	19809
A.C. SMITH ETAL FRISBIE #1	SE SE 25-1S-36W	1.16	60	2185	-22	0.3876	0.3843	26021	15613
ABERCROMBIE WILKINSON #1	NE NW 34-1S-36W	0.46	125	2185	-28	0.2502	0.2356	42438	25463

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% CITIES SERVICE STEIER A-1	SW SE 28-2S-31W	0.915	70	1645	-29	0.2768	0.2623	38118	22871
		0.91	70	1915	-33	0.2436	0.2292	43633	26180
WAGGONER ESTATE HARFNER #1	SE SE 29-2S-31W	0.8	101	1770	-40	0.2384	0.2241	44613	26768
CITIES SERVICE HAFNER #1	NW NW 32-2S-31W	1.04	52	1750	-27	0.2577	0.2431	41130	24678
		1.04	52	1950	-32	0.2204	0.2069	48331	28998
EDWIN FOSTER NEIMETH B-1	SW NW 1-2S-32W	1.1	62	1660	-40	0.2083	0.1957	51101	30661
SAM HARRISON NEMETH #1	SE NE 5-2S-32W	0.48	88	1720	-23	0.2183	0.2050	48776	29266
EDWIN FOSTER SAMSON #1	NW NE 17-2S-32W	1.3	115	1670	-39	0.4506	0.4613	21679	13007
SKELLY OIL WIEKE B #1	SE NW 21-1S-32W	0.578	94	1765	-31	0.2158	0.2026	49360	29616
BUTTES G&O MARTIN #1	NE SW 23-2S-32W	0.66	60	1690	-22	0.2184	0.2051	48766	29260
R. SCHULEIN #11-24 ERICKSON	NE SW 24-2S-32W	1.6	72	1695	-25	0.5665	0.6177	16188	9713
		1.6	72	1805	-31	0.4674	0.4828	20713	12428
R. SCHULEIN #10A-24 ERICKSON	W/2 SE 24-2S-32W	1.31	75	1675	-25	0.4813	0.5008	19967	11980
AMERADA PET. HESTERMAN #1	SW NE 31-2S-32W	0.46	110	1670	-28	0.2188	0.2055	48670	29202
EDWIN FOSTER SAMSON B-1	SW NW 21-2S-33W	0.55	115	1900	-33	0.2334	0.2193	45591	27355
EDWIN FOSTER HORINEK #1	NW SW 29-2S-33W	1.22	58	1875	-40	0.2193	0.2060	48553	29132
EMPIRE DRLG. HUESSMAN #1	SE NE 29-2S-34W	0.25	78	1890	-28	0.0868	0.0937	106719	64031
AMERICAN ENERGY McAFEE 31	NE 35-2S-34W	0.68	65	1885	-23	0.2351	0.2209	45265	27159
PAN AMERICAN PROCHAZKA #1	NW NE 2-2S-35W	1.15	87	2145	-32	0.3910	0.3882	25759	15455
		1.15	87	2225	-42	0.2843	0.2700	37032	22219
EDWIN FOSTER URBAS #1	NE SE 13-2S-35W	0.81	111	2010	-25	0.4319	0.4378	22841	13705
		0.81	111	2120	-30	0.3686	0.3621	27617	16570
		0.81	111	2170	-35	0.3143	0.3016	33151	19891
@ RITCHIE EXPL. #1 KOPRIVA	E/2 NE NW 13-2S-35W	1.05	70	2255	-40	0.2268	0.2130	46937	28162
		1.05	70	2325	-42	0.2133	0.2003	49924	29954
SKELLY OIL CO. SEVERNS #1	NW NW SW 15-2S-35W	0.52	115	2065	-31	0.2365	0.2224	44974	26984
		0.52	115	2155	-32	0.2296	0.2157	46357	27814
		0.52	115	2260	-38	0.1900	0.1790	55871	33523
EDWIN FOSTER PRENTICE #1	SE NW 29-2S-35W	0.91	72	2090	-31	0.2680	0.2534	39468	23681
		0.91	72	2280	-38	0.2153	0.2021	49474	29685
JOHN O. FARMER DAVID #1	NW SE 1-2S-36W	1.2	95	2435	-30	0.4758	0.4938	20253	12152

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MIAMI OPERATING BRUMM A-1	NE SE SW 7-2S-36W	1.725	72	2320	-24	0.6396	0.7262	13770	8262
		1.72	72	2490	-33	0.4805	0.4998	20007	12004
MIAMI PET. BRUMM F-1	SW SW SE 7-2S-36W	2.28	57	2365	-37	0.4521	0.4632	21589	12953
		2.28	57	2560	-40	0.4136	0.4154	24076	14445
MIAMI OPERATING BRUMM A-2	SW NW SE 7-2S-36W	0.9	115	2545	-24	0.5183	0.5504	18169	10901
MIAMI PET. FRED BURMM F-2	NW SE SE 7-2S-36W	0.7	117	2360	-21	0.4492	0.4596	21759	13055
		0.7	117	2550	-24	0.4098	0.4108	24345	14607
% ASHLAND OIL KACIREK #1	NE SE SW 8-2S-36W	0.825	102	2460	-32	0.3283	0.3168	31565	18939
MIAMI PET. DOBBS A-1	SW SE NW 19-2S-36W	0.52	121	2280	-27	0.2838	0.2696	37097	22258
		0.52	121	2525	-25	0.3043	0.2909	34372	20623
K & E DRLG. SOLKO #1	NW SW 24-3S-31W	1	69	1870	-24	0.3532	0.3445	29024	17414
CITIES SERVICE HOLMDAHL A-1	NE SW SW 29-3S-31W	1.04	66	1620	-15	0.4706	0.4870	20534	12320
		1.04	66	1730	-22	0.3753	0.3699	27033	16220
AMERADA HESS WIGNER #1	SW SE 9-3S-32W	0.61	77	1880	-29	0.2026	0.1904	52515	31509
% NATURAL GAS & OIL LEWIS #1	SW NW NE 21-3S-32W	1.65	68	1755	-24	0.5736	0.6280	15923	9554
		1.65	68	1945	-27	0.5228	0.5565	17970	10782
JOHN O FARMER FIKAN #1	NE NE SE 11-3S-33W	0.54	107	1645	-40	0.1691	0.1605	62313	37388
		0.54	107	1880	-44	0.1498	0.1440	69453	41672
SHAMROCK OIL GAINES B-1	SE SE NW 1-3S-36W	0.95	114	2150	-37	0.3542	0.3457	28926	17355
		0.95	114	2215	-44	0.2836	0.2693	37136	22282
B.W.A.B. INC. WEBB #19-43	NE SE 19-3S-36W	1.1	75	2115	-31	0.3365	0.3259	30689	18413
COASTAL O & G HUBBARD #1-20	SW SE 20-3S-36W	1.72	56	2325	-42	0.2857	0.2715	36834	22100
@ COASTAL O & G HUBBARD #7-28	NE SW SW 28-3S-36W	2.3	45	2120	-44	0.2932	0.2793	35807	21484
		2.3	45	2225	-62	0.1652	0.1571	63647	38188
COASTAL O & G HUBBARD # 6-28	W/2 NE SE 28-3S-36W	0.71	80	2060	-32	0.2228	0.2092	47794	28677
		0.71	80	2115	-35	0.2026	0.1904	52514	31508
		0.71	80	2160	-39	0.1784	0.1686	59295	35577
		0.71	80	2275	-44	0.1526	0.1463	68337	41002
COASTAL O & G HUBBARD #10-28	NE SW SW 28-3S-36W	1.1	83	2035	-38	0.2941	0.2802	35688	21413
		1.1	83	2295	-46	0.2296	0.2157	46359	27815
COASTAL O & G HUBBARD 3-28	NW SE 28-3S-36W	1.54	76	2035	-43	0.3231	0.3111	32141	19285

COUNTY: RAWLINS

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COASTAL O & G HUBBARD 3-28		1.54	76	2135	-62	0.1760	0.1665	60058	36035
		1.54	76	2250	-66	0.1558	0.1490	67101	40260
COASTAL O & G HUBBARD #1	NE SW 28-3S-36W	1.33	74	2045	-40	0.3000	0.2865	34908	20945
		1.33	74	2145	-49	0.2254	0.2117	47233	28340
		1.33	74	2250	-53	0.1992	0.1873	53389	32033
COASTAL O & G HUBBARD 5-28	NE SW SE 28-3S-36W	1.5	100	2015	-48	0.3451	0.3355	29808	17885
		1.5	100	2115	-58	0.2512	0.2367	42252	25351
@ COASTAL O & G HUBBARD 2-28	NE NW SW 28-3S-36W	1.28	76	2055	-41	0.2866	0.2724	36704	22023
@		1.28	76	2105	-50	0.2149	0.2018	49554	29732
		1.28	76	2185	-57	0.1722	0.1632	61267	36760
	NE SW 19-3S-36W	1.1	55	2265	-22	0.3406	0.3304	30265	18159
COASTAL O & G HUBBARD 5-29S	SE SE SE 29-3S-36W	1.24	71	2065	-48	0.2083	0.1956	51118	30671
		1.24	71	2300	-61	0.1387	0.1347	74226	44536
@ COASTAL O & G HUBBARD 2-29	E/2 SE NE 29-3S-36W	1.31	54	2000	-40	0.2220	0.2084	47973	28784
@		1.31	54	2095	-42	0.2088	0.1962	50977	30586
@		1.31	54	2140	-45	0.1900	0.1789	55889	33533
		1.31	54	2185	-60	0.1175	0.1175	85101	51060
COASTAL O & G HUBBARD 1-33	NE NW 33-3S-36W	3.6	56	2205	-51	0.4459	0.4554	21961	13177
		3.6	56	2270	-60	0.3351	0.3244	30828	18497
@ CITIES SERVICE H-POWELL A-2	SW NW 33-3S-36W	1.79	73	2015	-23	0.6896	0.8049	12424	7454
		1.79	73	2215	-42	0.3763	0.3710	26953	16172
		1.79	73	2275	-52	0.2737	0.2592	38577	23146
@ COASTAL O & G HUBBARD 2-33	SE NW 33-3S-36W	1	66	2010	-31	0.2714	0.2569	38929	23358
		1	66	2190	-37	0.2250	0.2113	47331	28399
		1	66	2265	-42	0.1921	0.1809	55284	33170
COASTAL O & G FISHER 5-33	W/2 SW NE 33-3S-36W	1.2	65	2020	-27	0.3656	0.3587	27880	16728
		1.2	65	2125	-35	0.2833	0.2691	37166	22299
		1.2	65	2245	-47	0.1936	0.1822	54894	32937
COASTAL O & G FISHER 3-33	SW NE 33-3S-36W	0.975	79	2095	-42	0.2194	0.2060	48543	29126
		0.975	79	2250	-63	0.1125	0.1135	88075	52845
COASTAL O & G FISHER 6-33	SW SW SE 33-3S-36W	0.642	45	2205	-27	0.1417	0.1372	72887	43732

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@ CITIES SERVICE H-POWELL A-1	NW NW NW 33-3S-36W	2.16	59	2100	-52	0.2701	0.2556	39128	23477
@		2.16	59	2230	-55	0.2468	0.2324	43037	25822
PIONEER O&G ACHILLES 15-34	SW SE 15-4S-31W	0.975	50	1700	-18	0.3125	0.2998	33361	20016
GENERAL CRUDE SCHMIDT #1	SW SE 18-4S-31W	0.38	110	1525	-22	0.2192	0.2058	48594	29157
% TRANS ERA VRBAS #1	NW NW NW 20-4S-32W	1.35	72	1750	-40	0.2938	0.2800	35719	21432
		1.35	72	1850	-48	0.2275	0.2137	46794	28077
STOEPPELWERTH McCLAIN 7-1	NE NE 6-4S-33W	1.43	55	1835	-39	0.2529	0.2383	41958	25175
		1.43	55	2070	-49	0.1848	0.1743	57383	34430
AMERADA CORP. WALTERS #1	NE NE SW 17-4S-33W	0.7	115	2000	-12	0.5871	0.6475	15444	9266
A.K. MERY NASH #1	SW SW 28-4S-34W	0.89	119	2010	-30	0.4312	0.4370	22884	13730
LARSON O&G FIKAN #1	SE SE 5-4S-35W	0.329	55	2035	14	0.3239	0.3121	32043	19226
% SINCLAIR-PRAIRIE ROBBINS #1	SW NE 32-4S-35W	2.7	85	1855	-44	0.6037	0.6720	14881	8928
AMAX PET. WILLIAMS #1	NE NE 4-4S-36W	0.93	67	1940	-28	0.2814	0.2671	37442	22465
		0.93	67	2080	-37	0.2113	0.1985	50387	30232
BWAB WAHRMAN 6-41	NE NE 6-4S-36W	1.69	58	2065	-42	0.2868	0.2727	36673	22004
WHITE & ELLIS WAHRMAN #2	SW NE 6-4S-36W	1.5	44	2240	-39	0.2212	0.2077	48150	28890
LUFF EXPL. GOLTL N-7	SE SW 7-4S-36W	1.207	75	2010	-38	0.2937	0.2798	35741	21445
		1.207	75	2200	-50	0.2011	0.1890	52912	31747
		1.207	75	2355	-71	0.1034	0.1064	93968	56381
EMPIRE DRLG. WILLIAMS RANCH #1	SE NW 11-4S-36W	1.29	56	1940	-24	0.3780	0.3730	26807	16084
LUFF EXPL. N-17 BEMIS	SE SW 17-4S-36W	2.115	82	2075	-60	0.2756	0.2611	38303	22982
FRONTIER BRINEY A-1	NW SW 20-4S-36W	1.17	64	1960	-23	0.3994	0.3983	25107	15064
		1.17	64	2045	-30	0.3193	0.3070	32570	19542
		1.17	64	2240	-35	0.2734	0.2589	38629	23177
COASTAL O&G HAWKINS 1-29	SE SE 29-4S-36W	1.46	93	2200	-57	0.2370	0.2228	44885	26931
FRONTIER BRINEY B-1	SW NW 30-4S-36W	0.66	115	2015	-28	0.3303	0.3190	31344	18807
		0.66	115	2150	-38	0.2403	0.2260	44254	26553
		0.66	115	2280	-43	0.2056	0.1932	51765	31059
@ ABRAXAS PET. ARCHER FARMS	SW SW 31-4S-36W	1.09	95	2040	-30	0.4277	0.4326	23115	13869
		1.09	95	2180	-42	0.2920	0.2780	35972	21583
HODGDEN OIL WISMAN 32-1	NW NE 32-4S-36W	2.2	76	2220	-56	0.3062	0.2931	34124	20474

COUNTY: RAWLINS

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JAMES OIL CO. HARRISON #1	SE SE 32-4S-36W	1.31	110	2115	-35	0.5031	0.5298	18874	11325
LEE PHILLIPS CRAWFORD #1	SE SE SE 3-5S-31W	0.47	106	1800	-12	0.3642	0.3571	28003	16802
MURFIN DRLG. ERICKSON 1-11	SE NW 11-5S-31W	0.86	60	1425	-14	0.3680	0.3614	27667	16600
AMARILLO NAT GAS BRYAN #1	SW SW 12-5S-31W	0.88	65	1380	-15	0.3915	0.3888	25720	15432
		0.88	65	1620	-21	0.3229	0.3110	32157	19294
% B-R-G HAMILTON #1	SW SW NE 17-5S-31W	1.5	66	1660	-25	0.4902	0.5127	19506	11704
CITIES SERVICE RYAN #1	NW SW NW 14-5S-32W	1.51	74	1690	-25	0.5481	0.5917	16901	10140
CITIES SERVICE RYAN B-1	SW NW NE 24-5S-32W	1.47	44	1725	-12	0.5125	0.5424	18435	11061
		1.47	44	1870	-32	0.2684	0.2538	39394	23636
EMPIRE DRLG. HORINEK #1	SW SW 4-5S-33W	0.35	72	1800	25	0.6300	0.7116	14053	8432
EMPIRE DRLG. DEWEY #1	SW NW 3-5S-35W	1.6	64	1875	-20	0.6009	0.6679	14971	8983
TOTO GAS CO. FALCONER #1	NW NW 6-5S-36W	1.22	62	2110	-24	0.3931	0.3908	25589	15353
		1.22	62	2195	-34	0.2857	0.2715	36838	22103
% PETROLEUM INC. FALCONER #1	SE SW 6-5S-36W	0.72	82	2055	-21	0.3295	0.3182	31429	18857
		0.72	82	2215	-37	0.1978	0.1860	53768	32261
SHAKESPEARE OIL HUBBARD #1	E/2 NE NW 7-5S-36W	1.21	62	2060	-28	0.3424	0.3324	30085	18051
		1.21	62	2150	-38	0.2488	0.2343	42686	25612
		1.21	62	2230	-44	0.2058	0.1933	51726	31036
MAREXCO TOVREA 13-31	NW SW 31-5S-36W	2.4	76	2055	-53	0.3650	0.3580	27936	16762

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DIAMOND SHAM. MADER 1-8	SW NW NE 8-6S-26W	0.787	75	1320	13	1.0017	1.3776	7259	4355
% EMPIRE DRLG. WARD #1	SW SW SW 13-6S-26W	1.5	84	1125	18	2.5069	6.2650	1596	958
% HARRY GORE GLASGOW #1	NE NE NW 21-6S-26W	1.8	70	1190	17	2.4589	6.0508	1653	992
BLACK PET. #1 TEEL	E/2 SW SE 23-6S-26W	1.3	77	1135	6	1.3477	2.1814	4584	2750
BEACON PET. BRANT FARMS 2-26	NW-NE-SW 26-6S-26W	1.5	58	1220	15	1.6175	2.9361	3406	2044
DIAMOND SHAM. B-FICKEN 1-27	NE-NE-SE 27-6S-26W	1.15	58	1405	17	1.3208	2.1125	4734	2840
DIAMOND SHAM. SHOEMAKER #1	SE SE NE 27-6S-26W	0.88	67	1405	17	1.1512	1.7026	5873	3524
DIAMOND SHAM. MUIRHEAD 1-4	NW SE SE 4-6S-27W	1.41	84	1170	-10	0.9331	1.2394	8068	4841
DIAMOND SHAM. MAIN 1-19	S/2 SE SW 19-6S-27W	0.321	59	1540	45	0.9336	1.2405	8061	4837
EMPIRE DRLG. DUTTON #1	SW SW SW 26-6S-27W	0.49	110	1480	18	1.0472	1.4729	6789	4073
DIAMOND SHAM. SIDESINGER 1-35	SE SW NE 35-6S-27W	1.08	69	1500	16	1.4022	2.3248	4301	2581
D.R. LAUCK PALMER #1	E/2 W/2 SE 9-6S-29W	1.13	75	1685	-10	0.6769	0.7846	12746	7648
DIAMOND SHAM. BUGGERMAN 1-13	NE NE 13-6S-29W	1.53	51	1550	-8	0.6904	0.8062	12404	7442
% WESTERN HC. CO. HEFF B-1	SW SW SW 15-6S-29W	1.275	42	1400	15	1.0326	1.4421	6934	4161
% SAUVAGE & DUNN BRANTLEY #1	SE SE SE 16-6S-29W	0.8625	82	1405	10	1.0789	1.5412	6488	3893
% ANDERSON ET. AL. NEFF A-1	NE NE NE 21-2S-29W	0.684	93	1400	12	1.0270	1.4301	6992	4195
% HENDERSON OIL NEFF #2	NE SW SE 21-6S-29W	1.125	79	1425	15	1.6019	2.8891	3461	2077
% WESTERN H.C. CO. WESSEL #1	SW SW SW 22-6S-29W	0.84	82	1380	14	1.1986	1.8129	5516	3310
% WESTERN H.C. CO. NEFF B-1	NW NW NW 22-6S-29W	1.0875	65	1375	15	1.2966	2.0513	4875	2925
% WESTERN H.C. CO. E. WESSELL #2	NW NW NW 27-6S-29W	0.825	98	1385	17	1.5332	2.6880	3720	2232
% WESTERN H.C. CO. E. WESSELL #3	NE SW NW 27-6S-29W	0.9	85	1400	11	1.2027	1.8226	5487	3292
DIAMOND SHAM. PORSCH 1-33	SW NW NW 33-6S-29W	1.08	52	1565	0	0.6440	0.7331	13641	8184
CITIES SERVICE STROHWIG #1	NW SE SE 11-6S 30W	0.93	67	1375	-11	0.4849	0.5057	19776	11865
% J.G. BROWN REED #1	SW SW SW 21-6S-30W	1.425	72	1340	-21	0.5708	0.6239	16029	9617
PANCANADIAN BYRNE 41-24 #1	NE NE 24-6S 30W	0.825	65	1575	-8	0.4626	0.4766	20982	12589
% ANSHUTZ DRLG. ANDREGG #1	NW NW NW 2-7S-26W	2.25	74	1260	15	3.0239	8.8341	1132	679
% EMPIRE DRLG. ALLEN #1	SW SW SW 3-7S-26W	1.05	70	1290	42	3.2634	10.1915	981	589
% HERNDON DRLG. BARNETT #1	NW NW SE 5-7S-26W	1.0875	65	1290	27	1.9277	3.9469	2534	1520
% LEBEN DRLG. SHEPARD #1	NW NW NW 20-7S-26W	0.66	92	1425	28	1.6581	3.0593	3269	1961
LEBEN DRLG. JONES #1	NW NW NE 22-7S-26W	0.62	106	1425	28	1.7783	3.4407	2906	1744
% JONES ET. AL. BARNETT #1	NW NW NE 24-7S-26W	1.425	59	1250	25	2.1692	4.8439	2064	1239

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@ DIAMOND SHAM. SCHEETZ #1-35	NW SE 35-7S-26W	0.95	77	1155	9	1.0875	1.5600	6410	3846
DIAMOND SHAM. J. SCHEETZ A-1	SE NE SW 35-7S-26W	0.89	63	1085	32	1.8195	3.5767	2796	1678
OZARK-MAHONING WALDEN #1	SW NW SE 4-7S-27W	0.72	113	1415	30	2.3428	5.5499	1802	1081
EMPIRE DRLG. SELBE #1	SW SW SW 6-7S-27W	0.65	110	1610	15	1.2568	1.9526	5121	3073
% EMPIRE DRLG. WATKINS #1	SE SE SW 15-7S-28W	1.4775	80	1420	13	1.9932	4.1806	2392	1435
% EMPIRE DRLG. STEWART #1	SE SE NE 35-7S-28W	1.305	78	1490	35	3.5330	11.8516	844	506
% CONTINENTAL OIL POPE #1	SW SW SE 18-7S-29W	1.725	46	1610	20	1.7745	3.4283	2917	1750
VOYAGER PET. HILL #1	SE SW NW 30-7S-29W	1.23	64	1585	30	2.3537	5.5959	1787	1072
KING RESOURCES HUBER 1-3	SW SE 3-7S-30W	0.67	79	1770	8	0.7562	0.9153	10926	6555
DIAMOND SHAMROCK MICKEY #1	NE NE SW 19-7S-30W	0.612	78	1690	31	1.4450	2.4405	4097	2458
DIAMOND SHAM. ELDON TEEL 1-19	NE NW SE 19-7S-30W	1.51	66	1705	21	2.2091	5.0017	1999	1200
GULF ENERGY GILCHRIST #1	NE NE 20-7S-30W	1.37	79	1655	20	2.2888	5.3246	1878	1127
% JOE HICKMAN BOGGS #1	NE NE NE 22-7S-30W	1.2	73	1600	15	1.5852	2.8397	3521	2113
AURORA GASOLINE FARBER #1	SE SE SE 32-7S-30W	0.46	110	1720	30	1.4470	2.4459	4088	2453
% EMPIRE DRLG. NIBLOCK #1	NE NE SE 2-8S-26W	0.57	85	1190	23	1.1349	1.6655	6004	3602
DON PRATT ALBERS #1-5	SE SE SE 5-8S-26W	0.9	74	1195	28	1.8602	3.7136	2693	1616
LANDMARK EXPL. C. ROBBIN 1-15	SW NW SE 15-8S-26W	1.05	88	1170	15	1.6579	3.0588	3269	1962
BEACON EXPL. PRATT 1-20	NE SW NE 20-8S-26W	1.35	78	1125	19	2.1780	4.8784	2050	1230
% UNION OIL PRATT #8	NW NE SE 22-8S-26W	1.875	32	1135	20	1.4298	2.3989	4169	2501
LANDMARK EXPL. C. ROBBEN 1-22	SE SW NE 22-8S-26W	1.125	68	930	9	1.1517	1.7038	5869	3522
% UNION OIL PRATT #3	NW SE 23-8S-26W	1.425	80	955	25	2.8819	8.0797	1238	743
% UNION OIL PRATT #7	NW SE 23-8S-26W	1.65	50	1170	40	3.5665	12.0681	829	497
% UNION OIL PRATT #10	NW SW NW 23-8S-26W	1.425	72	1135	25	2.6050	6.7153	1489	893
% JONES ET.AL. FOX #1	SE SE SW 25-8S-26W	1.095	66	1250	31	2.2478	5.1573	1939	1163
% UNION OIL SCHLEMEYER #1	NW NE NW 26-8S-26W	1.875	55	995	15	1.9345	3.9708	2518	1511
LANDMARK EXPL. 1-27 ROBBEN	SE SW SW 27-8S-26W	1.8	72	1020	15	2.3673	5.6537	1769	1061
LANDMARK EXPL. 2-28 ROBBEN	SE SE SE 28-8S-26W	2.25	75	1095	10	2.6001	6.6925	1494	897
LANDMARK EXPL. ROBBEN 1-28	NE SE SE 28-8S-26W	1.575	65	1090	15	1.8854	3.8001	2632	1579
HBP PETRO ROBBEN 28-8 B	NW SE NE 28-8S-26W	1.73	82	1220	8	2.0293	4.3124	2319	1391
VINCENT OIL PRATT #2	NE NE SW 29-8S-26W	1.125	60	1055	15	1.2535	1.9447	5142	3085
CRANE PET. SCHAMBERGER #1	NW SW NW 31-8S-26W	0.98	58	1290	15	1.0557	1.4912	6706	4024

COUNTY: SHERIDAN

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OPERATOR/ WELL NAME	LOCATION	Rmf	Rmf Temp	Form Depth	SSP	Rwe @ 77	Rw @ 77	SC @ 77	Est. TDS
PETROLEUM INC. MICKEY #1	NE SE 32-8S-26W	0.54	105	1245	17	1.0730	1.5285	6542	3925
% EMPIRE DRLG. HOXIE ST. BANK #1	SW NE NE 32-8S-26W	0.8025	64	1185	28	1.4537	2.4642	4058	2435
% ANDERSON PRITCHARD PRATT #1	SE SW SE 32-8S-26W	1.065	86	1235	23	2.1414	4.7358	2112	1267
LANDMARK EXPL. HANSEN 1-33	NE NE NE 33-8S-26W	1.425	65	1090	15	1.7059	3.2082	3117	1870
NORTHERN LIGHTS PRATT B-3	NE NW NW 34-8S-26W	1.575	65	1105	16	1.9485	4.0205	2487	1492
NORTHERN LIGHTS PRATT B-4	NW NW NW 34-8S-26W	1.625	65	1145	16	2.0092	4.2387	2359	1416
NORTHERN LIGHTS PRATT B-5	SE NW NW 34-8S-26W	1.425	70	1115	18	2.0146	4.2584	2348	1409
LEBEN DRLG. TOOTHAKER #1	SE SE SW 7-8S-27W	0.75	110	1455	27	2.1540	4.7845	2090	1254
% MYRON BUTTRAM SIMONTON #1	SE SE SE 22-8S-27W	0.9	70	1115	35	2.2340	5.1012	1960	1176
% NCRA TAYLOR #1	SW SW SW 23-8S-27W	0.705	72	1075	28	1.4256	2.3875	4188	2513
% NCRA TAYLOR #2	SW SE SW 23-8S-27W	0.93	45	1135	40	1.8356	3.6305	2754	1653
PARRISH CORP. #1 GLEN BROWN	N/2 SW 25-8S-27W	0.805	62	1140	20	1.0887	1.5628	6399	3839
% HEATHMAN OIL BROWN A-2	SW NW 26-8S-27W	1.455	73	1150	25	2.6927	7.1322	1402	841
% HEATHMAN OIL BROWN A-1	NW NW NW 26-8S-27W	1.095	76	1175	21	1.8411	3.6491	2740	1644
% CARTER OIL HELENDARES #1	NE NE NE 27-8S-27W	0.8925	63	1135	35	2.0120	4.2491	2353	1412
% AURORA GAS. MASSER #1	NW NW 34-8S-27W	0.8925	90	1290	24	1.9323	3.9633	2523	1514
TXO GOETZ #1	N/2 N/2 SE 35-8S-27W	1.63	74	1140	21	2.6763	7.0535	1418	851
% HEATHMAN ET.AL. CLARK E-1	NW SE 31-8S-28W	0.78	73	1200	24	1.3949	2.3053	4338	2603
DONALD SLAWSON SHAW C-1	SE SE 33-8S-28W	0.38	85	1370	47	1.6588	3.0615	3266	1960
HBP PROD. SHAW 33-90	SE NE SE 33-8S-28W	1.7	75	1385	15	2.3090	5.4082	1849	1109
JOHN FARMER MOSIER #2	S/2 SE SE 36-8S-28W	0.43	109	148	51	2.8689	8.0125	1248	749
% EMPIRE DRLG. MANN 31	NW NW NW 8-8S-29W	3.64	54	1600	32	6.3823	38.9407	257	154
%DON PRATT COOPER #1	SW SE 25-8S-29W	1.2375	93	1480	8	1.6283	2.9685	3369	2021
% JONES ET.AL. FOSTER #1	SE SE SW 29-8S-29W	0.96	75	1420	23	1.6946	3.1728	3152	1891
ROCK ISLAND MICKEY #1	SE SE NE 34-8S-29W	0.88	73	1500	18	1.2843	2.0206	4949	2969
PET. RESERVE HUGHES #1	SW NE 35-8S-29W	0.67	97	1530	45	3.0759	9.1196	1097	658
OIL PROP. MANG. DECKER A-2	SE SW 36-8S-29W	0.36	107	1490	42	1.6452	3.0198	3311	1987
% ANSCHUTZ DRLG. DOLLY #1	SW SW SE 10-8S-30W	1.95	86	1620	20	3.5259	11.8065	847	508
VOYAGER PET. SCHLAGECEK #1	NW NE 25-8S-30W	1.15	61	1560	24	1.7332	3.2948	3035	1821
% HELMERION & PAYNE MORGAN #1	NE NE SW 2-9S-26W	1.65	70	1260	0	1.2853	2.0230	4943	2966
NAT. PET. RES. EPLER #1	SW NE SE 23-9S-26W	0.79	69	1305	20	1.1736	1.7542	5701	3420

COUNTY: SHERIDAN % = Rmf estimated from Rm using Rmf = .75 Rm, @ = Thin Bed Corrected

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NAT. PET. RES. PFEIFER #3	NW SE NE 23-9S-26W	1.125	62	1235	35	2.4915	6.1961	1614	968
NAT. PET. RES. EPLER A-1	SW NW SW 24-9S-26W	0.675	66	1220	45	2.2017	4.9722	2011	1207
SOLAR PET. CAROLYN MAE #1	SE SE SE 33-9S-26W	1.15	70	1095	25	2.0509	4.3922	2277	1366
TSO PROD. McFADDEN #1	NE NE SE 9-9S-27W	1.5	52	1210	28	2.2549	5.1860	1928	1157
SHARON RESOURCES WHITE #1	SW SW 10-9S-27W	1.53	69	1240	25	2.6838	7.0892	1411	846
@ PETROVENTURES BREEDEN #9	NE NE SE 11-9S-27W	1.22	65	1205	15.5	1.4824	2.5438	3931	2359
@ PETROVENTURES BREEDEN #10	NE SW SE 11-9S-27W	1.27	69	1220	15	1.6021	2.8898	3460	2076
PETROVENTURES BREEDEN #14	NW NE SW 11-9S-27W	1.46	59	1215	16	1.6525	3.0422	3287	1972
PETROVENTURES BREEDEN #11	SW SW SW 12-9S-27W	1.15	66	1235	12	1.2617	1.9646	5090	3054
PETROVENTURES BREEDEN #8	SW NE NW 13-9S-27W	1.28	67	1225	22	1.9806	4.1351	2418	1451
TXO HAFFNER A-1	NW NW SE 19-9S-27W	1.39	73	1275	23	2.4012	5.7988	1725	1035
HEATHMAN ET.AL. ALBERT #1	SW SW NW 22-9S-27W	1.8	51	1265	35	3.3455	10.6822	936	562
NAT. PET. RES. McFADDEN #1	SW NW NW 25-9S-27W	0.975	75	1270	20	1.5641	2.7775	3600	2160
SHILOH RESOURCES CLARK #1	NE NE 6-9S-28W	0.56	96	1475	30	1.5609	2.7683	3612	2167
TXO SHAW C-1	SW SW NW 7-9S-28W	0.343	64	1210	52	1.3716	2.2436	4457	2674
JOHN FARMER ALEX #1	SE SW 14-9S-28W	0.79	68	1320	27	1.4578	2.4754	4040	2424
HBP INC. PRATT C #16-8	SW SE NE 16-92-28W	1.27	71	1285	20	1.9371	3.9802	2512	1507
OLYMPIC PET. #1 KRANNAWITTER	NE SW SW 17-9S-28W	0.65	76	1410	30	1.4619	2.4868	4021	2413
JOHN FARMER PRATT B-2	NW NE 1-9S-29W	0.6	106	1500	28	1.7176	3.2453	3081	1849
EMPIRE DRLG. PATMAN #1	SE SE NE 5-9S-29W	0.61	117	1770	20	1.4675	2.5024	3996	2398
GULF OIL. HUGHES #1	SW SW 22-9S-29W	1.68	52	1575	39	3.5836	12.1797	821	493
GULF OIL LORA PRATT 1-28	NE NE 28-9S-29W	1.64	55	1565	30	2.7407	7.3666	1357	814
EMPIRE DRLG. BAALMAN #1	NE NE NE 12-9S-30W	0.66	82	1645	43	2.4168	5.8663	1705	1023
EMPIRE DRLG. MOELLLERING #1	SE SE NE 28-9S-30W	0.9	94	1700	25	2.0772	4.4907	2227	1336
JOHN FARMER SCHWARTZ #1	SE SE 34-9S-30W	0.7	79	1585	35	1.9115	3.8904	2570	1542
DIAMOND SHAM. VON LINTEL #3	SE SW SW 2-10S-26W	0.624	79	1240	33	1.6133	2.9233	3421	2053
NAT. PET. RES. JONES #1	S/2 NW SW 5-10S-26W	0.72	54	1110	37	1.5118	2.6268	3807	2284
% LEBEN DRILLING HARVEY #1	NE NE NW 6-10S-26W	0.5625	77	1300	62	3.6848	12.8498	778	467
HEATHMAN-SEELIGSON KAISER #1	SE SE 7-10S-26W	0.39	113	1325	35	1.4998	2.5928	3857	2314
NAT. PET. RES. FULLER #1	NE NE NE 10-10S-26W	0.79	74	1130	29	1.6907	3.1604	3164	1898
DIAMOND SHAM. BITTEL #1	NE NW NW 11=10S-26W	0.483	75	1220	50	2.0880	4.5314	2207	1324

COUNTY: SHERIDAN

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% C&G DRLG FLAGLER #1 (UPPER)	E/2 NE SW 12-10S-26W	0.42	85	1105	43	1.6248	2.9581	3381	2028
(LOWER)		0.42	85	1300	55	2.3934	5.7655	1734	1041
K&E PET. JOHNSON 1-17 (MIDDLE)	W/2 W/2 NW 17-10S-26W	0.42	70	1135	42	1.3134	2.0936	4776	2866
(LOWER)		0.42	70	1305	47	1.5381	2.7020	3701	2221
LEBEN DRLG. HILLIE #1	NE NE SE 26-10S-26W	0.39	75	1160	35	1.0296	1.4356	6966	4179
% HEATHMAN ET.AL. GOETZ A-1	NW NW SW 3-10S-27W	0.825	73	1260	40	2.4972	6.2215	1607	964
KING RES. BURNETTE #1	NW NE 12-10-27W	0.77	65	1345	50	2.9045	8.1970	1220	732
AURORA GAS. SCHOENFELD #1	SW SW NE 16-10S-27W	1.17	65	1080	52	4.7752	21.4165	467	280
DAVIS BROTHERS FALLON #1	SE SE NE 19-10S-27W	1.35	75	1180	35	3.5615	12.0358	831	499
EMPIRE DRLG. CHAPMAN #1	SE SE NE 9-10S-28W	0.76	77	1400	35	2.0392	4.3490	2299	1380
	CHEYENNE	0.76	77	1510	-14	0.4085	0.4092	24440	14664
HEATHMAN ET.AL. HEIN #1	NW NW NW 16-10S-28W	0.75	100	1375	38	2.8330	7.8286	1277	766
% ARMER DRLG. BEIDEN #1 (UPPER)	NW NW NE 15-10S-28W	1.05	40	1200	32	1.4340	2.4103	4149	2489
(LOWER)		1.05	40	1385	40	1.8547	3.6951	2706	1624
CINCO EXPL. ZIGLER #1	SE SW 17-10S-28W	0.331	92	1400	42	1.3178	2.1048	4751	2851
ANSCHUTZ DRLG. RUPP #1	NW NW NW 21-10S-28W	1.125	92	1400	33	3.3328	10.6056	943	566
LYNCO OIL ZERR #1	NE SW 23-10S-28W	0.58	64	1240	52	2.3159	5.4369	1839	1104
ANGLE EXPL. KRANNAWITEZ A-1	SW SW NW 3-10S-29W	2.25	60	1285	34	4.6736	20.5110	488	293
@ DIAM. SHAM. KRANNAWITTER #1	SE SE NE 4-10S-29W	0.907	78	1345	17	1.3647	2.2257	4493	2696
ANGLE EXPL. KRANNAWITTER #1	NE NE SE 4-10S-29W	1.35	75	1515	18	2.0191	4.2752	2339	1403
% EMPIRE DRLG. JOHNSON #1	NW SW 13-10S-29W	0.675	90	1515	25	1.5025	2.6003	3846	2307
% EMPIRE DRLG. STEWART #1	NE NE SW 16-10S-29W	1.08	76	1255	18	1.6422	3.0109	3321	1993
EMPIRE DRLG. KOERHER B-1	SE SE SW 23-10S-29W	0.43	113	1455	27	1.2667	1.9769	5058	3035
BELL OIL SCHMIDTBERGER #1	SW SW NW 25-10S-29W	0.54	114	1340	22	1.3647	2.2255	4493	2696
EMPIRE DRLG. KOERBER #1	SE SE SE 24-10S-29W	1.05	72	1445	50	4.3267	17.5875	569	341
ANSCHUTZ DRLG. GASSMAN #1	SE SE SE 28-10S-29W	1.35	61	1375	35	2.9328	8.3458	1198	719
% EMPIRE DRLG. FINLEY #1	NE NE NW 11-10-30W	1.695	50	1565	48	4.6890	20.6465	484	291
MORRISON DIXON FERGUSON #1	NW SE SW 19-10S-30W	0.86	79	1460	25	1.6988	3.1860	3139	1883
DON PRATT BECKMAN 5-31	NW SE SW 31-10S-30W	1.15	75	1460	26	2.2379	5.1172	1954	1173

COUNTY: SHERMAN

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PHIPPIPS PET. LLANUS #7	NE NE 10-6S-37W	0.29	98	2005	-12	0.2093	0.1966	50877	30526
ABRAXES PET. COOK #1	SW SW 35-6S-38W	0.095	71	2000	44	0.3081	0.2951	33892	20335
JOHN FARMER ZIMBELMAN #1	SW SE 9-6S-39W	0.72	120	2270	-25	0.4156	0.4178	23933	14360
		0.72	120	2655	-75	0.0859	0.0930	107548	64529
R.G. LAWTON PETERS #1	NE NE 3-6S-40W	0.57	125	2305	-20	0.4017	0.4010	24936	14962
	CHEYENNE	0.57	125	2750	-55	0.1338	0.1307	76525	45915
MACK OIL SEAMAN #1	SW SW 17-6S-40W	1.4	63	2555	-26	0.4336	0.4399	22730	13638
R.G. LAWTON BAIR #1	NE NE 20-6S-41W	0.38	133	2455	-13	0.3560	0.3478	28755	17253
NORBLA OIL DEFRIES #1	NE NW NW 22-6S-41W	0.91	120	2540	-20	0.6196	0.6958	14373	8624
NORBLA OIL CUWER #1	SE NW 33-6S-41W	0.65	126	2515	-15	0.5432	0.5848	17100	10260
SIEGEL ET.AL. FINAGON #1	SE NW 29-6S-42W	0.97	69	2665	-20	0.3956	0.3937	25400	15240
% SIGNAL OIL SIGNAL 71 BAIRD #1	NE SW 4-7S-37W	0.1725	56	1900	40	0.4013	0.4005	24970	14982
E.J. ATHENS ZEIBIG #1	SW SW 10-8S-42W	0.53	125	2450	-12	0.4833	0.5035	19860	11916
		0.53	125	2500	-22	0.3517	0.3428	29169	17501
1ST ENERGY COOPER GRAIN 34-20	SW SE 20-9S-37W	0.187	73	1800	46	0.6742	0.7802	12817	7690
MUSGROVE PET. VAN DONGE #1	NW NW SE 31-9S-38W	0.085	133	1910	42	0.4695	0.4856	20594	12357
MED. PET. SW GOODLAND 2-1	SW NW 2-9S-40W	0.537	60	2040	-20	0.1909	0.1797	55637	33382
SOURCE PET. MURRAY A-1	SE NW 15-9S-41W	0.5	65	1965	6	0.4421	0.4505	22196	13318
ABERCROMBIE VESELIK #1	SE NW 15-9S-42W	1.6	70	2165	-27	0.5233	0.5572	17948	10769
% SINCLAIR PRAIRIE COGSWELL #1	SW SW SW 20-10S-38W	0.075	50	1750	74	0.2981	0.2844	35163	21098
MACK OIL DARNAVER #1	NW NW 3-10S-40W	0.125	78	2180	15	0.1741	0.1648	60664	36399
K&E DRLG. JAMES #1	NW SW 20-10S-40W	0.57	113	2165	-37	0.2109	0.1981	50492	30295
SINCLAIR PRAIRIE MERCER #1	NE NE NW 28-10S-40W	0.1125	65	1970	42	0.3239	0.3121	32046	19227
MEDALLION PET. ALDERMAN 8-1	SW SE 8-10S-41W	1.49	71	2195	-45	0.2771	0.2627	38071	22842
% VAN GRISSO OIL GOLDEN #1	SE SE SE 24-10S-42W	1.47	78	2210	-40	0.3501	0.3411	29321	17592

COUNTY: THOMAS

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NELSON PET. V. DECKERT #1	NW SE NE 15-6S-31W	1.07	62	1655	-18	0.4152	0.4173	23965	14379
		1.07	62	1750	-31	0.2725	0.2579	38771	23263
TARGER DRLG. PRESTON #1	SE SW 34-6S-31W	0.75	116	1740	-32	0.3299	0.3186	31384	18830
JOHN FARMER BOURGMAN #1	NE NE 7-62-32W	1.15	119	1780	-12	0.9937	1.3612	7347	4408
		1.15	119	1895	-26	0.6323	0.7150	13985	8391
	CHEYENNE	1.15	119	2010	-32	0.5223	0.5559	17989	10793
% JACKSON ETAL. FOSTER #1	SW SW SW 14-6S-32W	0.885	98	1770	-23	0.4455	0.4549	21984	13190
CITIES SERVICE BOURGUIN #1	NE NW NE 18-6S-32W	1.15	64	1560	-20	0.4294	0.4348	22999	13800
		1.15	64	1800	-42	0.2111	0.1983	50434	30261
	CHEYENNE	1.15	64	1930	-46	0.1864	0.1758	56898	34139
TARGET DRLG. AKERS #1	SE SE 23-6S-32W	0.8	117	1860	-13	0.6592	0.7566	13216	7930
TARGET DRLG. FOSTER #1	SE NE 34-6S-32W	1.15	117	1855	-18	0.8057	1.0014	9986	5992
		1.15	117	1905	-26	0.6224	0.7000	14286	8571
@ BROUGHER OIL MILLER C-1	NE SW 13-6S-36W	0.36	41	1835	26	0.4056	0.4057	24648	14789
		0.36	41	2025	28	0.4307	0.4364	22915	13749
J.S. CARTER FOSTER #1	SE SE SE 6-7S-31W	0.89	118	1550	-18	0.6254	0.7046	14192	8515
		0.89	118	1775	-28	0.4536	0.4651	21500	12900
TARGET DRLG. DIBLE #1	NW SE 8-7S-31W	1	117	1605	-12	0.8487	1.0791	9267	5560
%@ GULF OIL J.F. SCHILTZ #1-14	SE SE 14-7S-31W	0.9225	85	1530	-11	0.5993	0.6656	15025	9015
		0.92	85	1780	-5	0.7282	0.8681	11520	6912
ROLAND PELT RENNERS #1	NE NE NE 14-7S-31W	0.63	111	1500	-12	0.5082	0.5367	18633	11180
		0.63	111	1600	-17	0.4321	0.4381	22825	13695
GULF ENERGY McCORMICK 5-24	NW NW 24-7S-31W	1	117	1810	-23	0.5952	0.6595	15164	9098
GULF ENERGY McCORMICK 2-24	SE SW 24-7S-31W	0.94	52	1735	10	0.7761	0.9494	10533	6320
GULF ENERGY McCORMICK 4-24	SW NW NW 24-7S-31W	0.89	57	1755	8	0.7470	0.8996	11117	6670
GULF ENERGY McCORMICK 5-24	NW NW 24-7S-31W	1.36	60	1765	-4	0.8091	1.0073	9927	5956
% NATURAL G&O DREW #1	SE SE NW 25-7S-31W	1.35	78	1730	-20	0.6057	0.6751	14813	8888
GULF ENERGY RAIL #1	NE NE NE 35-7S-31W	0.57	73	1810	6	0.5606	0.6093	16412	9847
@ ALPAR RES. MELLAR 18-9	N/2 SW NW 9-7S-32W	2.5	68	1750	-25	0.8412	1.0654	9386	5632
		2.5	68	1835	-51	0.3626	0.3552	28149	16890
MUSGROVE PET. FLANAGIN #1	NE NE 10-7S-32W	0.91	115	1650	-20	0.5857	0.6455	15492	9295

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MUSGROVE PET. FLANAGIN #1	NE NE 10-7S-32W	0.91	115	1830	-45	0.2611	0.2465	40572	24343
% KELLY & WEISSBECK THOMAS #1	NE NE NW 30-7S-32W	1.2	70	1695	-15	0.5735	0.6278	15928	9557
		1.2	70	1900	-55	0.1575	0.1505	66463	39878
MUSGROVE ETAL. ANDERSON #1	SW SW 17-7S-32W	1.06	113	1630	-22	0.6284	0.7091	14102	8461
		1.06	113	1830	-52	0.2384	0.2241	44621	26773
% VIRGINIA DRLG. COOPER #1	NE NE NE 12-7S-36W	1.5	77	1670	-28	0.5119	0.5417	18462	11077
		1.5	77	1780	-35	0.4089	0.4097	24409	14645
		1.5	77	1940	-50	0.2530	0.2384	41942	25165
FIRST ENERGY LEHMAN 28-26	SE SW SW 26-7S-36W	0.154	83	1765	48	0.6677	0.7701	12986	7791
@		0.154	83	1920	36	0.4498	0.4603	21727	13036
		0.154	83	2000	43	0.5624	0.6119	16343	9806
	CHEYENNE	0.154	83	2245	15	0.2269	0.2131	46916	28149
SHAKESPEARE OIL FREERKEEN #1	SW NW 32-8S-31W	0.84	57	1580	4	0.6194	0.6956	14377	8626
ANDERSON ENERGY WEYAND #2	W/2 SE NW 28-8S-32W	1.87	45	1710	-12	0.6646	0.7652	13069	7841
		1.87	45	1830	-30	0.3711	0.3650	27396	16437
ANDERSON ENERGY #1 BOEGER	NW SW NE 28-8S-32W	0.825	65	1735	-21	0.3034	0.2900	34479	20687
@		0.82	65	1565	-8.75	0.4486	0.4588	21797	13078
@ HANSEN TRUST WEYLAND #6	NW NW SW 28-8S-32W	1.65	58	1715	-14	0.6875	0.8015	12476	7486
		1.65	58	1860	-22	0.5314	0.5684	17593	10556
% VEEDER SUPPLY KINDIG #1	NE NE SE 30-8S-32W	1.1775	70	1570	-12	0.6196	0.6959	14370	8622
% ASHLAND OIL MISNER #1	NE NE NE 33-8S-32W	1.5	45	1645	-32	0.2775	0.2630	38018	22811
		1.5	45	1770	-35	0.2526	0.2381	42008	25205
GENERAL CRUDE BREMENKAMP #1	NE SW 36-8S-32W	0.63	114	1605	-13	0.5050	0.5323	18785	11271
		0.63	114	1840	-27	0.3216	0.3095	32309	19385
SUNBURST BREMENKAMP G-1	SW NE SW 16-8S-33W	0.86	100	1670	-15	0.5714	0.6248	16004	9603
% JONES ETAL. BAKER #1	NE NE NW 21-8S-33W	0.975	81	1700	-17	0.4992	0.5246	19064	11438
ANADARKO VACIN FARMS A-1	NW 25-8S-33W	1.25	65	1740	-12	0.6161	0.6906	14481	8688
JAY BOY OIL H&H FARMS F#1	SW SW SE 34-8S-33W	1.39	74	1730	-24	0.5217	0.5551	18015	10809
JAY BOY OIL H&H FARMS #1	SW SW SE 34-8S-33W	0.938	81	1625	-7.5	0.6540	0.7486	13359	8015
		0.938	81	1760	-37	0.2509	0.2363	42313	25388
PLACID OIL BERTRAND #1	NE NE 7-8S-34W	0.63	74	1740	-15	0.3170	0.3045	32837	19702

COUNTY: THOMAS

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OPERATOR/ WELL NAME	LOCATION	Rmf	Rmf Temp	Form Depth	SSP	Rwe @ 77	Rw @ 77	SC @ 77	Est. TDS
MORRISON DIXON OSTMEYER #1	S/2 SW SE 32-9S-31W	1.875	75	1650	-12	1.0519	1.4830	6743	4046
JOHN FARMER WELCH #1	NE NE 33-9S-31W	0.83	72	1510	22	1.3633	2.2220	4501	2700
@ LANDMARK OIL #1-7 HORN	SW SE NW 7-9S-32W	1.65	65	1605	-11	0.8390	1.0613	9422	5653
L.D. DRLG. #1 KELLER	SE SW 19-9S-32W	3	54	1700	-15	1.1350	1.6659	6003	3602
% PHILLIPS PET. KELLER A-1	NE SW SW 19-9S-32W	0.825	96	1595	-10	0.6206	0.6973	14341	8604
% TRANS TEX KELLER #1	NE NE SW 19-9S-32W	0.9	95	1585	-10	0.6704	0.7742	12916	7750
RED OAK STEINLE FARMS 1-20	SE NE NE 20-9S-32W	0.788	70	1620	-20	0.3196	0.3073	32538	19523
ANDERSON ENERGY BERTRAND #1	NE SE SE 22-9S-32W	2.33	65	1775	-24	0.7779	0.9525	10499	6299
DUNNE OIL RUTH UNGER #1	NE SE SW 22-9S-32W	2.775	65	1575	-18	1.1222	1.6370	6109	3665
FIRST ENERGY BERTRAND #32	SW NE 22-9S-32W	2.14	50	1600	-15	0.7553	0.9137	10945	6567
FIRST ENERGY RENNER #42-23	SW NW 23-9S-32W	1.26	53	1595	12	1.1308	1.6565	6037	3622
FIRST ENERGY OHLROGGE 58-23	SW SW NE 23-9S-32W	1.03	62	1515	20	1.3833	2.2744	4397	2638
RAYMOND OIL ROBBEN #1	SW NW 25-9S-32W	1.65	70	1500	5	1.5140	2.6330	3798	2279
RAYMOND OIL HOWARD TRUST #1	N/2 NE SE 26-9S-32W	1.725	65	1500	7	1.5799	2.8239	3541	2125
FIRST ENERGY BERTRAND 21	N/2 NE NW 26-9S-32W	0.623	56	1530	22	0.8151	1.0181	9822	5893
ANDERSON ENERGY #1 HOWARD	NW SW 26-9S-32W	0.825	78	1520	12	1.0510	1.4811	6752	4051
BLACK PET. STEINLE FARMS #1	NW SE 30-9S-32W	2	58	1740	-15	0.8069	1.0035	9965	5979
FIRST ENERGY KELLER 72-35	SW NE NE 35-9S-32W	1.24	57	1555	16	1.3539	2.1975	4551	2730
THUNDERBIRD DRLG. #1 NYE A	NW NE NW 36-9S-32W	1.1	59	1505	21	1.4601	2.4821	4029	2417
% WYCOFF DRLG. CHASE #1	NE NE SE 1-9S-33W	0.975	104	1570	3	1.2088	1.8369	5444	3266
PICKRELL DRLG. ROSS A-1	NE SW 25-9S-33W	0.79	73	1645	22	1.3105	2.0862	4793	2876
FALCON EXPL. HANSON #1	W/2 NW NW 26-9S-33W	1.65	62	1665	-10	0.8311	1.0469	9552	5731
JOHN FARMER LUNSWAY #1	NW NW SE 32-9S-33W	1.5	65	1680	12	1.6150	2.9285	3415	2049
DUNNE OIL #1-33 DUMER	SE NE SW 33-9S-33W	0.975	77	1705	10	1.1477	1.6947	5901	3540
BRITO OIL #1-33 DUMLER	NE NW SE 33-9S-33W	0.9	72	1695	10	0.9963	1.3664	7319	4391
BRITO OIL #2-33 DUMLER	SE NW SE 33-9S-33W	1.425	60	1705	25	2.1790	4.8823	2048	1229
DUNNE OIL #1-15 KELLY	SE 15-9S-34W	0.638	72	1535	0	0.5099	0.5390	18552	11131
SIGNAL OIL PENNY #1	NE NE 31-9S-36W	0.225	66	1660	25	0.3754	0.3699	27032	16219
% NAPC OSTMEYER #1	SE SE SE 1-10S-31W	1.575	68	1500	5	1.4075	2.3389	4276	2565
NAT. PET. RES. ROBBEN #1	S/2 SW SW 9-10S-31W	1.088	78	1550	27	2.2630	5.2189	1916	1150
DAVID CLOTHIER OSHER 2-14	NE SW 14-10S-31W	1.32	77	1660	15	1.8297	3.6107	2770	1662

COUNTY: THOMAS

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OPERATOR/ WELL NAME	LOCATION	Rmf	Rmf Temp	Form Depth	SSP	Rwe @ 77	Rw @ 77	SC @ 77	Est. TDS
FIRST ENERGY FERGUSON 17-19	NW SW SW 19-10S-31W	1.55	58	1435	25	2.3135	5.4271	1843	1106
K.C. RESOURCES OTTLLY #1	NW SW SE 21-10S-31W	1.13	61	1370	28	1.9506	4.0280	2483	1490
FIRST ENERGY SUMMERS 68-25	SE SW SE 25-10S-31W	0.7	74	1320	35	1.8157	3.5640	2806	1684
FIRST ENERGY BIXENMAN 33-25	NW SE NW 25-10S-31W	1.93	80	1330	38	5.9342	33.4285	299	179
FIRST ENERGY BIXENMAN 63-25	NE SW NE 25-10S-31W	1.19	50	1330	32	1.9649	4.0789	2452	1471
		1.19	50	1525	42	2.7099	7.2157	1386	832
FIRST ENERGY BIXENMAN 52-25	SE NE NE 25-10S-31W	0.91	95	1335	25	2.1392	4.7271	2115	1269
FIRST ENERGY BIXENMAN 54-25	SW SW NE 25-10S-31W	0.92	71	1325	31	2.0140	4.2562	2350	1410
FIRST ENERGY BIXENMAN 61-25	NE NW NE 25-10S-31W	0.91	61	1315	35	1.9808	4.1360	2418	1451
MID CONT. RES. MOORHAUS #8	NE SW SW 31-10S-31W	1.33	68	1525	21	2.0063	4.2281	2365	1419
TXO CORP. MEERIAN #1	S/2 NW 34-10S-31W	1.5	70	1550	20	2.2474	5.1554	1940	1164
FIRST ENERGY WIEGEL 63-36	NE SW NE 36-10S-31W	1.81	57	1465	12	1.7357	3.3028	3028	1817
FIRST ENERGY WIEGEL 72-36	SW NE NE 36-10S-31W	1.96	61	1315	18	2.4378	5.9580	1678	1007
BLACK PET. ARBERS #1	NW NW NE 1-10S-32W	1.575	68	1500	5	1.4075	2.3389	4276	2565
ANDERSON ENERGY ROBBEN #1	SE NE NW 1-10S32W	1.27	72	1530	-12	0.6854	0.7982	12528	7517
% GEORGE JOHNSON FLIPSE #1	NE NE SE 18-10S-32W	0.3375	85	1500	30	0.8395	1.0622	9415	5649
OLYMPIC PET. SIM TRUST #1	SW SE NE 17-10S-32W	0.55	73	1485	13	0.6816	0.7920	12626	7575
ARGENT ENERGY KRUG #1	NW SW SE 27-10S-32W	0.95	63	1505	5	0.7922	0.9775	10230	6138
ABERCROMBIE BROECKELMAN #2	S/2 NE 29-10S-32W	0.615	75	1535	16	0.8613	1.1023	9072	5443
ABERCROMBIE BROECKELMAN #1	SW SW NE 29-10S-32W	0.6	70	1635	30	1.2438	1.9209	5206	3124
JOHN FARMER HODGES #1	NW NW 2-10S-33W	0.54	84	1635	41	1.8949	3.8328	2609	1565
THUNDERBIRD DRLG. HODHES #1	SE SE SW 2-10S-33W	0.975	75	1595	10	1.1214	1.6353	6115	3669
BRITO OIL #2-8 REGIER	W/2 SW 8-10S-33W	0.375	70	1575	43	1.1908	1.7945	5572	3343
MURFIN DRLG. #1-32 CARL REINS	SE SE SE 32-10S-33W	0.39	74	1385	30	0.8565	1.0935	9145	5487
WANKER OIL CLARK #1	SW SW SE 33-10S-33W	0.8	64	1410	20	1.1078	1.6049	6231	3739
THUNDERBIRD DRLG. KRAUS #1	E/2 SW SE 15-10S-34W	0.54	72	1485	17	0.7533	0.9103	10985	6591
MURFIN DRLG. P. HENRY 1-15	NW SE 5-10S-36W	0.243	78	1590	38	0.7232	0.8598	11630	6978

COUNTY: WALLACE % = Rmf estimated from Rm using Rmf = .75 Rm, @ = Thin Bed Corrected

OPERATOR/ WELL NAME	LOCATION	Rmf	Rmf Temp	Form Depth	SSP	Rwe @ 77	Rw @ 77	SC @ 77	Est. TDS
MURFIN DRLG. T-BAR RANCH #1	W/2 NW NE 7-11S-38W	0.391	77	1675	30	0.8835	1.1439	8742	5245
TXO PEARCE D-1	SE SE NE 28-11S-39W	0.724	58	1525	25	1.0784	1.5402	6493	3896
S & J OPERATING NELSON #1	NW SW 5-11S-41W	1.13	72	2100	-20	0.4743	0.4918	20335	12201
MEDALLION PET. BEACHNERS #4-1	SE SW 4-12S-38W	0.44	85	1455	40	1.5210	2.6531	3769	2262
MEDALLION PET. ARMSTRONG 5-1	SE SE 5-12S-38W	0.73	73	1430	34	1.8032	3.5225	2839	1703
FIRST ENERGY SWEAT ETAL 22-9	SW NW NW 9-12S-38W	0.312	89	1405	46	1.3733	2.2480	4448	2669
FIRST ENERGY GARVEY 21-9(40)	NE NW 9-12S-38W	0.395	86	1435	42	1.4751	2.5234	3963	2378
ADVANTAGE RES. S. FARMS #1	SE SE SE 13-12S-38W	0.315	61	1310	40	0.8085	1.0064	9937	5962
MURFIN DRLG. GERSTBERGER 1-18	S/2 SE NW 18-12S-38W	1.17	79	2045	-22	0.5008	0.5268	18983	11390
HOLDEN ENERGY BURK 23-1	SW NE 23-12S-41W	0.34	42	1695	30	0.4470	0.4568	21893	13136
ANADARKO PET. SIDEBOTTOM A-1	NE SE SW 9-13S-38W	0.376	83	1220	40	1.2827	2.0166	4959	2975
DNB DRLG. BIEKER #1	SW SE 9-13S-39W	0.43	64	1390	38	1.0760	1.5350	6515	3909
OXY USA ROBBEN A-1	SW SW NE 21-13S-41W	1.01	74	1685	45	3.5860	12.1948	820	492
F&M OIL BROCK A-1	NE NW 19-13S-42W	0.14	84	1735	62	0.9692	1.3112	7627	4576
CINCO EXPL. GUNGLEMAN 1-A	NE NE 20-13S-42W	0.508	53	1645	45	1.3369	2.1536	4643	2786
CARR EXPL. ALDRIDGE 1-31	S/2 SW NE 31-13S-42W	1.28	51	1690	35	2.3463	5.5646	1797	1078
UPRC #1 IRIS 246-14	S/2 SE SW 14-14S-39W	0.87	74	1510	35	2.2427	5.1365	1947	1168
ANADARKO GELSTHORP A-1	E/2 NW SW 31-14S-39W	0.557	53	1410	43	1.3862	2.2822	4382	2629
SULLIVAN & CO. WOODMANEY #1	NW NE SE 31-14S-40W	0.405	84	1825	31	1.0200	1.4157	7064	4238
UPRC #2 REISS 42-7	SE NE 7-14S-41W	0.76	66	1675	55	3.3691	10.8255	924	554
UPRC #1 REISS 22-7	SE SE NW 7-14S-41W	0.54	68	1580	55	2.4715	6.1067	1638	983
UPRC #1 SCHEMM 446-32	S/2 SE SE 32-14S-41W	1.18	72	1575	22	1.9356	3.9749	2516	1509
TREND EXPL. WAUGH #1	NE SW 16-14S-42W	0.12	70	1955	97	2.1516	4.7755	2094	1256
TXO PROD. PURVIS FARMS #1	SW SE SE 36-14S-43W	0.601	69	1635	50	2.3613	5.6281	1777	1066
BHP PET. SILKMAN INC. #5-9	SW SW NW 9-15S-40W	0.792	68	1535	32	1.7119	3.2271	3099	1859
	LONGFORD	0.79	68	1765	42	2.3475	5.5696	1795	1077
BHP PET. WESTERBERG #1-34	NE NE NE 34-15S-40W	0.447	70	1355	49	1.7444	3.3308	3002	1801
	LONGFORD	0.44	70	1680	50	1.7479	3.3421	2992	1795
TXO PROD. AKERS B-1	W/2 W/2 26-15S-41W	0.446	69	1765	62	2.5729	6.5661	1523	914
TXO PROD. AKERS C-1	N/2 S/2 SW 26-15S-41W	0.772	72	1790	49	3.0308	8.8715	1127	676
GRAND MESA 1-32 RESOLUTE	NW NW SW 32-15S-41W	0.84	68	1405	40	2.3703	5.6664	1765	1059

COUNTY: WALLACE

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OPERATOR/ WELL NAME	LOCATION	Rmf	Rmf Temp	Form Depth	SSP	Rwe @ 77	Rw @ 77	SC @ 77	Est. TDS
TXO PROD. HIBBERT B-1	NW NW NW 6-15S-42W	0.604	84	1680	60	3.9298	14.5575	687	412
TXO PROD. HIBBERT B-3	NW NW SW 6-15S-42W	1.1	74	1630	52	4.9188	22.7370	440	264
TXO PROD. GOODRICH A-2	SW 19-15S-42W	0.6	75	1570	55	3.0047	8.7297	1146	687
COASTEL OKESON 1-25	E/2 NW 25-15S-42W ?	0.474	61	1465	50	1.6789	3.1236	3201	1921
COASTEL CHARLES 1-25	S/2 NW SW 25-15S-42W	1.01	62	1560	35	2.2132	5.0179	1993	1196
TXO PROD. WALLACE R-1	N/2 N/2 SW 28-15S-42W	1.1	56	1575	50	3.5903	12.2230	818	491
	LONGFORD	1.1	56	1785	35	2.1842	4.9030	2040	1224
TXO PROD. BERQUIST #2	NE NE SW 32-15S-42W	0.36	65	1620	105	8.0714	64.4683	155	93
TXO PROD. BERQUIST A-1	NE NE SW 32-15S-42W	0.34	71	1535	73	2.9234	8.2961	1205	723
TXO PROD. NICKELSON #1	SW SW SW 35-15S-42W	0.52	80	1570	50	2.3467	5.5662	1797	1078

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